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Editorial

Viral Hepatitis – Major Public Health Problem in Pakistan

Prof. Dr. Azhar Masud Bhatti

Editor-in-Chief

Hepatitis is defined as inflammation of the liver that can result from a variety of causes, such as heavy alcohol use, autoimmune disorders, drugs, or toxins. However, the most frequent cause of hepatitis is due to a viral infection, referred to as "viral hepatitis." In the United States, the most common types of viral hepatitis are hepatitis A, hepatitis B, and hepatitis C. The other types of viral hepatitis are hepatitis D and E, which are less frequently encountered.¹

Hepatitis can be further classified into "acute" and "chronic" based on the duration of the inflammation in the liver. Inflammation lasting less than 6 months is defined as "acute," and inflammation lasting greater than 6 months is defined as "chronic." Although acute hepatitis is usually self-limiting, it may also cause fulminant liver failure, depending on the etiology. In contrast, chronic hepatitis may result in the development of liver fibrosis, cirrhosis, hepatocellular carcinoma, and features of portal hypertension, leading to significant morbidity and mortality.^{2,3}

Etiology:

The majority of cases of viral hepatitis result from hepatotropic viruses A, B, C, D, and E. It is unclear whether the hepatitis G virus (HGV) is pathogenic in humans.

Hepatitis A

The hepatitis A virus (HAV) is an RNA virus from the Picornaviridae family. It is usually present in the highest concentration in the stool of infected individuals.

The most common mode of transmission of hepatitis A is via the fecal-oral route from contact with food, water, or objects contaminated by fecal matter from an infected individual.⁴

Hepatitis B

Hepatitis B virus (HBV) is a DNA virus and a member of the Hepadnaviridae family. HBV can be detected in serum, semen, vaginal mucus, saliva, and tears, even at a lower level but is not found in stool, urine, or sweat. It is transmitted parenterally and sexually when individuals come in contact with mucous membranes or body fluids of infected individuals. Intravenous drug users, men who have sex with men, healthcare workers with exposure to infected body fluids.

Transfusion of blood and blood products, injection drug use with shared needles, needle sticks, or skin penetrating wounds caused by other instruments used by healthcare workers, and hemodialysis.⁵

Hepatitis C

Hepatitis C virus (HCV) is an RNA virus and is a member of the Flaviviridae family with 1 serotype but

at least 6 major genotypes and more than 80 subtypes. Transmission can be parenteral, perinatal, and sexual. Others who are susceptible are those who require frequent blood transfusions and transplantation of organs from infected donors. Sexual and perinatal transmission is not very common.⁶

Hepatitis D

The hepatitis D virus (HDV) is an RNA virus and a single species in the Deltaviridae family. HDV has modes of transmission similar to HBV, but perinatal transmission is uncommon.⁷

Hepatitis E

The hepatitis E virus (HEV) is a non-enveloped RNA virus and a single species in the Caliciviridae family of the Herpesvirus genus. The primary transmission mode of the HEV is the fecal-oral route. Contaminated water is the most common source of infection. Person-to-person transmission is rare. However, occasionally, maternal-neonatal transmission can occur.⁸

Hepatitis G-Human Pegivirus

Hepatitis G virus ((HGV), now designated human pegivirus (HPgV-1), is an RNA virus and is a member of the Flaviviridae family. The primary mode of transmission is through infected blood and blood products, but sexual contact and vertical transmission occur as well.⁹

Epidemiology

Viral hepatitis is a major public health issue. Viral hepatitis infects millions of people annually, causing significant morbidity and mortality. Chronic hepatitis B and C infections can cause liver damage that includes liver fibrosis, cirrhosis, hepatocellular carcinoma, and features of portal hypertension. The World Health Organization (WHO) estimated that 1.3 million people died due to hepatitis in 2015, and 1 in 3 people in the world have had infections with either HBV or HCV. Viral hepatitis can cause up to 1.4 million deaths annually, and HBV and HCV are responsible for about 90% of those deaths. Reportedly, infection rates show that 2 billion people are infected with HBV, 185 million with HCV, and 20 million with HEV worldwide.^{10,11,12}

Latest Research on Viral Hepatitis in Pakistan

According to latest research on viral hepatitis, Pakistan faces a massive, escalating burden of viral hepatitis, with 10–12 million people living with hepatitis B or C (HBV/HCV). Recent 2024–2025 research indicates a 4.8%–5% prevalence of HCV, particularly in Balochistan (25.77%), driven by unsafe healthcare practices and a low treatment rate (3% for HBV, 2% for HCV).

Research highlights HCV is dominant, affecting 9.3 million, with high risk in rural areas (67%) and housewives (37%). Primary drivers include unsafe dental procedures, blood transfusions, and unsafe therapeutic injections.

According to Provincial Breakdown (HCV) Global report varying prevalence: Baluchistan (25.77%), KPK (6.07%), Punjab (5.46%), and Sindh (2.55%).

Pakistan Tops World in Hepatitis C infections

An alarming report from the World Health Organisation (WHO) indicates that Pakistan had the highest number of viral hepatitis C infections in the world, around 8.8 million, and accounts for 44 per cent of all new hepatitis C infections attributed to unsafe medical injections.

In previous years, Egypt reported the largest number of hepatitis C and B cases, followed by Pakistan.

The data from 187 countries shows the estimated number of deaths from viral hepatitis increased from 1.1 million in 2019 to 1.3 million in 2022. Of these,

83pc were caused by hepatitis B and 17pc by hepatitis C, according to the report.

If the number of hepatitis B and hepatitis C cases are combined, then Pakistan ranks fifth in the world, only trailing behind China, India, Indonesia and Nigeria, with around 12.6 million cases reported in 2022.

The WHO's Global Hepatitis Report 2024 notes that ten countries account for nearly two thirds of the global burden of viral hepatitis B and C, with Ethiopia, Bangladesh, Vietnam, Philippines and the Russian Federation rounding off the top ten.

For hepatitis C, six countries — China, India, Indonesia, Pakistan, Russian Federation and US — represent 50% of the global burden. However, the report states that Egypt has become the first country to achieve gold tier status on the path to elimination of hepatitis C, based on fulfilling WHO criteria that will set the country up to achieve the reduced incidence.

WHO aims for a 90% reduction in new chronic infection and 65% reduction in mortality in 2023. As of 2025, WHO reports approximately 304 million people are living with chronic hepatitis B and C.

Countries that represent two-thirds of the global burden of hepatitis B and C combined in 2022

Country	Total hepatitis B infections	Total hepatitis C infections	Total hepatitis B+C infections
China	79,700,000	4,000,000	83,800,000
India	29,800,000	5,500,000	35,300,000
Indonesia	17,500,000	1,400,000	18,900,000
Nigeria	14,400,000	1,350,000	15,700,000
Pakistan	3,800,000	8,800,000	12,600,000
Ethiopia	7,700,000	692,000	8,400,000
Bangladesh	7,200,000	1,020,000	8,300,000
Vietnam	6,500,000	900,000	7,400,000
Philippines	5,700,000	400,000	6,100,000
Russia	1,700,000	2,700,000	4,300,000

Source: Global Hepatitis Reporting System, WHO

Pathophysiology

The pathophysiology of viral hepatitis varies with the type of hepatitis pathogen.

Types of Hepatitis

	TRANSMISSION	PREVENTION	TREATMENT
Hepatitis A	Eating contaminated food or drinking contaminated water	• Practicing good hygiene • Vaccine	No treatment
Hepatitis B	Through contact with the blood or bodily fluids of an infected person	• Practicing good hygiene • Vaccine • Blood screening	• Alpha interferon • Peginterferon
Hepatitis C	Blood-to-blood contact	• Practicing good hygiene • Avoid sharing needles, toothbrushes, razors or nail scissors	Direct-acting antiviral drugs
Hepatitis D	Contact with infected blood (only occurs in people already infected with hepatitis B)	• Hepatitis B vaccine • Avoid sharing needles, toothbrushes, razors or nail scissors	Interferon
Hepatitis E	Eating contaminated food or drinking contaminated water	• Practicing good hygiene • Avoid drinking water that has come from a potentially unsafe source	No treatment

Types of Hepatitis (A, B, C, D, E)

Hepatitis A (HAV)¹³

Nature: Acute only (does not become chronic)

Transmission: Focal-oral route (contaminated food, water, poor hygiene).

Risk Groups: Travelers, people in crowded settings, areas with poor sanitation

Symptoms: Flu-like illness, jaundice, nausea, abdominal pain.

Diagnosis: Anti-HAV 1gM indicates active infection, 1gG indicates past infection and immunity.

Treatment: Supportive therapy with rest, hydration, and nutrition.

Vaccine: Available and effective in prevention.

Hepatitis B (HBV)¹⁴

Nature: Both acute and chronic

Transmission: Blood and body fluids (unprotected sex, IV drug use, transfusion, childbirth).

Risk Groups: Healthcare workers, IV drug users, newborns of infected mothers.

Symptoms: GI upset, jaundice, dark urine, fatigue

Diagnosis: HBsAg indicates active infection; Anti-HBs shows recovery or immunity

Treatment:

- Acute: supportive care
- Chronic: Antiviral therapy (entecavir, tenofovir) to suppress viral replication

Vaccine: Safe and effective HBV vaccine prevents infection.

Hepatitis C (HCV)¹⁵

Nature: Both acute and chronic; most infections become chronic

Transmission: Blood borne (IV drug use is the most common route)

Symptoms: Often asymptomatic in early stages; may progress to chronic liver disease

Diagnosis: Anti-HCV antibodies and HCV RNA detection

Treatment: Direct-acting antivirals (DAAs) provide >95% cure rates

Vaccine: None available

Hepatitis D (HDV)¹⁶

Nature: Requires hepatitis B for replication (cannot exit alone)

Transmission: Blood and body fluids, similar to HBV

Complications: Superinfection with HBV worsens prognosis, leading to fulminant hepatitis and cirrhosis

Diagnosis: Detection of HDV antigen or anti-HDV antibodies

Treatment: Limited options; interferon-based therapies may be used

Vaccine: No direct vaccine, but HBV vaccination prevents HDV infection

Hepatitis E (HEV)¹⁷

Nature: Acute only (usually self-limiting)

Transmission: Fecal-oral route (contaminated food, water, undercooked meats)

Risk Groups: Endemic in developing countries; severe in pregnant women

Symptoms: Similar to HAV, with additional risk of fulminant hepatitis in pregnancy

Diagnosis: Detection of anti-HEV antibodies

Treatment: Supportive care (rest, hydration, nutrition)

Vaccine: Limited availability; not widely used

Human Pegivirus

The incubation period of human pegivirus (HPgV-1) is approximately 14 to 20 days.¹⁸

Common Signs and Symptoms of Hepatitis

While symptoms vary across types, common clinical features include:

- Gastrointestinal upset (nausea, vomiting, abdominal pain, anorexia).
- Jaundice (yellowing of skin and eyes)
- Dark urine
- Clay-colored stool
- Fatigue and malaise
- Flu-like symptoms

Diagnostic Investigations

Diagnostic tools vary by hepatitis type but commonly include:

Test	Interpretation
Liver Enzymes (ALT, AST)	Elevated in all types of hepatitis
Bilirubin	Increased in jaundice
Ammonia	Elevated in advanced cases (hepatic encephalopathy)
Anti-HAV IgM/IgG	Distinguishes active vs past HAV infection
HBsAg, Anti-HBs	Indicates HBV infection status and immunity
Anti-HCV, HCV RNA	Confirms HCV infection
HDAg, Anti-HDV	Identifies HDV infection
Anti-HEV	Indicates HEV infection

Treatment / Management

The general management of acute viral hepatitis is supportive, and most individuals can be safely monitored in the outpatient setting. The infection is usually self-limited in most cases. Efforts should be made to prevent disease transmission to those in close contact with the patient.

Treatment Approaches

Supportive Therapy: Rest, hydration, and nutritional support in acute hepatitis (A & E, and mild cases of B).

- Antivirals: Chronic HBV and HCV infections are treated with antiviral agents to suppress viral replication and prevent progression.
- Interferon Therapy: Occasionally used in chronic HCV and HDV infections
- Liver Transplant: In cases of end-stage liver disease or liver failure due to hepatitis

Prevention and Vaccination

- **HAV Vaccine:** Effective and recommended, especially for travelers and high-risk groups
- **HBV Vaccine:** Universal vaccination protects against both HBV and HDV
- **HCV Vaccine:** Not available, preventive strategies rely on avoiding exposure
- **HEV Vaccine:** Available in limited regions, not widely accessible

Preventive measures include:

- Practicing good hand hygiene
- Avoiding unprotected sex with infected partners
- Avoiding sharing of needles or personal hygiene products
- Consuming safe, clean food and water
- Limiting alcohol and hepatotoxic medications

Patient Education for Hepatitis

Patients should be educated on:

- Rest and proper nutrition with small frequent meals
- Diet modifications: low fat and protein, high carbohydrates and calories
- Avoidance of alcohol, acetaminophen, and other hepatotoxic drugs
- Safe practices to prevent transmission (no sharing personal items, safe sex)
- Avoiding sexual activity until hepatitis antibodies are negative

Complications of Hepatitis

If left untreated, hepatitis can lead to

- Acute liver failure
- Chronic hepatitis (B, C, D)
- Cirrhosis and portal hypertension
- Hepatocellular carcinoma
- Fulminant hepatitis (especially in HEV during pregnancy)

Differential Diagnosis

The differential diagnoses for viral hepatitis are as follows:

1. Liver abscess
2. Hepatocellular cancer
3. Pancreatic cancer
4. Drug-induced hepatitis
5. Autoimmune hepatitis
6. Acute cholangitis
7. Acute cholecystitis and biliary colic
8. Pancreatitis
9. Gastroenteritis
10. Cholelithiasis
11. Peptic ulcer disease
12. Small-bowel obstruction

Prognosis

The prognosis of viral hepatitis depends on the type of virus causing the infection.

REFERENCES

1. Zuckerman AJ. Hepatitis Viruses. In: Baron S, editor. Medical Microbiology. 4th ed. University of Texas Medical Branch at Galveston; Galveston (TX): 1996.
2. Dakhil N, Junaidi O, Befeler AS. Chronic viral hepatitis. *Mo Med* 2009;106(5):361-5.
3. Ryder SD, Beckingham IJ. ABC of diseases of liver, pancreas, and biliary system: Acute hepatitis. *BMJ* 2001;322(7279):151-3.
4. Koenig KL, Shastry S, Burns MJ. Hepatitis A Virus: Essential Knowledge and a Novel Identify-Isolate-Inform Tool for Frontline Healthcare Providers. *West J Emerg Med* 2017;18(6):1000-1007.
5. You CR, Lee SW, Jang JW, Yoon SK. Update on hepatitis B virus infection. *World J Gastroenterol* 2014;20(37):13293-305.
6. Li HC, Lo SY. Hepatitis C virus: Virology, diagnosis and treatment. *World J Hepatol* 2015; 7(10):1377-89.
7. Rizzetto M. Hepatitis D Virus: Introduction and Epidemiology. *Cold Spring Harb Perspect Med* 2015;5(7):a021576.
8. Pérez-Gracia MT, García M, Suay B, Mateos-Lindemann ML. Current Knowledge on Hepatitis E. *J Clin Transl Hepatol* 2015;3(2):117-26.
9. Soleiman-Meigooni S, Asgari A, Hoseini-Shokouh SJ, Rajabi J, Kazemi-Galougahi MH, Moshtaghi M. Association between Hepatitis G and Unknown Chronic Hepatitis. *Electron Physician* 2015; 7(1):985-9.
10. Hajarizadeh B, Grebely J, Dore GJ. Epidemiology and natural history of HCV infection. *Nat Rev Gastroenterol Hepatol* 2013;10(9):553-62.
11. Ott JJ, Stevens GA, Groeger J, Wiersma ST. Global epidemiology of hepatitis B virus infection: new estimates of age-specific HBsAg seroprevalence and endemicity. *Vaccine* 2012;30 (12):2212-9.
12. Kamar N, Bendall R, Legrand-Abravanel F, Xia NS, Ijaz S, Izopet J, et al. Hepatitis E. *Lancet* 2012; 379(9835):2477-2488.
13. Matheny SC, Kingery JE. Hepatitis A. *Am Fam Physician* 2012;86(11):1027-34; quiz 1010-2.
14. Chisari FV, Isogawa M, Wieland SF. Pathogenesis of hepatitis B virus infection. *Pathol Biol (Paris)* 2010;58(4):258-66.
15. Bandiera S, Billie Bian C, Hoshida Y, Baumert TF, Zeisel MB. Chronic hepatitis C virus infection and pathogenesis of hepatocellular carcinoma. *Curr Opin Virol* 2016;20:99-105.
16. Wedemeyer H, Manns MP. Epidemiology, pathogenesis and management of hepatitis D: update and challenges ahead. *Nat Rev Gastroenterol Hepatol* 2010;7(1):31-40.
17. Lhomme S, Marion O, Abravanel F, Chapuy-Regaud S, Kamar N, Izopet J. Hepatitis E Pathogenesis. *Viruses* 2016;8(8).
18. Reshetnyak VI, Karlovich TI, Ilchenko LU. Hepatitis G virus. *World J Gastroenterol* 2008; 14(30):4725-34.

Operative Management of Fistula-in-Ano: A Four Year Retrospective Outcome Analysis

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ABSTRACT

Objective: To evaluate fistula types, surgical strategies, healing, recurrence and continence. This evaluation was conducted in a non-tertiary setting.

Study Design: A retrospective analysis.

Place and Duration of Study: This study was conducted at the surgical department, Shaqra General Hospital, Shaqra, Kingdom of Saudi Arabia between November 2021 and October 2025.

Methods: This study was analysed the 56 consecutive adult patients (48 males, 8 females). The median age of patients was 44 years who underwent surgery for anal fistula. Fistulas were classified using Parks criteria with preoperative endoanal ultrasound, MRI and examination under anaesthesia. Simple fistulas were treated by fistulotomy/fistulectomy, and complex fistulas were managed with LIFT, cutting or loose Seton (Crohn's disease).

Results: The cryptoglandular fistulas comprised 94.6% of patients and crohn's-related patients were 5.4% of the total study sample. Low intersphincteric fistulas were found to be most commonly occurring (55.4%), followed by high transsphincteric fistula (30.4%). Out of the total study sample, simple fistulas accounted for 66.1% and complex were 33.9%. In 47 patients primary healing was achieved (83.9%) at a median follow up time of 22 months (92.9% traceability). Recurrence was found in five patients (8.9%), all these cases of recurrence happened within 6 months. No major complications were recorded during the study.

Conclusion: High healing rates (83.9%) were found in patients treated with conventional techniques tailored to each fistula anatomy in the general colorectal unit with a low recurrence rate (8.9%). The outcomes of this study support the efficacy of established procedures in routine practice.

Key Words: Rectal fistula surgery, Fistula-in-Ano, Recurrence, Fecal Incontinence, Parks Classification, Seton.

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INTRODUCTION

Fistula-in-ano is a very common anorectal disorder in colorectal surgical practice. The disease affects the quality of life of the patient due to recurrent pain, purulent discharge and pruritus.

The disease has an annual incidence rate of estimated 1.2–2.8 cases per 10,000 individuals in Europe and

males between the ages of 20-50 are found to be more prone to get the disease¹. The incidence rate according to a large population based analyse reported comparable incidence rates in the UK and US where the incidence was 1.69-2.5 per 10,000 cases².

The disease typically originates from cryptoglandular sepsis, which is an infection of the small glands within anal crypts which then presents with an epithelialized tract connecting the anal canal to the perianal skin. Over 90% of cases originate from obstruction and infection of the intersphincteric anal glands leading to abscess formation and fistulous extension. The remaining (5–10%) cases are usually due to Crohn's disease, tuberculosis, trauma, radiation therapy and malignancy^{3,4}. Early diagnosis of the underlying etiology directly informs surgical strategy and prognostic expectations.

The foundation of treatment planning and outcome prediction is the precise classification of anal fistulas and the Parks classification (1976) is the most widely adopted system of fistula categorization. The parks classification categorizes fistulas based on trajectory

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relative to the anal sphincter complex: intersphincteric (20–45% of cases), transsphincteric (subdivided into low and high), suprasphincteric and extrasphincteric^{5, 6}. The St. James University Hospital MRI based system and American Society of Colon and Rectal Surgeons guidelines also enhance complexity assessment by integrating secondary extensions, horseshoe configurations and abscesses⁷. Gender specific anatomy plays a role in male and female incidence rates because the anterior anal canal in females is shorter than males. This puts males on higher risk of the disease.

Accurately mapping the fistula and its relation to the sphincter muscle is essential to heal it completely while protecting bowel control before surgery. The first step of clinical evaluation is a thorough exam is looking at the perianal area, digital rectal exam and proctoscopy Goodsall's rule is not reliable for complex or anterior fistula evaluation⁸. 3D endoanal ultrasound detects internal openings and main tracts with 97% accuracy in initial assessment^{9, 10}. Pelvic MRI has more than 90% accuracy and is considered the gold standard for complex fistula cases^{7, 11}.

Surgical management of anal fistula includes sepsis eradication, tract closure and perseverance of continence. Fistulotomy is particularly beneficial in low intersphincteric or transsphincteric fistulas with more than 95% healing cases but 5–15% incontinence risk¹². High transsphincteric, suprasphincteric and recurrent fistulas always require sphincter-sparing techniques to avoid incontinence. Cutting or loose setons, advancement flaps, LIFT, VAAFT, FiLaC, OTSC and bioprosthetic plugs are some common options^{13, 14, 15}. Even with these techniques recurrence rate are still 5–30% according to recent studies and continence can be impaired in up to 13% of patients in complex cases^{16, 17}. Most published studies are undertaken in high volume specialized centers but the majority of fistulas worldwide are treated in regular colorectal units^{18, 19}. This retrospective study analyses fistula types, operative strategies, recurrence, healing times and continence in patients treated at general colorectal unit.

METHODS

The current single center retrospective observational study included 56 adult patients. The sample had 48 males and 8 female patients with median age of 44 years with age ranging between 31–57 years. All patients underwent surgical treatment for anal fistula between November 2021 and October 2025. Among the sample, three patients (5.4%) had Crohn's disease and the remaining had cryptoglandular fistulas. Seven patients had fistula surgery history. All patients either underwent clinical examination, rigid proctoscopy or examination under anaesthesia. Pre or intraoperative imaging included endoanal ultrasound in 38 (67.9%) patients and pelvic MRI in 41 (73.2%) patients.

Hydrogen peroxide was used to identify the internal opening when necessary.

Fistulas were classified according to Park criteria with St James's University Hospital MRI based grading. Procedures included fistulotomy (n=18, 32.1%), fistulectomy (n=20, 35.7%), LIFT (n=9, 16.1%) and loose/cutting Seton placement (n=9, 16.1%). Setons were used as a staged approach in complex cases. Clinical healing was defined as closure of all external openings without discharge. Recurrence was defined as reappearance of symptoms or abscess after initial healing. Continence was assessed at each follow up visit. Data were analysed using SPSS version 26.0.

RESULTS

Total 56 patients were included in the study out of which 48 were male and 8 females. The median age was 44 years (range 31–57 years). All patients included in the study underwent operative treatment for anal fistula. Three patients (5.4%) had Crohn's disease in clinical remission and seven (12.5%) had recurrent fistulas after previous surgery.

According to Parks criteria, fistula classification is shown in Table 1. Intraoperative findings differed from preoperative assessment in only two cases (diagnostic accuracy 96.4%). Table 2 shows simple fistulas in 37 (66.1%) and complex in 19 (33.9%) patients (Table 2). Surgical procedures according to fistula complexity are presented in Table 3. Cutting Seton was the most frequently used technique among complex fistulas. Median postoperative hospital stay was 1 day (range 1–3 days). No major complications occurred.

Table No. 1: Fistula classification according to Parks criteria (n=56)

Fistula type	Male (n=48)	Female (n=8)	Total, n (%)
Low intersphincteric	25	6	31 (55.4)
Low transsphincteric	5	1	6 (10.7)
High transsphincteric	16	1	17 (30.4)
Horseshoe intersphincteric	2	0	2 (3.6)

Median postoperative hospital stay was 1 day (range 1–3 days). No major complications occurred. Median follow-up was 22 months (range 6–54 months) in 52 patients (92.9% traceability). Primary healing was achieved in 47 patients (83.9%). Recurrence occurred in five patients (8.9%), all within the first 6 postoperative months (Table 4). Formal continence assessment using the Cleveland Clinic (Wexner) Incontinence Score was performed in five patients. Out of the five patients four reported minor incontinence to

flatus or liquid stool (score 1–2) and one had full continence.

Table No. 2: Distribution of simple and complex fistulas (n=56)

Category	n	%
Simple	37	66.1
Complex	19	33.9

Table No. 3: Surgical procedures stratified by fistula complexity (n=56)

Procedure	Simple (n=37)	Complex (n=19)	Total, n (%)
Fistulotomy/fistulectomy	37	0	37 (66.1)
LIFT procedure	0	5	5 (8.9)
Cutting seton	0	11	11 (19.6)
Loose seton (Crohn's disease)	0	3	3 (5.4)

Table No.4: Characteristics of patients with recurrence (n=5)

Underlying condition	Previous/current procedure	Recurrence (months)
Crohn's disease (n=2)	Loose seton	4 and 5
Cryptoglandular, recurrent	Fistulotomy	5
Cryptoglandular, recurrent (n=2)	Cutting seton	4 and 6

DISCUSSION

The present study reports the operative management of fistula-in-ano over a four year period. Most of the patients were male (85.7%) and the median age of the sample was 44 years. The demographic findings of this study align closely with large studies published recently. Recent studies consistently report a male to female ratio of 1.8–2.5:1 and peak incidence in the fourth to fifth decades of life^{1, 2}. Cryptoglandular origin for cases were evident in 94.6% and this proportion is very similar to recent series from Europe and Asia (90–95%)^{3, 12, 20}.

The distribution of fistula types in our cohort was 55.4% low intersphincteric, 10.7% low transsphincteric, 30.4% high transsphincteric and 3.6% horseshoe. A recent multicentre analysis included 848 MRI-assessed fistulas and found intersphincteric fistulas in 48–56%, low transsphincteric in 9–14% and high transsphincteric in 28–34%. This finding is comparable to the current study and confirms that low intersphincteric is the most frequent subtype in non-referral settings^{6, 21}. The diagnostic accuracy of combined preoperative imaging

and examination under anaesthesia reached 96.4% in the current study. This finding is consistent with recent published literature where the rates were 92–98% when endoanal ultrasound and MRI are used together^{7, 9, 11}.

The presentation of simple fistulas were found in 66.1% of cases. Since this figure is within the 60–72% range and comparable results are reported in general surgical units in recently published literature^{18, 22}. However, tertiary referral centres often report higher complexity rates sometimes exceeding 50%²³. This difference underscores the selection bias inherent in specialised centres and signifies the value of real world data from district level departments^{7, 19}.

Primary healing was achieved in 83.9% patients with a median follow up of 22 months and the overall recurrence rate was 8.9%. These outcomes are favourable when compared with similar non tertiary cohorts. Sirikumpiboon et al. (2022) showed a healing rate of 81.4% and the recurrence was in 11.2% cases in 312 patients¹⁸. A retrospective series from the UK included 378 patients from district general hospitals and it documented primary healing in 79–85% with a recurrence in 9–14%¹⁶. The recurrence rate in the current study is also lower than the 12–18% observed in several studies¹².

Fistulotomy/fistulectomy showed 100% healing without recurrence in regular follow up for treatment of simple fistulas. These results are in agreement with recent evidence that fistulotomy remains the gold standard for low/simple fistulas and the healing rates are >95% with low incidence of minor incontinence^{12, 24}. However cutting Seton was the most frequently employed technique for complex fistulas (57.9%). The technique showed complete healing in most cases but contributed to two of the five total recurrences in this study. Cutting seton is associated with gradual sphincter division but recent long term studies show recurrence rates of 5–15% with a minor incontinence of 8–20%. These findings are mirrored in our limited continence data^{16, 25}. The LIFT procedure was used in 26.3% of complex cases. There was no recurrence which is consistent with recent reports of primary success rates of 68–92% and low incontinence risk^{12, 20}.

Crohn's related fistulas treated with loose setons showed 8.9% recurrence rate which is a well-known challenge in this subgroup. It is recommended in recent cohort studies that loose seton drainage combined with biologics should be the preferred initial strategy, with a recurrence or persistence rates of 20–40% at two years^{4, 15}.

Several limitations of the current study must be acknowledged. The retrospective design and relatively small sample size and the inclusion of complex and Crohn related fistulas, limit statistical power for subgroup analyses. Follow up was incomplete for objective continence assessment in most patients. The absence of standardised patient reported outcome

measures beyond the Wexner score in a minority of cases restricts full evaluation of functional impact. However, the high traceability rate of 92.9% at a median of 22 months and the detailed intraoperative classification are the strengths of the current study and make the results reliable in reporting healing and recurrence rates.

CONCLUSION

This study demonstrates that high healing rates and low recurrence can be achieved with conventional techniques, if tailored to fistula anatomy. The findings reinforce the reliability of fistulotomy/fistulectomy in simple fistulas and staged seton based approaches for complex disease in non-specialised settings.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Muhammad Saleem Malik, Eleftherios Karamanlis, Ahmad Mustafa AlQassom
Drafting or Revising Critically:	Muhammad Israr Shahzad, Yasser Abbas Abdelrahman, Ahmad Zaghloul Alshabasy
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

- Lu MY, Wang J, Wang ZC, Cai ZL, Liang N, Shi R. Diagnosis and treatment for anal fistula: a systematic review of clinical practice guidelines and consensus statements. *Front Surg* 2025; 12:1566130.
- Garcia-A-Olmo D, Zanotti C, Martinez-Puente C, Pascual I, Pascual M, Herreros D. Prevalence of anal fistulas: a systematic review and meta-analysis. *World J Gastroenterol* 2022;28(18): 1785-99.
- Włodarczyk M, Włodarczyk J, Sobolewska-Włodarczyk A, Trzciński R, Dziki Ł, et al. Current concepts in the pathogenesis of cryptoglandular perianal fistula. *J Int Med Res* 2021;49(1): 300060520986669.
- Ratto C, Litta F, Lucchetti D, Parello A, Boninsegna A, Arena V. The pathogenesis of cryptoglandular anal fistula: New insight into the immunological profile. *Colorectal Dis* 2023; 25(5):878-87.
- Emile SH, Elfeki H, El-Said M. Modification of parks classification of cryptoglandular anal fistula. *Dis Colon Rectum* 2021;64(4):446-58.
- Garg P. Assessing validity of existing fistula-in-ano classifications in a cohort of 848 operated and MRI-assessed anal fistula patients–Cohort study. *Ann Med Surg (Lond)* 2020;59:122-6.
- Sudoł-Szopińska I, Garg P, Mellgren A, Spinelli A, Breukink S, Iacobellis F, et al. Structured magnetic resonance imaging and endoanal ultrasound anal fistulas reporting template (SMART): An interdisciplinary Delphi consensus. *World J Gastrointest Surg* 2024;16(10):3288-303.
- Kummari S, Burra KG, Reddy VRK, Das S, Ramadugu R, Ramadugu S. The role of magnetic resonance imaging in pre-operative assessment of anorectal fistula with surgical correlation. *Cureus* 2024;16(1):e53237.
- Sudoł-Szopińska I, Kołodziejczak M, Santoro GA. Structured magnetic resonance imaging and endoanal ultrasound anal fistulas reporting template (SMART): An interdisciplinary Delphi consensus. *World J Gastrointest Surg* 2024;16(10): 3288-303.
- Sudoł-Szopińska I, Kołodziejczak M, Santoro GA. Magnetic resonance imaging template to standardize reporting of anal fistulas. *Tech Coloproctol* 2021;25(4):501-5.
- Al-Enezi MS, Muharraq AA, Almeshari MY. Diagnosis of perianal fistula with diffusion-weighted MRI. *J Biol Regul Homeost* 2025; 39(3):3881.
- Sierra Fernández I, Balciscueta Coltell Z, Uribe Quintana N. Systematic review and network meta-analysis of cryptoglandular complex anal fistula treatment: evaluation of surgical strategies. *Updates Surg* 2025;77(4):1067-78.
- Garg P, Sodhi SS, Garg N. Management of complex cryptoglandular anal fistula: challenges and solutions. *Clin Exp Gastroenterol* 2020; 13:555-67.
- De Parades V, Haouari MA, Fathallah N, Spindler L, Barré A, Pommaret E, et al. Sphincter-sparing techniques for fistulas-in-ano. *J Visc Surg* 2015; 152(2):S31-6.
- Harsányi L, Ónody P, Ferreira G, Novak A, Tóth E, Baradnay G, et al. The novel BioHealx® assisted fistula treatment (BAFT): effective primary fistula healing with continence preservation. *Int J Colorectal Dis* 2025;40(1):110.
- Khan S, Kotcher R, Herman P, Wang L, Tessler R, Cunningham K, et al. Predictors of recurrence and long-term patient reported outcomes following surgical repair of anal fistula, a retrospective analysis. *Int J Colorectal Dis* 2024;39(1):37.
- Mei Z, Wang Q, Zhang Y, Liu P, Ge M, Du P, et al. Risk Factors for Recurrence after anal fistula

- surgery: A meta-analysis. *Int J Surg* 2019;69: 153-64.
18. Sirikurnpiboon S, Awaporn N, Jivapaisarnpong P. Long-term outcomes after anal fistula surgery: results from two university hospitals in Thailand. *Ann Gastroenterol* 2022;35(2):191-6.
 19. Ding Y, Xue Y, Miao Y, Zhu H, Ye R, Wang X. Evaluation of the RIFER procedure in treating high intersphincteric anal fistulas. *Front Med (Lausanne)* 2025;12:1589278.
 20. Garg P, Kaur B, Yagnik VD. Long-term outcomes of fistulotomy for simple anal fistulas: a 10-year single-centre experience. *Colorectal Dis* 2024; 26(6):1125-33.
 21. Iqbal N, Tozer PJ, Vaughan R. The importance of MRI-defined fistula complexity in the surgical management of perianal fistulas: a multicentre study. *Tech Coloproctol* 2024;28(1):45.
 22. Amri R, Leenders GJM, Berghuis KA. Real-world outcomes of anal fistula surgery in non-tertiary Dutch centres. *Ann Coloproctol* 2023;39(4): 319-26.
 23. Lee MJ, Heywood N, Adegbola S, Tozer P, Sahnan K, Fearnhead NS, et al. Systematic review of surgical interventions for Crohn's anal fistula. *Br J Surg* 2017;1(3):55-66.
 24. Shi R, Liu F. *Diagnosis and treatment of special anal fistula*. Singapore: Springer Singapore 2021; Nov 27:181-221.
 25. Qin J, Wu Y, Zheng X, Wu K, Dai G, Tan Y, et al. Comparative evaluation between cutting of the intersphincteric space vs cutting seton in high anal fistula: a randomized controlled trial. *J Am Coll Surg* 2024;239(6):563-73.

Association of Asymptomatic Coronary Heart Disease in Patients Presented with Peripheral Arterial Disease Undergoing Angiography

Asymptomatic
Coronary Heart
Disease with
Peripheral
Arterial Disease

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ABSTRACT

Objective: Association of coronary artery disease in peripheral artery disease patients.

Study Design: Retrospective observational study

Place and Duration of Study: This study was conducted at the Iraqi Center of Heart Disease, Iraq from 1st April 2024 to 31 March 2025.

Methods: This is a retrospective observational study, with 300 peripheral arterial disease patients with computerized tomography angiography and/or peripheral angiography at the Iraqi Center of Heart Disease, Iraq and none of them had any previous symptoms and/or had ever experienced coronary artery disease. Asymptomatic coronary artery disease was detected by means of comprehensive checks, such as electrocardiogram, echocardiography, and coronary angiography.

Results: The silent coronary artery disease was high with 72% of patients having peripheral arterial disease. Diabetes mellitus was also significantly correlated as 77.4% patients with coronary artery disease were asymptomatic ($p=0.008$). Another highly predictive factor was reduced ejection fraction; 84.7% of ejection fraction less than 50% individuals had coronary artery disease ($p=0.0001$). Patients with coronary artery disease were more likely to develop lower limb peripheral arterial disease (83.2, $p=0.0001$). The age factor also predisposed the possibility of identifying asymptomatic coronary artery disease, and the risk was also elevating at a steady rate, 0.0512/year.

Conclusion: A significant load of asymptomatic coronary artery disease in peripheral arterial disease patients, including older people, diabetics and low-ejection-fraction. Cardiovascular screening should be a routine in this high-risk group in order to prevent the emergence of complications in the future and better the clinical outcomes.

Keywords: Peripheral arterial disease, Coronary heart disease, Angiography

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INTRODUCTION

The two related conditions discussed include peripheral arterial disease (PAD) and coronary heart disease (CHD), which are manifestations of the same systemic atherosclerosis that is a progressive vascular disorder with endothelial dysfunction, formation of plaque, and arterial constriction.

Whereas PAD is mostly localized in the arteries that serve the limbs, and the majority of cases are lower extremity, CHD is located in the coronary arteries which serve the myocardium. Although the two conditions differ in terms of their anatomy, they both exhibit similarities in their risk factors, including diabetes, hypertension, dyslipidemia, aging, and smoking, which are characteristics of their underlying pathophysiological processes.^{1,2}

Atherosclerosis may occur in any arterial bed with a result of inconsistent clinical manifestations of the obstruction location. PAD can be in the form of intermittent claudication, rest pain, or critical limb ischemia as a result of an inadequate supply of blood to the extremities. CHD on the contrary normally shows in the form of angina, myocardial infarction or sudden cardiac death. Nevertheless, a large number of people might have a prominent and undetected coronary artery disease (CHD) that poses a high risk upon the occurrence of the condition. The detection of CHD asymptomatic patients with PAD has been gaining

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more importance, since this group of patients has been thought to have a substantially higher risk of occult coronary involvement.³⁻⁵

Computed tomography angiography (CTA) and peripheral angiography are commonly used to assess PAD as they offer a specific anatomical imaging of arterial structure and stenosis, along with the burden of plaque. Whereas these imaging modalities emphasize peripheral arteries, they can also emphasize on the level of systemic atherosclerosis and therefore further assessment of silent coronary disease is made where appropriate.^{6,7} Various researchers have examined prevalence and predictors of asymptomatic CHD in PAD patients in modalities like coronary angiography and coronary CTA. These investigations substantially reveal that silent coronary artery involvement in the PAD populations is high, supporting the systemical aspect of atherosclerosis and utility of complete cardiovascular assessment in clinical practice.⁸⁻¹¹

The stenosis of arteries and the elevated vulnerability of the cardiovascular system to cardiovascular events like myocardial infarction, stroke and ischemia of limbs can be explained by the fact that the deposition of lipids, cholesterol and inflammatory debris in the arterial walls triggers atherosclerosis.¹² CTA is one of the most important methods of imaging that provides non-invasive and high-resolution and 3D arterial imaging following contrast administration.^{13,14} With this background, this study attempts to examine association between PAD, as confirmed by CTA and /or peripheral angiography, of upper or lower limbs, and asymptomatic coronary artery disease with the view of enhancing risk assessment and early detection among this high-risk group.

METHODS

The retrospective and observational study was carried out in the Iraqi Center of Heart Disease, Iraq from 1st April 2024 to 31 March 2025 vide letter No. 4545/QM/Approval/SJKDH379 dated 9th March, 2024. This research sought to explore the correlation between peripheral arterial disease (PAD) and the presence of asymptomatic coronary artery disease (CAD) in patients who had come to seek CT angiography and or peripheral angiography. It addressed the patients presenting with PAD to find out the prevalence of silent CAD in this group.

The patients with PAD chosen in the study were 300 patients that had CT or peripheral angiography of the lower or upper limbs. Of them, 62 were upper limb PAD and 238 were lower limb PAD. Clinical assessment was done elaborately to all patients and the risk factors that were included age, gender, smoking, hypertension, diabetes, dyslipidemia, and the family history of CAD. Cardiac abnormalities were detected by a 12-lead ECG, and cardiac structure and ejection fraction was determined by echocardiography.

Asymptomatic CAD was identified through invasive coronary angiography where the lesions of the coronary arteries could be observed. Medical records with demographics, clinical and test results were used to obtain data that was accurate and confidential.

The analysis of the data was performed with the help of SPSS version 26. The t-test or ANOVA was used to assess the continuous variables, chi-square test was used to assess the categorical variables and multiple logistic regression was used to determine predictors of silent CAD as independent variables and significance was measured using $p < 0.05$.

RESULTS

There were 62 (20.7%) patients presented with upper peripheral arterial disease, while significant majority of 238 (79.3%) patients were diagnosed with lower peripheral arterial disease.

Table No. 1: Demographic and clinical features of study population (n=300)

Variable	No.	%
Sex		
Male	192	64.0
Female	108	36.0
Diabetes		
No	114	38.0
Yes	186	62.0
Hypertension		
No	138	46.0
Yes	162	54.0
Smoking		
No	142	47.3
Yes	158	52.7
Arterial fibrillation		
No	159	53.0
Yes	141	47.0
Ejection Fraction ≥ 50		
No	150	50.0
Yes	150	50.0

The cohort that a higher prevalence of males (192,64%) compared to females (108, 36%). The mean age of the patients was 62.45 years with a standard deviation of 11.553 and an age range of 38 to 84 years. A significant portion of the population had diabetes (186, 62%), hypertension (162, 54%), and smoking history (158, 52.7%). Additionally, 141 patients (47%) had arterial fibrillation, and the ejection fraction was equally distributed among patients with values above and below 50% (150 patients each, 50%) [Table 1, Fig. 1).

Figure 2 reveals that out of 300 PAD patients, the majority of them 216 patients (72%) were found to have positive findings for coronary artery disease while 84 patients (28%) had negative findings. Figure 3 clearly show the difference in the prevalence of asymptomatic CAD between patients with lower limb

PAD and those with upper limb PAD showing a significant association between the limb affected by PAD and the likelihood of having asymptomatic CAD. Table 2 illustrates the relationship between various demographic and clinical features and the presence of coronary artery disease (CAD) among the study population. The data reveals that there was no significant difference between males and females regarding both negative and positive CAD findings with a p value of 0.385. Diabetes was significantly

associated with a higher prevalence of CAD, with 77.4% of diabetic patients showing positive CAD findings compared to 63.2% in non-diabetic patients ($P=0.008$). Hypertension, smoking, and arterial fibrillation did not show significant differences in CAD prevalence. However, ejection fraction was notably significant, with 84.7% of patients with an ejection fraction below 50% having positive CAD findings compared to 59.3% with an ejection fraction of 50% or higher ($P=0.0001$).

Table No. 2: Demographic features and their association with coronary artery disease

Variable		Coronary Artery Disease				P value
		Negative (n=84)		Positive (n=216)		
		No.	%	No.	%	
Sex	Male	57	29.7	135	70.3	0.385
	Female	27	25.0	81	75.0	
Diabetes	No	42	36.8	72	63.2	0.008
	Yes	42	22.6	144	77.4	
Hypertension	No	36	26.1	102	73.9	0.496
	Yes	48	29.6	114	70.4	
Smoking	No	37	26.1	105	73.9	0.477
	Yes	47	29.7	111	70.3	
Arterial fibrillation	No	46	28.9	113	71.1	0.703
	Yes	38	27.0	103	73.0	
Ejection fraction ≥50	No	23	15.3	127	84.7	0.0001
	Yes	61	40.7	89	59.3	

Table No. 3: Prevalence of peripheral artery disease in patients with and without coronary artery disease

Peripheral artery disease		Coronary artery disease				P value
		Negative (n=84)		Positive (216)		
		No.	%	No.	%	
PAD Limb	Upper	44	52.4	18	8.4	0.0001
	Lower	40	47.6	198	91.6	

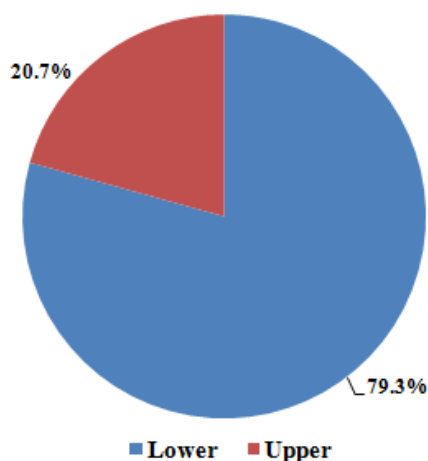


Figure No. 1: Distribution of peripheral arterial disease patients

Table 3 shows a significant difference, that lower limb PAD is much more prevalent in patients with CAD

compared to those without CAD, where a super limb PAD is more common in patients without CAD.

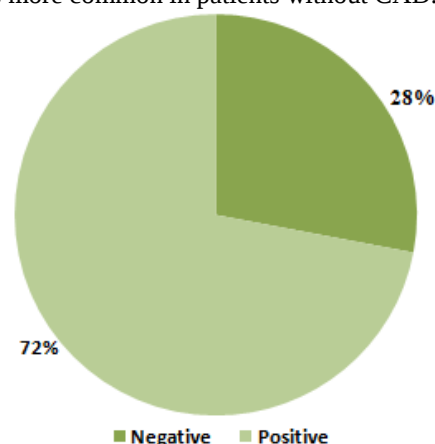


Figure No. 2: Prevalence of coronary artery disease

Among patients without CAD (CAD Negative, No=84), 71.0% have upper limb PAD and 16.8% have lower limb PAD. In contrast, among patients with CAD (CAD

Positive, No=216), only 29.0% have upper limb PAD, whereas a striking 83.2% have lower limb PAD. The

p-value of 0.0001 indicates that these differences are statistically significant.

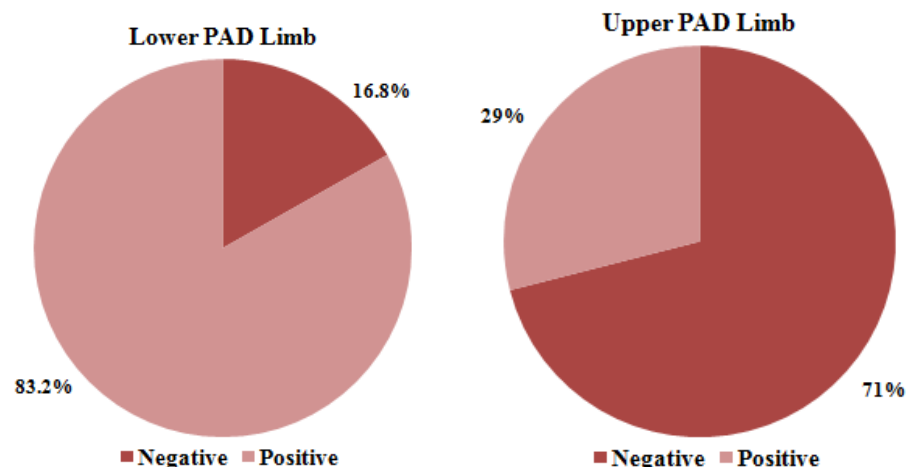


Figure No. 3: Proportion of a symptomatic CAD among PAD limbs

DISCUSSION

The current research examined the association between the peripheral arterial disease (PAD) location and the occurrence of an asymptomatic coronary artery disease (CAD). Good correlation was found, which demonstrates that lower limb PAD is highly associated with more silent CAD, and it proves the idea that atherosclerosis is a system disorder. Out of 300 patients, 79.3% were lower limb PAD and 20.7% were upper limb PAD. The prevalence of CAD in lower limb PAD patients (83.2) was significantly greater than upper limb PAD patients (29.0), showing that lower limb involvement is a more significant atherosclerotic burden systemically. Roy et al¹⁵ also reported similar results when they found that in lower limb PAD, concurrent CAD was observed in 75.18 percent of cases and Mehta et al¹⁶ found that in high-risk individuals, asymptomatic PAD was progressive. In addition, Saleh et al¹⁷ and Hicks et al¹⁸, too, provided the evidence of the close relation between PAD and either multi-vessel or severe CAD.

Aly et al¹⁹ observed that PAD complication is similar to CAD in diabetic populations. There were also significant correlations between clinical parameters. Lower ejection fraction (EF less than 50) was linked to more prevalence of CAD (84.7%), as was the case with Liu et al²⁰, Trevisan et al²¹, Sutton et al²², and Gloria-Bottini et al²³, who all reported the prognostic value of EF in CAD. Another significant predictor was diabetes mellitus, as diabetics had high prevalence of CAD (77.4%), which is consistent with findings by Trevisan et al.²¹ The age factor had a significant role with CAD-positive patients being older (around 70 years) and the prevalence of CAD progressively increasing with age. These findings are consistent with Madhavan et al²⁴ and Hosseini et al²⁵, who reported higher CAD occurrence

in the geriatric populations. The results of the gender-based analysis demonstrated that there were similar tendencies in both male and female, which showed that the association between lower limb PAD and CAD is non-sex-specific. This result is confirmed by previous observations by Saleh et al¹⁷, pathological reports by Narula et al²⁶, and clinical reports by Taimur et al²⁷, Manfrini et al²⁸ and Sharma et al.²⁹ Age and diabetes as independent predictors were found in multivariate analysis, as was also stated by Xu et al.³⁰ and Mousavinasab et al³¹, whereas preserved EF (>50%) was correlated with good results, as it was claimed by DeVore et al.³² The predictive implications in the study are in line with the proved models by Aerts et al³³ and advanced machine-learning by Chang et al.³⁴

CONCLUSION

The presence of a great number of asymptomatic CAD in PAD patients especially lower limb PAD, and the necessity of thorough cardiovascular examinations to avoid complications. Age and ejection fraction are also important predictors where older age and low ejection favour the increased risk of CAD. The findings emphasize the relevance of specific interventions in older patients and individuals with impaired cardiac function to lessen the CAD burden and enhance the outcomes in this vulnerable segment of the population.

Author's Contribution:

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Drafting or Revising Critically:	Abdullah Hussein Nassir, Murtada Ali Jassim
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

- Hiatt WR, Regensteiner J, Hirsch AT. Peripheral arterial disease handbook. CRC Press; 2023.p.31.
- Narula N, Olin JW, Narula N. Pathologic disparities between peripheral artery disease and coronary artery disease. *Arterioscler Thromb Vasc Biol* 2020;40(9):1982-9.
- Jebari-Benslaiman S, Galicia-García U, Larrea-Sebal A, Olaetxea JR, Alloza I, Vandenbroeck K, et al. Pathophysiology of atherosclerosis. *Int J Molecular Sci* 2022;23(6):3346.
- Abu Rahma AF, Campbell JE. Over view of peripheral arterial disease of the lower extremity. *Noninvasive Vascular Diagnosis: A Practical Textbook for Clinicians* 2022; 449-88.
- Nakamura M, Yaku H, Ako J, Arai H, Asai T, Chikamori T, et al. JCS/JSCVS 2018 guideline on revascularization of stable coronary artery disease. *Circ J* 2022;86(3):477-588.
- Shamaki GR, Markson F, Soji-Ayoade D, Agwuegbo CC, Bamgbose MO, Tamunoinemi BM. Peripheral artery disease: a comprehensive updated review. *Curr Problems Cardiol* 2022; 47(11):101082.
- Liu Y, Liu S, Zhao Z, Song X, Qu H, Liu H. Phenylacetylglutamine is associated with the degree of coronary atherosclerotic severity assessed by coronary computed tomographic angiography in patients with suspected coronary artery disease. *Atherosclerosis* 2021;333:75-82.
- Reiner Ž, De Sutter J, Ryden L, Mirrakhimov E, Pogosova N, Dolzhenko M. Peripheral arterial disease and intermittent claudication in coronary heart disease patients. *Int J Cardiol* 2021;322: 227-32.
- Subherwal S, Patel MR, Kober L, Peterson ED, Bhatt DL, Gislason GH, et al. Peripheral artery disease is a coronary heart disease risk equivalent among both men and women: results from a nationwide study. *Eur J Prevent Cardiol* 2015; 22(3):317-25.
- Sillesen HH. Peripheral vascular disease. *Textbook of diabetes*. WB Saunders;2024.p. 755-67.
- Prajapati R, Patel P, Upadhyay U. A review on coronary artery disease. *World J Pharm Res* 2021; 10(13):775-90.
- Wright JD, Folsom AR, Coresh J, Sharrett AR, Couper D, Wagenknecht LE, et al. The ARIC (atherosclerosis risk in communities) study. *JACC* 2021;77(23):2939-59.
- Narula J, Chandrashekhar Y, Ahmadi A, Abbasa S, Berman DS, Blankstein R, et al. SCCT 2021 expert consensus document on coronary computed tomographic angiography: a report of the society of cardiovascular computed tomography. *J Cardiovasc Comput Tomogr* 2021;15(3):192-217.
- Lawton JS, Tamis-Holland JE, Bangalore S, Bates ER, Beckie TM, et al. 2021 ACC/AHA/SCAI guideline for coronary artery revascularization: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol* 2022;79(2):e21-129.
- Roy A, Singh K, Kumar V, Agrawal S, Singh A. Clinical and angiographic profile of asymptomatic coronary artery disease in patients undergoing peripheral angiogram. *Int J Sci Res* 2023; 12(10):50-53.
- Mehta N, Ogendo S, Awori M. Prevalence, progression and associated risk factors of asymptomatic peripheral arterial disease. *Ann Afr Surg* 2017;14(1).
- Saleh A, Makhamreh H, Qoussoos T, Alawwa I, Alsmady M, Salah ZA, et al. Prevalence of previously unrecognized peripheral arterial disease in patients undergoing coronary angiography. *Med* 2018;97(29):e11519.
- Hicks CW, Al-Qunaiet A, Ding N, Kwak L, Folsom AR, Tanaka H, Mosley T, et al. Symptomatic and asymptomatic peripheral artery disease and the risk of abdominal aortic aneurysm: The ARIC study. *Atherosclerosis* 2021;333:32-8.
- Aly K, Sabet S, Elkhey A, Fakhry H. The complexity of peripheral arterial disease and coronary artery disease in diabetic patients: an observational study. *Cardiol Res* 2023;14(1):54.
- Liu Y, Song J, Wang W, Zhang K, Qi Y, Yang J, et al. Association of ejection fraction with mortality and cardiovascular events in coronary artery disease. *ESC Heart Fail* 2022;9(5):3461-8.
- Trevisan L, Cautela J, Resseguier N, Laine M, Arques S, Pinto J, et al. Prevalence and characteristics of CAD in HFpEF and mid-range EF. *Arch Cardiovasc Dis* 2018;111(2):109-18.
- Sutton NR, Li S, Thomas L, Wang TY, de Lemos JA, Enriquez JR, Shah RU, et al. Association of LVEF with outcomes after MI. *Am Heart J* 2016;178:65-73.
- Gloria-Bottini F, Saccucci P, Banci M, Neri A, Magrini A, Bottini E. Correlation between LVEF and clinical severity in CAD. *Cardiovasc Disord Med* 2016;1(2):46-8.
- Madhavan MV, Gersh BJ, Alexander KP, Granger CB, Stone GW. CAD in patients ≥ 80 years. *J Am Coll Cardiol* 2018;71(18):2015-40.

25. Hosseini K, Mortazavi SH, Sadeghian S, Ayati A, Nalini M, Aminorroaya A, et al. Trends in CAD risk factors and age at diagnosis. *BMC Cardiovasc Disord* 2021;21.
26. Narula N, Olin JW, Narula N. Pathologic differences between PAD and CAD. *Arterioscler Thromb Vasc Biol* 2020;40(9):1982-9.
27. Taimur SD, Chowdhury MZ, Hakim ME. Correlation between PAD and CAD in Bangladesh. *Univ Heart J* 2015;11(2):79-84.
28. Manfrini O, Amaduzzi PL, Cenko E, Bugiardini R. Prognostic implications of PAD in CAD. *Curr Opin Pharmacol* 2018;39:121-8.
29. Sharma A, Rasikiran RS, Padmakumar R, Pai U, Ashwal AJ, Aslam M, Thomas T. CAD in patients with PAD: A cross-sectional study. *J Med Sci Clin Res* 2018;6(12):469-72.
30. Xu Z, Pan J, Chen T, Zhou Q, Wang Q, Cao H, et al. Prediction score for significant CAD in older Chinese patients. *Interact Cardiovasc Thorac Surg* 2018;26(4):623-30.
31. Mousavinasab N, Yazdani Cherat J, Bagheri B, Bakhti FS, Bakhti Z. Risk factors for CVD using logistic regression. *J Mazandaran Univ Med Sci* 2017;26(144):50-56.
32. DeVore AD, Hellkamp AS, Thomas L, Albert NM, Butler J, Patterson JH, et al. Improvement in LVEF in HF patients. *Circ Heart Fail* 2020;13(7):e006833.
33. Aerts M, Minalu G, Bösner S, Buntinx F, Burnand B, Haasenritter J, et al. Clinical prediction rule for CAD in primary care. *J Clin Epidemiol* 2017; 81:120-28.
34. Chang CC, Chen CH, Hsieh JG, Jeng JH. Prediction of CAD using machine learning. *IEEE ECBIOS*. 2022:225-7.

Prevalence of Acute Kidney Injury (AKI) Using Rifle Criteria in Patients with Acute Diarrhea

Acute Kidney
Injury with
Acute Diarrhea

Anab Bibi¹, Abdul Samad¹, Hani Noor¹, Abdul Samad² and Amir Hamza³

ABSTRACT

Objective: The study will be used to identify the prevalence of AKI in acute diarrhea patients through the RIFLE criteria and the most significant risk factors, such as dehydration and diarrhea duration.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the Medicine Department, Bolan Medical Complex Hospital Quetta from August 2025 to October 2025.

Methods: This was a cross-sectional study carried out in a tertiary care hospital, which used 100 patients diagnosed with acute diarrhea. The criteria used for inclusion were patients aged 18 years and older, with diarrhea not exceeding 7 days. The eligibility criteria included exclusion criteria of pre-existing renal and chronic kidney disease. The following data were collected: patient demographics, clinical history, and laboratory results. Renal functioning was measured with the help of the RIFLE criteria, which evaluated the level of loss of kidney function through the level of urine output and serum creatinine level. Descriptive statistics and chi-square tests were used to analyze statistical data and determine the relationship between variables, such as dehydration, duration of diarrhea, and AKI.

Results: The study included 100 patients, with a mean age of 38.6 years (SD = 15.2). Among the patients, 58% were male and 42% female. The prevalence of AKI based on the RIFLE criteria was as follows: **Risk (R):** 12% (12 patients) **Injury (I):** 6% (6 patients) **Failure (F):** 2% (2 patients) **Loss (L):** 0.5% (1 patient) **End-stage kidney disease (ESKD):** None significant association was found between dehydration and AKI severity ($p = 0.02$), and patients with diarrhea lasting over 72 hours had a higher risk of developing AKI ($p = 0.03$). Severe dehydration was particularly prevalent among older patients. Mean serum creatinine levels for patients in the "Risk" stage were 1.2 mg/dL ($p = 0.04$), and 1.9 mg/dL for "Injury" patients ($p = 0.03$).

Conclusion: The paper draws attention to the fact that AKI is very common among patients who have acute diarrhea, dehydration, and protracted diarrhea, which are found to be key risk factors. The RIFLE criteria are used to detect and intervene early, enhancing patient outcomes.

Key Words: Acute Kidney Injury, Diarrhea, RIFLE Criteria, Dehydration.

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INTRODUCTION

Acute Kidney Injury (AKI) is an acute disorder that is defined by the abrupt deterioration of kidney functioning, which results in waste products building up and changes in fluid and electrolyte balance¹. It is a grave health complication that may be caused by several factors, such as infections, dehydration, toxins, and other systemic complications.

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Among them, dehydration and fluid imbalance, which are common in acute diarrhea cases, are deemed as one of the key factors contributing to the occurrence of AKI². Acute diarrhea is an illness characterized by a stool that is three or more liquid or loose feces every day and may result in the loss of fluid, especially in vulnerable groups like children and the elderly³. Renal hypoperfusion is caused by dehydration caused by prolonged diarrhea in severe cases, causing kidney dysfunction⁴. RIFLE criteria, abbreviated as Risk, Injury, Failure, Loss, and End-stage kidney disease, rely on a systemized method of categorizing the intensity of AKI. The system of classification is founded on the serum creatinine level and urine output to enable clinicians to determine kidney function in different stages. Early diagnosis and classification of AKI should be used to inform management, e.g., whether fluid resuscitation, renal replacement therapy, and complications monitoring are necessary^{5,6}. The occurrence of AKI among patients with acute diarrhea has been increasingly identified, but little information is

available on the actual prevalence of this condition as well as the factors implicated in its development, especially based on the RIFLE criteria⁷. Past study has reported that dehydration, chronic diarrhea, and comorbidities (cardiovascular disease, diabetes mellitus, etc.) have the potential to be a major risk factor for AKI. Nevertheless, the exact processes by which diarrhea causes renal damage are still under investigation⁸. Study to evaluate the prevalence of AKI with the RIFLE criteria on such groups of patients can be of great benefit in terms of early detection and intervention, which will positively impact patient outcomes and avert the possibility of chronically damaged kidneys⁹. Besides dehydration, other factors like age, sex, and the existence of underlying health conditions can also contribute to the occurrence of AKI. The elderly and patients with pre-existing comorbidities are likely to be more prone to kidney injury because they have decreased renal reserve and limited compensatory responses. Moreover, characteristics of diarrhea, such as the duration of diarrhea and the loss of liquids, are also relevant in determining the level of AKI among such patients. The use of RIFLE criteria on such patients provides a systematic way of identifying the AKI at different stages so that the necessary timely interventions can be provided¹⁰.

METHODS

The study was a cross-sectional observational study in a tertiary care hospital. The objective of the study was to determine the prevalence of AKI based on the RIFLE criteria in acute diarrhea patients.

Participants: This was a prospective study on 100 patients with acute diarrhea admitted to the hospital within six months. The age of the participants was 18 years and above, and the diarrhea took less than seven days. The chronic kidney disease patients and patients with pre-existing renal conditions or those under dialysis treatment were not used in the study to eliminate confounding variables.

Sample Size Calculation: The sample size was determined using a 95 percent level of confidence, a 5 percent level of error, and an approximate prevalence of AKI of 10 percent in patients with acute diarrhea. On the basis of the standard formula of cross-sectional studies, 100 patients were chosen to ensure sufficient statistical power and meaningful results to be obtained to analyze the prevalence.

Inclusion Criteria

- Patients who are 18 years of age and above.
- Seven-day acute diarrhea.
- indicates no history of chronic kidney disease.

Exclusion Criteria

- Chronic kidney disease
- Renal conditions that already exist.
- Patients who receive dialysis therapy.

Diagnostic Strategy and Management Strategy: The RIFLE criteria, which consider the serum creatinine levels and the output of urine, were used to diagnose AKI. Management involved fluid resuscitation depending on the level of dehydration, kidney monitoring, and supportive care. Renal replacement therapy was a possibility for patients with advanced kidney failure.

Statistical Analysis: The descriptive statistics were used to analyze the data to provide the prevalence of AKI and its stages based on the RIFLE criteria. The associations between risk factors (e.g., dehydration, duration of diarrhea) and the development of AKI were determined by using chi-square tests. The p-value of less than 0.05 was regarded as statistically significant.

RESULTS

The study included 100 patients with a mean age of 38.6 years (SD = 15.2). Of these, 58% were male and 42% were female. The prevalence of AKI based on the RIFLE criteria was as follows: Risk (R): 12% (12 patients) Injury (I): 6% (6 patients) Failure (F): 2% (2 patients) Loss (L): 0.5% (1 patient) End-stage kidney disease (ESKD): None The study found that dehydration significantly contributed to AKI development, with 80% of AKI cases being associated with moderate to severe dehydration. A significant association between prolonged diarrhea (lasting more than 72 hours) and AKI was found ($p = 0.03$). The mean serum creatinine levels for patients in the "Risk" stage were 1.2 mg/dL ($p = 0.04$), while "Injury" stage patients had levels of 1.9 mg/dL ($p = 0.03$). There was also a significant correlation between age and the severity of AKI, with older patients exhibiting a higher prevalence of AKI ($p = 0.01$).

Intervention Outcome: Fluid resuscitation intervention, informed by the severity of the dehydration condition, was useful in the reduction of AKI in the majority of the patients. Early diagnosis and therapy based on the RIFLE criteria contributed to the minimization of the level of kidney damage, which resulted in positive outcomes, as no patient was put on dialysis throughout the study.

Table No. 1: Demographic Characteristics of Patients

Characteristic	Value
Total Number of Patients	100
Mean Age (Years)	38.6 (SD = 15.2)
Gender (Male)	58%
Gender (Female)	42%

This table shows the demographic characteristics of the 100 patients included in the study. The mean age was 38.6 years, with a standard deviation of 15.2. Among the patients, 58% were male, and 42% were female.

Table No. 2: Prevalence of AKI Based on RIFLE Criteria

RIFLE Stage	Number of Patients	Percentage
Risk (R)	12	12%
Injury (I)	6	6%
Failure (F)	2	2%
Loss (L)	1	0.5%
ESKD	0	0%

This table shows the prevalence of Acute Kidney Injury (AKI) in patients with acute diarrhea based on the RIFLE criteria. The highest prevalence was observed in the "Risk" category (12%), with a progressively lower number of cases in the "Injury" and "Failure" stages.

Table No. 3: Association Between Dehydration and AKI Severity

Dehydration Status	Risk (R)	Injury (I)	Failure (F)	Total AKI
No Dehydration	2	1	0	3
Mild Dehydration	4	2	1	7
Moderate Dehydration	6	3	1	10
Severe Dehydration	0	0	0	0

This table presents the relationship between dehydration severity and the stage of AKI in the studied population. Severe dehydration was significantly associated with the development of AKI, particularly in the "Risk" and "Injury" stages.

Table No. 4: Serum Creatinine Levels at Different Stages of AKI

RIFLE Stage	Mean Serum Creatinine (mg/dL)	p-value
Risk (R)	1.2	0.04
Injury (I)	1.9	0.03
Failure (F)	2.5	0.02

This table displays the mean serum creatinine levels at different stages of AKI based on the RIFLE criteria. The values for serum creatinine were significantly higher in the "Failure" stage, reflecting the worsening severity of kidney injury.

DISCUSSION

The current paper estimated the frequency of Acute Kidney Injury (AKI) in patients who developed Acute Diarrhea based on the RIFLE criteria, and 20.5% of patients had AKI, which was mainly in the Risk stage and Injury stage¹¹. The same observations can be made in the recent literature where the incidence of AKI in diarrheal illnesses has shown to vary widely based on the diagnostic criteria, patient population, and the severity of fluid loss¹². Indeed, in one example, an observational review established the prevalence of AKI

as between 38.4% and 51% of the studies with various diagnostic benchmarks (such as RIFLE, AKIN, and KDIGO), with different diagnostic benchmarks showing varying injury prevalence rates¹³. The relationship between dehydration and AKI identified in this paper follows the established pathophysiology: due to hypovolemia caused by the loss of diarrheal fluid, renal perfusion is reduced, and prerenal injury is enhanced by electrolyte imbalance and systemic hypotension. Past studies are congruent with such a mechanism, as dehydration is always discovered to be one of the main risk factors of AKI in cases of diarrhea and other acute diseases^{14,15}. These results can be further placed into perspective by comparison studies of the past five years. An estimated prevalence of AKI in dehydrated children was found to be 12.6 to 12.9% in a 2025 pediatric cohort with varying results depending on diagnostic criteria and patient age, reflecting the lower end of our adult population results¹⁶. Another hospital study in Pakistan observed that 28.2 percent of patients with acute gastroenteritis developed AKI and that older age was associated with the need to be on dialysis-again consistent with our observation that older age is correlated with severe AKI¹⁷. Regional studies are still in line with these trends internationally. A tertiary care study documented diarrheal illness as a cause of AKI in about 12.7% of patients, which is similar to the RIFLE prevalence of one of the categories of Risk in our cohort¹⁸. An incident study of related incidence at Ayub Teaching Hospital reported that AKI was a frequent complication of hypovolemia, which could be prevented by early and sufficient fluid replacement, supporting the message of hydration management presented in our findings¹⁹. Analogies to children's populations have shown that AKI has dissimilar impacts. An illustrative example is in a meta-analysed data where AKI, which is linked with mortality in a hospital, is approximately 18% in children, with rates of AKI rising with severity, thereby highlighting the overall clinical consequences of AKI and not just prevalence²⁰. Though mortality outcomes were not a major endpoint of the current study, our results indicate a serious clinical issue since the severity of AKI is already established to have negative outcomes in other cohorts²¹. The importance of comorbidity, including diabetes and chronic kidney disease (CKD), has been repeatedly mentioned in the literature as a risk factor enhancer in AKI among patients with diarrhea²². Although we have concentrated on otherwise excluded patients who did not have previous CKD, the literature indicates that an underlying renal compromise has a significant risk of AKI progression and adverse outcomes, which indicates the importance of extensive risk stratification in clinical practice²³. Although demographics and settings of population manifests differ, the overall evidence during the past five years supports the idea that AKI in acute diarrhea is a

clinically significant phenomenon that has a significant prevalence rate when measured using standardized measures²⁴. The inconsistency of the reported prevalence underscores the importance of standardized ways of diagnosing the condition, as well as the role played by early intervention, especially fluid management, in disease prevention and better outcomes²⁵. In general, the findings of the study are consistent with the recent studies²⁵ that support the idea that dehydration, age, and timely hydration treatment are critical factors that determine AKI development and severity in patients with acute diarrhea.

Limitations: The study was carried out in one tertiary care hospital, and there was a restriction in the generalizability of the results. It is also cross-sectional, making it impossible to develop the causal relationships. Moreover, this could have resulted in under diagnosis or over diagnosis of AKI based on the different conditions of the patients due to the reliance on the RIFLE criteria.

CONCLUSION

The study indicates that AKI is very common among patients who have acute diarrhea, and the risk factors identified are dehydration and chronic diarrhea. Timely diagnosis based on the RIFLE criteria and early hydration are the essential measures of the absence of progression and positive patient outcomes. These findings should be confirmed by further multicenter studies.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Anab Bibi, Abdul Samad
Drafting or Revising Critically:	Hani Noor, Abdul Samad, Amir Hamza
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

- Al-Githmi IS, Abdulqader AA, Alotaibi A, Aldughather BA, Alsulami OA, Wali SM, et al. Acute Kidney Injury After Open Heart Surgery. *Cureus* 2022;14(6):e25899.
- Barbar SD, Clere-Jehl R, Bourredjem A, Hernu R, Montini F, Bruyère R, et al. Timing of Renal Replacement Therapy in Patients with Acute Kidney Injury and Sepsis. *The New Engl J Med* 2018;379(15):1431-42.
- Er RE, Ulusal Okyay G, Aygencel BKG, Türko Lu M, Erten Y. Comparison Between RIFLE, AKIN, and KDIGO: Acute Kidney Injury Definition Criteria for Prediction of In-hospital Mortality in Critically Ill Patients. *Iranian J Kid Dis* 2020;14(5):365-72.
- Ferah O, Akbulut A, Açık ME, Gökkaya Z, Acar U, Yenidünya Ö, et al. Acute Kidney Injury After Pediatric Liver Transplantation. *Transplantation proceedings* 2019;51(7):2486-91.
- Hussain SW, Qadeer A, Munawar K, Qureshi MSS, Khan MT, Abdullah A, et al. Determining the Incidence of Acute Kidney Injury Using the RIFLE Criteria in the Medical Intensive Care Unit in a Tertiary Care Hospital Setting in Pakistan. *Cureus* 2019;11(2):e4071.
- Meysam S, Khosravi Z, Rashti R, Qorbani M, Assadi F, Hayatshahi A, et al. Colistin induced acute kidney injury in critically ill children: a prospective study utilizing RIFLE criteria. *Daru : J Faculty of Pharmacy, Tehran Univ Med Sci* 2022;30(1):11-5.
- Putra ON, Saputro ID, Diana D. Rifle Criteria For Acute Kidney Injury In Burn Patients: Prevalence And Risk Factors. *Annals Burns Fire Disasters* 2021;34(3):252-8.
- Sisay M, Hagos B, Edessa D, Tadiwos Y, Mekuria AN. Polymyxin-induced nephrotoxicity and its predictors: a systematic review and meta-analysis of studies conducted using RIFLE criteria of acute kidney injury. *Pharmacological Study* 2021;163:105328.
- Yadav S, Chauhan M, Jain D, Aggarwal HK, Yadav RK. Renal Outcomes of Pregnancy-Related Acute Kidney Injury: a Single Centre Experience in India. *Maedica* 2022;17(1):80-7.
- Yuan SM. Acute kidney injury after pediatric cardiac surgery. *Pediatr Neonatol* 2019;60(1):3-11.
- Bagai S, Prakash A, Agrawal A. Profile of Community-Acquired Acute Kidney Injury Defined Using RIFLE Criteria Among Medical In-Patients: A Prospective Descriptive Single Centre Study. *J Assoc Physicians Ind* 2019;67(11):14-8.
- De Clercq L, Ailliet T, Schaubroeck H, Hoste EAJ. Acute and Chronic Cardiovascular Consequences of Acute Kidney Injury: A Systematic Review and Meta-Analysis. *Cardiorenal Med* 2023;13(1):26-33.
- Folkestad T, Brurberg KG, Nordhuus KM, Tveiten CK, Guttormsen AB, Os I, et al. Acute kidney injury in burn patients admitted to the intensive care unit: a systematic review and meta-analysis. *Critical care (London, England)* 2020;24(1):2.
- Kaushik S, Villacres S, Eisenberg R, Medar SS. Acute Kidney Injury in Pediatric Acute Respiratory

- Distress Syndrome. *J Intensive Care Med* 2021; 36(9):1084-90.
15. Kodikara P, Walker R, Wilson S. Renal physiology and kidney injury during intense (CrossFit®) exercise. *Internal Med J* 2023;53(7):1180-7.
 16. Søvik S, Isachsen MS, Nordhuus KM, Tveiten CK, Eken T, Sunde K, et al. Acute kidney injury in trauma patients admitted to the ICU: a systematic review and meta-analysis. *Intensive Care Med* 2019;45(4):407-19.
 17. Ülger F, Pehlivanlar Küçük M, Küçük AO, İlkaya NK, Murat N, Bilgiç B, et al. Evaluation of acute kidney injury (AKI) with RIFLE, AKIN, CK, and KDIGO in critically ill trauma patients. *European journal of trauma and emergency surgery : official publication of the European Trauma Society* 2018;44(4):597-605.
 18. Usman P, Qaisar H, Haque AU, Abbas Q. Comparison Of Two Definitions (P-Rifle And Kdigo) For Prevalence Of Acute Kidney Injury And In Hospital Mortality In A Paediatric Intensive Care Unit Of Pakistan. *J Ayub Med Coll Abbottabad : JAMC* 2022;34(1):112-7.
 19. Vodovar D, Peyre H, Mégarbane B. Relationship between acute kidney injury and mortality in poisoning - a systematic review and metanalysis. *Clinical toxicology (Philadelphia, Pa)* 2021; 59(9):771-9.
 20. Yaqub S, Hashmi S, Kazmi MK, Aziz Ali A, Dawood T, Sharif H. A Comparison of AKIN, KDIGO, and RIFLE Definitions to Diagnose Acute Kidney Injury and Predict the Outcomes after Cardiac Surgery in a South Asian Cohort. *Cardiorenal Med* 2022;12(1):29-38.
 21. Hancı V, Özbilgin Ş, Başçı O, Ömür D, Boztaş N. Acute kidney injury after major orthopedic surgery: A retrospective study of frequency and related risk factors. *Acta orthopaedica et traumatologica turcica* 2022;56(4):289-95.
 22. Kimmel LA, Wilson S, Walker RG, Singer Y, Cleland H. Acute Kidney Injury: It's not just the 'big' burns. *Injury* 2018;49(2):213-8.
 23. Nakamura T, Mikamo A, Matsuno Y, Fujita A, Kurazumi H, Suzuki R, et al. Impact of acute kidney injury on prognosis of chronic kidney disease after aortic arch surgery. *Interactive cardiovascular and thoracic surgery* 2020; 30(2):273-9.
 24. Ying T, Chan S, Lane S, Somerville C. Acute kidney injury post-major orthopaedic surgery: A single-Centre case-control study. *Nephrol (Carlton, Vic)* 2018;23(2):126-32.
 25. Zhang H, Gao P, Wang Y, Chen J, Jia G, Zhang F, et al. Baseline kidney function is associated with vancomycin-induced acute kidney injury in children: a prospective nested case-control study. *Pediatr Nephrol (Berlin, Germany)* 2021;36(5): 1299-306.

Correlation of Serum Irisin Level with Nerve Conduction Study in Diabetic Patients

Serum Irisin
Level with Nerve
Conduction in
Diabetic

Zaid Talib Saleh Alfahham and Falah Mahdi Dananah

ABSTRACT

Objective: To assess irisin hormone in diabetic peripheral neuropathy and to assess the relation between irisin hormone and nerve conduction study.

Study Design: Meta-analysis of observational study

Place and Duration of Study: This study was conducted at the Marjan Teaching Hospital in Babil City in Endocrinology and Diabetes Center from 1st January 2025 to 31st March 2025.

Methods: Forty one diabetic patients divided into two groups, 22 patients with diabetic peripheral neuropathy and 19 patients without diabetic peripheral neuropathy. Patients with diabetic peripheral neuropathy are diagnosed based on history and clinical examination with assistance of Michigan Neuropathy Screening Instrument scoring system. Serum irisin, nerve conduction study of sural nerve (amplitude, velocity) and sural/radial amplitude ratio are doing for all patients.

Results: Irisin hormone level was significantly lower in patients with diabetic peripheral neuropathy (143.18 pg/ml) than patient without diabetic peripheral neuropathy (203.29 pg/ml), ($p=0.0001$) and the relation between irisin hormone and sural nerve conduction study and sural/radial amplitude ratio in both groups show no significant correlation.

Conclusion: The irisin hormone level is significantly decreased in DPN patients. There is no significant correlation between irisin and nerve conduction study of sural nerve and sural/radial amplitude ratio.

Key Words: Type 2 diabetes mellitus, Diabetic neuropathy, Irisin hormone, Nerve conduction study, Sural nerve

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INTRODUCTION

Type 2 DM is one of the most common noncommunicable disease in the world, it accounts for about 90% of diabetes cases globally. It's prevalent about 580 million in 2024 and 635 million at risk to develop diabetes.¹

The complications of diabetes are serious and impact on the health and quality life of the patients. It includes vision loss, CAD, kidney failure and lower limb amputation.² One of the major complication is diabetic peripheral neuropathy that affects 50% of diabetes patients. In addition, approximately half of these cases may be present without symptoms, this led to serious complication like foot ulcer that may lead to limb amputation.³

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The most common type of diabetic peripheral neuropathy is diabetic distal symmetrical polyneuropathy that constitutes about 80-90% of diabetic neuropathy.⁴

Irisin hormone is a myokine derived from FNDC5 protein in proteolytic mechanism by PGC1 α named referring to the "Iris" a Greek messenger of the Gods. It discovered in 2012 by Boström and his colleagues as an exercise-induced hormone. The first description of its role is converting white adipose tissues to brown adipose tissues by what is called beiging, and this conversion aid by irisin via increase thermogenesis gene expression in white adipose tissues. Activation of brown adipose tissues dissipates energy as a heat; this can help in weight loss in obesity and T2DM patients.⁵ After that, it was found that irisin also regulates glucose homeostasis by preventing gluconeogenesis and enhancing glycogen synthesis in the liver and helps in improving insulin resistance. For that, the interest is increased in researchers over all world to explore more effects of this hormone in physiological and pathological aspects.⁶

Later, it was found beneficial effect on the nervous system by enhancing memory, cognition and learning after brain injury such as stroke and cerebral ischemia.⁷ Additionally, it can induce skeletal muscles hypertrophy by activating stem cell in the muscle (satellite cell) and so helping in protein synthesis.

Moreover, in model of muscle denervation, irisin can save muscle from atrophy.⁸ In addition, there is a suggestion about irisin may induce neuronal differentiation and proliferation but need further studies to confirm it.⁹

The level of irisin in T2DM patients is controversy, most studies show decrease level of irisin¹⁰; conversely, some studies report increase level of irisin¹¹; also, a few studies find no link between irisin and diabetes mellitus.¹²

Regarding irisin level in diabetic complications, the studies also report controversial result, most of them report lower irisin levels in patients with diabetic complication than without complications.¹³ Regarding diabetic neuropathy, there are limited studies that correlate irisin hormone with it. However, two studies report a significant decrease in irisin hormone in diabetic neuropathy in comparison with diabetics without neuropathy.^{14,15}

Nerve Conduction Study considers the gold standard tools to diagnosis the DPN. Moreover, it can be used for severity determination, follow up and screening of DPN.¹⁶ The vast majority of polyneuropathy is axonal degeneration; it includes nearly all diabetic patients. On NCS it is demonstrated by decreasing amplitude and normal or slightly decrease in latency and conduction velocity.¹⁷ Diabetic peripheral neuropathy can also be diagnosed with other tools like single fiber electromyography (SFEMG).¹⁸

The most sensitive nerve for evaluating DPN is the sural nerve. It is preferred because of many reasons related to the anatomical and pathophysiological features of DPN. Many authors agree for the first impairment appears in sural nerves. On the other hand, some authors suggest the NCS of the further distal nerves than sural, such as planter nerves, may be an early detector for DPN.¹⁹ Up to know, there is no study correlating irisin hormone with nerve conduction study in diabetic patients.

The purpose of this study is to assess the level of irisin hormone in diabetic peripheral neuropathy patients. Also, to find the correlation between irisin hormone and nerve conduction study in diabetic patients.

METHODS

This study was conducted at Marjan Teaching Hospital in Babil City in Endocrinology and Diabetes Center from 1st January 2025 to 31st March 2025 vide letter No. MEC-101 dated 22/12/2024. This study involves 41 diabetic patients divided into two groups, 22 patients with diabetic peripheral neuropathy (10 male and 12 female) and 19 patients without peripheral neuropathy (12 male and 7 female). All of them are diagnosed with T2DM by physician according to American Diabetes Association criteria. They included if they are T2DM and aged lower than 60 years old. Patients with type 1 diabetic mellitus, chronic kidney disease or renal

failure, hepatic failure, inflammatory diseases such as systemic lupus erythematosus, rheumatoid arthritis and inflammatory bowel disease, neoplasia, pregnancy and Hypothyroidism or hyperthyroidism are excluded.

Diabetic peripheral neuropathy is diagnosed based on signs and symptoms and clinical examination. Signs and symptoms include pain (burning, painful cold, electric shock), numbness, tingling, pins and needle symptoms, itching and loss of temperature sensation. The physical examination is done with assistance of MNSI system score that includes 5 parts in physical examination include appearance of feet, foot ulceration, ankles reflexes, vibration perception at great toe by 128 Hz tuning fork and 10 g monofilament, scoring of 2 of 10 and more of MNSI score consider diabetic neuropathy.

Venous blood sampling about 4 mL in gel tube and left it about 10 minutes before centrifugation, then separate the serum by centrifuge for 10-15 minutes in set of 4000 round per minute. Then the serum is divided into 2 Eppendorf tubes and stored in refrigerator at -20 Celsius. One of the Eppendorf tubes is thawed after all samples collection is complete to use for analysis. Irisin hormone assay was measured by using Human Irisin ELISA Kit (Elabscience/China) by ELISA reader (Biotec/USA) for all participants, by following the manufacture's protocol.

NCS is done for all patients in this study by a specialist examiner in EMG/NCS unit in Marjan Teaching Hospital by using EMG/NCV systems of Nihon Kohden company. The nerves that examined divided into motor and sensory nerves. The motor nerves that examined include peroneal and tibial nerves bilaterally. The sensory nerves include sural nerves bilaterally, radial and ulnar nerves. However, we include only the sural nerve parameter and sural/radial amplitude ratio (SRAR) in this study.

All statistical analyses were performed using the SPSS-26 and compared across groups using one-way analysis of variance (ANOVA). The normality of data distribution was assessed using the Shapiro-Wilk test. Variables that did not meet the assumptions of normality were expressed as median and interquartile range (IQR) and analyzed using the Mann-Whitney U test. Chi-square test or Fisher's exact test was used as appropriate. Pearson's correlation coefficient was used to determine the association between serum irisin levels and continuous variables, including age, body mass index (BMI), duration of diabetes, and nerve conduction parameters. A p-value of less than or equal 0.05 was considered statistically significant for all analyses.

RESULTS

The mean age of patient in diabetic patients with and without PDN are 53.5±6.6 and 51.9±5.2 respectively, which are not significantly different between groups.

The mean of BMI in diabetic patients without PDN show (28.5 ± 2.9) and it is significant different ($p=0.009$) in comparison with diabetic PDN (31.1 ± 5.3). The mean duration of DM shows borderline significant differences ($p=0.05$) between two groups. The mean duration of DM shows borderline significant differences ($p=0.05$) between two groups. The mean HbA1c is higher in diabetic PDN in comparison with patients without PDN with high significant differences (0.0001) [Table 1].

The mean level of irisin hormone in diabetic patients with PDN is (143.18 pg/ml) and it is lower than the mean level of the hormone in diabetic patients without

PDN (203.29 pg/ml) with highly significant difference between them ($p=0.0001$) [Fig. 1].

The comparison of nerve conduction study in diabetic without and with PDN shows significant differences in sural nerve amplitude and SRA ratio between two groups (IQR=13.2(3.9), IQR=8.95(12), $p=0.04$), (IQR=0.8 (0.2), IQR=0.5(0.5), $p=0.001$) respectively. While there is no significant difference between sural nerve velocity between two groups ($p=0.06$) [Table 2].

Correlation of irisin with nerve conduction study: In both group of diabetic patients with and without PDN there is no significant correlation between irisin hormone and sural nerve amplitude, sural nerve velocity and sural to radial amplitude ratio (Table 3).

Table No.1: General characteristics of patient in study groups

Characteristics		Diabetic(n=19)	Diabetic Neuropathy(n=22)	p-value
Age		51.9 $\pm$ 5.2	53.5 $\pm$ 6.6	0.2
Body mass index		28.5 $\pm$ 2.9	31.1 $\pm$ 5.3	0.009
Duration of DM (years)		8.7 $\pm$ 4.7	12 $\pm$ 5.6	0.05
HbA1c		8.7 $\pm$ 1.8	9.6 $\pm$ 1.5	0.0001
Gender	Male	12 (63.2%)	10 (45.5%)	0.5
	Female	7 (36.8%)	12 (54.5%)	

Table No.2: Comparison of median (IQR) of sural nerve amplitude, sural nerve velocity and SRA ratio between diabetic patients with and without PDN

NCS	Diabetic (n=19) Median (IQR)	Diabetic neuropathy (n=22) Median (IQR)	P-Value
Sural nerve amplitude	13.2(3.9)	8.95(12)	0.04
Sural nerve velocity	46.8(9.2)	40.2(20.3)	0.06
SRA ratio	0.8 (0.2)	0.5(0.5)	0.001

Table No.3: Correlations of irisin with NCS

NCS	Irisin hormone			
	Diabetic		Diabetic Neuropathy	
	Pearson Correlation	Sig. (2-tailed)	Pearson Correlation	Sig. (2-tailed)
Sural N. Amp.	0.205	0.399	0.159	0.479
Sural N. Velocity	-0.092	0.709	0.012	0.957
SRA Ratio	0.089	0.716	0.192	0.393

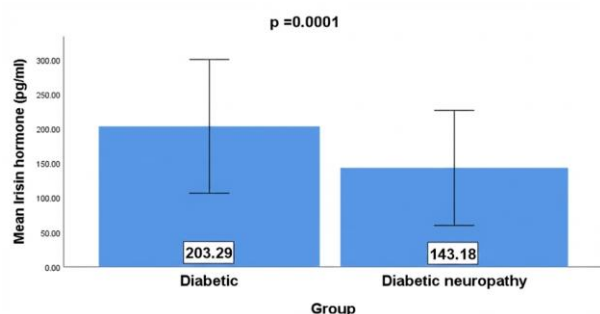


Figure No. 1: Irisin hormone level (pg/ml) among study groups

DISCUSSION

This study shows that irisin hormone level in patients with PDN is lower than patient without PDN. This

agrees with other studies that also show decreases in irisin hormone in patients with PDN.^{14,15}

Irisin is important in glucose homeostasis by facilitating glucose uptake by muscle.²⁰ For that, the increased irisin in diabetic group without PDN perhaps the normal physiological response to hyperglycemia to restore the normal condition in the body.

However, in disease progression and the condition worsens with development of complication because uncontrolled the disease, there may be exhaustion in this processes that lead to decreased irisin¹⁴, as shown in this study with group of PDN when compared with group of diabetics without PDN. The decreased in irisin concentration may further contribute to developing diabetic complications.

Another explanation for increased irisin in diabetic patients without PDN is irisin receptors resistance, the

increased irisin is to overcome this resistance. However, this process reach to point of exhaustion, resulting in decline in irisin level that may cause complications that appear in the patients¹²; this is shown in group of diabetic with PDN in this study when the concentration of irisin is lower than group of diabetics without PDN.

NCS in this study shows significant differences in sural amplitude and SRA ratio between diabetic patients with and without PDN as shown in table 2. This indicated a marked damage to the nerves in patients with neuropathic symptoms compared without symptoms.¹⁶ Also, reduced sural amplitude indicated axonal degeneration in the nerve, it considers the major type of nerve injury in polyneuropathy especially in diabetes patients.¹⁷ There is a significant difference between study groups in the duration of diabetes mellitus which significantly affects the severity of DPN and may confound the results of this study.²¹

To date, this is first correlation between irisin and NCS in diabetes patients. It is known that NCS consider an invasive procedure to the patient, the goal of this correlation is testing the possibility of irisin to be a biomarker indicator for neuropathy in diabetic patients. NCS in this study depends on sural nerve velocity and amplitude to assess the PDN as its accessibility more than others sensory nerves¹⁹ and, in addition, the sural/radial amplitude ratio is measured.

The result in this study shows no correlation between irisin and sural nerve amplitude, sural nerve velocity and SRA ratio in both groups of diabetics as shown in table 3. This may be due to differences in the time of nerve damage and the control of the disease. The damage to the nerve when occurring in advanced stage is poorly reversed¹⁷; after while maybe the patient restores his glycemic control and improve the irisin level but the nerve damage persists.

However, more investigation is needed between irisin and NCS with more sample size, involved more nerves and may benefit to include newly diagnosed PDN.

CONCLUSION

The irisin hormone level was lower in diabetic peripheral neuropathy than diabetic patient without PDN. There is no significant correlation between irisin hormone and nerve conduction study of sural nerve, regarding amplitude and velocity, and RSA ratio.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Zaid Talib Saleh Alfahham, Falah Mahdi Dananah
Drafting or Revising Critically:	Zaid Talib Saleh Alfahham, Falah Mahdi Dananah
Final Approval of version:	All the above authors
Agreement to accountable	All the above authors

for all aspects of work:	
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REFERENCES

1. International Diabetes Federation. Diabetes atlas. 11th ed. Belgium: Saunders; 2025p.25-30.
2. Joseph L, Fauci AS, Kasper DL, Hauser SL, Longo DL, Larry JL. Harrison's principles of internal medicine. 21st ed. McGraw Hill; 2022.p. 235.
3. Hicks CW, Selvin E. Epidemiology of peripheral neuropathy and lower extremity disease in diabetes. *Curr Diab Rep* 2019;19(10):86.
4. Pop-Busui R, Boulton AJM, Feldman EL, Bril V, Freeman R, Malik RA, et al. Diabetic Neuropathy: A Position Statement by the American Diabetes Association. *Diabetes Care* 2017;40(1):136-54.
5. Boström P, Wu J, Jedrychowski MP, Korde A, Ye L, Lo JC, et al. A PGC1- α -dependent myokine that drives brown-fat-like development of white fat and thermogenesis. *Nature* 2012;481(7382):463–8.
6. Perakakis N, Triantafyllou GA, Fernández-Real JM, Huh JY, Park KH, Seufert J, et al. Physiology and role of irisin in glucose homeostasis. *Nat Rev Endocrinol* 2017;13(6): 324–37.
7. Wrann CD, White JP, Salogiannis J, Laznik-Bogoslavski D, Wu J, Ma D, et al. Exercise induces hippocampal BDNF through a PGC-1 α /FND5 pathway. *Cell Metab* 2013;18(5): 649–59.
8. Reza MM, Subramaniam N, Sim CM, Ge X, Sathiakumar D, McFarlane C, et al. Irisin is a pro-myogenic factor that induces skeletal muscle hypertrophy and rescues denervation-induced atrophy. *Nat Commun* 2017;8(1):1104.
9. Novelle MG, Contreras C, Romero-Picó A, López M, Diéguez C. Irisin, two years later. *Int J Endocrinol* 2013;2013.
10. Aminov E, Folan P, Pisconti A. Linking Circulating Irisin and Type 2 Diabetes: A Systematic Review and Meta-Analysis. *JCSM* 2025; 8(1).
11. Rana KS, Pararasa C, Afzal I, Nagel DA, Hill EJ, Bailey CJ, et al. Plasma irisin is elevated in type 2 diabetes and is associated with increased E-selectin levels. *Cardiovasc Diabetol* 2017;16(1).
12. Mathia VL, Mendonça MIS, Simões DP, Perez MM, da Costa Aguiar Alves B, Encinas JFA,

- et al. Relationship of irisin expression with metabolic alterations and cardiovascular risk in type 2 diabetes mellitus: a preliminary study. *Rev Assoc Med Bras* 2023;69(12).
13. Hou Q, Song R, Zhao X, Yang C, Feng Y. Lower circulating irisin levels in type 2 diabetes mellitus patients with chronic complications: a meta-analysis. *Heliyon: Elsevier Ltd*; 2023.p.9.
 14. El Haddad H, Sedrak H, Naguib M, Yousief E, Ibrahim DR, Abdel Samie RM, et al. Irisin level in type 2 diabetic patients and its relation to glycemic control and diabetic complications. *Int J Diabetes Dev Ctries* 2019;39(4):641–6.
 15. Reda Halawa M, Abu Shady MM, Abdel-Fattah Mahmoud M, Hasan Ibrahim M. Irisin hormone level in type 2 diabetic patients with and without diabetic neuropathy. *Ain Shams Med J* 2015; 66.
 16. Preston DC., Shapiro Bellen. Electromyography and neuromuscular disorders: clinical-electrophysiologic-ultrasound correlations. Elsevier; 2021.p.768.
 17. Yang C, Zhao X, An X, Zhang Y, Sun W, Zhang Y, et al. Axonal transport deficits in the pathogenesis of diabetic peripheral neuropathy. *Front Endocrinol (Lausanne)* 2023;14.
 18. Kadhim ZM, Ajeena IA, Al-Maamori MJ. Single-fiber Electromyography in Patients with Diabetic Neuropathy. *Med J Babylon* 2022; 19(4):511–3.
 19. Galiero R, Caturano A, Vetrano E, Beccia D, Brin C, Alfano M, et al. Peripheral neuropathy in diabetes mellitus: pathogenetic mechanisms and diagnostic options. *Int J Molecular Sci* 2023; 24.
 20. Zhao R. Irisin at the crossroads of inter-organ communications: Challenge and implications. *Frontiers Endocrinol* 2022; 13.
 21. Alsalihi N, Ajeena I, Alkashwan TA. The duration of Type 2 DM as a risk factor for the occurrence of peripheral neuropathy. *Med J Babylon* 2016; 13(3): 570-74.

Evaluation of the Outcome of the Effectiveness and Safety of Ureteroscopic Pneumatic Lithotripsy in the Management of Ureteric Stone

Ahmed Abdul Ameer Alwan and Ali Obaid Ahmed

ABSTRACT

Objective: To determine the results of efficacy and safety ureteroscopic pneumatic lithotripsy as a treatment of ureteral calculus.

Study Design: Descriptive study

Place and Duration of Study: This study was conducted at the Department of Urology, Al-Diwanya Teaching Hospital Iraq from 15th August 2024 31st January 2025.

Methods: A total of 100 patients with ureteric stone between 7 mm in diameter, patient and method were 9.5 French semi rigid ureteroscopes and Swiss lithoclast pneumatic lithotripsy were enrolled. The end of the operation involved JJ stenting of the ureter. Kidney, ureter and bladder X-ray assessed the stone clearance and noted complications. The JJ stent was removed within 4 weeks.

Result: There were 73 (73%) males and 27 (27%) females. The average length of stay was 2.72 ± 2.4 days. The stone free rate and total clearance of the stone was observed in (2-4) week in 92 (92%) patients. A total of 70 (70%) of the patients were being discharged on the first day after surgery. The patients who had upper ureteric stone 5 of them had a rock up migration into the kidney and it was successfully treated by JJ who did the endoscopic stent.

Conclusion: Ureteroscopic pneumatic lithotripsy is an efficient device in clearing the majority of the lower and middle ureteric stone up migration of stone to the kidney may be considered as rare complications.

Key Words: Ureteric stone, Ureteroscopy, Lithotripsy

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INTRODUCTION

Kidney stones, also known as renal calculi or nephrolithiasis, represent one of the most common disorders of the urinary system. The lifetime risk of developing a kidney stone varies by age, sex, and ethnicity. Approximately ten percent of Caucasian men are estimated to develop a kidney stone by the age of seventy years, while the incidence in women is comparatively lower. The increasing prevalence of urolithiasis in modern populations can be attributed to multiple contributing factors that can be broadly categorized into intrinsic factors, which are related to

the individual patient, and extrinsic factors, which are associated with environmental and lifestyle influences.¹ Among the intrinsic factors, there are genetic predisposition, metabolic deviations, anatomical differences in the urinary tract and underlying medical illness that alters urine structure. As an example, people with hypercalciuria, hyperoxaluria, or gout face increased risk of stones formation because of heavy excretion of calcium, oxalate or uric acid in the urine. Family history also contributes significantly implying a hereditary factor in stone disease. In addition, some structural malformations, including medullary sponge kidney or ureteropelvic junction obstruction, can predispose the patients to the development of stones by leading to urinary stasis.¹

On the other hand, extrinsic factors are mainly associated with environment exposures and lifestyles behaviors. The risk of the formation of the stones was associated with diet, hydration status, geographical location, and occupation factors. People in warm climates or those who have jobs that require a long working period in an environment with high temperatures are highly vulnerable since they experience chronic dehydration and thick urine. Diets rich in animal proteins, sodium and oxalate-containing foods like spinach and nuts may also predispose to the

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risk of the formation of stones whereas low calcium intake ironically facilitates oxalate absorption and predisposition to the formation of stones.¹

A ureteric stone is most commonly known to manifest itself with the sudden onset of the severe colicky pain in the loin that radiates in the flank to groin. Acute occlusion of urinary tract and distension of the urinary tract is what causes the pain since it stimulates the visceral pain fibers. The intensity of pain will either vary or remain the same in case the ureteric smooth muscle contracts in which it will attempt to propel the stone in the same direction. Often that liking to pain in the loin-to-groin is accompanied by the systemic expression of nausea and vomiting, the patient appearing simply uncomfortable, or unable to get in a comfortable position.²

Others might also have the pain extending to lower abdomen, testis or labia, depending on the location of the stone in the ureter. Hematuria can be microscopic or macroscopic and it normally presents itself as a manifestation of mucosal irritation or mucosal trauma due to the stone. Dysuria, frequency, and urgency can result in the instance of the presence of the stone near the vesicoureteric junction. Physical examination results tend to be nonspecific, with the tenderness of the costovertebral angle possible.

The symptoms and the onset itself could be of various stages, and various durations. Some of the patients complain that there is some intermittent discomfort but there are those who end up in the hospital complaining of acute and excruciating pain. The diagnostic evaluation normally involves the use of urinalysis, renal functional tests and radiographic evaluation with computer tomography of the kidneys, ureters, and the bladder that has now become the diagnostic gold standard.

Ureteric stones in most cases particularly in cases where the stones are small may just spontaneously emerge through the urinary tract after days or weeks without necessarily undergoing surgery.³ The size, location and shape of the calculus, the magnitude of the obstruction and ureteral spasm have been estimated as the major means of determining a spontaneous passage. The rate of spontaneous passage is positively proportional to the size of the stone. It is said that 90 percent of stones smaller than 4 mm in size may get along by their own, and the possibility of getting along decreases considerably as the size of the stone is greater than 6 mm.³ The proximity of the ureteral stones is less likely to pass when compared to the distal stones because the distance to the bladder is short, and it is more likely to pass because of a larger ureteral lumen at the end. Conservative management is a treatment option in such cases, and it includes proper hydration, analgesics such as nonsteroidal anti-inflammatory drugs (NSAIDs) and in certain cases medical expulsive therapy such as alpha-blockers (e.g., tamsulosin) to

relax ureteral smooth muscle to pass a stone. Special care must however be taken of patients in order to identify any form of infection, obstruction, or impairment of renal functions. Indications of Surgical Intervention: Spontaneous passage can be observed, but the rate of patients who will be forced to go through surgical or procedural intervention will be high. The major clues of active intervention include the following: Unsuccessful conservative treatment, the stone fails to pass out after a reasonable period of observation, and continues to be a symptom or obstruction. Fever or infection, a symptom of the fact that an infected blocked system exists - an emergency in urology that must be dismantled at once. Impediments in either bilateral or unilateral functioning kidney in particular where there is a history of poor renal functioning. Patient's preference, whereby the patient opts to have active removal due to persistent pain, due to professional factors or fear of frequent colic.⁴

Surgery in this instance is necessary to prevent irretrievable damage of the kidney and sepsis complications. The management of ureteric calculi has several therapeutic modalities and the modality to be used will be determined by the nature of the stones as well as the factors associated with the patient and the expertise at hand. The chief forms of treatment include shock wave lithotripsy (SWL), ureteroscopy (URS), percutaneous nephrolithotomy (PCNL), and open or laparoscopic ureterolithotomy.⁵ Shock wave lithotripsy (SWL) refers to a non-invasive procedure, which uses the acoustic pulse which is focused in order to break stones into smaller fragments which can be spontaneously expelled. It is particularly effective with stones that are not greater than 1cm in the upper ureter or kidney. Its efficiency however, decreases as the size or the distal stones increase and may require multiple sessions. Conversely, the ureteroscopy (URS) system is gradually developing to be the most conducted procedure of ureteric stones globally (6). It involves the insertion of a small endoscope into the urethra and bladder into the ureter to treat and visualize the stone directly. URS positively has the advantage of stone clearance without the need of additional sessions, and regardless of the position of the stones. Different types of intracorporeal lithotripsy systems are available to be used in disintegrating the stones in the case of ureteroscopy. These include; electrohydraulic lithotripsy (EHL), pneumatic lithotripsy (PL), ultrasonic lithotripters, and laser lithotripters.⁶ The pneumatic lithotripter was developed in 1990 and took a massive leap in the technology and could fragment stones with mechanical force. In relatively more recent times laser lithotripsy and in particular with the use of the Holmium: YAG laser is the technique of preference due to its versatility, safety and its ability to fragment all forms of rocks with minimal collateral

tissue effects. Percutaneous nephrolithotomy (PCNL) is reserved for large or complex stones, typically located in the kidney or upper ureter, where other approaches are less effective. Open and laparoscopic ureterolithotomy, although less commonly performed today, remain valuable options in cases where minimally invasive methods fail or are contraindicated. This purpose was to evaluate the results of efficacy and safety ureteroscopic PL in treatment of ureteral calculus.

METHODS

The study was started in Department of Urology, Al-Diwanya Teaching Hospital Iraq from 15th August 2024 31st January 2025 vide letter 4545/QM/Approval/9389JFDNF dated August 11, 2024. A total of 100 patients with ureteral calculus >7 mm size were enrolled. Preoperative assessment was done in all patient by detailed history taking and thorough physical examination and routine investigations included urinalysis, complete blood counts, serum urea and creatinine. urinary tract infection was treated by antibiotics. X-ray of KUB, ultrasonography and CT KUB was done also for all patients to identify site, side and size of the stone. All the patients were receiving one gram intravenous ceftriaxone at the induction of anesthesia. Ureteroscopy was done under general anesthesia with dorsal lithotomy position in all patients, semirigid 9.5Fr (karlstorz) ureteroscope transurethrally used, the ureteroscope enter into the ureter through the ureteric orifice by the aid of flexible end guide wire 150 cm long and 0-038 inch in diameter with aid of compression of fluid bag. Ureteric orifice dilatation was not done by any method. When reaching the ureteral calculus Swiss pneumatic lithoclast applied on the calculus through single on multiple fire measures. Frequent tip of probe impaction over the calculus were leading to calculus destruction in small parts less than 3 mm that pass spontaneously. Insertion of JJ stent was done at the end of the operation and this stent was removed through 2-4 weeks under local anesthesia when ensure there was no residual calculus fragments. The data was entered and analyzed through SPSS-26.

RESULTS

The mean duration of hospitalization was 2.7 days. Seventy (70%) patients were discharged on first postoperative day. Ninety two patients had complete stone clearance within 2-4 weeks as manifest by KUB and/or ultrasonography. Five patients from those having upper ureteric stone had up migration of stone into the kidney. Those patients managed by JJ stent insertion and SWL that resulting in clearance of calculus. The major complication was ureteric perforation that occurs in the distal ureter in 2 patients and diagnosed intraoperatively at the time of procedure and these cases

were successfully managed by JJ stent placement and subsequently the stents were removed after six weeks. The other complications can be considered as minor complications and including postoperative self-limiting loin pain hematuria, and irritable bladder symptoms that treated conservatively (Tables 1-2).

Table No. 1: Demographic information of the patients (n=100)

Variable	No.	%
Gender		
Male	73	73.0
Female	27	27.0
Ureteric Stone		
Upper	12	12.0
Mid	23	23.0
Lower	65	65.0

Table No. 2: Descriptive statistics of the patients

Variable	Mean±SD
Age (years)	37±6.2
Stone size (mm)	13.47±2.01
Hospitalization (days)	2.7±2.24

DISCUSSION

The endourological treatment of ureteric stone is in continuous development, many types of intracorporeal lithotripters are presented now a day including electrohydraulic lithotripsy (EHL), Pneumatic ultrasonic, and LASER lithotripters.⁷ One of the most earlier intracorporeal lithotripter used for ureteric stone was EHL⁸, it works by bubble cavitation that lead to fragmentation of stone the stone fragmentation rate by EHL more than 90% had been reported.⁹

Using of ultrasound lithotripter that firstly described by Mulvaney the main disadvantages of this type of lithotripter is requirement of large and straight working channel diameter.¹⁰

The development of small-calibre ureteroscopes with active deflecting mechanisms and instrument channels, in combination with the development of laser technology, small-diameter laser fibres, and stone baskets and graspers, has opened the way for intracorporeal, endoscopic treatment of urinary stones.¹¹ Pneumatic lithotripsy success rate seems entitle more than ninety percent.^{6,7} In a large series reported by Puppo, the overall success rate was 93.6%.¹¹⁻¹³

In the present study, 92% success rate was observed that was in agreement with other studies.^{6,7} Five patients of those having upper ureteric stone had failed pneumatic lithotripsy because of up migration of these stone from the upper ureter to the kidney. The incidence of stone that reported was ranging from 2-3.8%.¹⁴⁻¹⁶

To avoid and prevent upper ureteric stone from retropulsion to the kidney during pneumatic lithotripsy several measures might be taking such as head

elevation of the operating table by 15-20 degree, using of low pressure of fluid, using of stone cone and Instillation of lidocaine jelly proximally to the stone.^{17,18}

There are many complications reported during using of pneumatic lithotripsy for ureteric such as injury to the ureteric mucosa (3.6%), ureteric perforation (0-4.7%), stricture (3.5%) ureteric avulsion (0.06-0.4%).¹⁹ Other complications include hematuria (1.2-7.3%), loin pain (18.4%) fever (5.3%) and urospepsis (1.8-3.0%).²⁰

This study showed that ureteric perforation occurred in two cases. In those two patients the stone was impacted at the distal ureter and this impaction of stone lead to weakening of the wall of the ureter and the perforation occurred during pneumatic lithotripsy because of difficult manipulation, insertion of JJ stent were done endoscopically in both patients. To prevent such complications, it is obligatory to never using or applying forces against resistance and the lumen of the ureter must be in view while advancing the ureteroscopy and safety guide wires must be used while crossing the curves, vessels and or kinking. At the end of the operation, JJ insertion routinely done in this study for all patients, and this will confirm flow of the urine from the kidney to the bladder without obstruction that might be occurred from the residual stone fragment and ureteral wall edema. Thus JJ stents were inserted to decrease the incidence of potential complications.

CONCLUSION

Ureteroscopic pneumatic lithotripsy is an effective device in clearing most of the lower and mid ureteric stone. Up migration of stone to the kidney may occur in patients with upper ureteric stone. Major complications can be considered as uncommon complications.

Author's Contribution:

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Drafting or Revising Critically:	Ahmed Abdul Ameer Alwan, Ali Obaid Ahmed
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REFERENCES

- Johri N, Cooper B, Robertson W, Choong S, Rickards D, Unwin R. An update and practical guide to renal stone management. *Nephron Clin Pract* 2010; 116:c159-71.
- Lopez M, Hoppe B. History, epidemiology and regional diversities of urolithiasis. *Pediatr Nephrol* 2010; 25:49-59.
- Griwan MS, Singh SK, Paul H, Pawar DS, Verma M. The efficacy of tamsulosin in lower ureteral calculi. *Urol Ann* 2010; 2:63-6.
- Ather MH, Nazim SM, Sulaiman MN. Efficacy of semirigid ureteroscopy with pneumatic lithotripsy for ureteral stone surface area of greater than 30 mm². *J Endourol* 2009; 23:619-22.
- Hong YK, Park DS. Ureteroscopic lithotripsy using Swiss Lithoclast for treatment of ureteral calculi: 12 years experience. *J Korean Med Sci* 2009; 24:690-4.
- Akhtar MS, Akhtar FK. Utility of the lithoclast in the treatment of upper, middle and lower ureteric calculi. *Surgeon* 2003; 1:144-8.
- Sozen S, Kupeli B, Tunc L, Senocak C, Alkibay T, Karaoglan U, et al. Management of ureteral stones with pneumatic lithotripsy: report of 500 patients. *J Endourol* 2003; 17:721-4.
- Tawfick ER. Treatment of large proximal ureteral stones: extra corporeal shock wave lithotripsy versus semi-rigid ureteroscope with lithoclast. *Int Arch Med* 2010; 3:3.
- Cho CO, Yu JH, Sung LH, Chung JY, Noh CH. Comparison of percutaneous nephrolithotomy using pneumatic lithotripsy (lithoclast®) alone or in combination with ultrasonic lithotripsy. *Korean J Urol* 2010; 51:783-7.
- Khan AA, Hussain SA, Khan NU, Majeed SMK, Sulaiman M. Safety and efficacy of ureteroscopic pneumatic lithotripsy. *JCPSP* 2011; 21(10): 616-9.
- Padhye AS, Yadav PB, Mahajan PM, Bhawe AA, Kshirsagar YB, Sovani YB, et al. Shock wave lithotripsy as a primary modality for treating upper ureteric stones: a 10-year experience. *Indian J Urol* 2008; 24:486-9.
- Bapat SS, Pai KV, Purnapatre SS, Yadav PB, Padhye AS. Comparison of holmium laser and pneumatic lithotripsy in managing upper-ureteral stones. *J Endourol* 2007; 21:1425-7.
- Shrestha B, Karki DV, Baidya JL. The outcome of pneumatic lithotripsy for the management of ureteric calculi. *Kathmandu Univ Med J* 2008; 6:355-60.
- Tunc L, Kupeli B, Senocak C, Alkibay T, Sozen S, Karaoglan U, et al. Pneumatic lithotripsy for large ureteral stones: is it the first line treatment? *Int Urol Nephrol* 2007; 39:759-64.
- Dretler SP. Prevention of retrograde stone migration during ureteroscopy. *Nat Clin Pract Urol* 2006; 3:60-1.

16. Kesler SS, Pierre SA, Brison DI, Preminger GM, Munver R. Use of the escape nitinol stone retrieval basket facilitates fragmentation and extraction of ureteral and renal calculi: a pilot study. *J Endourol* 2008; 22:1213-7.
17. Dirim A, Tekin MI, Aytekin C, Peskircioglu L, Boyvat F, Ozkardes H. Ureteroscopic treatment of proximal ureter stones with the aid of an antegrade occlusion balloon catheter. *Acta Radiol* 2006; 47:103-6.
18. Zehri AA, Ather MH, Siddiqui KM, Sulaiman MN. A randomized clinical trial of lidocaine jelly for prevention of inadvertent retrograde stone migration during pneumatic lithotripsy of ureteral stone. *J Urol* 2008; 180:966-8.
19. Gunlusoy B, Degirmenci T, Arslan M, Kozacioglu Z, Nergiz N, Minareci S, et al. Ureteroscopic pneumatic lithotripsy: is the location of the stone important in decision making? Analysis of 1296 patients. *J Endourol* 2008; 22:291-4.
20. Aridogan IA, Zeren S, Bayazit Y, Soyupak B, Doran S. Complications of pneumatic ureterolithotripsy in the early postoperative period. *J Endourol* 2005; 19:50-3.

The Role of the Family in Solving the Psychology and Behavioral Issues the Children Suffer from During Adolescence

Alya Khudhair Abas

Psychological
And Behavior
Disorders Among
Teenagers

ABSTRACT

Objective: To examine and contemplate the influence of parenting style in social and psychological development of the adolescents,

Study Design: Descriptive study

Place and Duration of Study: This study was conducted at the Department of Mental Health Nursing, College of Nursing, University of Al-Qadisiyah, Iraq from 1st February to 31st July 2024.

Methods: One hundred parents of adolescents as well as 10 psychologists of the age between 30 and 55 years were enrolled. There were also questionnaires analyzing behavioral problems and how well the family is able to handle these problems, as well as a psychologist based scale giving the contribution of the family in solving the problems.

Results: 72% of the parents are willing to communicate with their children to address their psychological needs, but only 59% demonstrate a reasonable level of knowledge of the needs, which means that there is a psychological blind spot. 68% of adolescents experience anxiety and stress, which points to psychological pressure in adolescence. 54% are socially isolated and this depicts poor social communication. 72% of parents are interested in improving the communication with their children. Nevertheless, negative behaviors are a challenge to 46% of families, and it is possible to conclude that a more effective parenting skill should be developed.

Conclusion: The family continues to be the most powerful consideration when it comes to influencing the psychological and social growth of the adolescents, especially at a time when such events cause rapid transformations and their vulnerability is at its highest.

Key Words: Family, Adolescents, Psychological issues, Behavioral issues

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INTRODUCTION

The family happens to be the initial institution that influences the values, character, and emotional stability of a child.¹ Parents pay much time and efforts to offer moral, psychological, and educational backgrounds to their children and see parenthood as the kind of trust that needs constant counsel and attention.¹ Mother, particularly during the early childhood days, is in the center stage of instilling emotional security as well as behavior modeling.

Being brought up in an atmosphere of morally supportive and love builds and reinforces values and stability in the children and morally corrupt

environments elevate chances of deviant or destructive behaviour.^{2,3}

The family role also increases at the adolescent stage, the stage that is characterized by intense physical, emotional and social transformations. The behavioral problems can be avoided by inculcating religious and moral values, encouraging the importance of prayer, reminding of God, and keeping an eye on peer relations, giving the adolescents a way to develop in a balanced manner. Family climate can be defined as the overall emotional and social atmosphere in the house, that is, its security, cooperation, roles, and satisfaction of the basic needs. It is a mirror of the relations in the family and creates the individual identity of a family.⁴

Ismail has given a high priority on the relationships between parents and children and has proven that insecurity, low self-confidence and social maladjustment occur due to the lack of affection between parents and children.

Mouna and Nina discovered that a good communication and parental engagement did positively affect the relationship between adolescents on one hand and strong friendships on the other hand, and parental neglect on the other hand is associated with delinquency, substance abuse, and poor social skills.³

Terminology study: Turn In language, the term turn and its derivations are applied to describe moving in a

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concave or a rotation around an axis. A motion in a circular direction is called a rotation. You may also say that I turned something around to mean that it moved in a circular manner or turned about. I turned it/ I rotated it/ I turned the object/ I turned the object itself.

In the social interaction perspective, it is considered to be a composite of roles acquired by an individual in the context of a social interaction scenario.⁵

In language the term family contains within it a variety of meanings concerning power and constraint, and Ibn Manzoor in his dictionary said that family is the invincible armor which offers defense, and the rope or shackle with which the prisoner is bound, and family of a man is his clan and his nearest relatives upon whom he draws strength and support, and thus the family is defined as people of a home of a man and his closer relatives.^{5,6}

The family within the terminological concept is the socially approved organization based on the authority and power it holds, which mainly comprises the married couple and children, and which may include other members of family members, the workers, or those under the care of the family, including the orphans, though they must all dwell under a single roof, and every member has developed rights and particular responsibilities according to the Shari'ah.⁷

It proves to be multifaceted and unclear. One of the problems is a series of intersecting events or facts. These are ambiguous so they cannot be easily solved unless one clearly understands the causes and the conditions under which they occur.⁸

Behavior is the action by which an organism reacts to the conditions of its environment that is symbolized by its constant attempt to modify or transform those conditions to better fit the needs of its own survival and continuance through time. The term adolescence is used linguistically to mean approaching and approaching the dream that is, an adolescent is a young individual who is approaching the maturity and completeness stage.^{9,10}

Adolescence is the period that starts at puberty and ends at adulthood, since puberty is the initial phase of this period, furthermore, it does not mark the end, since puberty is symbolized by physiological maturity and the maturation of organs and gonads, in the male case puberty is the time when the first ejaculation occurs, and in the female case the time when menstruation takes place, and other signs will be included such as the development of breasts, hair growth etc., in the male case testicular This research is meant to Learn the nature and qualities of adolescence. Determine biological changes that occur due to hormonal changes. Discover the role of family in the education of values and the guide to behavior. Recognize mental and behavioral issues typical of adolescents. And also to investigate the role played by the family in mitigating and altering these problems.

METHODS

This descriptive study was conducted at Department of Mental Health Nursing, College of Nursing, University of Al-Qadisiyah, Iraq from 1st February to 31st July 2024 vide letter No. 4545/QM/Approval/KDJFHHF32 dated January 11, 2024. How the family contributes to the psychological and behavioral problems of the adolescents by looking at the nature of these problems and the family strategy. The analysis of adolescence experiences and family reactions was selected by the descriptive-analytical approach. Some were tools used were questionnaires of the parents and adolescents and semi-structured interviews with social workers and psychologists. The population sample comprised of 100 parents, 100 adolescents and 10 specialists. The effectiveness of family interventions was measured, and behavioral and psychological problems among adolescents were identified by the help of the semi-structured questionnaire. Data were analyzed with the help of SPSS-26.

RESULTS

72% of the parents are willing to communicate with their children to address their psychological needs, but only 59% demonstrate a reasonable level of knowledge of the needs, which means that there is a psychological blind spot. Forty-six percent of families do not cope with negative behaviors, which is the manifestation of parenting problems. 35% engaging in psychological counseling is an indication of not knowing the importance of professional assistance when dealing with issues (Table 1). 68% of adolescents experience anxiety and stress, which points to psychological pressure in adolescence. The findings revealed that 54% of them are socially isolated and this depicts poor social communication. Also, behavioral problems like stubbornness and anger arose in 41% and 33 percent gave report of constant family feuds in their families meaning that there are difficulties when communicating with their children (Table 2). Adolescence is the stage in which adolescents build their independent personality and that the traits that characterize this stage may be shared by the majority of adolescent children.

Table No. 1: Evaluating the role of the family from the parents' point of view

Type of family behaviour	No.	%
Constant communication with children	72	72.0
Understanding children's psychological needs	59	59.0
Difficulty dealing with negative behaviours	46	46.0
Seek the help of a psychologist if needed	35	35.0

The family is a key to treating the psychological and behavioral problems of the adolescents, decreasing their isolations and stress. 72 percent of parents are interested in improving the communication with their children. Nevertheless, negative behaviors are a challenge to 46% of families, and it is possible to conclude that a more effective parenting skill should be developed. They would only consult a psychologist when the need arises with just 35% showing their lack of knowledge on the need of professional assistance (Table 3). The level of family awareness of the importance and seriousness of the adolescent stage, as

well as the cultural and social awareness of parents, greatly influences the ability to overcome some of the issues prevalent in this stage. The strong positive correlation between family support and reduced psychological issues in adolescents, with a correlation coefficient of 0.62 and statistically significant at the 0.01 level was showed. This shows that enhancing family support significantly helps in reducing adolescent psychological issues, with a correlation coefficient of 0.62 and statistically significant at the 0.01 level.

Table No. 2: A survey on some of the behavioral and psychological issues faced by adolescents

Variable	Most of the time	Always	Sometimes	In some situations	Never
Behavioral issues					
Steals	12	13	13	45	17
Lies	38	12	25	12	13
Betrays honesty	12	18	41	9	10
Social issues					
Stubborn	23	37	14	16	10
Uncooperative	13	14	33	23	17
Isolates from others	10	23	27	19	21
Refuses to obey orders	15	25	28	12	20
Fighting with his siblings	25	19	21	15	20
Psychological issues					
Sad	19	21	30	15	15
Crying	12	18	25	15	30
Afraid of people	9	11	42	33	5
Seems a little insecure	14	16	28	22	20
Jealous of his siblings	22	24	38	10	16

Table No. 3: Measuring the effectiveness of the family in solving some behavioral and psychological issues

Variable	Most of the time	Always	Sometimes	In some situations	Never
Behavioral issues					
I make my son feel my intense hatred of lying	3	7	25	55	10
Showing my son why I don't like lying	18	38	24	9	11
I reward him for being honest and admitting he's wrong	26	33	25	26	-
I'm looking for the reasons why my son lied	19	31	35	25	-
Address the reasons why my son lied	22	28	22	15	3
Social issues					
I ask my son to put back what doesn't belong to him	42	28	16	14	-
Respect my son's property	28	32	22	18	-
Addressing my son's impulses to steal	32	33	25	10	-
I avoid meddling in disputes between my children	36	24	22	18	-
I play the role of a fair judge	42	28	22	8	-
Teach my children problem-solving skills	34	36	19	21	-
I use the principle of fairness when resolving conflicts between my children	38	32	23	17	-
Psychological issues					
Continue to encourage my son to socialize	43	37	11	9	-

with others					
Coaching my son on communication skills	33	27	23	17	-
Emotional warmth in the home environment	34	26	22	18	-
I punish right when you're being stubborn	33	27	23	17	-
I use persuasive dialog	36	24	22	18	-
I explain the strange thing that usually causes fear	28	32	27	13	-
Preparing my son to express his emotions	22	38	25	15	-
I encourage my son to participate in social activities	38	21	26	15	-
Encouraging my son's self-confidence	39	21	23	17	-

DISCUSSION

The immense effects of the family and social dimension on the adolescent children, this study revealed that the family and social dimension influences the passage of adolescence in children significantly. This finding concurs with the findings of the study by Dotterer⁵, which indicated that significant relationships existed between the family and social dimension and certain social and psychological problems experienced by adolescent children, and the researcher holds the view that there is a reasonable evidence that any environmental factors may trigger some behavioral problems and such events tend to accumulate over time until certain behavioral and psychological problems are manifested among adolescent children.^{11,12}

It is important in the given situation and the numerous problems youth is experiencing at this critical period of their lives. It is the critical period in the life of a human being, and the social processes and continuous communication with the environment become particularly important at this stage to influence the psychosocial development of a person.^{13,14} The paper, therefore, takes an in-depth analysis of the study results, showing that the relationship between the parenting style of parents and the harmonious social development of adolescents is very close, and determining the factors that influence it and how the capacity of young individuals to address the challenges they can face in a positive and effective manner can be enhanced and the parenting style and its influence on social characteristics of adolescents. The findings depicted that parenting style plays an important role in developing the social characteristics of adolescents. In the new study, the types of parenting styles may be divided into the primary: Balanced upbringing: These families understand how to be firm and flexible at the same time when working with their children, enabling teenagers to acquire better social competence. Such a strategy promotes their independence and makes sure that they do not neglect the family values and proper guidance. Harsh parenting: This parenting is typified by rigorous and overboard treatment of the children, which leads to the development of social and emotional problems in adolescents, including the social isolation

and inability to develop healthy relationships in a social environment. This negative influence was obviously established.

Pedagogical approaches and their effect on social interaction, whether improving or diminishing: The research underlined the fact that parenting had a direct influence on the degree of social interaction among adolescents. It was discovered that in families of open communication style, children have been able to develop a wider expression and become more active in social activities. It is a method that helps the adolescents to have social skills that can cause them to easily fit in various settings, be it in education or in social set-ups.^{15,16}

Conversely, the research indicates that parenting styles based on harsh disciplinary and enforcing extreme limits on the child may cause psychological problems in the adolescent regarding socialization. Their inability to internalize social boundaries may make them unable to establish balanced and productive relationships with their peers. The emotional parenting is very crucial in enhancing self-confidence among the teenagers. The findings revealed that teenagers who had experienced the childhood in a family that stressed emotional support and actively and emphatically addressed their needs during their childhood acquired more favorable social encounter opportunities. This positive atmosphere usually is converted to high self confidence among these teens and this helps them to develop effective and enduring social connections. The factors of influence on social development as family interaction and effective communication: The results indicate that successful and good family interaction is one of the major aspects of greatly contributing to the social development of the adolescents. The adolescents, having been raised in family backgrounds, which allow them a real space to engage themselves in the process of decision making in the family, besides discussing a number of social and emotional concerns openly and frankly, have better skills in forming constructive relationships with their peers, and can integrate into the society in a more balanced and stable way.^{15,16}

CONCLUSION

The family continues to be the most powerful consideration when it comes to influencing the psychological and social growth of the adolescents, especially at a time when such events cause rapid transformations and their vulnerability is at its highest. Parenting style, emotional support and good communication played a instrumental role in creating positive social characteristics, self-confidence and capacity to establish positive relations with peers. The manner of balanced parenting involving warmth and reasonable structure is also a factor that enhances resilience in the adolescents whereas harsh and restrictive parenting was linked to greater emotional and behavioral problems and the value of open communication within the family that improves the capacity to overcome obstacles and socialize among adolescents. The manifestations of these findings include the suggestion of the study to reinforce family communication patterns, to integrate the counseling programs and emotional-intelligence training into schools, to enhance the psychological awareness of adolescents and to create the supportive media content that fosters the mental health. Moreover, the importance of the availability of a psychological service, cross-sector coordination of families, schools, and community institutions, and the enhanced understanding of the importance of balanced parenting in raising socially competent and emotionally stable adolescents.

Author's Contribution:

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Final Approval of version:	The above author
Agreement to accountable for all aspects of work:	The above author

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REFERENCES

- Al-Ezza SH. Family counseling theories and therapeutic methods. 1st Ed. Jordan: Dar Al-Thulafa 2000; 23.
- Ahmed AFAS. The role of Islamic education in modifying some wrong behaviors in the Muslim family. J Faculty Educ Al-Azhar Univ 2020; 175(III): 416.
- Kafafi A. Communication and interaction skills in the teaching and learning processes. 1st Ed. Jordan: Dar Al-Fikr 2003; 56.
- Al-Mamari BNS. Adolescents' attachment to their friends and its relationship with adolescent gender, age, self-esteem and parental treatment. Faculty of Education Ibn Rushd, University of Baghdad, 2000; 20.
- Rashwan HAH. Family and society: A study in family sociology. Egypt: University Youth Foundation 2003; 20.
- Li JB, Willems YE, Stok FM, Deković M, Bartels M, Finkenauer C. Parenting and self-control across early to late adolescence: a three-level meta-analysis. Perspectives Psychol Sci 2019; 14(6): 967-1005.
- Baardstu S, Karevold EB, Soest TV. Childhood antecedents of agreeableness: a longitudinal study from preschool to late adolescence. J Res Personality 2016; 67: 202-14.
- Mounts D, Nina S. Adolescents' perceptions of parental management of peer relationships in an ethnically diverse sample. J Adolescent Res 2004; 19(4): 446-67.
- Dotterer AM, Wehrspann E. Parent involvement and academic outcomes among urban adolescents: examining the role of school engagement. Educa Psychol 2016; 36(4): 151.
- Dotterer AM. Parental involvement and adolescent psychosocial outcomes: Exploring the role of parenting practices. J Youth Adolescence 2016; 45(6): 1053-67.
- Escamilla I, Juan N, Benito A, Castellano-García F, Rodríguez-Ruiz F, Haro G. Substance Addiction in Adolescents: Influence of Parenting and Personality Traits. Brain Sci 2024;14(5):449.
- Steinberg L. We know some things: Parent - adolescent relationships in retrospect and prospect. Journal of Research on Adolescence 2001; 11(1): 1-9.
- Pena JV, Menendez CR, Torio S. Family and socialization process: Parental perception and evaluation of their children's household labor. JSTOR 2010; 41(1): 131-48.
- Mounts NS. Parental management of adolescent peer relationships: A contextual perspective. J Adolescent Res 2002; 17(4): 323-46.
- Bronfenbrenner U. The Ecology of Human Development: Experiments by Nature and Design. Harvard University Press; 2009.p.19.
- Smetana JG. Adolescents, families, and social development: How teens construct their worlds. London: Wiley-Blackwell; 2011.p.19.

Prevalence and Clinical Implications of Helicobacter Pylori Infection in Dyspepsia Patients: A Cross-Sectional Study

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ABSTRACT

Objective: To determine the prevalence of *H. pylori* infection among patients presenting with dyspepsia and to describe their demographic and clinical characteristics.

Study Design: Descriptive cross-sectional study

Place and Duration of Study: This study was conducted at the outpatient department of Saidu Teaching Hospital from October 9, 2021, to April 9, 2022.

Methods: A total of 179 consecutive patients with dyspeptic symptoms were enrolled using non-probability consecutive sampling. Demographic data, socioeconomic status, comorbidities, smoking history, and anthropometric measurements were recorded.

Results: The mean age of participants was 34.1 ± 8.9 years. Males constituted 64.2%, while females accounted for 35.8%. Most patients (62%) resided in urban areas. Smoking was reported in 17.3%, and 34.1% belonged to low socioeconomic status. Diabetes mellitus was present in 22.9% of cases. The mean body mass index was 25.9 ± 3.8 kg/m², with 15.1% classified as obese. *H. pylori* infection was detected in 49.7% of patients.

Conclusion: Nearly half of dyspeptic patients were infected with *H. pylori*, indicating a substantial disease burden in this population.

Key Words: Dyspepsia, Helicobacter pylori, prevalence, gastritis, peptic ulcer disease, Pakistan

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INTRODUCTION

Dyspepsia, commonly characterized by epigastric pain, is associated with various symptoms such as early satiety, epigastric burning, and discomfort following meals. The underlying causes of dyspepsia are diverse, with gastroesophageal conditions, particularly peptic ulcers and gastroesophageal reflux disease (GERD), being the most prevalent. Helicobacter pylori (*H. pylori*) gastritis is recognized as one of the primary etiological factors in dyspepsia¹. *H. pylori* is the most widespread chronic bacterial infection in humans², affecting individuals globally, regardless of age. It is estimated that approximately 50% of the world's population is infected, with higher rates of infection

occurring in developing countries, typically acquired at a younger age. In these regions, the prevalence in adults can exceed 80% by the age of 50 years³. *H. pylori* infection is closely associated with a range of significant upper gastrointestinal disorders, including chronic gastritis, peptic ulcer disease, and gastric malignancy. The incidence of *H. pylori* infection is strongly influenced by socioeconomic factors, explaining its higher prevalence in developing nations compared to developed countries like the United States⁴. *H. pylori* is a microaerophilic, gram-negative bacterium with a distinctive spiral shape. Its primary sites of infection are the stomach and duodenum. Biochemically, it is characterized by catalase, oxidase, and urease activity, with urease playing a central role in both the bacterium's survival and its ability to colonize the gastric mucosa. Urease, which constitutes more than 5% of the bacterium's total protein content, is critical for its pathogenicity and serves as the basis for several diagnostic tests, both invasive and non-invasive, used to detect *H. pylori* infection⁵. The mode of transmission of *H. pylori* remains uncertain, though current evidence suggests that the bacterium is primarily transmitted from person to person via oral-oral or fecal-oral routes⁶. Humans are the primary reservoir for the infection. The clinical consequences of *H. pylori* infection are significant, as it is associated with chronic gastritis, gastric mucosal atrophy, peptic ulcers, mucosa-

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associated lymphoid tissue (MALT) lymphoma, and gastric cancer (GC). Approximately 20% of individuals infected with *H. pylori* develop precancerous lesions, though only 2% ultimately progress to gastric cancer. The development of gastric cancer is influenced by various factors, including host genetic predisposition, environmental conditions, and the virulence of the infecting *H. pylori* strain^{7,8}. While primary care physicians are generally trained in the diagnosis and management of *H. pylori* infection through various educational programs⁹, surveys have indicated that their understanding of the bacterium's pathophysiology, diagnostic approaches, and therapeutic options remains inconsistent.

METHODS

This study was a descriptive cross-sectional analysis aimed at evaluating the prevalence of *Helicobacter pylori* (*H. pylori*) infection among patients presenting with dyspepsia. The study was conducted from October 9, 2021, to April 9, 2022, at the outpatient department (OPD) of Saidu Teaching Hospital, Swat. A non-probability consecutive sampling technique was employed for patient selection. The sample size for this study was calculated using Daniel's formula for health sciences research, considering an expected prevalence of *H. pylori* infection of 65% among dyspeptic patients. Based on this prevalence, the calculated minimum sample size was 179 participants, which was sufficient to provide meaningful statistical power for the analysis.

Inclusion Criteria: The study included patients aged between 18 to 50 years, both male and female, who were diagnosed with dyspepsia according to standard clinical definitions. Dyspepsia was characterized by epigastric pain, discomfort, or a feeling of fullness after meals, without any obvious structural, organic, or systemic pathology identified in routine clinical assessments.

Exclusion Criteria: Patients were excluded from the study if they had a history of significant comorbid conditions such as chronic liver disease, upper gastrointestinal bleeding, hepatic encephalopathy, pancreatic disease, gallbladder disease, or any serious concurrent illnesses that could affect the study outcomes.

Data Collection: The study protocol was approved by both the CPSP (College of Physicians and Surgeons Pakistan) and the hospital's ethical review committee, ensuring that all ethical guidelines were followed. Informed consent was obtained from all participants after they were fully briefed on the study's objectives, procedures, and potential risks. Each participant underwent a detailed history-taking process and a clinical examination. This included gathering demographic data such as age, gender, and socioeconomic status (SES), as well as lifestyle factors like smoking status and body mass index (BMI). Blood

samples were collected from each participant for *H. pylori* detection using enzyme-linked immunosorbent assay (ELISA), a widely used and reliable method for diagnosing *H. pylori* infection. All data were meticulously recorded in a pre-designed proforma to ensure uniformity and consistency across the study.

Data Analysis: The collected data were analyzed using MS excel version 2016. Descriptive statistical methods were employed to summarize the demographic and clinical characteristics of the study sample. Categorical variables, including gender, educational status, and *H. pylori* positivity, were expressed as frequencies and percentages. For continuous variables such as age and BMI, the data were analyzed using stratification by key factors such as gender, smoking status, SES, and other relevant variables.

RESULTS

The largest portion of the sample, 41.3%, fell within the 20-30 years' age group (Figure 1). This suggests that the study was predominantly composed of younger participants, reflecting either a younger population in the healthcare setting or an increased prevalence of dyspepsia in this age group. Following this, 33.5% of the participants were in the 30-40 years' age range, with 25.1% being in the 40-50 years' group.

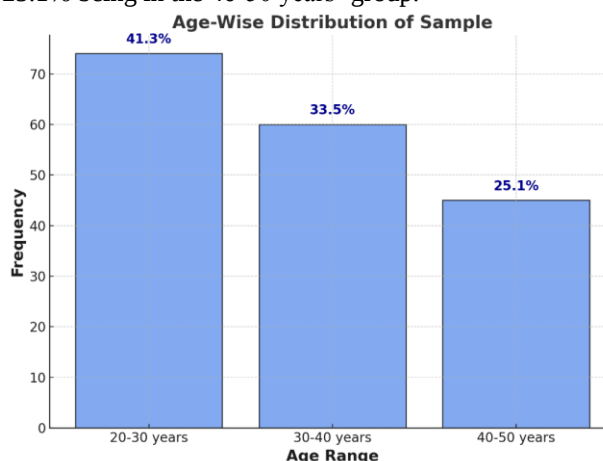


Figure.No.1. Age-wise distribution of the sample, showing the highest frequency in the 20-30 years' age group (41.3%), followed by the 30-40 years' group (33.5%), and the lowest in the 40-50 years range (25.1%).

The gender distribution of the sample revealed a significant male predominance, with 64.2% of the participants being male and 35.8% female (Figure 2). This suggests a skewed gender representation, which could reflect the general demographics of dyspepsia patients in the population sampled, or a trend within the healthcare setting.

The residence distribution of the sample showed that 62.0% of participants were from urban areas, while 38.0% were from rural areas (Figure 3). This urban-rural divide may be indicative of a broader trend where individuals from urban areas have easier access to

healthcare facilities, possibly leading to higher rates of diagnosis or treatment for dyspepsia.

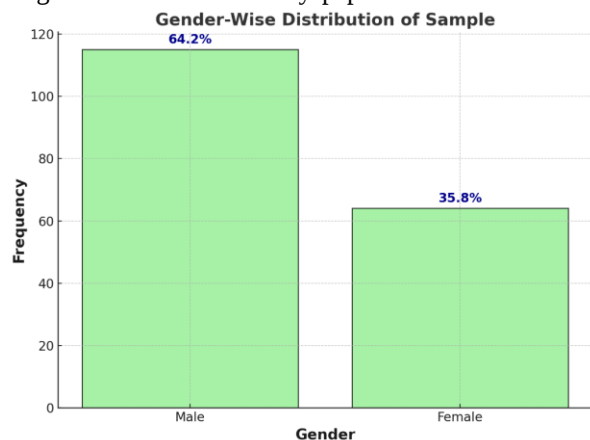


Figure.No.2: Gender-wise distribution of the sample, with a majority of males (64.2%) compared to females (35.8%).

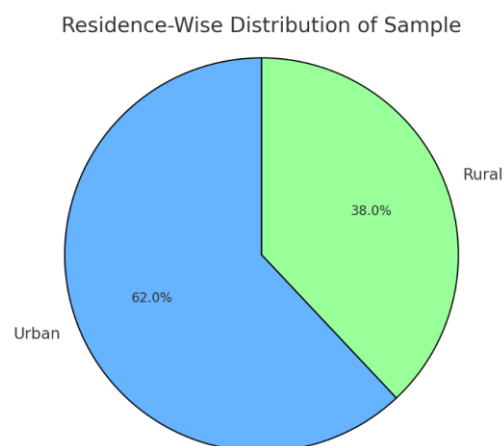


Figure.No.3: Residence-wise distribution of the sample, with 62.0% of participants residing in urban areas and 38.0% in rural areas

The distribution of participants by **socioeconomic status (SES)** showed that 52.0% of the sample came from the middle SES group, followed by 34.1% from the low SES group, and 14.0% from the high SES group (Table 1). This distribution indicates that most participants were from a middle-income background, which could have various implications.

Table No. 1: SES-Wise Distribution of Sample (n=179)

SES	Frequency	Percent
Low	61	34.1%
Middle	93	52.0%
High	25	14.0%
Total	179	100%

The sample's diabetes status revealed that the majority of participants (77.1%) were non-diabetic, while 22.9% had diabetes (Table 2). This distribution is relevant

because diabetes can affect the gastrointestinal system and may contribute to the development of dyspepsia.

Table No. 2: DM-Wise Distribution of Sample (n=179)

DM	Frequency	Percent
Yes	41	22.9%
No	138	77.1%
Total	179	100%

DISCUSSION

The results of this study provide important insights into the prevalence of *H. pylori* infection and its associations with various factors, shedding light on its implications for gastrointestinal health. The findings reflect patterns that are consistent with broader trends observed globally while also highlighting unique features of the sample population. In terms of age, the study found the highest prevalence of *H. pylori* infection among participants aged 41-60 years, with 38.7% testing positive for the infection. This aligns with previous studies that show middle-aged individuals tend to have the highest rates of *H. pylori* infection, likely due to the cumulative effect of ongoing exposure over time. The prevalence in this age group was notably higher than that in individuals over 60 years (19.5%), which supports the idea that *H. pylori* infection tends to accumulate as people age, with infections commonly acquired during early adulthood. These findings are consistent with studies conducted in regions like Nigeria, where the highest rates of *H. pylori* infection are also observed in the fourth and fifth decades of life^{10,11}. Regarding gender, the study revealed a significant male predominance, with 64.2% of participants being male. This trend might suggest gender-based differences in *H. pylori* prevalence, as several studies indicate that lifestyle factors, such as dietary habits, smoking, and alcohol consumption, could contribute to higher rates of infection in men. However, it is worth noting that while this study found no significant gender differences, other research has highlighted that females might be at greater risk for developing gastric cancer as a result of *H. pylori* infection, which further complicates the relationship between gender and infection outcomes¹². This calls for further investigation into gender-specific factors that could influence the clinical outcomes of *H. pylori* infections. The study also explored the relationship between *H. pylori* infection and socioeconomic status (SES), finding that the majority of participants (52%) came from middle-income backgrounds, followed by 34.1% from lower-income groups. This distribution is consistent with the well-established link between low SES and higher rates of *H. pylori* infection. Individuals

from lower SES groups often live in overcrowded conditions with limited access to sanitation and healthcare, which increases their exposure to the bacteria. Additionally, urban participants (62%) were more represented in this study, which may reflect better access to healthcare and diagnostic services in urban areas. As urbanization has been associated with improved hygiene and greater healthcare accessibility, these factors could be contributing to the observed patterns of *H. pylori* prevalence¹³. Smoking habits were also assessed in this study, and it was found that a large proportion of participants (82.7%) were non-smokers. Smoking is a well-established risk factor for gastrointestinal diseases, including *H. pylori* infection, as it exacerbates symptoms and weakens the stomach's protective mechanisms. The relatively low prevalence of smoking in this sample suggests that other lifestyle factors, such as diet and healthcare access, may be more influential in the development and prevalence of *H. pylori* infection in this population¹⁴. While smoking may not have been a predominant factor in this study, its role as an exacerbating factor for *H. pylori* and other gastrointestinal conditions should not be overlooked in future research. In terms of Body Mass Index (BMI), the study found that most participants (39.1%) had a normal BMI, while 29.6% were overweight and 15.1% were obese¹⁵. Obesity has been shown to contribute to several gastrointestinal disorders, and it is plausible that overweight and obese individuals may be more susceptible to *H. pylori* infection due to factors like altered gastric acid secretion¹⁶⁻¹⁸. The findings of this study suggest that while BMI was not a primary factor in *H. pylori* prevalence, its potential role in influencing gastrointestinal health outcomes, particularly in the context of infection, warrants further investigation.

CONCLUSION

Helicobacter pylori infection is a prevalent and significant health concern among patients with dyspepsia, affecting individuals across a broad spectrum of age groups, genders, and socioeconomic statuses. The high prevalence of this infection underscores its importance in the pathophysiology of dyspepsia and related gastrointestinal disorders. Given the widespread nature of *H. pylori* infection in our population, it is crucial to conduct further research to identify the underlying risk factors contributing to this burden. Understanding these factors will be pivotal in developing targeted interventions and refining clinical strategies for the prevention, diagnosis, and management of *H. pylori*-related diseases.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Fakhrealam, Abdul Jabbar, Sajid Khan
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Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

1. Vakil NB, Halling K, Becher A, Rydén A. Systematic review of patient-reported outcome instruments for gastroesophageal reflux disease symptoms. *Eur J Gastroenterol Hepatol* 2013;25(1):2–14.
2. Suerbaum S, Michetti P. *Helicobacter pylori* infection. *New Engl J Med* 2002;347(15):1175–1186.
3. Peura DA, Crowe SE. *Helicobacter pylori*. In: Feldman M, Friedman LS, Brandt LJ, editors. *Sleisenger and Fordtran's gastrointestinal and liver disease: Pathophysiology, diagnosis, management*. 2nd ed. Saunders Elsevier; 2010.p.833–839.
4. Narayanan M, Reddy KM, Marsicano E. Peptic ulcer disease and *Helicobacter pylori* infection. *Missouri Med* 2018;115(3):219–224.
5. Muzahed. *Helicobacter pylori* oncogenicity: Mechanism, prevention, and risk factors. *Science World J* 2020; 3018326:1–10.
6. Bello AK, Umar AB, Borodo MM. Prevalence and risk factors for *Helicobacter pylori* infection in gastroduodenal diseases in Kano, Nigeria. *Afri J Med Health Sci* 2018;17(1):41–46.
7. Agah S, Khedmat H, Ghamar-Chehred ME, Hadi R, Aghaei A. Female gender and *Helicobacter pylori* infection, the most important predisposition factors in a cohort of gastric cancer: A longitudinal study. *Caspian J Int Med* 2016;7(3):136–141.
8. Ishaq S, Nunn L. *Helicobacter pylori* and gastric cancer: A state of the art review. *Gastroenterol Hepatol Bed from Bench* 2015;8(S6–S14).
9. Kooffreh-Ada M, Okonkwo U, Ugbong E, Essien A, Chukwudike E, Edogiawerie D, et al. Prevalence of *Helicobacter pylori* infection among dyspepsia patients in Calabar. *Global J Pure Applied Sci* 2019;25:145–151.
10. Agah S, Khedmat H, Ghamar-Chehred ME, Hadi R, Aghaei A. Female gender and *Helicobacter pylori* infection, the most important predisposition factors in a cohort of gastric cancer: A longitudinal study. *Caspian J Internal Med* 2016;7(2):136.
11. Wu Y, Zeng H, Zhang M, Li C, Tang Y, Li X, Zhang X. Sex-specific risk factors associated with *Helicobacter pylori* infection among individuals

- undergoing health examinations in China. *Int J General Med* 2022;5861-5868.
12. Butt J, Varga MG, Wang T, Tsugane S, Shimazu T, Zheng W, Epplein M. Smoking, *Helicobacter pylori* serology, and gastric cancer risk in prospective studies from China, Japan, and Korea. *Cancer Prevention Res* 2019;12(10): 667-674.
 13. Hishida A, Matsuo K, Goto Y, Naito M, Wakai K, Tajima K, et al. Smoking behavior and risk of *Helicobacter pylori* infection, gastric atrophy and gastric cancer in Japanese. *Asian Pac J Cancer Prev* 2010;11(3):669-673.
 14. Oluyemi A, Anomneze E, Smith S, et al. Influence of *Helicobacter pylori* infection on the prevalence and patterns of upper gastrointestinal symptoms in Nigerians with diabetes mellitus. *Niger J Clin Pract* 2017;20:188–193.
 15. Soboka M, Gudina EK, Gashaw M, Amare H, Berhane M, Desalegn H, et al. Depression among people with dyspepsia and *H. pylori* infection: A community based cross-sectional study in Ethiopia. *PLoS One* 2022;17(10):e0275424.
 16. Kouitcheu Mabeku LB, Noundjeu Ngamga ML, Leundji H. Potential risk factors and prevalence of *Helicobacter pylori* infection among adult patients with dyspepsia symptoms in Cameroon. *BMC Infect Dis* 2018;18(1):278.
 17. Corojan AL, Dumitraşcu DL, Ciobanca P, Leucuta DC. Prevalence of *Helicobacter pylori* infection among dyspeptic patients in Northwestern Romania: A decreasing epidemiological trend in the last 30 years. *Exp Ther Med* 2020;20(4): 3488-3492.
 18. Looor A, Dumitrascu DL, Surdea-Blaga T, Leucuta DC, David L. *Helicobacter pylori* infection and positive Rome IV criteria for functional dyspepsia in Romanian medical students. *J Med Life* 2021; 14(4):492-497.

Exploring the Relationship Between Reading Sources and Grade Point Average Among Medical Students in King Khalid University, Saudi Arabia

Abdullah Raizah¹ and Turki Ahmed Alqahtani²

ABSTRACT

Objective: To determine which reading materials may have affected medical students' learning commitments as indicated by their changes in GPA.

Study Design: Cross-sectional institutional-based observational study

Place and Duration of Study: This study was conducted at the Orthopedic Department, College of Medicine, King Khalid University, Abha, Saudi Arabia from January 2025 to June 2025.

Methods: This study targeting male and female clinical-year medical students at King Khaled University, Saudi Arabia, excluding those in their preparatory year. The research utilized a structured 21-question online survey (via Google forms) to investigate the potential impact of different reading sources on students' academic performance, as measured by their GPA.

Results: The study involved 241 medical students, with a slight female majority (51%) and most participants in their fifth year (30.7%). While 50.6% relied on lectures as their primary resource, only a small percentage used AI tools like ChatGPT (2.5%) or scientific literature (2.1%). Most students (79.3%) believed additional resources were necessary for good grades, and 62.7% found medical websites helpful. High GPAs were strongly linked to reading scientific books (80%), whereas low GPAs were common among those relying solely on lectures (69.8%).

Conclusion: The evaluation highlights students' struggle to effectively integrate diverse resources into their studies, as evidenced by the minimal impact of reading medical literature on GPA.

Key Words: Reading sources, GPA, Medical students, Academic achievement

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INTRODUCTION

The abundance of medical information resources has increased over the past ten years as a result of extensive medical research. As a result, medical students now face the difficulty of figuring out the most efficient method of learning outside of traditional curricula because of the growing availability of online educational resources. The concept of autonomous learning is also being embraced in medical education, where students design their own study schedules that include resource selection and feedback use in order to achieve their educational goals.

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Indeed, a variety of study resources, including textbooks, booklets, and lecture notes, are available to medical students¹. Medical students usually use additional resources as part of their study strategy in addition to the ones that their instructors supply in their academic courses. They might use, for instance, online books, scientific medical websites, scientific medical articles and journals, internet search engines like Google, artificial intelligence technologies like ChatGPT, and external resources from the internet, such as board preparation supplies. Strong reading habits, which are essential for success in the medical field, can be encouraged by easily accessible resources². As previously stated, the goal of medical college curricula and examinations is to enhance students' clinical interpretation abilities and study habits. A student's attitude and approach to learning, including their study habits and resource choices, have been shown to have a major impact on their professional achievement. Medical students show doubt about the lecture material's suitability for achieving high grades and believe that more resources are needed³. The grade point average (GPA) is a well-known measure that is used to support a number of learning topics, ranging from national education policy

to individual student accomplishment. The necessity to create a system that was transferable and understood by institutions in order to measure student progress in an ordinal fashion served as the basis for the creation of these grading measures^{4,5}. Grade point averages (GPAs) are used to inform and guide assessments in numerous fields of education, including college admissions decisions. Furthermore, there is a chance that making GPA a commodity that grants access to academic opportunities could influence students' learning strategies in an effort to compete with other students. Policymakers assume that GPA offers an objective metric that can predict academic preparation and, consequently, examination achievement. However, the study found that using GPA as a criterion can influence student-learning behavior⁶. There is no doubt that medical students in Saudi Arabia have unprecedented access to a wide range of educational resources; yet it is still not entirely known how these resources are used, how they differ within educational cohorts, or how they relate to academic achievement.

METHODS

This cross-sectional, questionnaire-based study was conducted at King Khalid University, Saudi Arabia. A total of 241 medical students (118 male and 123 female) from various clinical years were included, selected from the 660 students enrolled in the college. Students from first to sixth year participated, with representation ranging from 0.41% in first year to 30.71% in fifth year. Academic performance was evaluated using GPA, categorized as low (<4.5) and high (≥ 4.5), along with measures of reading frequency and academic achievement.

Data Collection: Data were collected using a structured 21-item online questionnaire developed through Google Forms. The tool covered demographics, GPA, academic performance, study habits, access to

educational resources, and frequency of reading scientific literature. The questionnaire underwent face and content validation by faculty and students. Multiple-choice items utilized Likert-type responses and allowed multiple selections to optimize response rates. Confidentiality of participants was ensured.

Statistical Analysis: Data were analyzed using IBM SPSS version 25. Frequencies and percentages were generated for categorical variables. Associations between variables were examined using Chi-square or Fisher's exact tests, with $p < 0.05$ considered statistically significant.

RESULTS

Over half of the students relied mainly on lectures (50.6%), while only a small proportion used scientific books or AI tools alone. Many students preferred mixed learning resources, combining lectures with medical websites, Google searches, journals, and AI. Most students rated their academic achievement from reading books as average, and reading frequency was low, with 63.4% reading non-periodically and 22.0% never reading medical books. A large majority (79.3%) believed lectures alone were insufficient for full marks. Motivation from coordinators varied, scientific websites were viewed as highly effective by 62.7% of students, and only one-third benefitted from journals. More than half (57.5%) studied three hours or more per day (Table 1).

Table 2 shows that GPA was significantly influenced by several study behaviors. The primary study source had a significant association with GPA ($p = 0.048$), with higher GPA more common among students using diverse resources rather than lectures alone. Reading frequency of medical books ($p = 0.01$), daily study duration ($p = 0.008$), and availability of books in the college library ($p = 0.035$) were also significantly linked with higher GPA.

Table No.1: Characteristic of study population.

	Answers	Count (%)
The primary source you rely on in your study	Lectures	122 (50.6%)
	Scientific books	5(2.1%)
	Artificial intelligence tools such as ChatGPT	6(2.5%)
	Lectures and scientific books	2 (0.8%)
	Lectures, scientific books, scientific medical websites, scientific medical articles and journals	6 (2.5%)
	Lectures, scientific books, scientific medical websites, scientific medical articles and journals, Internet search sites such as Google, and artificial intelligence tools such as ChatGPT	27 (11.2%)
	Lectures, scientific medical websites, and Internet search sites such as Google	18 (7.5%)
	Lectures, scientific medical websites, Internet search sites such as Google, and artificial intelligence tools such as ChatGPT	47 (19.5%)
	Scientific medical websites and Internet search sites such as Google	8 (3.3%)

How do you evaluate your academic achievement when reading medical scientific books?	1	50 (20.7%)
	2	77 (32.0%)
	3	70 (29.0%)
	4	31 (12.9%)
	5	13 (5.4%)
How much time do you spend reading scientific medical books?	Per day	11 (4.6%)
	Per week	24 (10.0%)
	Non-periodic	153 (63.4%)
	Never read it	53 (22.0%)
Do you think that what is given in the lectures is enough to get full marks in the tests?	Yes	50 (20.7%)
	No	191 (79.3%)
Do you find continuous motivation and guidance from the subject coordinators in order to benefit from the medical books?	Yes	53(22.0%)
	No	79(32.8%)
	Sometimes	109 (45.2%)
Do you find scientific medical websites more effective and of higher quality in presenting scientific material?	Yes	151 (62.7%)
	No	25 (10.40%)
	Sometimes	65 (27.0%)
Do you benefit from medical journals and published scientific articles in your academic achievement?	Yes	53 (22.0%)
	No	106 (44.0%)
	Sometimes	82 (34.0%)
How much time do you spend studying daily?	An hour or less per day	51 (21.2%)
	Two hours per day	51 (21.2%)
	3 hours or more	139 (57.5%)

Table No.2: The relationship between the source of knowledge and the GPA level

	Answers categories	Overall GPA		P-value
		Low GPA	High GPA	
The primary source you rely on in your study Lectures Scientific books	Lectures	81 (69.8%)	35 (30.2%)	0.048*
	Scientific books	1 (20.00%)	4(80.0%)	
	Artificial intelligence tools such as ChatGPT	4 (66.7%)	2 (33.3%)	
	Lectures and scientific books	1 (33.3%)	2 (66.7%)	
	Lectures, scientific books, scientific medical websites, scientific medical articles and journals	16 (55.2%)	13 (44.8%)	
	Lectures, scientific books, scientific medical websites, scientific medical articles and journals, Internet search sites such as Google, and artificial intelligence tools such as ChatGPT	10 (38.5%)	16(61.5%)	
	Lectures, scientific medical websites, and Internet search sites such as Google	11(64.7%)	6(35.3%)	
	Lectures, scientific medical websites, Internet search sites such as Google, and artificial intelligence tools such as ChatGPT	16 (69.6%)	7(30.4%)	

	Scientific medical websites and Internet search sites such as Google	4(50%)	4(50%)	
How do you evaluate your academic achievement when reading medical scientific books?	1	23(48.9%)	24(51.1%)	0.223 ^{NS}
	2	50(64.9%)	27(35.1%)	
	3	46(69.7%)	20(30.3%)	
	4	17(56.7%)	13(43.3%)	
	5	8(61.5%)	5(38.5%)	
How much time do you spend reading scientific medical books?	Per day	10(90.9%)	1(9.1%)	0.01*
	Per week	18(78.3%)	5(21.7%)	
	Non-Periodic	89(59.3%)	61(40.7%)	
	Never read it	27(55.1%)	22(44.9%)	
Do you think that what is given in the lectures is enough to get full marks in the tests?	Yes	31(63.3%)	18(36.7%)	0.81
	No	113(61.4%)	71(38.6%)	
Do you find continuous motivation and guidance from the subject coordinators in order to benefit from the medical books?	Yes	34(64.2%)	19(35.8%)	0.594
	No	47(65.3%)	25(34.7%)	
	Sometimes	63(58.3%)	45(41.7%)	
Do you find scientific medical websites more effective and of higher quality in presenting scientific material?	Yes	93(64.1%)	52(35.9%)	0.453
	No	15(65.2%)	8(34.8%)	
	Sometimes	36(55.4%)	29(44.6%)	
Do you benefit from medical journals and published scientific articles in your academic achievement?	Yes	31(62.0%)	19(38.0%)	0.952
	No	64(62.7%)	38(37.3%)	
	Sometimes	49(60.5%)	32(39.5%)	
How much time do you spend studying daily?	An hour or less per day	39(79.6%)	10(20.4%)	0.008**
	Two hours per day	30(58.8%)	21(41.2%)	
	3 hours or more	75(56.4%)	58(43.6%)	
The availability of scientific book in the college library	Yes	48(70.6%)	20(29.4%)	0.035*
	No	60(61.9%)	37(38.1%)	
	Some of books	2(50.0%)	2(50.0%)	
	Don't know	34(53.1%)	30(46.9%)	
Low GPA score (< 4.5) and high GPA score (≥4.5)				
NS: non-significant difference p>0.05; * significant difference p <0.05; ** highly significant difference				

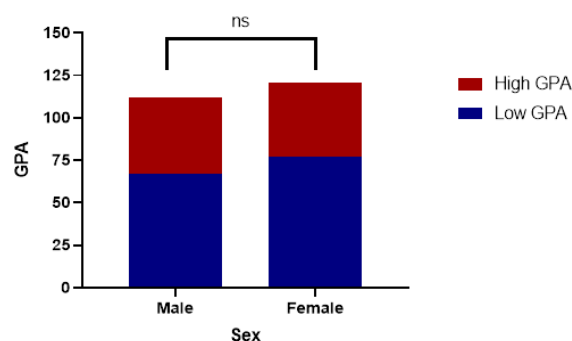


Figure No.1: Association between sex and GPA

DISCUSSION

The purpose of the current survey study was to ascertain how frequently King Khaled University medical students used different study reading sources and whether or not those sources affected their GPA and its relationship to academic performance. Over the past decade, there has been a significant increase in the educational preparation resources available to undergraduate medical students. More specifically, technological developments have made it possible for medical education to employ digital resources more frequently⁷. Our evaluation of medical students' resource use on academic performance is an attempt to better understand the overall efficacy of these

resources. Determining whether particular resources result in scholastic improvements is crucial for improving a developing medical curriculum¹. A study carried out in the United States found that almost half of students used too many commercial review resources, while the majority did not use professional textbooks. Test scores showed a weak negative correlation with this latter fact, whereas the former was significantly linked to poor academic performance⁶. In the context of medical education, data provides insights on students' study habits, assessments of educational resources, and their academic performance. Medical students' responses to survey questions concerning primary reading resources were categorized as likely for analysis. Some contend that fewer students are attending lectures because they prefer to view lectures on record at their own time. 57.2% of first- and second-year Harvard Medical School students attend lectures, while 29.9% view them online, according to a survey of the students⁸. According to a different survey of New York University medical students, 20% of them mainly utilize online or computer-based learning, while 80% of them attend lectures⁹. The evaluation of students' performance from reading medical books is not statistically significant; the p-value of 0.223 indicates no significant association between the evaluation of academic achievement and GPA, indicating that students' ratings of their performance when reading medical books do not significantly correlate with their overall GPA, even though relying on scientific books revealed an improvement in the GPA level¹⁰. The findings suggest that there is no statistically significant correlation between sex and GPA across all participants in the study. We cannot conclude that sex has a significant effect on academic achievement because both male and female students tend to fall into the low GPA category. Chinese researchers discovered that female students had higher GPAs than male students, which opposes our findings. This implies that factors other than gender alone might be having a greater impact on GPA results¹¹. In addition, research from other studies showed a slight positive relationship between gender and academic achievement among university of Ibadan undergraduate medical students¹². This contrasts with a previous study that found no significant correlation between gender and students' academic achievement¹³. According to these results, a significant proportion of respondents read books on an irregular basis. It is believed that effective time management improves students' academic performance. Counsellors, psychologists, academic advisors, seminars, and workshops can help students develop better time management skills in order to increase their academic achievement¹⁴. A strong reliance on a medical school GPA, according to some medical educators, may lead to presumptions in the selection of students who may be more cognitively capable but lack important

non-cognitive skills that are necessary for success¹⁵. For a long time, academic performance measured by grade point achievement (GPA) score has been used as a main factor for both selections of medical students and residency program applicants since grades long served as an objective measure that predicts better outcomes¹⁶. It is important to remember that medical students did not consider published scientific articles and medical journals to be easy primary sources for reading. Students' academic performance in this sample is not significantly correlated with their perception of the value of medical journals and scientific articles, according to an alternative perspective.

CONCLUSION

The present study reveals a clear link between the type of study resources used by students and their overall GPA. Students who incorporate scientific books into their study routine tend to achieve higher GPAs, while those who rely solely on lectures often experience lower academic performance. Combining diverse resources, including lectures, scientific literature, and online tools, proves beneficial for improving outcomes. Reading habits also play a significant role, but high levels of daily reading are associated with lower GPAs, suggesting that an optimal reading frequency may support success more effectively than simply increasing time spent reading.

Author's Contribution:

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REFERENCES

1. Bauzon, J, Alver, A, Ravikumar, V. et al. The Impact of Educational Resources and Perceived Preparedness on Medical Education Performance. *Med Sci Educ* 2021; 31:1319–1326.
2. Ikonne, U, Brodie, A, Bay, C. et al. Frequency of Student Resource Use and Academic Performance in Preclerkship Education: A Survey Study. *Med Sci Educ* 2022; 32:1465–1479.
3. Selvig D, Holaday L W, Purkiss J, Hortsch M. Correlating students' educational background,

- study habits, and resource usage with learning success in medical histology. *Anat Sci Educ* 2015;8(1):1.
4. Brookhart SM, Guskey TR, Bowers AJ, McMillan JH, Smith JK, Smith LF, et al. A Century of Grading Research: Meaning and Value in the Most Common Educational Measure. *Review Educ Res* 2016;86(4):803-848.
 5. Imran Ali, Raza MH, Yasmeen M, Raza MA, Munawar N. Analyzing the Impact of Student's Reading Habits on Academic Performance. *J Learning Educ Policy* 2023;3(06):23-33.
 6. Ranabhat SK, Kunjukrishnan ML, Dubey M, et al. Exploring the usage of learning resources by medical students in the basic science stage and their effect on academic performance. *BMC Med Educ* 2024;24:543.
 7. Egarter S, Mutschler A, Tekian A, Norcini J, Brass K. Medical assessment in the age of digitalisation. *BMC Med Educ* 2020;20(1):101.
 8. Cardall S, Krupat E, Ulrich M. Live lecture versus video-recorded lecture: are students voting with their feet? *Acad Med* 2008;83 (12):1174-8.
 9. Paul S, Pusic M, Gillespie C. Medical student lecture attendance versus iTunes U. *Med Educ* 2015;49(5):530-1.
 10. Nagavolu VR, Bandaru M. Analyzing the Reading Habits of Medical Students: Insights from a Research Study. *J Learning Educ Policy* 2023;3(04):32-45.
 11. Zhou YX, Zhao ZT, Li L, et al. Predictors of first-year GPA of medical students: a longitudinal study of 1285 matriculates in China. *BMC Med Educ* 2014;:87.
 12. Ladipo, Sunday O. Rev. and GBOTOSHO, Sunmade Ajibola Mr, "Influence of Gender Difference on Reading Habit and Academic Achievement of Undergraduate Medical Students in University of Ibadan, Nigeria". *Library Philosophy and Practice (e-journal)* 2015. 1338. <http://digitalcommons.unl.edu/libphilprac/1338>
 13. Mushtaq I, Khan NK. Factors affecting students' academic performance. *Global J Manag Business Res* 2012;12(9):73-83.
 14. Elmahdy MA, Anwer MM. Effect of Time-Management on the Academic Performance of Medical Students, Benha University: A Cross-Sectional Study. *The Egypt J Hospital Med* 2023;93:7382-7392. <https://ejhm.journals.ekb.eg/>
 15. ElAbd R, AlShatti R, Sultan S, AlOtaibi N, AlSabah S. Medical School Performance as Measured by GPA: What Can it Predict? *Res Square* 2024. <https://doi.org/10.21203/rs.3.rs-3860391/v1>
 16. Wariyapperuma UM, Atapattu PM, Fernando A. Academic performance and well-being of medical students during online learning of basic sciences in a newly established medical faculty. *Asian J Int Med* 2024;3(1):7-23.

Detection of Latent Iron Deficiency and Thalassemia Trait with Red Cell Indices and Peripheral Blood Smear

Latent Iron
Deficiency and
Thalassemia with
RBCs

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ABSTRACT

Objective: To evaluate the effectiveness of red cell indices and peripheral blood smear findings in detecting latent iron deficiency and differentiating it from thalassemia trait, and to determine the diagnostic accuracy of commonly used discrimination indices in distinguishing between these two causes of microcytosis.

Study Design: Observational cross-sectional study

Place and Duration of Study: This study was conducted at the Department of Pathology (Hematology) at Pakistan Railway Hospital (PRH), in collaboration with the Medicine, Surgery, and Gynecology/Obstetrics departments. The study was carried out over one year, from September 2023 to September 2024.

Methods: This study was conducted over one year and involved 285 adults referred from outpatient departments in medicine and surgery, with haemoglobin levels ranging from 10 to 12 g/dL. Participants included both males and females, with a predominant representation of young adults. Data collection focused on complete blood counts, red cell indices, and blood smear examinations.

Results: A total of 285 samples were collected and analyzed, comprising 50.9% male and 49.1% female participants, with a mean age of 24 ± 3 years. Haematological parameters, including haemoglobin, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and red cell distribution width (RDW), were recorded. The findings revealed that 61.4% of participants were diagnosed with latent iron deficiency, while 38.6% were identified as having thalassemia trait on the basis of CBC and blood smears.

Conclusion: The data analysis revealed a high prevalence of latent iron deficiency, characterized by a hypochromic microcytic blood picture and low ferritin levels. In contrast, participants with thalassemia trait also exhibited microcytosis but typically had normal or elevated ferritin levels. Despite similar haematological features, the conditions stem from different causes.

Key Words: Iron, Anemia, Thalassemia, Peripheral, Blood smear, MCH, Microcytosis, Blood

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INTRODUCTION

Iron deficiency is the most prevalent nutritional deficiency worldwide, affecting a significant portion of the population, particularly in developing countries¹. It occurs when there is inadequate iron to meet the body's needs, leading to reduced hemoglobin synthesis and anemia. Thalassemia, on the other hand, is a genetic disorder characterized by abnormal hemoglobin production².

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The thalassemia trait, or carrier state, often presents with mild anemia and microcytosis, which can be easily confused with iron deficiency anemia. Both conditions share similar hematological features, making differential diagnosis challenging but essential for appropriate treatment³. Prevalence rates of iron deficiency do not vary much between developed and developing nations, with young women, infants, and children being the most affected populations⁴. Latent iron deficiency, characterized by iron deficiency without anemia, often goes unnoticed but can have significant health implications. Latent iron deficiency is marked by a serum ferritin level of ≤ 15 $\mu\text{g/L}$ and hemoglobin > 11 g/dL⁵. Iron deficiency anemia ensues when hemoglobin drops to ≤ 12 g/dL alongside low serum ferritin. Low serum ferritin levels (< 12 ng/mL) are specific indicators of iron deficiency⁶. A complete blood count (CBC) might reveal a normal hemoglobin level in latent iron deficiency but indicate a decrease in serum ferritin levels, suggesting a depletion of iron stores in the body. Peripheral blood smear findings in latent iron deficiency may include anisopoikilocytosis

with hypochromia and microcytosis⁷. Occasional target cells may be present, indicating early changes in red cell morphology. This can lead to more severe health issues such as impaired cognitive and physical development in children and reduced work capacity in adults⁸. Latent iron deficiency is a stage when the body's iron stores are depleted, yet hemoglobin levels have not fallen below the threshold for anemia. This stage is critical as it can still affect various bodily functions and overall health⁹. Iron is a vital component of hemoglobin, which is necessary for oxygen transport in the blood. Even without anemia, low iron levels can lead to fatigue, reduced physical performance, and impaired immune function. Iron is crucial for cognitive development and function, and latent iron deficiency in children can result in long-term developmental deficits¹⁰. The diagnostic approach for detecting latent iron deficiency involves assessing clinical symptoms and laboratory parameters. Symptoms may include fatigue, pallor, and weakness. However, these are non-specific and can also be present in other conditions¹¹. Laboratory tests are more definitive, with serum ferritin being the most reliable indicator of iron status. Ferritin reflects the body's iron stores, and low levels indicate depletion. However, ferritin is also an acute-phase reactant and can be elevated in the presence of inflammation, infection, or liver disease, complicating the diagnosis¹². Other tests such as transferrin saturation and serum iron levels can provide valuable information about iron status. Transferrin saturation, which measures the percentage of transferrin that is saturated with iron, is typically low in iron deficiency¹³. Serum iron levels can also be low, but they are subject to diurnal variation and influenced by recent dietary intake, making them less reliable as a standalone test¹⁴. The treatment of latent iron deficiency focuses on replenishing iron stores and addressing the underlying cause. Oral iron supplements are commonly used to increase serum ferritin and hemoglobin levels. Ferrous sulfate is the most widely used preparation, although other forms, such as ferrous gluconate and fumarate, are also available¹⁵.

METHODS

This observational cross-sectional study was conducted in the Department of Pathology (Hematology) at Pakistan Railway Hospital (PRH), in collaboration with the Medicine, Surgery, and Gynecology/Obstetrics departments. The study was carried out over one year, from September 2023 to September 2024, following approval from the Institutional Review Committee of Riphah International University, Islamabad. A sample size of 285 was determined using Cochran's formula based on a 25% prevalence estimate, a 95% confidence level, and a 5% margin of error. Participants were selected through non-probability convenience sampling. Adult male and female patients referred from outpatient

departments, with hemoglobin levels between 10–12 g/dl, were included. Individuals with chronic systemic disease, those receiving hematinic therapy, or those who had undergone recent blood transfusion were excluded. Non-probability convenience sampling was employed.

Inclusion Criteria

- Adult male and female patients referred from Medicine, Surgery, and Gynecology/Obstetrics OPDs
- Hemoglobin level between 10–12 g/dl on CBC

Exclusion Criteria

- History of chronic systemic disease
- Current use of hematinic therapy
- History of recent blood transfusion

Data Collection: A total of 285 adult patients meeting the inclusion criteria were enrolled. After obtaining informed consent while ensuring anonymity and confidentiality, detailed clinical history and physical examination findings were recorded using a structured proforma. Blood samples were collected from all eligible participants for hematological analysis. Complete blood counts (CBC) were performed using the Mindray BC-5000 analyzer. Each sample was matched with patient details, gently inverted 10–20 times for homogenization, scanned for identification, and aspirated automatically by the analyzer. Printed results were reviewed, abnormal parameters highlighted, and attached to patient records. Peripheral blood smears were prepared by placing a 4 mm blood drop on a clean glass slide, spreading it at a 45° angle, and allowing it to air dry. Slides were labeled with a lead pencil, flooded with Leishman stain for five minutes, followed by buffered water for 10 minutes. Slides were washed, dried, and examined under 10×, 40×, and 100× objectives. Morphological features such as microcytosis, hypochromia, anisopoikilocytosis, pencil cells, target cells, and basophilic stippling were noted. Any diagnostic uncertainty was discussed with the hematologist before final reporting. Serum ferritin levels were assessed using the Rayto RT-6000 microplate ELISA reader. Two milliliters of blood were centrifuged at 5000 rpm for five minutes to obtain serum. Wash buffer was prepared by mixing 25 ml concentrate with 475 ml distilled water. Ferritin standards, controls, and patient samples (25 µl each) were pipetted into microplate wells, followed by 100 µl enzyme conjugate. After a 30-minute incubation, the wells were washed three times with buffer, blotted dry, and then incubated with 100 µl TMB substrate for 15–30 minutes in the dark. A stop solution (50 µl) was added, and absorbance was measured at 450 nm. Ferritin levels were calculated by comparing absorbance readings with the standard curve. Based on CBC parameters, peripheral smear morphology, and ferritin levels, participants were classified into two

diagnostic groups: latent iron deficiency and thalassemia trait.

Data Analysis: Data were entered and analyzed using SPSS version 27. Continuous variables were expressed as mean $\pm$ standard deviation (SD). Categorical variables were analyzed using the Chi-square test. A p-value < 0.05 was considered statistically significant. To maintain data quality, strict adherence to standard operating procedures (SOPs) was ensured throughout collection, transport, analysis, and storage. All samples were examined for hemolysis, clot formation, adequate volume, appropriate labeling, and correct timing of collection. Analyzer performance was routinely validated using hematology cell controls.

RESULTS

Data were collected from 285 patients. The sample comprised almost equal proportions of males (50.9%) and females (49.1%), with a mean age of 24.10 ± 3.43 years. Nearly half of the participants were students (44.9%), while 18.6% were employed in private jobs and 36.5% were unemployed.

Table No. 1. Combined Demographic, Clinical, and Laboratory Characteristics of Study Participants (n = 285)

Variable	Category / Statistic	n (%) / Mean $\pm$ SD
Gender	Male	145 (50.9%)
	Female	140 (49.1%)
Age (years)	Mean $\pm$ SD	24.10 ± 3.43
Occupation	Student	128 (44.9%)
	Private job	53 (18.6%)
	Unemployed	104 (36.5%)
Weight (kg)	Mean $\pm$ SD	70.51 ± 10.88
Hemoglobin (g/dl)	Mean $\pm$ SD	10.61 ± 0.63
WBC count ($10^9/L$)	Mean $\pm$ SD	7.42 ± 2.07
RBC count (mcl)	Mean $\pm$ SD	4.23 ± 0.84
MCV (fL)	Mean $\pm$ SD	73.89 ± 4.59
MCH (pg)	Mean $\pm$ SD	24.22 ± 1.99
RDW (%)	Mean $\pm$ SD	13.04 ± 1.17
Platelet count ($10^9/L$)	Mean $\pm$ SD	296.64 ± 86.32
Ferritin (ng/mL)	Mean $\pm$ SD	49.43 ± 40.98

The mean body weight was 70.51 ± 10.88 kg. Hematological indices showed a mean hemoglobin

level of 10.61 ± 0.63 g/dL, consistent with mild anemia. The mean RBC count was 4.23 ± 0.84 mcl, with accompanying microcytosis (MCV 73.89 ± 4.59 fL) and low MCH (24.22 ± 1.99 pg). RDW levels showed mild anisocytosis ($13.04 \pm 1.17\%$), while platelet counts remained within the normal range ($296.64 \pm 86.32 \times 10^9/L$). Mean serum ferritin was 49.43 ± 40.98 ng/mL, indicating variable iron stores across participants. No significant correlation was observed between gender and hemoglobin ($r = .004$, $p = .950$). Hemoglobin showed a strong, statistically significant positive correlation with RBC count ($r = .726$, $p < .001$), suggesting that higher red cell mass corresponded with improved hemoglobin concentration. A moderate positive correlation was also noted between hemoglobin and ferritin levels ($r = .487$, $p < .001$), indicating that individuals with greater iron stores generally demonstrated higher hemoglobin values.

Table No. 2. Combined Correlation Matrix of Gender, Hemoglobin, RBC Count, and Ferritin Levels (n = 285)

Variables	Gender	Hb (g/dl)	RBC Count (mcl)	Ferritin (ng/mL)
Gender	Pearson Correlation	1	.004	—
	Sig. (2-tailed)	—	.950	—
	N	285	285	285
Hb (g/dl)	Pearson Correlation	.004	1	.726**
	Sig. (2-tailed)	.950	—	< .001
	N	285	285	285
RBC Count (mcl)	Pearson Correlation	—	.726**	1
	Sig. (2-tailed)	—	< .001	—
	N	285	285	285
Ferritin (ng/mL)	Pearson Correlation	—	.487**	—
	Sig. (2-tailed)	—	< .001	—
	N	285	285	285

Table No. 3: Association Between Peripheral Smear Findings and Final Classification (n = 285)

Peripheral Smear Findings	Latent Iron Deficiency (n)	Thalassemia Trait (n)	Total (n)	% Within Category
Microcytosis, Hypochromia, Anisocytosis, Poikilocytosis	175	0	175	100% in LID / 0% in TT
Hypochromia, Microcytosis, Anisopoikilocytosis, Target cells, Occasional Fragmentation	0	110	110	0% in LID / 100% in TT
Total	175	110	285	61.4% LID / 38.6% TT

All 175 individuals (100 percent) classified as latent iron deficiency exhibited microcytosis, hypochromia, anisocytosis, and poikilocytosis. In contrast, all 110 individuals (100 percent) diagnosed with thalassemia trait showed hypochromia, microcytosis, anisopoikilocytosis, target cells, and occasional fragmentation. There was no overlap in smear morphology between the groups. Overall, 61.4 percent ($n = 175$) of the study sample was categorized as latent iron deficiency, while 38.6 percent ($n = 110$) was classified as thalassemia trait. The association was not statistically significant ($\chi^2 = 0.245$, $df = 1$, $p = 0.620$). Similar findings were observed with the continuity correction test (0.140, $p = 0.709$), likelihood ratio (0.245, $p = 0.620$), and Fisher's Exact test ($p = 0.629$). The linear-by-linear association showed 0.244 with a p -value of 0.621. All 285 cases were valid for analysis.

Table No. 4: Chi-Square Test for Association Between Peripheral Smear Pattern and Diagnostic Classification

Test	Value	df	p-value (2-sided)
Pearson Chi-Square	0.245	1	0.620
Continuity Correction	0.140	1	0.709
Likelihood Ratio	0.245	1	0.620
Fisher's Exact Test	—	—	0.629
Linear-by-Linear Association	0.244	1	0.621
Valid Cases	285	—	—

DISCUSSION

Our study was conducted to evaluate and determine the detection of latent iron deficiency & Thalassemia trait with red cell indices and peripheral blood smear. A total of 285 samples were collected and analyzed. Out of 285 participants, the male participants were 50.9% while the females were 49.1%. The mean age of participants recorded was 24 ± 3 years. In our study the majority of population belong to the age group of 21-25 years with minimum age was 18 years and the maximum was 29 years. Out of 285, 122 participants belonged to age group ranging from 21-25 years. A study conducted a study on 620 participants with majority of participants were from the age range of 21-36 years. Similar to our study, all the participants underwent serum iron and ferritin with individuals showing low hemoglobin. All those participants underwent morphology with MCV, RBC count and red cell distribution width index. The study concluded a total of 135 individuals with hypochromic microcytic anemia having the normal hemoglobin F and hemoglobin A2 < 3.2 . out of it, 93 participants were diagnosed with iron deficiency anemia and 32 with Beta thalassemia trait. As compared to the iron deficiency anemia, the RBC count was relatively higher and MCV was much lower in beta thalassemia trait patients¹⁶. In a nutshell, the RDWI (Red cell distribution width index was a reliable index

in differentiating the iron deficiency with the Beta Thalassemia trait. In our study, different parameters were recorded such as Hemoglobin, mean corpuscular volume (MCV), Mean corpuscular hemoglobin (MCH) and Red cell distribution width (RDW). The mean hemoglobin calculated in our patients was 10.61 mg/dl and MCV was reported to be 73.89fl which interprets that the participants have hypochromic and microcytic blood picture¹⁷. Moreover, the RDW of 13.04% indicates the variability of red cell size which supports the evidence that the participants were suffering from the iron deficiency. Furthermore, the participants reported with low ferritin level of 49.43 ng indicates more of a latent iron deficiency¹⁸. The thalassemia trait is distinguished from iron deficiency by normal or high ferritin levels, even in the presence of microcytic hypochromic blood findings. While low MCV with normal or high ferritin indicates thalassemia trait, low MCV and low ferritin alone is more suggestive of iron deficiency¹⁹.

In another study conducted by on 131 individuals who underwent RBC indices such as RBC count, RDWI, MCV and MCH along with different index such as Mentzer index, Shine and Lal index, sensitivity, specificity, positive & negative predictive values and compared them with cutoff values available in the literature. As a result, all the values were reported to be higher than the cutoff values indicating 50 participants diagnosed with Iron deficiency anemia and Beta thalassemia trait and alpha thalassemia trait in 31 participants. In our study, the mean of Hemoglobin levels was calculated with a low range of 10.61 g/dl indicating the majority of population as suffering from hypochromic microcytosis²⁰⁻²². The WBC count and platelet count were reported to be in the normal limit hence indicating no association in diagnosing the iron deficiency and thalassemia trait²³. This study has several limitations that should be considered when interpreting the findings. The use of non-probability convenience sampling limits the generalizability of the results to the broader population. The cross-sectional design captures hematological parameters at a single point in time, preventing assessment of temporal changes or progression from latent iron deficiency to overt anemia. Serum ferritin levels, although useful, may be influenced by inflammation or subclinical infection, which was not controlled through additional biomarkers such as CRP. The study also relied heavily on peripheral smear interpretation, which, despite being cross-checked with a hematologist, is subject to observer variability.

CONCLUSION

The analysis of the data reveals a significant prevalence of latent iron deficiency among the study population, characterized by a hypochromic microcytic blood picture and low ferritin levels. In contrast, participants

classified with thalassemia trait also exhibited microcytic red blood cells but typically have normal or elevated ferritin levels. While both conditions share similar hematological features, they arise from distinct underlying causes related to iron metabolism. The findings underscore that latent iron deficiency, a major health problem in society, requires greater attention due to its widespread nature and potential long-term impact.

Author's Contribution:

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Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

- Camaschella C. Iron deficiency: new insights into diagnosis and treatment. *Hematology/Oncology Clinics of North Am* 2019;33(3):393–408.
- Kassebaum NJ. The global burden of anemia. *The Lancet Haematol* 2021;8(9):e626–e628.
- Cappellini MD, Motta I. Anemia in clinical practice—definition and classification. *Internal and Emerg Med* 2020;15(8):1467–1471.
- Piva E, Brugnara C, Spolaore F. Automated reticulocyte and red cell parameters in the diagnosis of iron-restricted erythropoiesis. *Clin Chem Lab Med* 2022;60(4):567–576.
- Urrechaga E. Red blood cell morphology and indices in the detection of iron deficiency and thalassemia traits. *Int J Lab Hematol* 2020;42(3):214–222.
- Khan S, et al. Prevalence of iron deficiency anemia among adults in South Asia. *BMC Publ Health* 2021;21:2341.
- Lopez A, Cacoub P, Macdougall IC, Peyrin-Biroulet L. Iron deficiency anaemia. *The Lancet* 2019;393(10191):1200–1211.
- Trenker C, Skopp G. Diagnostic performance of RBC indices in identifying thalassemia minor. *Annals Hematol* 2023;102(5):1235–1244.
- Pathare AV, et al. Thalassemia carrier screening using red cell indices and discrimination indices. *Hematol* 2020;25(1):39–44.
- Yadav R, et al. Correlation between serum ferritin and red cell parameters in latent iron deficiency. *J Clin Pathol* 2022;75(4):259–264.
- Adeli K, Raizman JE, Higgins V. The role of CBC parameters in modern hematology. *Clinica Chimica Acta* 2021;523:21–29.
- Wang L, et al. Novel hematological markers for diagnosing thalassemia trait. *J Hematol Oncol* 2021;14:54.
- Bianchi VE. Iron homeostasis and immune function. *Nutr* 2019;11(10):2510.
- Qamar K, et al. Frequency of iron deficiency anemia in young females using CBC and ferritin. *Cureus* 2020;12(6):e8654.
- Sharma R, et al. Comparative evaluation of iron status indicators in latent anemia. *Int J Med Lab Res* 2023;10(1):15–22.
- Daru J, et al. Serum ferritin thresholds for iron deficiency diagnosis. *The Lancet Global Health* 2020;8(3):e387–e395.
- Lin CK, Lin JS. Updated diagnostic algorithms for microcytic anemia. *J Formosan Med Assoc* 2022;121(5):879–890.
- Tan J, et al. Red cell distribution width (RDW) in iron deficiency and anemia of chronic disease. *BMC Hematol* 2019;19:1–7.
- Ricerca BM, et al. Advances in the molecular diagnosis of thalassemia traits. *Mediterranean J Hematol Infectious Dis* 2021;13(1):e2021011.
- Guo W, et al. Machine-learning-based models using CBC parameters to detect thalassemia minor. *Scientific Reports* 2023;13:9532.
- Bain BJ. Diagnosis from the blood smear. *New England J of Med* 2021;385(22), 2071–2081.
- Mahmood T, et al. Evaluation of discriminant indices in differentiating iron deficiency anemia and thalassemia trait. *Pak J Med Sci* 2022;38(2):474–480.
- Aapro M, et al. Iron deficiency in adults: updated recommendations. *Oncol Hematol Review* 2020;16(1):63–71.

Lavender Aromatherapy and the Incidence of Post-Operative Nausea and Vomiting: A Randomized Controlled Trial

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Effectiveness of
Lavender
Aromatherapy to
Standard
Antiemetic
Therapy

ABSTRACT

Objective: To evaluate the effectiveness of lavender aromatherapy, in addition to standard antiemetic therapy, in reducing postoperative nausea and vomiting among patients undergoing exploratory laparotomy.

Study Design: Randomized controlled trial study

Place and Duration of Study: This study was conducted at the DHQ Hospital Sheikhupura, Pakistan, between February and July 2024.

Methods: The sample size used was 70 adult patients who had undergone laparotomy with general anesthesia, experienced nausea or vomiting in 24 hours after surgery and were enrolled and randomized to either intervention (n=35) or control (n=35) group. Both groups were treated with standard antiemetics, and the experimental one was also treated with lavender aromatherapy according to the validated protocols. The levels of nausea and vomiting were evaluated on levels at baseline and after 15 and 40 minutes of intervention. Analysis of data involved comparison of within and between group changes at individual time point.

Results: Baseline nausea and vomiting rates were comparable between groups. At 40 minutes, nausea was significantly lower in the intervention group compared to controls (2.9% vs. 17.1%, $p=0.04$). Vomiting showed a marked reduction at 15 minutes (8.6% vs. 48.6%, $p=0.001$) and was completely absent in the intervention group at 40 minutes (0% vs. 14.3%, $p=0.02$). Both groups showed within-group improvement over time, but reductions were more pronounced in the lavender group.

Conclusion: When lavender aromatherapy was applied together with the conventional antiemetic treatment, nausea as well as vomiting after exploratory laparotomy was greatly reduced. It is safe, not invasive, and cost-effective, which makes it appropriate to be incorporated as a postoperative supportive strategy.

Key Words: Lavender aromatherapy, postoperative nausea and vomiting, exploratory laparotomy, complementary therapy,

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INTRODUCTION

Exploratory laparotomy stands out as a critical surgical intervention employed in cases where the etiology of abdominal symptoms remains vague and varies across patients. The number of this surgical procedure accounts for at least 175,000 surgeries per year in America, and around 85,000 were done yearly in England for diverse surgical causes and presentations.¹

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PONV is the second most common and distressing symptom following surgery and anaesthesia, second only to pain. In some cases, these symptoms can be more common than pain and result in more suffering for patients, regardless of whether the surgery was minor or major.²

The pharmacological properties of the anaesthetic agents used are closely linked to the etiology of PONV, as prolonged exposure leads to elevated drug concentrations that overwhelm the body's elimination mechanisms. Notably, general anaesthesia poses a significant risk in comparison to local anaesthesia, with the duration of general anaesthesia correlating with increased susceptibility to PONV. Each additional 30 minutes of anaesthesia is projected to raise the risk of PONV by 59%.

PONV is also the contributor to numerous issues, such as dehydration, electrolyte imbalances, and changes in acid-base equilibrium. Moreover, it is also associated with a range of respiratory issues including aspiration, pneumothorax, and esophageal rupture. PONV can also increase intracranial pressure, suture disruption, wound dehiscence, bleeding, oral intake delay, prolonged

hospital stay, anxiety, fatigue, and unanticipated hospital readmission thereby exacerbating healthcare spending.³

PONV is defined as the onset of nausea or vomiting among the postoperative patients in the post-anaesthesia care unit (PACU) or the period of first 24-48 hours following exploratory laparotomy in the general ward. The global prevalence of PONV is estimated to be 75 million patients each year.

A distinction should be made between the subjective experience of nausea and the objective experience of vomiting to provide useful surgical attention. Excessive parasympathetic nervous system leads to nausea with evident symptoms of bradycardia, diaphoresis, salivation, pallor skin, and bradycardia. Vomiting, on the other hand, refers to the violent expulsion of stomach contents through the mouth, and is usually instigated by some form of strong urge.⁴

Dopamine antagonists (Inj. Metoclopramide), histamine antagonists (Inj. Ranitidine), serotonin antagonists (Inj. Ondansetron), muscarinic, neurokinin, corticosteroids, benzodiazepines, and cannabinoids (Inj. Cannabidiol) are commonly used as pharmacological agents in the management of postoperative nausea and vomiting (PONV).⁵ Despite this, complementary treatment like aromatherapy has gained interest given its growing use in health care.⁶

According to the National Institutes of Health, aromatherapy is the therapeutic use of essential oils derived out of plants, which have unique chemical composition with certain curative effect (ie. nausea, pain and anxiety).⁷ The low toxicity, uncommon allergic reactions, calming and anxiolytic effects, mood elevation, and analgesic activity of lavender oil are especially appreciated.^{8,9}

Five randomized controlled trials in a systematic review support the idea that aromatherapy is an effective adjunct in managing PONV and suggests further studies using standardized nausea scales.¹⁰ A recent Italian protocol also supports the idea that lavender aromatherapy can be used as an effective adjunct in PONV management.¹¹

Aromatherapy is a valuable part of the holistic care of the patient during the postoperative period, and thus the study will help determine the effectiveness of aromatherapy in the prevention of PONV.

METHODS

This is a randomized controlled trial that assessed the efficacy of lavender aromatherapy in preventing the postoperative nausea and vomiting (PONV) in adult patients undergoing exploratory laparotomy. The eligible participants were adults within the age of 18-65 years who underwent general anesthesia and experienced nausea or vomiting within 24 hours of surgery. Convenience sampling was used to recruit the patients, and a sample of 70 participants (35 in each

group) was calculated to yield 80% statistical power of a 95% confidence interval. This research was carried out at DHQ Hospital Sheikhupura, Punjab, Pakistan after it received ethical consent at the University of Health Sciences, Lahore. Participants were thoroughly educated on the study processes, assured of confidentiality and given the right to withdraw any time without repercussions.

The period of collecting the data was between February 2024 and July 2024, a span of six months. Informed consent was obtained and after that all the participants were grouped randomly to an intervention or control group using a computer-generated randomization sequence to reduce any allocation bias. The two groupings were given normal antiemetic treatment in case of nausea or vomiting. In the intervention group, there was lavender essential oil aromatherapy on top of the antiemetic. The aromatherapy protocol used was a legitimate and valid procedure as outlined by Bolgeo et al. (2023) and Karaman et al. (2019). In case a subject of the intervention group complained of nausea, or right after the initial vomiting, a sterile gauze pad soaked in 0.2 ml of lavender oil was placed 10 cm below the nose of the subject using sterile forceps. The participant was told to wait 5 minutes to inhale the aroma whilst being observed.

There were standardized outcome assessment between groups. In the case of participants with nausea, 15 and 40 minutes after the intervention compared the severity. In the case of vomiting, the vomiting frequency was measured at 15 and 20 minutes of the first vomiting. Control group members were only given the prescribed antiemetic drug and their symptoms were measured at the same time frames like the intervention group so as to be comparable.

Throughout the study, adherence to ethical standards, patient safety, and uniform assessment procedures was maintained. This methodology ensured methodological rigor and allowed for accurate evaluation of the added benefit of lavender aromatherapy in managing PONV in postoperative patients.

RESULTS

The sociodemographic characteristics of the participants indicated that the majority of the members of both groups were middle aged, with most of them falling in the 41-60 years bracket. It was found that a greater percentage of the participants in the control group were in this age bracket than the intervention group. The Females constituted 51.4 percent of the control, and 37.1 percent of the intervention and the male gender was a little higher on the whole. The majority of the participants in both groups are married with equal representation of married people in the control (91.4) and intervention (88.6) groups. These results show similar baseline demographic factors of the two groups (Table 1).

The history of medical records showed that nearly half of the group of controls (48.6) and over half of the intervention group (57.1) had gone through a previous surgery. The level of medical problems was higher among participants of the intervention group (71.4%), than among those of the control group (62.9%). Anesthesia drugs were given to all the participants in the two groups. When it comes to the variables of the procedure, only in the intervention group was lavender aroma therapy used at the moment of injection, but duration of the surgery was different, and the majority of the procedures took 1-1.5 hours in both groups. These features depict clinical comparability of groups prior to intervention (Table 2).

The occurrence of postoperative nausea revealed that the two groups reported similar baseline levels of nausea. Nausea dropped in the control group and tended to rise in the intervention group at 15 minutes but there was no significant difference between the two groups.

At 40 minutes, there was a significant difference in the nausea between the intervention and control group, with the intervention group showing reduced nausea (2.9% versus 17.1%). The within-group comparisons indicated a substantial decrease in the baseline of both groups at 40 minutes, and it was more pronounced in the intervention group (Table 3).

At baseline postoperative vomiting did not differ between the two groups but at 15 minutes, the control group vomited significantly (48.6%) more than the intervention group (8.6%) which was highly significant. At 40 minutes, the further reduction of vomiting in the intervention group became zero, and 14.3% of participants in the control group still vomited. The two groups showed considerable changes in baseline and time; nevertheless, the reduction was observed to be higher in the intervention group, which can substantiate the applicability of lavender aroma therapy in alleviating postoperative vomiting (Table 4).

Table No. 1: Sociodemographic and clinical characteristics between groups.

Variables	Control Group 35 (%)	Mean± SD	Interventional Group 35(%)	Mean ±SD	All participants 70 (%)	Mean ±SD
Age						
25-40	8(22.9)	48.9±9.89	17 (48.6)	44.91±9.86	25(35.7)	46.9±10.0
41-60	22(62.9)		15 (42.9)		37(52.9)	
61-70	05(14.3)		03(8.6)		8(11.4)	
Gender						
Female	18(51.4)	1.51±0.50	13(37.1)	1.37±0.49	31 (44.3)	1.44±0.50
Male	17(48.6)		22 (62.9)		39 (55.7)	
Marital status						
Married	32(91.4)	1.09±0.28	31(88.6)	1.11±0.32	63 (90.0)	1.10±0.30
unmarried	3(8.6)		4(11.4)		7(10.0)	

Table No. 2: Medical History of control group and interventional group (N=70).

Variables	Control Group 35 (%)	Mean± SD	Interventional Group 35(%)	Mean ±SD	All participants 70 (%)	Mean ±SD
History of Surgery						
Yes	17(48.6)	1.51±0.50	20(57.1)	1.43±0.50	37(52.9)	1.47±0.50
No	18(51.4)		15(42.9)		33(47.1)	
Any kind of medical problem of participant						
Yes	22(62.9)	1.37±0.49	25(71.4)	1.28±0.45	47(67.1)	1.32±0.47
No	13(37.1)		10(28.6)		23(32.9)	
Anesthesia drug						
Yes	35(100%)	1.00±0.00	35(100.0)	1.00±0.00	70(100)	1.00±0.00
Anesthesia drug						
Injection onset	35(100.0)	0.00±0.00	0(0.0)	1.00±0.00	35(50.0)	0.50±0.50
Injection onset+lavender aroma therapy	0(0.0)		35(100.0)		35(50.0)	
Surgery time						
1 hour	8(22.9)	2.05±0.76	4(11.4)	2.25±0.74	12 (17.1)	2.15±0.75
1.5 hour	18(51.4)		20(57.1)		38(54.3)	
2 hours	8(22.9)		9(25.7)		17(24.3)	
2.5 hour	1(2.9)		2(5.7)		3(4.3)	

Table No. 3: Incidence of postoperative nausea within and between the groups at three different time intervals

Time interval	Group	Yes, n (%)	No, n (%)	Total	P-value (Between Groups)
Before Intervention	Control	15 (42.86%)	20 (57.14%)	35 (100%)	0.808
	Intervention	14 (40.0%)	21 (60.0%)	35 (100%)	
At 15 Minutes	Control	7 (20.0%)	28 (80.0%)	35 (100%)	0.27
	Intervention	11 (31.4%)	24 (68.6%)	35 (100%)	
	P-value (Within Group vs. Baseline) Control: <0.008; Experimental: 0.25				
At 40 Minutes	Control	6 (17.1%)	29 (82.9%)	35 (100%)	0.04
	Intervention	1 (2.9%)	34 (97.1%)	35 (100%)	
	P-value (Within Group vs. Baseline) Control: <0.004; Intervention: <0.001				

Table No. 4: Incidence of postoperative vomiting within and between groups at three different time intervals

Time interval	Control (n=35)	Intervention (n=35)	Between-group P-value
Before Treatment (Baseline)			
Vomiting, n (%)	20 (57.1%)	21 (60.0%)	0.808
No vomiting, n (%)	15 (42.9%)	14 (40.0%)	
At 15 Minutes			
Vomiting, n (%)	17 (48.6%)	3 (8.6%)	0.001
No vomiting, n (%)	18 (51.4%)	32 (91.4%)	
Within group P-value	<0.250a	<0.25a	
At 40 Minutes			
Vomiting, n (%)	5 (14.3%)	0 (0.00%)	0.02
No vomiting, n (%)	30 (85.7%)	35 (100.0%)	
Within group P-value	<0.001	<0.001	

DISCUSSION

The results of the proposed study are consistent with the literature and demonstrate that lavender aromatherapy in conjunction with the conventional therapy has a huge impact in alleviating nausea and vomiting among surgical patients. The demographic factors related to the participants (gender composition, age bracket, and marital status) were also similar to the same in the past literature, which indicates that the findings can be applicable in different groups. There were also similarities in the clinical characteristics of the work such as the surgical history and medical history which is similar to other studies and this confirms the external validity of the study and also proves that the factors do not play a significant role in the activity of lavender aromatherapy in managing PONV.^{13, 14}

Among the key results of this research was the fact that lavender aromatherapy, when used alongside conventional therapy had a higher effectiveness in reducing nausea compared to the control group of individuals who only received conventional therapy. These findings were confirmed by the past studies that indicated that lavender aromatherapy can help in relieving postoperative nausea with better results with

time.¹⁵ This is in line with another study that has established the benefits of aromatherapy to be gradual and long lasting in the management of PONV.¹⁶

The combination of lavender aromatherapy and the conventional treatment also resulted in increased reduction of vomiting compared to the control group. This observation also reinforces the current amount of evidence that aromatherapy could make a useful tool in the management of both nausea and vomiting which seems more difficult to control in postoperative patients. A review of research was carried out in Turkey, which showed that aromatherapy was applicable in the management of PONV, and the ginger and lavender oils are better in comparison with others.¹⁷ The research offers a good evidence in favor of the application of lavender aromatherapy in the management of PONV. These results are consistent with those of other researchers, who have confirmed that lavender aromatherapy is a good intervention in the treatment of postoperative nausea and vomiting. These findings are reinforced by another study.¹⁸ The capacity of lavender to relieve nausea as well as vomiting provides an important clue that the compound can be used as a non-pharmacological alternative to conventional drugs, which have side effects.

Nevertheless, there are limitations to the study as well. The sample used was quite small, and it should be supplemented with bigger studies using more diverse populations to verify and further develop these results. Further studies that might be conducted in the future include the outcomes of lavender aromatherapy in the long run given that this study was conducted on the immediate postoperative conditions. It might also be explored through further researches that could look at how well lavender aromatherapy can be used in conjunction with other complementary therapies to see whether there is a synergistic effect that could be used to increase patient outcomes.

Lavender aromatherapy is a safe and effective potential to manage PONV in clinical practice at low cost. Its non-invasiveness and a small number of side effects make it a promising alternative to postoperative treatment, particularly when it comes to patients with a high sensitivity to conventional drugs. Lavender aromatherapy might be implemented into usual postoperative practice, and would cost less to the healthcare because it would decrease the necessity of use of pharmacological treatment and increase patient satisfaction.

CONCLUSION

This study reveals that lavender aromatherapy, when combined with conventional therapy, is a favorable intervention in the management of PONV incidence. These findings indicate that lavender aromatherapy can reduce the occurrence of nausea and vomiting considerably and can be used as an alternative to traditional pharmacological therapy. Lavender aromatherapy is a relatively inexpensive and patient-friendly method of postoperative care, considering its lack of invasiveness and a small number of side effects. These findings should be confirmed by future studies using bigger samples and long-term follow-up to investigate the expanded clinical use of this treatment alternative.

Author's Contribution:

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Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

1. Hailu S, Desta M, Teshome M, et al. Perioperative mortality and its predictors among patients undergoing emergency laparotomy at selected southern Ethiopian governmental hospitals, 2022: a multicenter prospective cohort study. *Ann Med Surg (Lond)* 2023;85(4):746-752.
2. Patel PC, Parmar D, Patel U, Shah RS. Comparison of injection granisetron versus injection ondansetron for control of intraoperative nausea and vomiting and post-operative nausea and vomiting among women undergoing lower segment caesarean section under spinal anaesthesia. *Adv Hum Biol* 2021;11(2):172-175.
3. Elvir-Lazo OL, White PF, Yumul R, Eng HC. Management strategies for the treatment and prevention of postoperative and postdischarge nausea and vomiting: an updated review. *F1000Res* 2020;9:F1000 Faculty Rev-983.
4. Arsana WKA, Semedi BP, Martanto TW, Rejeki PS. Complications of postoperative anesthesia in pediatric patients. *Jurnal Inovasi Global* 2024; 2(1):140-156.
5. Yanti L, Yudhoyono DT. Experience of patients with sectio caesarean in controlling post operative nausea and vomiting (PONV). *Dev Nurs Res* 2024;1(1):17-25.
6. Cimino C, Micali G, Rusciano D, et al. Essential oils: pharmaceutical applications and encapsulation strategies into lipid-based delivery systems. *Pharmaceutics* 2021;13(3):327.
7. Baptista-Silva S, Borges S, Ramos OL, Pintado M, Sarmiento B. The progress of essential oils as potential therapeutic agents: a review. *J Essent Oil Res* 2020;32(4):279-295.
8. Boyce VJ, Natschke M. Establishing a comprehensive aromatherapy program in patient care settings. *Pain Manag Nurs* 2019;20(6): 532-540.
9. Nugrawati N, Ekawati N, Wijaya A, Adam AM. The influence of classical music therapy and lavender aromatherapy candle on anxiety levels during the first stage of active labor. *Int J Nurs Midwifery Sci* 2024;8(1):40-45.
10. Asay K, Olson C, Donnelly J, Perlman E. The use of aromatherapy in postoperative nausea and vomiting: a systematic review. *J Perianesth Nurs* 2019;34(3):502-516.
11. Bolgeo T, Bianchi M, Ferrario MM, et al. Evaluation of the effectiveness of an aromatherapy treatment with lavender essential oil to reduce post-operative nausea and vomiting: study protocol of a randomised controlled trial. *Work Pap Public Health* 2023;11(1).
12. Mendes FCO, Santos J, Ribeiro OMPL, et al. Non-pharmacological strategies to reduce stress and

- anxiety in endovascular procedures: a scoping review. *Nurs Open* 2024;11(3):e2105.
13. Destiana, Suharsono, Sulistyowati DID. Effectiveness of a combination of lemon peppermint and murottal for postoperative nausea, vomiting, and anxiety after general anesthesia. *Malahayati Int J Nurs Health Sci* 2024;7(6): 693-700.
 14. Wulandari R, Wijaya DW, Nasution AH. Comparison of the effects of peppermint aromatherapy and intravenous ondansetron on the incidence of postoperative nausea and vomiting (PONV) laparotomy with general anesthesia. *Asian J Pharm Res Dev* 2021;9(4):6-10.
 15. April MD, Oliver JJ, Davis TE, et al. Aromatherapy versus oral ondansetron for antiemetic therapy among adult emergency department patients: a randomized controlled trial. *Ann Emerg Med* 2018;72(2):184-193.
 16. Amirhosseini M, Dehghan M, Mangolian Shahrabaki P, Pakmanesh H. Effectiveness of aromatherapy for relief of pain, nausea, and vomiting after percutaneous nephrolithotomy: a randomized controlled trial. *Complement Med Res* 2020;27(6):440-448.
 17. Karaman S, Karaman T, Tapar H, Dogru S, Suren M. A randomized placebo-controlled study of aromatherapy for the treatment of postoperative nausea and vomiting. *Complement Ther Med* 2019;42:417-421.
 18. Kakhki BR, Zangouei AS, Khoshnood M, et al. Aromatherapy with isopropyl alcohol versus intravenous ondansetron in management of mild brain trauma nausea and vomiting: a randomized clinical trial. *Arch Acad Emerg Med* 2022;10(1):e87.

Sex-Specific Correlation of microRNA-21 Expression in Chronic Myeloid Leukemia Patients Under Tyrosine Kinase Inhibitor Therapy

Abbas Ridha Jasim and Hussein. A Sahib

microRNA-21
Expression in
Chronic Myeloid
Leukemia Under
Tyrosine Kinase

ABSTRACT

Objective: To investigate the relation between expression level of microRNA-21 (miR-21) and patient gender in patients of CML receiving TKI therapy.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the University of Al-Qadisiya, College of Medicine, Iraq from 1st April 2025 31st August 2025.

Methods: This study included 50 chronic myeloid leukemia patients under tyrosine kinase inhibitors treatment. Molecular analysis of miR-21 expression was performed using real-time quantitative PCR. Statistical analysis, including correlation and cross-tabulation, was used to investigate the relation between gender, miR-21 expression, tyrosine kinase inhibitors type, and treatment response.

Results: A statistically significant association was observed between microRNA-21 expression level and patient sex ($r = 0.312$, $p = 0.027$). The cohort demonstrated a slight predominant of male patients (56%), while no statistically significant differences were detected in molecular response rates between genders.

Conclusion: The association between microRNA-21 expression level and patient sex indicates the presence of a potential sex-specific regulatory mechanism influencing microRNA-21 in chronic myeloid leukemia.

Key Words: Chronic myeloid leukemia, microRNA-21, Gender differences, Sex specific, Tyrosine kinase inhibitors

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INTRODUCTION

Chronic myeloid leukemia (CML) is hematological disease categorized by malignant transformation of hematopoietic stem cells carrying the Philadelphia chromosome, and has an annual incidence of about 2 cases per 100,000, representing approximately 15% of newly diagnoses leukemia cases in the adult population.^{1,2} A key event in pathogenesis of CML is the fusion of Ableson murine leukemia (ABL1) gene located on chromosome 9 with the breakpoint Cluster Region (BCR) gene on chromosome 22.³

This chromosomal rearrangement leads to formation of the BCR:ABL1 oncoprotein, a constitutively active

tyrosine kinase that drives leukemogenesis by promoting uncontrolled proliferation and survival of CML cells.^{4,5} Tyrosine kinase inhibitors (TKI) are a class of pharmacological drugs that disrupt protein kinase-mediated signal transduction pathways and have been approved by the US Food and Drug administration (FDA) for the treatment of CML.^{6,7} Despite this success, significant variability in patient response and toxicity profiles persists. Recent research has highlighted the function of non-coding RNA, epically microRNAs (miRNAs), in regulating these outcomes.⁸ microRNA-21 (miR-21) is a key oncomiR, and its elevated expression has been associated with weak prognosis. And drugs resistance in various cancers, including CML.^{9,10}

Growing evidence indicates that gender influence cancer susceptibility, disease progression, and therapeutic response, including in CML.¹¹ Clinical studies have identified gender-related variation in CML patient characteristic such as differences in platelet count and spleen size. These disparities are commonly attributed to a combination of hormonal influences, genetic differences linked to sex chromosomes, and gender specific variations in drug metabolism.¹² Considering that miR-21 expression has been reported to vary by gender in other cancer types, it is important

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to explore whether gender similarly affect the molecular profile of patients with CML.¹³ The purpose of this study was to evaluate the relationship between microRNA-21 (miR-21) expression levels and patient gender in individuals with CML undergoing TKI therapy, in order to gain insights in to possible sex-specific molecular mechanisms.

METHODS

A cross-sectional study was conducted at Al-Diwaniyah General Hospital and Department of Pharmacology and Therapeutics, faculty of Medicine, University of Al-Qadisiya, Iraq from 1st April 2025 31st August 2025 vide letter No. 301 date 23-2-2025 and 50 patients diagnosed with Philadelphia chromosome-positive chronic myeloid leukemia (CML) were included. All of whom were on therapy with tyrosine kinase inhibitors (TKIs) such as Imatinib, Nilotinib, or Bosutinib. For diagnosis and what follows, standard procedures included a complete blood count and BCR-ABL1 molecular analysis by real-time quantitative PCR. The entire RNA was taken from whole blood samples using TRI pure RNA extraction reagents (ELK, China) following the manufacturer's protocol, which involved lysis with Triazol, chloroform extraction, isopropanol precipitation, and 70% ethanol washing. RNA concentration was measured using the Quantus™ Fluorometer (Promega, USA). The isolated RNA was converted into complementary DNA (cDNA) using the reverse transcription ADDBio kit (Korea). The reaction of the mixture (20 µl total volume) included 4 µl of RNA and was incubated at 50°C for 60 minutes for reverse transcription.

The microRNA-21 (miR-21) expression level was quantified by [RT-qPCR] using the Add Script RT-qPCR Syber master (AddBio, Korea) on a BioRAD (USA) real-time qPCR machine. The housekeeping gene was GAPDH (Table 1). Reaction mix and preparation of RT-qPCR amplification is shown in Table 2. The thermal cycling conditions of the thermal conditions were carried in Table 3.

Total RNA was extracted from whole blood samples. The microRNA-21 (miR-21) expression level was quantified by [RT-qPCR] using the AddScript RT-qPCR Syber master (AddBio, Korea) on a BioRAD (USA) real-time qPCR machine, with GAPDH as the housekeeping gene. The data was analyzed through

SPSS-25. The correlation of miR-21 expression with patient gender was assessed using Pearson's correlation coefficient. Cross-tabulation and Chi-square tests were used to compare the distribution of TKI type and treatment response between male and female patients. Statistical significance was assigned to p-values less than 0.05.

RESULTS

There were 28 (56%) males and 22 (44%) females with male: female ratio is 1.27:1 (Fig. 1). The average age of male patients with CML was found to be higher than that of female patients, 51.78 years versus 47.18 years, respectively. However, from a statistical perspective, this apparent age difference between the sexes is not significant because the p-value is 0.275 (Fig. 2)

The disease's duration varied greatly, ranging from a minimum of one year to a maximum of 26 years. The median (inter-quartile range) of disease duration is 8 (15.25) years with average of 9.82 ± 7.93 years. With 42% of cases, the largest percentage of patients had disease duration of less than five years. Since it accounted for 10% of cases, the lowest percentage was recorded during the 6-10 year period. 20%, 16%, and 12% of cases at 11-15 years, 16-20 years, and >20 years disease duration, respectively (Table 4, Fig. 3).

Table No. 1: Primers for House Keeping Gene (GAPDH) and for Gene of Interest (miRNA21)

Gene	Primer	Sequence (5'→3')
House Keeping Gene (GAPDH)	Forward	GAAGGTGAAGGTCGGAGTC
	Reverse	GAAGATGGTGATGGGATTTC
Gene of Interest (miRNA-21)	Forward	TTGTCGGGTAGCTTATC
	Reverse	GTCAGACAGCCCATCGA

Table No. 2: Preparation RT-qPCR amplification

Substance	Amount
H2O	4 µl
AddScript RT-qPCR	10 µl
Forward primer (0.05 pmol/20 µl)	2 µl
Reverse primer (0.05 pmol/20 µl)	2 µl
cDNA	2 µl
Total	20 µl

Table No. 3: The thermal conditions were carried out using BioRAD (USA)

Temperature	Time/Ses	Repeat
Initials denaturations	95°C	300
Denaturations	95°C	20
Annealings	According to gradient protocol	30
Extensions	72°C	30
Melting analyses	94°C	15
Melting analyses	61°C	60
Melting analyses	+ 0.3°C of 95°C	15

96% of the cases in this project were in the chronic phase, and 4% were in the blast phase (Fig. 4).

Table No. 4: Disease duration of patients with chronic myeloid leukemia

Duration (years)	Results
Mean±SD	9.82±7.93
Minimum - Maximum	1 – 26
Median (IQR)	8 (15.25)
< 5 years	21 (42%)
6 – 10 years	5 (10%)
11- 15 years	10 (20%)
16 – 20 years	6 (16%)
> 20 years	6 (12%)

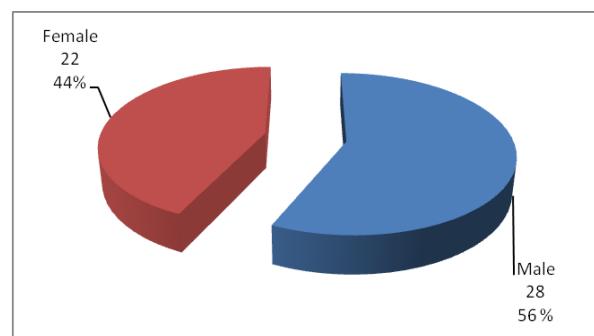


Figure No. 1: Frequency of genders

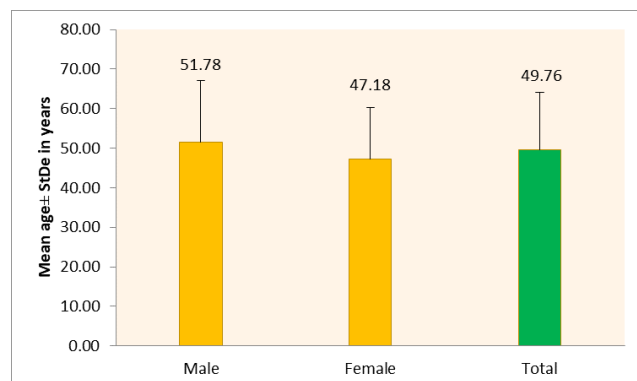


Figure No. 2: Relation between sex and mean of age of patients having CML

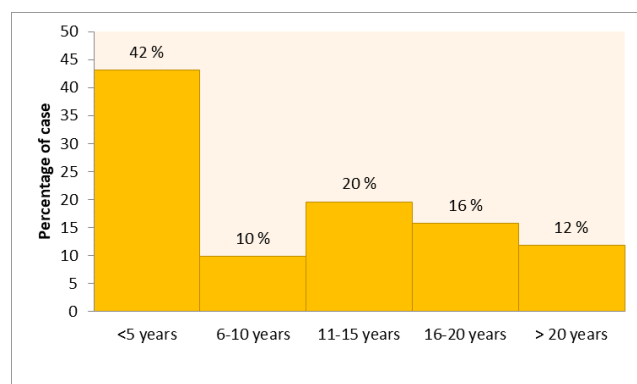


Figure No. 3: The proportions of case of CML classified based on duration of disease

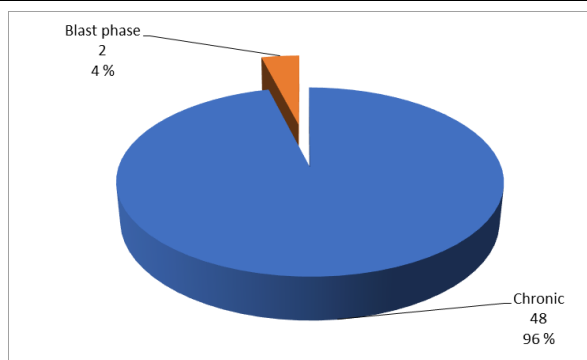


Figure No. 4: The proportion of cases of CML categorized into chronic phase and at blast phase

The primary finding of this study was the significant statistical correlation observed between miR-21 expression and patient sex ($r=0.312$, $p=0.027$) [Table 5].

Table No. 5: Correlation of miR-21 expression with patient sex

Characteristic	miRNA-21 (r)	miRNA-21 (p)
Sex	0.312	0.027

DISCUSSION

Interferon- α was the first successful therapy for CML, a blood cancer identified by neoplastic alteration of hematopoietic stem cells. Prior to the advent of new therapeutic approaches like Imatinib., a tyrosine kinase inhibitor, that drug is the sole option available to treating CML. patient. However, transplantation of allogenic stem-cell kind is only curing therapy for CML, and recent tyrosine kinase inhibitors. Numerous projects has proposed micro-RNAs taking part with the pathogenic mechanism of cancerous changes and progression of disease, and miR-21 was reported to show elevation in blood cancers.¹⁴ According to Chan et al¹⁵, miR-21 is a highly significant candidate involved in oncogenic activity. In a cell-line of glioblastoma culture, it was proposed this microRNA-21 knockout activated caspases, increased apoptosis, and caused cell death, indicating the upregulation of miR-21 may be a mechanism combating programmed cell death.

In the present study, the average age of CML patients was 49.76 years (median of 46.5 years) and it ranged between 14 and 77 years and approximately half of our patients were above 40 years and below 60 of age. In our study, there were 28 males CML cases and 22 of female cases, making the male to female ratio as 1.27:1 and we reported no significant differences in average of age between male patients and female patients. In 2023, Laabidi et al¹⁶ reported a little female predominance (sex-ratio 0.78), which contradicts our findings. They also reported that the mean age of CML patients was 50

years, which is fairly similar to the mean age obtained in our study.

In this study, the median disease duration was 8 years and the range of duration was between one and 26 years. Duration of less than 5 years was shared by the major fraction of patients (42%). Chronic phase was the dominant phase as it accounted for 96% of the cases whereas blast phase was seen in only 4% of cases. With respect to use of TKI, in our study we observe significant change from Imat. use as an initial form of therapy to other new generations such as bosutinib and nilotinib. In our study, drug toxicity was seen in 18% of cases.

The finding of a statistically significant association between miR-21 expression and patient gender ($r=0.312$, $p=0.027$) is a novel and important observation that warrants further discussion. This result aligns with a growing body of literature suggesting that sex-related differences exist in the molecular landscape of various cancers.^{4,7}

The underlying mechanism for this gender-dependent expression of miR-21 in CML is likely multifactorial. One hypothesis relates to the influence of sex hormones. Studies in other cancers have shown that estradiol can down regulate miR-21 expression.¹⁰ Given that CML is a disease with known gender-related clinical characteristics⁵, it is plausible that hormonal differences between male and female patients influence the regulatory pathways of miR-21, which is a known oncomiR.

An alternative explanation may involve gender-specific variations in the metabolism of tyrosine kinase inhibitors. Although our cross-tabulation analysis did not reveal a statistically significant difference in the types of TKIs prescribed between males and females, it is well-documented that cytochrome P450 (CYP) enzyme activity which plays a key role in the metabolism of TKIs such as Imatinib and Nilotinib - differs between genders.¹² These differences could lead to variations in TKI plasma concentrations, potentially influencing the cellular milieu and thereby modulating the expression of stress-responsive microRNAs including miR-21.

This investigation is constrained by its cross-sectional nature and the absence of direct measurements of hormonal levels. Nevertheless, the significant correlation identified underscores the importance of considering gender as a pivotal factor in future research exploring miR-21 as a biomarker in chronic myeloid leukemia. Subsequent studies should aim to quantify sex hormone concentrations and directly assess their relationship with miR-21 expression, in order to clarify the underlying regulatory mechanisms.

CONCLUSION

A significant association was observed between miR-21 expression and the gender in CML patients receiving

TKI therapy. This result underscores the importance of incorporating gender as a biological variable in molecular profile studies of CML and suggests the involvement of hormonal or metabolic regulatory mechanism in modulating miR-21 expression.

Author's Contribution:

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Drafting or Revising Critically:	Abbas Ridha Jasim, Hussein. A Sahib
Final Approval of version:	All the above authors
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REFERENCES

1. Jabbour E, Kantarjian H. Chronic myeloid leukemia: 2022 update on diagnosis, therapy, and monitoring. *Am J Hematol* 2022;97(9): 1236-56,
2. Shah NP. Chronic myeloid leukemia, *JNCCN* 2024;22(1):43-69.
3. Jain P. BCR-ABL Fusion transcripts in patients with chronic myeloid leukemia in chronic phase (CML-CP): Experience with ponatinib. *Blood* 2013;122(21): 2727.
4. Al Hamad M. Contribution of BCR-ABL molecular variants and leukemic stem cells in response and resistance to tyrosine kinase inhibitors: a review. *F1000 Res* 2022; 10.
5. Zenebe B, Nigussie H, Belay G, Seboka N. A review on characterization of BCR-ABL transcript variants for molecular monitoring of chronic myeloid leukemia phenotypes. *Hematolol* 2023; 28(1): 12.
6. Jabbour E, Kantarjian H. Chronic myeloid leukemia: 2016 update on diagnosis, therapy, and monitoring. *Am J Hematol* 2016;91(2): 252-65.
7. Delphine R, Hughes TP. Critical Reviews in Oncology / Hematology Development of asciminib. Novel Allosteric Inhibitor of BCR-ABL1 2022; 171.
8. Mohamad SFS, Ramlee Ra, Elias MH. The Role of MicroRNAs in Chronic Myeloid Leukemia (CML) Treatment, Biomarkers, and Resistance to Tyrosine Kinase Inhibitor: A Bioinformatics-Based Analysis. *J Trop Life Sci* 2024;14(3): 621-42.
9. Mirza MAB, Guru SA, Abdullah SM, Rizvi A, Saxena A. microRNA-21 expression as

- prognostic and therapeutic response marker in chronic myeloid leukaemia patients. *Asian Pacific J Cancer Prev* 2019; 20(8): 2379-83.
10. Feng YH, Tsao CJ. Emerging role of microRNA-21 in cancer (Review). *Biomed Reports* 2016;5(4):395-402.
11. Karantanos T, Jain T, Moliterno AR, Jones RJ, Dezern AE. Sex-related differences in chronic myeloid neoplasms. *Clin Observation Underlying Biol* 2021;16.
12. Caserta S, Gangemi S, Murdaca G. Gender differences and miRNAs expression in cancer: implications on prognosis and susceptibility. *Int J Mol Sci* 2023; 24(14): 1154.4
13. Hasáková K, Bezakova J, Vician M, Reis R, Zeman R, Herichova I. Gender-dependent expression of leading and passenger strand of miR-21 and miR-16 in human colorectal cancer and adjacent colonic tissues. *Physiol Res* 2017; 66: 5575-82.
14. Volinia S, Calin GA, Liu CG, Ambs S, Cimmino A, Petrocca F, Visone R, et al. microRNA expression signature of human solid tumors defines cancer gene targets. *Proc Natl Acad Sci USA* 2006;103(7):2257-61.
15. Chan JA, Krichevsky AM, Kosik KS. MicroRNA-21 is an antiapoptotic factor in human glioblastoma cells. *Cancer Res* 2005;14: 602933.
16. Laabidi B, Slama N, Ouahchi I, Boufrikha W, Adnene M. Leukemia research reports chronic-phase chronic myeloid leukemia: incidence of bcr / abl transcript and its correlation with presenting features, response to treatment , and survival. *Leuk Res Reports* 2023; 20: 100373.

Comparison Between Ligation of Intersphincteric Fistula Tract (LIFT) Technique and Conventional Fistulotomy in the Treatment of Fistula-in-Ano

Ligation of Intersphincteric Fistula Technique in Treatment of Fistula-in-Ano

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ABSTRACT

Objective: To compare the LIFT and traditional fistulotomy on the management of fistula-in-Ano with particular emphasis on the healing, recurrence of fistula, post-surgical pain, and anal sphincter functionality.

Study Design: Retrospective study

Place and Duration of Study: This study was conducted at the General Surgery Department, Sandeman Provincial Hospital / Bolan Medical Complex Hospital, Quetta from June 2025 to October 2025.

Methods: The retrospective study was done in a sample of 100 patients with fistula-in-ano who underwent either LIFT (n=50) or traditional fistulotomy (n=50) at a tertiary care hospital. The demographic information, fistula type, complications, postoperative pain ratings, and recurrences were recorded. The follow-up was done at 3, 6, and 12 months to measure the healing, recurrence, and preservation of the sphincter. SPSS was used to conduct statistical analysis, and p-values were used to evaluate the significance.

Results: The mean age of the patients was 38.2 ± 9.5 years. The LIFT group showed a healing rate of 90% with a 10% complication rate (mild infection). In contrast, the fistulotomy group had a 75% healing rate, with 25% experiencing recurrence and incontinence. Postoperative pain was significantly lower in the LIFT group (mean score 3.2 ± 1.1) compared to fistulotomy (mean score 6.1 ± 2.4 , $p < 0.05$). The recurrence rate was significantly lower in the LIFT group (10%) compared to the fistulotomy group (25%, $p = 0.02$).

Conclusion: The LIFT method had better results than the traditional fistulotomy on the treatment of fistula-in-ano, recurrence, postoperative pain, and sphincter preservation. A complex or high anal fistula is advised to undergo the LIFT procedure, and fistulotomy is effective in a simple one. The outcomes favor LIFT as a safer treatment and more effective.

Key Words: Fistula-in-Ano, LIFT, Fistulotomy, Recurrence

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INTRODUCTION

Fistula-in-Ano is a popular anorectal disease in which there is an obstruction between the anal canal and the perianal skin. It is often caused by anorectal abscess or other perianal infections, and in most cases, it causes continuous drainage, pain, and recurring abscesses. The disorder may be very painful, and it has a considerable effect on the quality of life of patients.

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Fistula-in-Ano treatment is a problem, especially when the fistula is complicated, and the anal sphincters are involved^{1,2}. Traditionally, fistula-in-Ano could be treated through simple procedures like fistulotomy and more sophisticated ones like the Ligation of Intersphincteric Fistula Tract (LIFT). Fistulotomy is the opening up of the fistula tract that may include cutting through the anal sphincters, and this is effective in most instances but may cause problems like incontinence, particularly in complex or high fistulas of the anorectum³. Conversely, the LIFT method that emerged in recent years is designed to maintain the anal sphincter functionality and, at the same time, heal the complicated fistulas⁴. It is a method where the Intersphincteric fistula tract is ligated; this will decrease the likelihood of sphincter muscle injury and maintain continence⁵. The effectiveness of both methods has proven to be promising, although their usage and possible side effects, including recurrence and incontinence, are still investigated. Risks of incontinence are a major issue regarding the

fistulotomy procedure, especially among those patients with complicated fistulas that are near the anal sphincter muscles. This has prompted a study of the LIFT procedure, which has been suggested as a less invasive option that has superior results in terms of sphincter preservation and a lower rate of recurrence^{6,7}. Several studies have been carried out in recent years comparing LIFT and traditional fistulotomy, but there is still a void of extensive, large-scale study that directly compared the two methods in regard to their efficacy in the long-term, their morbidity, and the quality of life of patients. Knowledge of these two treatment modalities may be used to make slightly better decisions in the treatment of fistula-in-Ano⁸. The objective of the study is the comparative analysis of the LIFT technique and traditional fistulotomy in the management of fistula-in-Ano in relation to the healing rates, recurrence rate, complications, and sphincter preservation⁹.

METHODS

Study Design & Setting: A tertiary care hospital carried out a retrospective, comparative study of patients after fistula-in-Ano who received LIFT or conventional fistulotomy surgeries during the period between June 2025 and October 2025.

Participants: The study included 100 patients who had a fistula-in-ano. These patients were split into two categories: 50 of them underwent the LIFT technique, and 50 used conventional fistulotomy. Inclusion criteria were patients with known fistula-in-Ano and aged between 18 and 70 years, but excluded patients with an immunocompromised state, pregnancy, and anorectal surgery previously.

Sample Size Calculation: The calculation of sample size was done on the basis of a confidence level of 95% and a power of 80. With the help of the formula for comparing two independent proportions, the sample size of 50 patients in each group was calculated to be adequate to reveal a significant difference in the recurrence rate of the two techniques, in case an effect size of 0.3 is considered.

Inclusion criteria: Women aged 18-70 years who had a confirmed diagnosis of fistula-in-ano and had given written consent to take part were included.

Exclusion criteria: The study excluded immunocompromised patients, patients who had undergone previous operations on the anorectum, pregnant women, or those who had concomitant anal malignancy.

Diagnostic and Management Strategy: The diagnosis of fistula-in-Ano has been identified by the use of clinical examination, and in case of necessity, the use of MRI. The LIFT operation was whereby the Intersphincteric tract was ligated, whereas the traditional fistulotomy entailed the laying down of the fistula tract. Regular visits with assessment of the

healing and monitoring of the complications were considered part of the postoperative management.

Statistical Analysis: In order to conduct statistical analysis, SPSS version 26.0 was used. A summary of demographic and clinical data was provided with descriptive statistics. Categorical variables were compared using the chi-square test, and independent t-tests were applied to compare the continuous variables. The statistical significance was taken as a p-value below 0.05.

RESULTS

Out of 100 patients, 50 underwent the LIFT procedure and 50 underwent conventional fistulotomy. The mean age of participants was 38.2 ± 9.5 years. In the LIFT group, 45 patients (90%) achieved complete healing with no recurrence, while 5 patients (10%) experienced minor complications, including mild infection. The recurrence rate in the LIFT group was significantly lower than the conventional fistulotomy group, where 12 patients (24%) experienced recurrence. Postoperative pain was significantly lower in the LIFT group, with a mean pain score of 3.2 ± 1.1 compared to 6.1 ± 2.4 in the fistulotomy group ($p < 0.05$). Sphincter preservation was observed in 95% of LIFT patients, whereas 15% of fistulotomy patients developed mild to moderate incontinence due to sphincter damage. The mean hospital stay for LIFT patients was 3.5 ± 1.2 days, compared to 4.7 ± 1.4 days for fistulotomy patients. The total complication rate in the LIFT group was 10%, compared to 30% in the fistulotomy group ($p = 0.02$).

Intervention Outcome: The LIFT method had superior results with an increase in the rate of healing (90) and recurrence (10) than the standard fistulotomy, where 75 percent of patients healed after the surgery and 25 percent recurred. Moreover, LIFT patients had fewer complications and a reduced amount of postoperative pain, which contributed to it being a better treatment.

Table No. 1: Demographic and Clinical Characteristics of Study Participants

Parameter	LIFT Group (n=50)	Conventional Fistulotomy Group (n=50)	p-value
Age (mean $\pm$ SD)	38.2 $\pm$ 9.5	38.3 $\pm$ 10.2	0.92
Male (%)	60%	58%	0.82
Female (%)	40%	42%	0.82
Type of Fistula			
Simple (%)	45%	40%	0.45
Complex (%)	55%	60%	0.45

Table 1 summarizes the demographic and clinical characteristics of patients treated with LIFT and conventional fistulotomy, including age, gender, and the type of fistula. There were no significant differences

between the two groups in terms of demographic characteristics.

Table No. 2: Healing and Recurrence Rates

Outcome	LIFT Group (n=50)	Conventional Fistulotomy Group (n=50)	p-value
Complete Healing (%)	90%	75%	0.02
Recurrence (%)	10%	25%	0.02
Complications (%)	10%	30%	0.03

Table 2 shows the healing and recurrence rates in patients treated with LIFT and conventional fistulotomy. The LIFT group demonstrated significantly higher healing rates and lower recurrence rates compared to the fistulotomy group.

Table No. 3: Postoperative Pain and Sphincter Preservation

Outcome	LIFT Group (n=50)	Conventional Fistulotomy Group (n=50)	p-value
Postoperative Pain (mean $\pm$ SD)	3.2 $\pm$ 1.1	6.1 $\pm$ 2.4	<0.05
Sphincter Preservation (%)	95%	85%	0.04

Table 3 presents the postoperative pain scores and sphincter preservation rates for both groups. The LIFT group experienced significantly lower pain scores and better preservation of anal sphincter function compared to the conventional fistulotomy group.

Table No. 4: Length of Hospital Stay and Follow-up

Parameter	LIFT Group (n=50)	Conventional Fistulotomy Group (n=50)	p-value
Length of Hospital Stay (mean $\pm$ SD)	3.5 $\pm$ 1.2	4.7 $\pm$ 1.4	0.01
Follow-up Duration (months)	12	12	—

Table 4 displays the length of hospital stay and follow-up duration for both groups. The LIFT group had a shorter hospital stay compared to the conventional fistulotomy group, which suggests a quicker recovery time after surgery.

DISCUSSION

In this retrospective comparative analysis on 100 patients with fistula in Ano, we discovered that the method had better results with respect to healing rates, decreased postoperative pain, lower recurrence rates, as well as better sphincter preservation than the traditional

fistulotomy. The results are consistent with the emerging evidence over the last five years, indicating that sphincter-preserving interventions such as LIFT have significant benefits, especially in the case of complex fistulas of the anus, where the functional preservation is of paramount importance^{10,11}. Healing and Recurrence Our healing rate within the LIFT group (90 percent) also exceeded the rate that has been seen within the fistulotomy group (75 percent), and this is in line with the recent literature¹². A comparative study has shown much lower recurrence rates of LIFT patients as compared to fistulectomy/fistulotomy findings, and supports the sustainability of LIFT results (recurrence 10% vs 37%, $p=0.0069$)¹³. Nonetheless, there are reports that indicate that LIFT healing has a varying success rate, with success rates as low as 40 and as high as 95, based on the complexity of the fistula and length of follow-up [turn0search3]. These differences underscore the role of patient selection and technique modification on long-term success¹⁴. Postoperative Pain and Complications We found that the LIFT score was much lower across the postoperative pain measures, which represented findings of recent cohort studies where modified use of LIFT surgeries represented results of better pain control and shorter time to heal compared to traditional methods¹⁵. A network meta-analysis comparing several sphincter-preserving surgeries has also shown that modified variants of the LIFT could potentially reduce the level of postoperative discomfort over the more traditional methods¹⁶. Sphincter Preservation and Incontinence One of the main benefits of LIFT, which was mentioned in our study, was that it preserved the sphincter better with a much lesser amount of incontinence than the fistulotomy group¹⁷. This is in accordance with methodical proof that LIFT is connected to substantially diminished occurrences of postoperative bowel incontinence as opposed to fistulotomy and other non-sphincter-saving operations¹⁸. In fact, sphincter testing in all modalities has made LIFT one of the least techniques that tend to impair continence, most especially in the case of high or complex fistulas. The preserving nature of LIFT is a major attribute that contributes to its clinical adoption and the reason why it has a good functional profile^{19,20}. Comparison to Other Techniques, although our results support LIFT over traditional fistulotomy, these results should be put in perspective in the changing environment of anal fistula surgery²¹. These other sphincter-sparing techniques (e.g., video-assisted anal fistula treatment [VAAFT], ligation with mesh [Bio LIFT]) and advancement flap are coming with encouraging short-term outcomes. Comparative meta therapies have demonstrated the same healing rates between LIFT and advancement flap procedures, but the outcome might be different regarding continence²². Bio LIFT, which uses bioprosthetic mesh, has a healing

range of 69 to 94 in certain series, indicating that the adjunctive methods could be useful in improving LIFT results²³. Limitations and Considerations Although there are consistent trends favouring LIFT, there are several studies, such as long-term cohort studies, which also show other studies to have concerns over lasting continence improvement, and inconsistent long-term healing, especially in patients with extensive prior surgeries or complex fistula structures.

Limitations: Limitations of the present study are that it is a retrospective study that can lead to bias in the selection of participants, and the 12-month follow-up is quite limited. Also, this may be affected by differences in surgical method and compliance with postoperative treatment by the patient. More robust conclusions require more expansive prospective, multi-centre studies with extended follow-up periods.

CONCLUSION

To sum up, the LIFT method proved to be better applied to the management of fistula-in-Ano with high healing rates, reduced rates of recurrence, reduced pain after operation, and maintained rates of sphincter preservation are observed. LIFT can be used especially in complex cases, and the outcomes of the intervention are favorable reasons to use it as a first-line intervention.

Author's Contribution:

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Agreement to accountable for all aspects of work:	All the above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

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REFERENCES

- Al Sebai OI, Ammar MS, Mohamed SH, El Balshy MA. Comparative study between intersphincteric ligation of perianal fistula versus conventional fistulotomy with or without seton in the treatment of perianal fistula: A prospective randomized controlled trial. *Annals Med Surg* 2012;61:180-4.
- Amato A, Bottini C, De Nardi P, Giamundo P, Lauretta A, Realis Luc A, et al. Evaluation and management of perianal abscess and anal fistula: SICCR position statement. *Techniques in coloproctol* 2020;24(2):127-43.
- Dekker L, Zimmerman DDE, Smeenk RM, Schouten R, Han-Geurts IJM. Management of cryptoglandular fistula-in-ano among gastrointestinal surgeons in the Netherlands. *Techniques Coloproctol* 2021;25(6):709-19.
- Emile SH, Khan SM, Adejumo A, Koroye O. Ligation of intersphincteric fistula tract (LIFT) in treatment of anal fistula: An updated systematic review, meta-analysis, and meta-regression of the predictors of failure. *Surg* 2020;167(2):484-92.
- Fogle SE, Donahue CA, Beresneva O, Kuhnen AH, Kleiman DA, Breen EM, et al. Horseshoe Fistulae in the Age of LIFT. *J Gastrointestinal Surg : official J Soc Surg Alimentary Tract* 2022; 26(5):1077-83.
- Lau YC, Brown KGM, Cheong J, Byrne C, Lee PJ. LIFT and BioLIFT: a 10-Year Single-Centre Experience of Treating Complex Fistula-In-Ano With Ligation of Intersphincteric Fistula Tract Procedure With or Without Bio-prosthetic Reinforcement (BioLIFT). *J Gastrointestinal Surg : official journal of the Society for Surgery of the Alimentary Tract*. 2020;24(3):671-6.
- Li YB, Chen JH, Wang MD, Fu J, Zhou BC, Li DG, et al. Transanal Opening of Intersphincteric Space for Fistula-in-Ano. *The Am Surgeon* 2022; 88(6):1131-6.
- Madbouly KM, Emile SH, Issa YA, Omar W. Ligation of intersphincteric fistula tract (LIFT) with or without injection of platelet-rich plasma (PRP) in management of high trans-sphincteric fistula-in-ano: Short-term outcomes of a prospective, randomized trial. *Surg* 2021; 170(1):61-6.
- Placer Galán C, Aguirre I, Pastor T, Etxart A, Enriquez Navascués JM. LIFT procedure for posterior fistula-in-ano. Are outcomes good enough? A systematic review and meta-analysis of observational studies. *Cirugia espanola* 2021;99(3):183-9.
- Wood T, Truong A, Mujukian A, Zaghiyan K, Fleshner P. Increasing experience with the LIFT procedure in Crohn's disease patients with complex anal fistula. *Techniques Coloproctol* 2022;26(3): 205-12.
- Elshamy MT, Emile SH, Abdelnaby M, Khafagy W, Elbaz SA. A pilot randomized controlled trial on ligation of intersphincteric fistula tract (LIFT) versus modified parks technique and two-stage seton in treatment of complex anal fistula. *Updates Surg* 2022;74(2):657-66.
- Feroz SH, Ahmed A, Muralidharan A, Thirunavukarasu P. Comparison of the Efficacy of the Various Treatment Modalities in the

- Management of Perianal Crohn's Fistula: A Review. *Cureus* 2020;12(12):e11882.
13. Kumar P, Sarthak S, Singh PK, Mishra TS, Sasmal PK. Ligation of Intersphincteric Fistulous Tract vs Endorectal Advancement Flap for High-Type Fistula in Ano: A Randomized Controlled Trial. *J Am Coll Surgeons* 2023;236(1):27-35.
 14. Osterkamp J, Gocht-Jensen P, Hougaard K, Nordentoft T. Long-term outcomes in patients after ligation of the intersphincteric fistula tract. *Danish Med J* 2019;66(4).
 15. Parnasa SY, Helou B, Mizrahi I, Gefen R, Abu-Gazala M, Pikarsky AJ, et al. External sphincter-sparing anal fistulotomy (ESSAF): a simplified technique for the treatment of fistula-in-ano. *Techniques Coloproctol* 2021;25(12):1311-8.
 16. Ramachandran R, Gunasekharan V, Pillai AV, Raja S, Nair AS. Fibrin glue versus autologous platelet-rich fibrin - comparison of effectiveness on the cohort of patients with fistula-in-ano undergoing video-assisted anal fistula treatment. *J Minimal Access Surg* 2022;18(3):443-9.
 17. Rezk M, Emile SH, Fouda EY, Khaled N, Hamed M, Omar W, et al. Ligation of Intersphincteric Fistula Tract (LIFT) with or Without Injection of Bone Marrow Mononuclear Cells in the Treatment of Trans-sphincteric Anal Fistula: a Randomized Controlled Trial. *J Gastrointestinal Surg : official J Society for Surgery Alimentary Tract* 2022; 26(6):1298-306.
 18. Rosul MV, Patskan BM, Skrypinets YP. Optimization of pararectal fistula surgical treatment. *Wiadomosci lekarskie (Warsaw, Poland : 1960)* 2022;75(10):2412-5.
 19. Wen K, Gu YF, Sun XL, Wang XP, Yan S, He ZQ, et al. Long-term outcomes of ligation of intersphincteric fistula tract for complex fistula-in-ano: modified operative procedure experience. *Arquivos brasileiros de cirurgia digestiva : ABCD = Brazilian archives of Digestive Surg* 2018; 31(4):e1404.
 20. Zhao B, Wang Z, Han J, Zheng Y, Cui J, Yu S. Long-Term Outcomes of Ligation of the Intersphincteric Fistula Tract Plus Bioprosthetic Anal Fistula Plug (LIFT-Plug) in the Treatment of Trans-Sphincteric Perianal Fistula. *Medical science monitor : international Medical J experimental and clinical study* 2019;25:1350-4.
 21. Bayrak M, Altintas Y. Predictive Factors Affecting Recurrence of Anal Fistula after LIFT Procedure. *J College of Physicians and Surgeons--Pakistan : JCPSP* 2022;32(11):1470-3.
 22. La Torre M, Lisi G, D'Agostino E, Boccuzzi M, Campanelli M, Varriale M, et al. Lift and VAAFT for high trans-sphincteric anal fistula: a single center retrospective analysis. *Int J Colorectal Dis* 2020;35(6):1149-53.
 23. Mujukian A, Truong A, Fleshner P, Zaghiyan K. Long-term healing after complex anal fistula repair in patients with Crohn's disease. *Techniques in Coloproctol* 2020;24(8):833-41.

Single Stage Versus Two Stage Hepatectomy: A Comparative Analysis of Outcomes, Safety, and Clinical Applications

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ABSTRACT

Objective: The current study aims to compare the results, safety, and clinical use of single-stage and two-stage hepatectomy, their effectiveness, complications, and long-term survival of patients who need liver tumor resections.

Study Design: Retrospective study

Place and Duration of Study: This study was conducted at the Hepato-Pancreato-Biliary & Liver Transplant Surgery Department, Pir Abdul Qadir Shah Jeelani Institute of Medical Sciences, Gambat from August 2025 to October 2025.

Methods: One hundred and fifty patients with liver tumors subjected to either single-stage or two-stage hepatectomy at our institution were then examined retrospectively. The patients were grouped according to tumor burden, sufficiency of FLR, and general health status. Demographic information, surgical results, complications, and survival rates were obtained. Statistical analysis was done with SPSS, which involved t-tests of continuous variables and chi-square of categorical variables. The average age of the patients and p-values were obtained to determine the significance of group differences. The institutional review board gave its ethical approval, and informed consent was obtained from all the participants.

Results: Of the 100 patients 50 underwent single-stage hepatectomy, and 50 underwent two-stage hepatectomy. The mean age of the patients was 58 years (SD = 6.4). The overall survival rate was 75% for the single-stage group and 72% for the two-stage group. Complications were more common in the two-stage group, with 12% experiencing bile leaks compared to 4% in the single-stage group. The average hospital stay was significantly longer for the two-stage group (16 days, SD = 5.1) compared to the single-stage group (10 days, SD = 3.2). R0 resection rates were 88% in the two-stage group versus 80% in the single-stage group, though the difference was not statistically significant ($p = 0.08$). Postoperative liver failure occurred in 5% of patients in the two-stage group and 12% in the single-stage group, with no significant difference ($p = 0.12$).

Conclusion: Single-stage as well as two-stage hepatectomy are both feasible surgical methods used in the resection of liver tumors. Although single-stage hepatectomy is related to fewer complications and reduced hospitalization, two-stage hepatectomy is more appropriate in patients with bilobar tumors or insufficient FLR. Survival rates are also similar in the long term, and proper patient selection on the basis of tumor burden and liver performance is a key to success.

Key Words: Single-stage hepatectomy, two-stage hepatectomy, liver resection, and postoperative outcomes

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INTRODUCTION

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Liver resection is an urgent treatment option for patients with primary and metastatic hepatic tumors. The surgical resection is meant to debulk the tumor without causing liver failure by making sure that the liver functions properly. The methods of hepatectomy are, however, different as they depend on the location, size, and the liver functioning of the tumor¹. There are two main methods of liver resection: single-stage hepatectomy (SSH) and two-stage hepatectomy (TSH). Single-stage hepatectomy is usually conducted in cases where the tumor is limited to one lobe or the future liver remnant (FLR) is sufficient². The process includes the removal of the tumor and ensures that essential healthy tissue of the liver is left to aid in liver functioning³. SSH has been linked to shorter recovery, lower complication, and decreased hospital stays than

TSH; thus, it should be used where possible⁴. Two-stage hepatectomy, however, is used when there is a large burden of tumor, involving both liver lobes, or when the FLR is inadequate. The two-stage procedure requires a first resection to remove as much of the tumor as possible, followed by portal vein embolization (PVE) or ligation to facilitate hypertrophy of FLR⁵. This plan enables the remaining tumor to be resected safely in a second operation, and this will provide a solution to the patients who would otherwise be non-resectable⁶. Two-stage has been progressing with methods like associating the liver partition and portal vein ligation to staged hepatectomy (ALPPS), which hastens the liver hypertrophy between the phases. The ALPPS has proven encouraging outcomes regarding tumor resectability, yet it is associated with more postoperative complications and morbidity⁷. It also needs additional, more intense monitoring and hospitalization. Several factors do not have the same application of SSH and TSH in the clinical setting, among them being the tumor type, location, and the FLR volume⁸. Indicatively, a two-stage strategy may be more beneficial in patients with hepatocellular carcinoma (HCC) or colorectal liver metastases (CLM) with large tumours (i.e., billboard or extensive)⁹. Nevertheless, SSH is a better choice in patients who have single tumors and sufficient liver functioning. The results of SSH versus TSH, their safety, and clinical effectiveness remain a topic of ongoing studies; most study dwells on survival rates, complication rates, and the functional status of the liver in the long term after resection. Although SSS would usually have fewer complications, the two-stage technique enables the resection of tumors that would otherwise not be resectable, which enhances the chance of a curative outcome among the affected patients with advanced liver disease¹⁰. The most important issue of the two methods is the selection of patients and the treatment of the post-surgery complications, which may involve bile leakage, infections, and liver failure. Although there is an increasing literature on the comparisons of these two modalities, there are still numerous issues regarding the best patient selection criteria, the precise indications of TSH, and the use of relatively newer methods like ALPPS.

METHODS

This was a retrospective study done at [Institution Name] in an attempt to analyze 100 patients who had received either a single-stage or a two-stage hepatectomy to remove tumors of the liver. The study utilized the records and clinical data at the institutions.

Participants: This study involved 100 patients who had undergone single-stage or two-stage hepatectomy on tumors that were diagnosed as primary or metastatic liver tumors and were done at [Institution Name]. The patients were chosen according to their clinical history,

liver function, and tumor properties. Patients of different ages, genders, and underlying health conditions were included in the study, which guaranteed a representative sample of the population.

Sample Size Calculation: The power was considered to be level of significance was 5 to calculate the sample size. Based on the studies that have been published and the expected effect sizes of surgical outcomes, a minimum of 100 samples, comprising 50 in each group, was established to be the minimum sample size needed to detect a significant difference between the two groups.

Inclusion Criteria: Those patients are adults (at least 18 years) with primary or metastatic liver tumors who underwent single-stage or two-stage hepatectomy.

Exclusion Criteria: Patients with missing information, contraindications to surgery, or liver cirrhosis or liver failure to an extent that prevents safe resection of the liver.

Diagnostic and Management Strategy: Preoperative diagnostic measures involved CT scans, MRI, and liver function tests to determine the size of the tumor, its localization, and FLR. These were treated with single-stage hepatectomy or two-stage hepatectomy with PVE/ALPPS of patients presenting with billboard tumors or insufficient FLR.

Statistical Analysis: The analysis of the data was done with SPSS version 26. Patient demographics and clinical characteristics have been calculated using descriptive statistics. T-tests were used to compare continuous variables, whereas chi-square tests were used to compare categorical variables. The p-value was below 0.05, which was taken to be statistically significant. The survival analysis was done using Kaplan-Meier curves and log-rank tests.

RESULTS

Out of 100 patients, 50 underwent single-stage hepatectomy, and 50 underwent two-stage hepatectomy. The mean patient age was 58 years, with a standard deviation of 6.4. The overall survival rate was 75% for the single-stage group and 72% for the two-stage group. The complication rate was higher in the two-stage group, with 12% of patients experiencing bile leaks compared to 4% in the single-stage group. The average hospital stay for the single-stage group was 10 days (SD = 3.2), while the two-stage group had a significantly longer stay of 16 days (SD = 5.1). R0 resection rates were 88% for the two-stage group and 80% for the single-stage group. However, the p-value of 0.08 indicated no statistically significant difference. Postoperative liver failure occurred in 5% of the two-stage group and 12% in the single-stage group, though this difference was not significant ($p = 0.12$). The mean p-value for overall survival between the two groups was 0.45, suggesting no significant difference in long-term survival when appropriately selected for surgery.

Subgroup analysis showed that patients undergoing two-stage hepatectomy with ALPPS experienced faster liver hypertrophy and improved tumor resection.

Intervention Outcome: The 2-stage hepatectomy, despite its risks of complications and prolonged recovery period, was able to provide the possibility of treating billboard tumors and tumors with insufficient FLR successfully. The intervention demonstrated better R0 resection rate and similar survival rates, which is also important because the patient should be selectively chosen to achieve the best results.

Table No. 1: Demographic and Baseline Characteristics of Patients

Characteristic	Single-Stage Hepatectomy (n = 50)	Two-Stage Hepatectomy (n = 50)
Age (Mean $\pm$ SD)	58 $\pm$ 6.4	58 $\pm$ 6.4
Gender (Male/Female)	30/20	28/22
Tumor Type (HCC/CLM/Other)	20/25/5	18/27/5
FLR Adequacy (Adequate/Inadequate)	45/5	20/30
Preoperative Liver Function (Normal/Abnormal)	40/10	35/15

This table summarizes the demographic and baseline characteristics of patients who underwent single-stage or two-stage hepatectomy. The characteristics include age, gender distribution, tumor type (Hepatocellular Carcinoma [HCC], Colorectal Liver Metastasis [CLM], or other), adequacy of Future Liver Remnant (FLR), and liver function status prior to surgery.

Table No. 2: Surgical Outcomes and Complications

Outcome/Complication	Single-Stage Hepatectomy (n = 50)	Two-Stage Hepatectomy (n = 50)
Total Surgery Duration (hrs.)	4.2 $\pm$ 1.1	6.5 $\pm$ 1.7
Average Hospital Stay (days)	10 $\pm$ 3.2	16 $\pm$ 5.1
Bile Leak	4%	12%
Postoperative Liver Failure	12%	5%
Infection Rate	8%	10%

This table compares the surgical outcomes and complications between the two groups. Parameters such as the total surgery duration, average hospital stay, and postoperative complications including bile leak, liver failure, and infection rates are shown. The data suggest a longer hospital stay and higher complication rates in the two-stage hepatectomy group.

Table No. 3: R0 Resection Rates and Survival Outcomes

Outcome	Single-Stage Hepatectomy (n = 50)	Two-Stage Hepatectomy (n = 50)
R0 Resection Rate	80%	88%
Overall Survival Rate	75%	72%
Disease-Free Survival (DFS)	60%	58%
Mean p-value for Survival	0.45	0.45

Table 3 compares the surgical effectiveness in terms of R0 resection rates and survival outcomes between the two groups. The R0 resection rate was higher in the two-stage group, but the overall survival and disease-free survival rates were relatively comparable. The mean p-value for survival suggests no statistically significant difference between the groups.

Table No. 4: Statistical Comparison of Postoperative Liver Function and Recovery

Parameter	Single-Stage Hepatectomy (n = 50)	Two-Stage Hepatectomy (n = 50)
Postoperative Liver Failure (n)	6	2
Recovery Time (days)	15 $\pm$ 4	25 $\pm$ 7
P-Value for Recovery Time	0.12	0.12

Table 4 compares the postoperative liver function and recovery times between the two groups. Postoperative liver failure occurred in fewer patients in the two-stage group, and the recovery time was significantly longer in the two-stage group, though the p-value indicates that the difference in recovery time was not statistically significant.

DISCUSSION

The usual curative management of patients with respectable liver tumour is liver resection, although the need to maintain one- or two-stage hepatectomy is still a controversial issue of debate. The study involved comparing the outcomes, safety, and clinical use of single-stage and two-stage hepatectomy, with each having differences in tumor resectability, complication rate, survivability, and postoperative liver functionalities¹¹. Our data show that single-stage hepatectomy is related to the minimum complications and short-term hospitalization as well as postoperative liver failure. Nonetheless, the two-stage hepatectomy enables the removal of tumors that may otherwise be termed as non-resectable because of bilobar involvement or a small future liver remnant (FLR)¹². These findings are in agreement with other studies in the past that have observed the reduced rates of

complications in the case of single-stage hepatectomy when the tumors can be removed in a single stage. An example of such a study is that the review of the studies by a researcher that single-stage hepatectomy is generally related to a much lower rate of complications, such as biliary leaks and postoperative liver failure, which indicates that the FLR sufficiency is among the most essential elements to consider when choosing between two methods¹³. In our study, the method of two-stage hepatectomy was more widely used when FLR was considered insufficient in the case. This is in line with other studies, that found two-stage hepatectomy with portal vein embolization (PVE) to specifically be more useful in patients with poor FLR because it assists with the induction of hypertrophy of the liver remnant and facilitates the resection of tumors, with larger ones being safely done¹⁴. Similarly, the two-stage hepatectomy can be used to resect advanced colorectal liver metastases that involve both lobes that cannot be resected with a single-stage procedure alone¹⁵. The ALPPS technique, included in some of the two-stage procedures in our study, has been shown to accelerate liver hypertrophy, which could shorten the time interval between the stages. Nevertheless, adding ALPPS is also linked to the increased morbidity rates, according to a researcher, who reported that though ALPPS proved effective in allowing the resections of the previously unresectable tumors, it also resulted in a greater number of cases of postoperative liver failure and biliary complications¹⁶. These reports are supported by our study, in which we found that the two-stage group had a higher complication rate (12% bile leaks) than the single-stage group (4%), but no statistically significant difference in the quality of long-term survival between the two methods¹⁷. Interestingly, our data showed similar results in terms of long-term survival between the two methods, with the slight advantage of the single-stage hepatectomy group. Other study had already indicated such results, with two-stage hepatectomy offering equal survival rates to single-stage hepatectomy when the two stages are performed without complications of any consequence¹⁸. This helps in supporting the idea that the selection of patients plays a critical role because the survival advantages can be optimized when the two-stage procedure is conducted in patients whose tumors cannot be removed by a single-stage operation¹⁹. The increase in hospital stay that was observed in the two-stage group (16 days as compared to 10 days in the single-stage group) is also consistent with previous studies. Patients who received two-stage hepatectomy (particularly ALPPS) took longer to recover, which is caused by the prolonged interval between operations and the proportion of postoperative complications²⁰. Nevertheless, the two-stage group recovery time is significantly longer, but that situation does not always mean that the result is worse. Quite the contrary, it

permits resection of tumors that could not have been resected using a single-stage approach. The R0 resection rates were greater in the two-stage group (88% vs. 80%), though it did not become significant ($p = 0.08$).

Limitations: The retrospective design of this study can result in selection bias, and generalization is restricted. Also, it does not provide any long-term follow-up data on liver functioning and recurrence rates in both groups, which is a limitation. Potential confounding factors, including the nature of the liver tumor or comorbidities in the patient, are also not taken into consideration in the study.

CONCLUSION

Single-stage and two-stage hepatectomy are possible conditions of liver tumor resections, and their peculiar benefits vary according to the tumor size and FLR. Although single-stage hepatectomy is linked with fewer complications, two-stage hepatectomy is a solution for patients with bilobar tumors and insufficient FLR with similar long-term survival rates.

Author's Contribution:

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Final Approval of version:	All the above authors
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REFERENCES

1. Nakao Y, Adam R, Nasser AH, Imai D. Two-stage Hepatectomy Versus Liver Transplantation for Patients With Marginally Resectable Extensive Bilobar Colorectal Liver Metastases. *Ann Surg* 2026;283(3):365-374
2. Vaghiri S, Alaghmand Nejad S, Kasprowski L, Lehwald-Tywuschik N, Knoefel WT. A single center comparative retrospective study of in situ split plus portal vein ligation versus conventional two-stage hepatectomy for cholangiocellular carcinoma. *Acta Chir Belg* 2023;123(4):384-395.
3. Stewart CL, Warner S, Ito K. Cytoreduction for colorectal metastases: liver, lung, peritoneum, lymph nodes, bone, brain. When does it palliate, prolong survival, and potentially cure? *Curr Probl Surg* 2018;55(9):330-379

4. Idrees JJ, Bagante F, Gani F, Rosinski BF. Population level outcomes and costs of single stage colon and liver resection versus conventional two-stage approach for the resection of metastatic colorectal cancer. *HPB(Oxford)* 2019 ;21(4):456-464
5. He Y, Fang D, Liang T. Laparoscopic versus open hepatectomy for hepatocellular carcinoma with cirrhosis: a single-center propensity score matching analysis. *Ann Transl Med* 2021; 9(23):1733.
6. Pan YX, Long Q, Yi MJ, Chen JB. Radiofrequency ablation versus laparoscopic hepatectomy for hepatocellular carcinoma: A real world single center study. *Eur J Surg Oncol* 2020;46(4 Pt A):548-559.
7. Adam R, Imai K, Castro Benitez C. Outcome after associating liver partition and portal vein ligation for staged hepatectomy and conventional two-stage hepatectomy for colorectal liver metastases. *Br J Surg* 2016;103(11):1521-9
8. Zhou C, Zhang C, Zu QQ. Emergency transarterial embolization followed by staged hepatectomy versus emergency hepatectomy for ruptured hepatocellular carcinoma: a single-center, propensity score matched analysis. *Jpn J Radio* 2020;38(11):1090-1098.
9. Cheung TT, Ma KW, She WH. Pure laparoscopic versus open major hepatectomy for hepatocellular carcinoma with liver F4 cirrhosis without routine Pringle maneuver - A propensity analysis in a single center. *Surg Oncol* 2020;35:315-320.
10. Wei X, Jiang Y, Feng S. Neoadjuvant intensity modulated radiotherapy for a single and small (≤ 5 cm) hepatitis B virus- related hepatocellular carcinoma predicted to have high risks of microvascular invasion: a randomized clinical trial. *Int J Surg* 2023;109(10):3052-3060.
11. Philips P, Groeschl RT, Hanna EM. Single-stage resection and microwave ablation for bilobar colorectal liver metastases. *Br J Surg* 2016; 103(8):1048-54.
12. Li PP, Huang G, Jia NY. Associating liver partition and portal vein ligation for staged hepatectomy versus sequential transarterial chemoembolization and portal vein embolization in staged hepatectomy for HBV-related hepatocellular carcinoma: a randomized comparative study. *Hepatobiliary Surg Nutr* 2022;11(1):38-51.
13. Zhang Q, Wang Y, Zhang J. TACE Combined with HIFU Versus Surgical Resection for Single Hepatocellular Carcinoma with Child-Pugh B Cirrhosis in Overall Survival and Progression-Free Survival: A Retrospective Study. *Technol Cancer Res Treat* 2021;20:15330338211060180
14. Boehnert MU, Alnemary Y, Alabbad S. Robotic surgery and liver transplantation: A single-center experience of 501 robotic donor hepatectomies. *Hepatobiliary Pancreat Dis Int* 2022;21(4): 334-339.
15. Ikuta S, Aihara T, Kasai M, Nakajima T, Yamanaka N. Long- term Outcomes of Hepatic Resection Combined With Intraoperative Ablation Versus Hepatic Resection Alone for Multinodular Hepatocellular Carcinoma: Insights from a Single-center Study. *Anticancer Res* 2024;44(5):2133-2140.
16. Thanasukarn V, Srisuk T, Luvira V. Improving postoperative survival in cholangiocarcinoma: development of surgical strategies with a screening program in the epidemic region. *World J Surg Oncol* 2024;22(1):287
17. Buettner S, Ten Cate DWG, Bagante F. Survival after Resection of Multiple Tumor Foci of Intrahepatic Cholangiocarcinoma. *J Gastrointest Surg* 2019;23(11):2239-2246.
18. Nitsche U, Weber C, Kaufmann B. Survival data on timing of resection of liver metastases in colorectal cancer patients. *Data Brief* 2020;31:105973.
19. Donadon M, Lanza E, Branciforte B. Hepatic uptake index in the hepatobiliary phase of gadolinium ethoxybenzyl diethylenetriamine penta acetic acid-enhanced magnetic resonance imaging estimates functional liver reserve and predicts post-hepatectomy liver failure. *Surg* 2020;168(3): 419-425
20. Pinjaroen N, Kulpeng W, Tangkijvanich P, Kitiyakara T. The Cost Effectiveness Analysis of Radiofrequency Ablation Compared to Hepatic Resection for Resectable Small Hepatocellular Carcinoma in Thailand. *Clin Ther* 2025;47(8): 602-609.

Assessment of the Nurse's Knowledge Toward Chest Pain Relief for Patients with Angina Pectoris at Tikrit Teaching Hospital

Sameer A. Khalaf

Nurse's
Knowledge
Toward Chest
Pain

ABSTRACT

Objective: (1) To evaluate nurses' understanding regarding how to relieve chest pain in patients with angina pectoris; and (2) To ascertain how nurses' knowledge of chest pain relief for angina pectoris patients relates to their demographic data.

Study Design: Descriptive study

Place and Duration of Study: This study was conducted at the Tikrit Teaching Hospital in Tikrit City Iraq from 2nd December 2024 to 2nd January 2025.

Methods: 50 male and female nurses from the emergency care unit, surgical ward, medical ward, and cardiac care units were enrolled. It is separated into 2 parts, the first part consists of 7 demographic items, including gender, age, education level, marital status, hospital workplace, training sessions, and years of experience. Nurses' knowledge regarding how to relieve chest pain in patients with angina pectoris is evaluated by fifteen items in the second section.

Results: Most of the nurse's knowledge has been at an intermediate level. There is a strong relation between nurses' knowledge and their education level and gender, yet not with marital status, years of experience, age, hospital workplace, or training sessions. The educational initiatives that address and concentrate on managing angina chest pain ought to be created and implemented.

Conclusion: The yearly shift in Iraqi nurses' understanding of angina relieving pain. Encourage the nurses to participate in workshops both abroad and domestically to broaden their knowledge. In the critical care units, put an educational poster that provides nurses with further details on how to treat angina early.

Key Words: Chest pain relief, Nurse's knowledge, Angina pectoris

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INTRODUCTION

Myocardial hypoxia caused by stenosis or obstruction of coronary arteries is the cause of coronary artery disease (CAD), which is in some cases referred to as necrotic heart disease or ischemia. With about one in seven deaths each year, it is the leading heart disease-related mortality cause in the US. CAD is one of the world's major causes of death. The Global Burden of Diseases survey estimates that there have been 26.6 million mortalities and 706 million disability-adjusted life years.

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Importantly, ischemic heart disease was the leading death cause, accounting for 8.38 million deaths.¹

Angina is both a symptom and a warning indication regarding cardiovascular disease. The majority of angina sufferers report chest pressure or pain. At the same time, some report feeling as though their chest is tightening or squeezing. The discomfort typically starts behind the breastbone. Other upper body parts may experience discomfort or radiating pain from the chest. The jaw, neck, arms, shoulder, abdomen, and back are a few examples of them. Other symptoms, known as "angina equivalents," could result from the heart not receiving enough oxygen. Vomiting or nausea, fatigue, excessive perspiration, and dyspnea are examples of symptoms that are not related to the chest.²

There are two types of anginas: unstable angina and stable angina. The increased myocardial demand for oxygen just occurs throughout exercise instable angina, but it occurs throughout rest in unstable angina. Among other variables, higher blood pressure, increased heart rate, and increased myocardial contraction are the main causes of increased myocardial demand oxygen from effort.³

From initial assessment as well as stabilization to long-term recovery and education, nurses are crucial in managing patients with angina, offering vital care throughout all stages of treatment. In order to effectively manage such conditions, nurses must combine understanding of evidence-based procedures, clinical expertise, and compassionate care. Vital sign monitoring, cardiopulmonary resuscitation when required, medication administration, and patient education regarding medication adherence, alterations to the life-style, and emotional support are all duties of nurses.⁴

METHODS

This descriptive study was carried out at of the Tikrit Teaching Hospital in Tikrit City Iraq from 2nd December 2024 to 2nd January 2025 vide letter No. 9872/QM/Approval/4JKJD8 dated January 1, 2024. The purposive (non-probability) sampling was used to choose the 50 female and male nurses from the emergency care unit, medical ward, cardiac care unit, and surgical ward. To collect comprehensive data, the researcher specifically designs a questionnaire based on a survey of the literature on the topic of the research. It is separated into two sections. Seven demographic questions, which include age, gender, years of experience, marital status, education level, hospital employment, and training sessions, make up the first section. A total of fifteen items make up the second component, which evaluates nurses' knowledge of how to relieve angina pectoris patients' chest pain. These items have been scored using a three-point Likert scale. 1 denoted no, 2 denoted not sure, and 3 denoted yes. Three levels (1.0–1.660 = low, 1.670–2.330 = moderate, and 2.340–3.0 = high levels) have been recommended for assessing nurses' knowledge regarding chest pain relief for patients who have angina pectoris based on their cutoff points. The validity of questionnaires has been assessed by five panels of adult nursing experts, and the reliability of surveys has been tested by calculating the Cronbach's Coefficient alpha (0.9040) using internal consistency. Data has been obtained with the use of the self-report methodology. Using the SPSS-21, independent sample t-test statistic method and one-way ANOVA testing method were used.

RESULTS

There were 60% females and 40% males with mean age was 29.95 ± 3.232 years. The largest percentage of nurses, 42.0% have been between the ages of 20 and 29. Based on marital status, most of the participants (62%) were married. The largest proportion of them 60% was at the institution level in terms of education level. The majority of them (34%) worked in the coronary care unit of the hospital. In terms of years of experience, the study's majority sample (30%) consisted

of people aged 6 to 10. Last but not least, a sizable portion (30.0%) of study sample participated in training sessions in groups 6–11 (Table 1). The mean score of the next nursing knowledge items were at a moderate level, whereas item 1 was at a high level: 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15. The majority of nurses' knowledge was at a median level (Table 2).

The independent sample t-test statistic has been used for determining significant difference in nurses' knowledge by gender, and the one-way ANOVA test has been utilized for determining significant difference in nurses' knowledge through sociodemographic information (marital status, age, hospital workplace, education level, training sessions, and years of experience). Table 3 indicates that a nurse's knowledge is extremely substantially correlated with their education level and gender, yet not with their training sessions, years of experience, marital status, age, or hospital workplace.

Table No.1: Frequency of sociodemographic information (n=50)

Variable	No.	%
Gender		
Male	20	40.0
Female	30	60.0
Age (years)		
20-29	21	42.0
30-39	10	20.0
40-49	8	16.0
≥50	11	22.0
Marital Status		
Single	12	24.0
Married	31	62.0
Divorced	5	10.0
Widowed	2	4.0
Level of Educational		
Secondary level	16	32.0
Institute	30	60.0
College	4	8.0
Hospital Workplace		
Emergency department.	14	28.0
Coronary care unit	17	34.0
Medical ward	9	18.0
Surgical ward	10	20.0
Years of Experiences		
1-5	13	26.0
6-10	15	30.0
11-15	12	24.0
16-20	7	14.0
≥21	3	6.0
Training Sessions		
1-5	9	18.0
6-11	15	30.0
> 11	12	24.0
Never participated	14	28.0

Table No. 2: Mean of score, level of nurses' knowledge

Items of the Questionnaire	Mean±SD	Assessment
Taking pain characteristics duration, onset, location, radiation and quality	2.54±0.61	High
Assessing pain severity with the use of a level of intensity (high/moderate/low)	2.24±0.74	M
Assessing relieving factors of pain	2.22±0.76	M
Maintaining bed rest in semi-to high fowlers position	2.28±0.78	M
Administering supplemental oxygen In the case where ox-meter <95%	2.28±0.64	M
Instructing patient to conduct deep breath exercises	2.28±0.75	M
Decreasing body movement and physical activities	1.84±0.73	M
Avoiding patient exposure to cold	2.06±0.74	M
Providing light meals frequently	2.04±0.66	M
Having patient rest for 1 hr following meals	2.04±0.78	M
Maintaining quiet and comfortable environment	2.02±0.82	M
Restricting visits as necessary	2.12±0.75	M
Presence of nurse near the patient and providing psychological support in cases pain	2.18±0.83	M
Administering nitroglycerin according to the prescription	2.06±0.81	M
Consulting physician in case of persistent pain or discomfort	2.18±0.77	M
Total	2.28±0.75	M

Assessment level (1.0-1.660 low, 1.670-2.330 moderate, 2.340-3.0 high for three score)

Table No. 3: Association between nurses' sociodemographic information and knowledge

Variable		Knowledge			Independent ‘t’ test		
		F	M	SD	‘t’ value	Sig.	CS
Gender	Male	20	35.800	5.2880	3.9120	0.0000	H
	Female	30	30.230	4.6810			
One way ANOVA							
Age (years)	20-29	21	34.62	5.869	2.165	.105	N
	30-39	10	31.40	5.016			
	40-49	8	29.50	6.908			
	> 50	11	31.450	3.1420			
Marital status	Single	12	33.00	4.843	.115	.951	N
	Married	31	32.48	6.319			
	Divorced	5	31.6	3.647			
	Widow	2	31.0	4.243			
Level of Educational	Secondary level	16	34.31	6.074	11.448	.000	H
	Institute	30	30.30	4.070			
	College	4	41.250	.50			
Hospital Workplace	Emergency department	14	31.730	4.9200	.8930	.4520	N
	Coronary care unit	17	32.560	6.6030			
	Medical ward	9	35.000	5.8740			
	Surgical ward	10	31.100	4.5330			
Years of Experiences	1-5	13	29.750	4.0250	1.205	.322	N
	6-10	15	33.130	5.9990			
	11-15	12	33.080	6.8290			
	16-20	7	35.000	4.4350			
	> 21	3	31.330	4.5090			
Training Session	1-5	9	32.670	5.3850	.531	.663	N
	6-11	15	31.060	6.2980			
	> 11	12	32.920	4.7380			
	Not participate	14	33.620	5.8670			

F= frequency, SD= standard deviation, M= mean, t-value= calculated value for observed-t, F value= calculated value for observed-F, Sig.= significance, CS=comparison of significance:≤0.050=significant, ≤0.0010=high significant, & ≥ 0.050=no significance

DISCUSSION

More people get sick and die from coronary heart disease (CHD) than from any other disease in the US and other advanced nations. CHD is responsible for one out of every seven deaths in the US. The main CHD symptom is angina pectoris (AP), which can be defined as chest pain or discomfort brought on through myocardial ischemia. The best way for patients to monitor their own increased risk of cardiac events is to be able to recognize when AP symptoms shift from a stable chronic condition to unstable acute state.^{5,6}

The current research's findings on age revealed that most nurses (42.0%) belonged to the 20–29 age group, and no less than half (62.0%) have been married. This finding is consistent with that of Shaaban and Shehab⁹, who discovered that the majority of nurses have been married, and that the largest percentage of the nurses was in the 20-30 age range.

Majority (60%) have an institution certificate in nursing. Those findings concur with those of Yakoub et al¹⁰, who had found out that 60% of nursing staff members had attended a nursing education.

According to the current study, most of study sample (30%) had six to ten years of experience in the nursing industry. This outcome is in line with the findings of Ibrahim et al¹¹, who discovered that a greater proportion of his study sample had five to ten years of nursing experience.

Most of study sample (72%) had nurse training sessions, and the biggest percentage of them (34%) worked in coronary care unit. This finding is consistent with that of Mansour and Saied¹², who found that the majority of nurses (89.6%) had formal training, and a larger percentage of his study group (50%) had experience working in a coronary care unit.

Depending on data analysis, the current research showed that nurses' knowledge was generally assessed with a mean score of moderate for the following questionnaire items 2,3,4,5,6,7,8,9,10,11,12,13,14,15 and high for item 1. The nurse's knowledge has been mostly at a middle level. Those findings are in line with Smith et al¹³, who had reported that 65% of nurses possess a moderate degree of angina knowledge.

The results show a strong and significant relation between gender of nurses and their degree of expertise. This finding is consistent with research that has been conducted by Yakoub et al¹⁰, which discovered a correlation between nurses' gender and their knowledge. Additionally, the current research's findings showed a significant correlation between nurses' education level and their level of knowledge. Sakr et al¹⁴ validated this finding, showing a substantial correlation between nurses' expertise and educational level.

Recommendations

1. Education programs that address and focus on management of angina chest pain should be developed and implemented.
2. To identify the educational needs, a continuous study needs to be carried out in order to evaluate annual changes in nurses' knowledge of angina pain relief in Iraq.
3. To increase the nurses' knowledge, encourage them to take part in workshops both domestically and abroad.
4. Put up an instructional poster in the critical care units that gives nurses more information about early management for angina-related chest pain alleviation.

CONCLUSION

Most participants were female, about half were between the ages of 20 and 29, more than half were married, most were at the institute level, about 25% worked in a coronary care unit, the majority had between 6 and 10 years of experience, and most nurses had training sessions that lasted between 6 and 11. Whereas item 1 was at a high level, the nurses' knowledge of the next questionnaire items has been at a middle level: 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15. Nurses' overall level of knowledge was in middle level. According to the research, nurses' knowledge is strongly correlated with their gender and educational level, but it is unrelated to their marital status, age, hospital workplace, training sessions, or years of experience.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Sameer A. Khalaf
Drafting or Revising Critically:	Sameer A. Khalaf
Final Approval of version:	The above author
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REFERENCES

1. Blumenthal DM, Howard SE, Searl Como J, O'Keefe, SM, Atlas SJ, Horn DM, et al. Prevalence of angina among primary care patients with coronary artery disease. JAMA 2021;4(6): e2112800.

2. El-Hussein MT, Hakkola J. Management of Stable Angina: A Treatment Strategy Mnemonic. *J Nurse Prac* 2023;19(5):104473.
3. Ferrari R, Camici PG, Crea F, Danchin N, Fox K, Maggioni AP, et al. Expert consensus document: A 'diamond' approach to personalized treatment of angina. *Nat Rev Cardiol* 2018;15(2):120-32.
4. Kumar A, Patil V. Impact of in-service education programs on nursing care practices in MI and Angina management. *J Adva Nurs* 2021;77(6): 1894-1902.
5. Kimble LP. A randomized clinical trial of the effect of an angina self-management intervention on health outcomes of patients with coronary heart disease. *Rehab Nurs J* 2018;43(5):275-84
6. Pelaj P, Autor B. Education and Nursing Care for Patients with Angina Pectoris during The Stay of Patients in The Regional Hospital of Peja. *J Pharmac Negative Results* 2023; 14(2): 739-49.
7. Howeri NM, AlBashtawy M, Ozaybi N, Alkhawaldeh A, Al-Azzam M, Albashtawy S, et al. Nurses' Knowledge Regarding Care Provided to Patients with Angina. *EC Pulmonol Resp Med* 2021; 10: 1-4.
8. Mali RL, Singh M. Assessment of the knowledge and practice on nursing management of Myocardial infarction and Angina among staff nurses with a view to develop informational booklet: A hospital-based study. *Bioscan* 2024; 19(Special Issue-1): 469-74.
9. Shehab M, Shaaban A. Nurses' Performance Regarding Caring of Patients with Angina Attack at Emergency and Critical Care Units. *Mansoura Nurs J* 2021; 8(3): 149-62.
10. Yakoub NNS, Mohamed MA, Ahmed GH, Farghal MAK. Assessment of Nurses' Performance In Caring for Patients with Myocardial Infarction at El kharga Specialized Hospital: A proposed Brochure. *Assiut Sci Nurs J* 2025; 13(51): 198-207.
11. Ibrahim R, Abd-Allah K, Arafa O, Mohammed S. Effect of nursing care standards on nurses' performance in caring for patients with cardiac arrhythmias. *Egypt Nurs J* 2017; 14(3): 251258.
12. Saied DR, Mansour KA. Effectiveness of an educational program on nurses' knowledge and attitudes about pain assessment and management in Imam Hussein Medical City in Holy Karbala. *Indian J Forensic Med Toxicol* 2021; 15(3).
13. Smith J, Brown K. Healthcare professionals' understanding of myocardial infarction and angina: a survey-based analysis. *J Cardiol Educ* 2021; 12(3): 150-58.
14. Sakr M, Metwaly E, Taha N. Effect of intervention guidelines on nursing performance regarding patients with angina. *Egypt Nurs J* 2019; 16:70-7.

Prevalence and Patterns of Severe Maternal Morbidity beyond Maternal Mortality at PIMS Hospital Islamabad

Severe Maternal Morbidity beyond Maternal Mortality

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ABSTRACT

Objective: To determine the prevalence and patterns of severe maternal morbidity among women delivering at Pakistan Institute of Medical Sciences Hospital, Islamabad.

Study Design: Retrospective descriptive cross-sectional study

Place and Duration of Study: This study was conducted at the MCH Unit II, Department of Obstetrics and Gynecology, Pakistan Institute of Medical Sciences from Jan-2021 to Dec-2022.

Methods: The records of all women who delivered at the hospital during the study period were included. This medical record was reviewed retrospectively to identify cases of severe maternal morbidity based on major clinical conditions such as obstetric hemorrhage, hypertensive disorders of pregnancy, sepsis, cardiac and hepatic dysfunctions, or other life-threatening complications. Descriptive statistics were employed to present the frequency and patterns of severe maternal morbidity among the study participants.

Results: Out of a total 9158 deliveries, severe maternal morbidity was found in 886 women (excluding cases of maternal death) giving a prevalence of 9.7%. The mean age of affected women was 29.4 ± 5.8 years with 58.7% belonging to urban residential status and only 39.3 % were booked cases. Analysis of the patterns revealed that major obstetric hemorrhage was the leading cause of severe maternal morbidity (50.0%), followed by hypertensive disorders of pregnancy (23.7%), sepsis (7%) and anemia (3.6%).

Conclusion: Severe maternal morbidity is a significant public health challenge at tertiary care level, with obstetric hemorrhage, hypertensive disorders and sepsis as the major contributors to its development. The high proportion of non-booked and poorly booked cases is the area where improvement can be expected through increased access to antenatal care and quality.

Key Words: Maternal morbidity, Maternal mortality, Obstetric hemorrhage, Pregnancy complications

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INTRODUCTION

Maternal mortality has traditionally been taken as a primary indicator for the assessment of maternal health. With the advancement in medical healthcare technologies and availability of these facilities, the global maternal mortality ratio (MMR) has significantly declined by 44% and from 385 per 100,000 live births in year 1990 to 216 deaths per 100,000 live births in year 2015.¹ However, it is estimated that approximately 20-30 women experience severe maternal morbidity (SMM) for every maternal death.

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It is estimated that up to 8% of hospital deliveries are complicated leading to poor maternal and neonatal outcomes and may result in death if not timely intervened. A concept called "maternal near-miss" (MNM) was introduced by world health organization (WHO), which helps to provide a good view to identify women who experience life threatening complications during pregnancy and require dedicated attention for their maternal health.²

Unfortunately, 99% of maternal deaths occur in low- and middle-income countries (LMICs), specifically in Sub-Saharan African region and the South Asia (SA) which accounts for 70 and 17 % of global maternal deaths respectively. In a report generated in 2017-18, by Pakistan demographic and health survey, estimated the MMR to be 186 per 100,000 live births which was higher than the neighboring countries including India and Bangladesh. This ratio is in contrast to the developed countries like United States where the MMR is 14 per 100,000, and underscores the importance of focused efforts for improved maternal healthcare in our population.^{3,4}

Maternal pregnancy outcomes form a continuum of severity as they start from a normal or healthy pregnancy and may lead to morbidity, severe morbidity, and ultimately, mortality. This situation gives rise to the concept of “moving beyond maternal mortality”, which emphasizes the understanding and prevention of SMM to address complications, severe enough to threaten survival but can often be managed through timely medical intervention.^{5,6}

The burden of SMM is not only confined to immediate health crisis for the mother yet it extends to women's long-term physical and psychological wellbeing and consequently affects families and health care system. The causes of SMM are same as of maternal mortality and includes obstetric hemorrhages, hypertensive disorders related to pregnancy, sepsis, cardiac diseases and hepatic dysfunctions. Like maternal mortality, a higher ratio of SMM is observed in low- and middle-income countries (LMICs) than the high-income countries (HICs) highlighting the urgent need for surveillance.^{7,8,9} It is therefore important to work on common causes and adopt strategies to manage SMM and prevent long-term negative health consequences through quality improvement activities.^{9,10}

The Pakistan Institute of Medical Sciences (PIMS) is a major tertiary care hospital in Islamabad and manages high-risk obstetric cases reported directly or referred by neighboring healthcare centers, making it an ideal setting for studying SMM. This study was therefore planned to determine the prevalence and patterns of SMM at the MCH unit 2 of the PIMS hospital. Understanding these patterns will enable healthcare administrators to implement evidence-based strategies for prevention, early detection, and timely management of life-threatening maternal complications, ultimately contributing to better outcomes for the mothers.

METHODS

This retrospective descriptive cross-sectional study was conducted at MCH Unit II, Department of Obstetrics and Gynecology, Pakistan Institute of Medical Sciences (PIMS) after taking prior approval from ethical review board of the hospital.

The records of all 9,158 women who delivered (both planned deliveries and those who were referred from other medical center due to any complication) at the hospital from Jan-2021 to Dec-2022 over a period of 2 years were included and analyzed in this study.

Exclusion criteria were set as women who delivered elsewhere and then reported to this hospital only for postpartum care. Moreover, cases with incomplete medical records, needed for the accurate assessment of morbidity status were also excluded.

Data were retrieved retrospectively from medical records available in the department in shape of case files using a structured data collection form. All the information related to demographic variables, obstetric

characteristics, clinical indicators, and maternal outcomes was extracted.

Severe maternal morbidity (SMM) was labeled according to the WHO guidance and adapted to locally relevant clinical parameters (This included life-threatening conditions such as obstetric hemorrhage ≥ 1000 mL, hypertensive disorders, sepsis, organ dysfunctions, or the cases where ICU admission was needed).

Variables related to SMM (such as obstetric hemorrhage, hypertensive disorders of pregnancy, incidence of sepsis, uterine rupture, cardiac disease, and hepatic dysfunction) were recorded.¹¹ Additionally interventions like admission to the intensive care unit (ICU), need for any surgical intervention and blood transfusions were also documented. Hemorrhage was mentioned as a Major obstetric hemorrhage (MOH) when blood loss was ≥ 1000 mL, or any case requiring blood transfusion, surgical intervention, or ICU secondary to hemorrhage.

The data extraction was performed by trained medical officers under the supervision of the team of obstetricians involved in this study.

Data were analyzed using SPSS version 26. Descriptive statistics were employed, to present variables where frequencies and percentages to share categorical variables while mean $\pm$ standard deviation were calculated to present the continuous variables. The prevalence of SMM was determined by dividing the number of SMM cases by the total number of deliveries and expressed as frequency and percentages. Similarly, patterns of morbidity were extracted from the reported underlying causes, organ dysfunctions, and clinical outcomes and presented as frequency and percentages.

RESULTS

A total of 9,158 deliveries were recorded during the two year study period. Out of these, maternal deaths occurred in 17 (0.19%) patients, with a ratio of approximately 1 death for every 539 deliveries. Overall 886 women (9.7%) suffered SMM, as shown in Figure-I.

Prevalence of SMM out of total deliveries

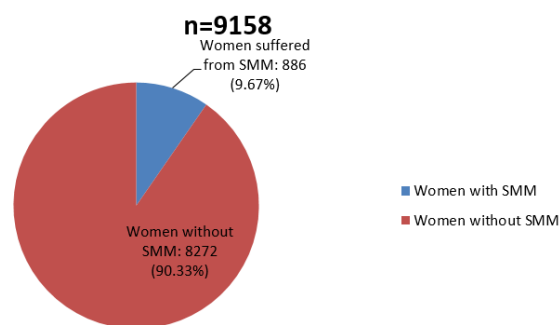


Figure No.1: Prevalence of SMM

The mean age of women with SMM was 29.4 ± 5.8 years. The demographics details and clinical

characteristics of women suffering from SMM are shown in Table-I.

Analysis of 886 cases showed that major obstetric hemorrhage (MOH) was the leading cause of SMM (50.0%). This was followed by hypertensive disorders of pregnancy (HDP) (23.7%), sepsis (7%), complications related to anemia (3.6%), cardiac disease

(3.4%), liver disease (2.7%), obstructed labor (2.7%), COVID-19 or respiratory illness (2.6%), acute renal failure (1.7%), Retained placenta / uterine inversion (1.1%), bladder or bowel injury (0.8%) and other causes (0.7%). The patterns of SMM observed in these patients are shown in Table-2.

Table No.I: Demographic details and obstetric characteristics of women with SMM n= 886

Demographic details and Obstetric Characteristics		Findings
Age (Mean± SD) years		29.4 ± 5.8
Residential status	Urban n (%)	520 (58.7)
	Rural n (%)	366 (41.3)
Antenatal booking status	Booked n (%)	348 (39.3)
	Poorly booked* n (%)	232 (26.2)
	Non-booked n (%)	306 (34.5)
Parity	Primigravida n (%)	277 (31.3)
	Multigravida n (%)	456 (52.5)
	Grand-multipara n (%)	153 (17.3)
ICU admission n (%)		38 (4.3)
Ventilator support n (%)		21 (2.4)
Duration of hospital stay (Mean± SD) days		9.8±3.7

Table No2: Patterns of Severe Maternal Morbidity n= 886

Type of Morbidity	Findings
Major obstetric hemorrhage n (%)	443 (50)
Hypertensive disorders of pregnancy n (%)	210 (23.7)
Sepsis n (%)	62 (7)
Complications related to anemia n (%)	32 (3.6)
Cardiac disease n (%)	30 (3.4)
Liver disease n (%)	24 (2.7)
Obstructed labor n (%)	24 (2.7)
COVID-19 or respiratory illness n (%)	23 (2.6)
Acute renal failure n (%)	15 (1.7)
Retained placenta / uterine inversion n (%)	10 (1.1)
Bladder or bowel injury n (%)	7 (0.8)
Other causes n (%)	6 (0.7)

DISCUSSION

SMM was found in 886 women giving a prevalence of 9.7%. The mean age of affected women was 29.4 ± 5.8 years with 58.7% belonging to urban residential status and only 39.3 % were booked cases. Analysis of the patterns revealed that major obstetric hemorrhage was the leading cause of severe maternal morbidity (50.0%), followed by hypertensive disorders of pregnancy (23.7%), sepsis (7%) and anemia (3.6%).

Comparable trends have been observed globally, indicating that despite advances in obstetric care, SMM remains a significant health care challenge for the obstetricians. The global data also show that incidences of hemorrhage and hypertensive account for the largest proportion of SMM cases.

Geller SE et al. initially worked on the overview of global burden of SMM and found that SMM was increasing, with higher rates in LMIC than rest of the

world. The most common causes reported for these cases were hemorrhage and hypertensive disorders. It was also mentioned that the most preventable factors were the lack of diagnosis and failure of treatment.¹²

This difference in the patterns of morbidity is also exhibited in a study conducted in Sweden which found a lower SMM prevalence (3.5%) during the first birth with uterine rupture, cardiac complications, cerebrovascular accidents, and severe mental health disorders being the leading causes. This variation reflects the improved obstetric surveillance and greater access to intensive perinatal care in these countries.¹³

Ukah UV et al. determined the risk of recurrent SMM among women with prior morbidity in Canadian hospitals. It was found that women who had already suffered from with SMM had a significantly higher recurrence rate (65.2 per 1000, compared to 20.3 per 1000 in women without prior SMM). This highlighted

the need for targeted counseling and care for the at risk mothers.¹⁴

Talking about the regional perspective, results similar to our study were reported in South Asian countries. Rajbanshi *et al.* in Nepal reported a 6.6% prevalence of SMM which were predominantly caused by hypertensive disorders (56.5%) and hemorrhagic complications (26.1%).¹⁵

In India, Rathod *et al.* found an exceptionally high prevalence of overall maternal morbidity (80%) in rural areas of India, particularly higher during the antenatal period (36%) compared to the postnatal period (26%). This high risk was significantly associated with the educational status, parity, and place of delivery.¹⁶ Data from Pakistan also reveal similar trends. Out of 9,130 deliveries, Naila *et al.* reported MNM in 268 cases (2.9%) and maternal deaths in 11 cases (0.12%). Hemorrhage (44%), hypertensive disorders (38%), uterine rupture (8%) and anemia (7%) were the leading causes, closely mirroring our results.¹⁷ Another regional context was elaborated by Aftab F *et al.* with a cohort of women belonging to SA and sub-Saharan African region. It was found that 32.7% of pregnancies had at least one major morbidity, with a significantly higher burden observed in SA (43.9%) than sub-Saharan Africa (23.7%). Prolonged/obstructed labor (11.1%) and infections were the key morbidities associated with the recorded adverse outcomes. Health programs were suggested to identify and treat these prevalent major morbidities.¹⁸

A detailed review as global scenario was worked by Nik Hazlina NH *et al.*, aiming to identify the prevalence and risk factors for SMM and MNM. The analysis found prevalence of SMM as 2.45% with a history of CS and coexisting medical conditions being the key risk factors. Early detection of these risk factors and regular patient follow-up were suggested as crucial steps to improve maternal health.¹⁹

The results of our study and the studies discussed above confirm that while prevalence varies, the primary causes of severe maternal morbidity (SMM) are common and largely preventable. Our findings underscore the need to strengthen antenatal care by, establishing continuous SMM audits and identifying avoidable factors to improve maternal outcomes, and progress toward maternal health.

The limitations of this study include its retrospective, single-center design, which may restrict the generalizability of our findings. A prospective study on this subject with some follow up plan may provide further insight to the prevalence and caused of SMM in women reporting to our tertiary care set ups.

CONCLUSION

SMM is a significant challenge at gynecological and obstetric units at tertiary care hospitals in Pakistan. Obstetric hemorrhage, hypertensive disorders, and

sepsis are the predominant contributors to this life threatening maternal complications. The high proportion of women with inadequate antenatal care is a critical area where intervention can yield improvement. There underscore a need for focused strategies on improving the quality of antenatal services, ensuring early identification, and timely management major obstetric complications to mitigate the severe maternal outcomes for our women.

Author's Contribution:

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Agreement to accountable for all aspects of work:	All the above authors

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REFERENCES

1. Lee S, Kim S, Lee H, Park J, Son Y, López Sánchez GF, *et al.* Global, Regional, and National Trends in Maternal Mortality Ratio Across 37 High Income Countries from 1990 to 2021, With Projections up to 2050: A Comprehensive Analysis from the WHO Mortality Database. *J Korean Med Sci* 2025;40(21):e85.
2. Ahn R, Gonzalez GP, Anderson B, Vladutiu CJ, Fowler ER, Manning L. Initiatives to Reduce Maternal Mortality and Severe Maternal Morbidity in the United States : A Narrative Review. *Ann Intern Med* 2020;173(11 Suppl):S3-S10.
3. Midhet F, Khalid SN, Baqai S, Khan SA. Trends in the levels, causes, and risk factors of maternal mortality in Pakistan: A comparative analysis of national surveys of 2007 and 2019. *PLoS One* 2025;20(1):e0311730.
4. Shaeen SK, Tharwani ZH, Bilal W, Islam Z, Essar MY. Maternal mortality in Pakistan: Challenges, efforts, and recommendations. *Ann Med Surg (Lond)* 2022;81:104380.
5. Saleh S, El Arnaout N, Sabra N, El Dakdouki A, El Iskandarani K, Chamseddine Z, *et al.* Evaluating the impact of engaging healthcare providers in an AI-based gamified mHealth intervention for improving maternal health outcomes among disadvantaged pregnant women in Lebanon. *Front Digit Health* 2025;7:1574946.
6. Main EK, Leonard SA, Menard MK. Association of Maternal Comorbidity with Severe Maternal Morbidity: A Cohort Study of California Mothers

- Delivering Between 1997 and 2014. *Ann Intern Med* 2020;173(11 Suppl):S11-S18.
7. Ekwuazi EK, Chigbu CO, Ngene NC. Reducing maternal mortality in low- and middle-income countries. *Case Rep Women Health* 2023; 39:e00542.
 8. Tenaw SG, Assefa N, Mulatu T, Tura AK. Maternal near miss among women admitted in major private hospitals in eastern Ethiopia: a retrospective study. *BMC Pregnancy Childbirth* 2021;21(1):181.
 9. Erjino DS, Mekiso AB, Woiloro LA, Arficho TT, Watumo AM, Katiso NA, et al. Maternal delays and unfavourable newborn outcomes among skilled deliveries in public hospitals of Hadiya Zone, Southern Ethiopia: a case-control study. *BMJ Open* 2022;12(5):e055569.
 10. Aloba G, Reverzani C, Sarno L, Giordani B, Greco L. Estimating the Risk of Maternal Death at Admission: A Predictive Model from a 5-Year Case Reference Study in Northern Uganda. *Obstet Gynecol Int* 2022;2022:4419722.
 11. Snowden JM, Lyndon A, Kan P, El Ayadi A, Main E, Carmichael SL. Severe Maternal Morbidity: A Comparison of Definitions and Data Sources. *Am J Epidemiol* 2021;190(9):1890-7.
 12. Geller SE, Koch AR, Garland CE, MacDonald EJ, Storey F, Lawton B. A global view of severe maternal morbidity: moving beyond maternal mortality. *Reprod Health* 2018;15(Suppl 1):98.
 13. Tsamantioti E, Sandström A, Lindblad Wollmann C, Snowden JM, Razaz N. Association of Severe Maternal Morbidity With Subsequent Birth. *JAMA* 2025;333(2):133-42.
 14. Ukah UV, Platt RW, Auger N, Lisonkova S, Ray JG, Malhamé I, et al. Risk of recurrent severe maternal morbidity: a population-based study. *Am J Obstet Gynecol* 2023;229(5):545.e1-545.e11.
 15. Rajbanshi S, Norhayati MN, Nik Hazlina NH. Severe maternal morbidity and its associated factors: A cross-sectional study in Morang district, Nepal. *PLoS One* 2021;16(12):e0261033.
 16. Rathod M, Parmar D, Unadakat S, Kaliya M, Patel N, Goel A. An assessment of maternal morbidity pattern among reproductive age group women in a district of West Gujarat: a community based cross sectional study. *Ind J Community Fam Med* 2018;4(1):40-6.
 17. Naila, Irshad I, Rehman F, Amin N. Akhtar N. Frequency and Covariates of Maternal Near-Miss Events and Maternal Deaths in a Tertiary Care Hospital; A Cross-Sectional Study. *J Soc Obstet Gynaecol Pak* 2023; 13(2):133-8.
 18. Aftab F, Ahmed I, Ahmed S, Ali SM, Amenga-Etego S, Ariff S, et al. Direct maternal morbidity and the risk of pregnancy- related deaths, stillbirths, and neonatal deaths in South Asia and sub-Saharan Africa: A population- based prospective cohort study in 8 countries. *PLoS Med* 2021.18(6):
 19. Nik Hazlina NH, Norhayati MN, Shaiful Bahari I, Mohamed Kamil HR. The Prevalence and Risk Factors for Severe Maternal Morbidities: A Systematic Review and Meta-Analysis. *Front Med (Lausanne)* 2022;9:861028.

Comparative Outcomes in Staged Reconstruction of Proximal Hypospadias

Reconstruction of
Proximal
Hypospadias

Asif Aziz

ABSTRACT

Objective: To report the overall incidence and spectrum of complications in a pooled cohort of 87 patients undergoing staged repair for proximal hypospadias and to evaluate outcomes based on number of stages required and the impact of different graft sources, as procedural risk factors.

Study Design: Retrospective observational study

Place and Duration of Study: This study was conducted at the Department of Plastic Surgery, Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, Pakistan from January 2023 to December 2024.

Methods: This retrospective observational study analysed 87 male patients with proximal hypospadias who underwent staged repair (63 two-stage, 24 three-stage) at a tertiary plastic surgery unit over an eight-years period (2017–2024). The primary outcome was the incidence and spectrum of all postoperative complications in the collective cohort.

Results: Overall, complications occurred in 21 patients (24%). The most common events were urethra-cutaneous fistula in 11 (12.6%) and residual curvature in 7 (8%) and meatal stenosis in 3 patients (3.4%). There was no statistically significant difference of complications between two or three staged repairs, but when analysed with regard to the sources of grafts (preputial vs labial), a very significant difference was noted, favouring preputial graft a far better substitution of urethral plate.

Conclusion: Preputial skin graft should be the preferred choice for urethral substitution in proximal hypospadias cases, whenever possible, while labial mucosal graft should only be used when preputial graft is not available.

Key Words: Proximal hypospadias; staged repair; urethroplasty; dehiscence; paediatric reconstructive surgery; surgical outcomes

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INTRODUCTION

Though hypospadias represents a very common congenital anomaly of the male external genitalia, proximal hypospadias continues to pose major reconstructive challenge due to its anatomical severity, associated curvature, and high postoperative complication rates. The goals of surgery in any hypospadias repair are to achieve a functionally straight penis, construct a reliable neourethra, and restore a cosmetically acceptable appearance¹. However, outcomes for proximal forms remain inferior to those of distal cases, with reported overall complication rates ranging from 30% to 60%^{2,3}.

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The most frequent adverse events include urethrocutaneous fistula, recurrent curvature, meatal stenosis, and urethral stricture^{4,5}.

Over the past three decades, staged approaches for proximal or severe forms of hypospadias, first popularized by Bracka⁶, have shown improved graft integration and reduced complication rates compared to single-stage procedures. The two-stage concept involves chordee correction and graft placement in the first stage (STAG Staged Tubularized Autograft), followed by urethroplasty after graft healing, thereby reducing tissue tension and enhancing vascularization⁷. While classically described as a two-stage operation, a three-stage modification has been introduced in severe cases, when surgical manoeuvres like penile degloving and transaction and mobilization of urethra alone cannot achieve complete straightening and ventral carporotomies become necessary, which then requires to be covered with local fascial flaps in the first stage of surgery. Later after at least six months time after each stage, the second and third stages are executed, where autografts are placed in the second stage and tubularization is achieved in the third stage^{8,9}.

Current controversies among hypospadiologists involves issues like the optimal number of surgical stages and the best graft material. The most common autograft sources include preputial skin and buccal or labial mucosal grafts. Contemporary research shows

equivalent outcomes between two and three staged STAG repairs^{8,10,11} but on the other hand reveals graft source as a strong indicator of major complications^{12,13}.

METHODS

Study Design and Setting: This retrospective, comparative study was carried out in the Department of Plastic Surgery, Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, Pakistan, over an eight-year period (January 2023 – December 2024).

Patient Selection: A total of 87 male patients diagnosed with proximal hypospadias were included. Only primary cases were included. All surgeries were performed by the same consultant surgeon and team, ensuring technique consistency.

Surgical Correction: All patients underwent staged surgical repair for primary hypospadias.

- **Two-Stage Repair (Group A, n=63):** Performed when degloving alone or in combination with urethral plate transaction and release, achieved adequate straightening. The first stage involved chordee correction and graft placement, followed by tubularization in the second stage after at least six months.
- **Three-Stage Repair (Group B, n=24):** Indicated in patients with significant residual curvature after degloving and urethral plate transaction that ultimately required ventral carporotomies (fig. 1). This involved three distinct stages: chordee correction (Stage 1), graft placement (Stage 2), and tubularization (Stage 3).

Outcome Measures: Primary outcomes assessed were anatomical complications: fistula formation, recurrent curvature, meatal stenosis and dehiscence.

Statistical Analysis: Data were analysed using IBM SPSS Statistics. Categorical variables were analysed with the Chi-square test or Fisher's exact test. A p-value < 0.05 was considered statistically significant.

RESULTS

Patient Demographics and Baseline

Mean age of patients was 3.2 ± 1.8 years. 68 patients were not circumcised, while 19 patients were already circumcised. Out of these 19 circumcised patients, 2 had enough residual prepuce that could be used to cover the meatus to glans.

Spectrum and Incidence of Postoperative Complications

Overall, postoperative complications were observed in 21 of 87 patients, resulting in a cumulative complication rate of 24.1% for staged repair.

Table No.1: Spectrum of Postoperative Complications

Complication	n	%
Urethrocuteaneous fistula	11	12.6%
Recurrent curvature	7	8%
Meatal stenosis	3	3.4%
Any complication	21	24.1%

Table No. 2: Comparison of Complication Rates by Repair Stage

Complication	Number of Cases (n=87)	Two stages n=63 (%)	Three stages n=24(%)
Urethro-cutaneous fistula	11 (12.6%)	8 (12.7%)	3 (12.5%)
Recurrent curvature	7 (8%)	4 (6.3%)	3(12.5%)
Meatal Stenosis	3 (3.4%)	2 (3.2%)	1 (4.2%)
Any Complication	21 (24.1%)	14 (22.2%)	7 (29.2%)

A p-value of 0.5776 depicts that there is no statistically significant difference in overall complications between two and three staged hypospadias repairs.



Figure No. 1: Intra-operative clinical photographs showing Stage 1 of three staged correction of midshaft meatus, that after penile degloving and urethral transaction required ventral carporotomies for complete straightening, have converted to a scrotal meatus. Note that the prepuce has been reconstructed circumferentially to expand in area to help in substituting the urethral plate in the second or intermediate stage.

Graft source as a Risk Factor

This data clearly shows statistically significant difference in the occurrence of urethrocutaneous fistulas and recurrent curvature when preputial grafts are used than labial mucosa, and a very significant difference in terms of overall complications.

Table No. 3: Comparison of complications by Sources of Graft

Complications	Preputial graft n=68	Labial graft n=19	p-value
Urethro-cutaneous fistula	5 (7.4%)	6 (31.6%)	0.0117
Recurrent curvature	2 (2.9%)	5 (26.3%)	0.0049
Meatal stenosis	2 (2.9%)	1 (5.3%)	0.5272
Any complication	9 (13.2%)	12 (63.2%)	0.0001

DISCUSSION

Number of stages: The evolution from two-stage procedures to three-stages was steered by the speculative benefits of allowing grafts to fully heal and mature before tubularization over a well vascularised bed, potentially reducing graft contracture and the resultant recurrence of contracture of the urethral plate. Nevertheless, current comparative research has not demonstrated any statistically significant advantage of the three staged approach in overall success and long-term urethral patency^{8,10,11}. Hence, the choice between two or three stages can be customized to patient anatomy, intraoperative findings and surgeon's preferences.

Graft source as the Critical Variable: This review clearly pointed, that the source of autograft has a profound effect on major associated complications. Labial mucosa from the inner lower lip, apparently a more suitable substitute for urethra because of being hairless, pliable and wet epithelium, is associated with higher complications.

Urethrocutaneous Fistula: Preputial skin grafts, specifically the inner layer of prepuce offers superior graft take and subsequent integration on the penile shaft compared to labial mucosa, with the added advantage of being in the same region, obliterating the need of harvest from other areas, with ensuing restrictions of oral intake. Preputial skin also offers the chance of circumcision, a cultural and religious obligation specific to this region. Other studies have also shown higher fistula rate when labial mucosa was used instead of preputial skin. Deng et al. (2021), in a meta-analysis, found oral mucosa (including buccal and labial) had a significantly higher fistula rate than penile skin grafts¹². Similarly, work by Leslie et al. (2011) and Castagnetti et al. (2013) noted that labial mucosa grafts were an independent risk factor for fistula formation, likely due

to their delicate nature and different healing characteristics in a non-oral environment^{13,14}.

Recurrent Ventral Curvature: Recurrent curvature after staged hypospadias repair can result from graft contracture during healing phase or may result during growth of penis in later years of life. The dense dermal layer of preputial skin provides greater structural support and consequently more resistance to contraction than labial mucosa with its scant lamina propria. As reported by Bracka (2011) and corroborated by Springer (2013), the use of extra-genital mucosa grafts carries a higher risk of graft shrinkage, which can re-tether the ventral penile shaft, leading to recurrent chordee^{15,16}. Johal et al. (2006) also observed more re-operations for curvature in patients receiving oral mucosa grafts compared to local skin¹⁷.

The preputial skin, whenever available, offers a more compatible choice because it shares embryological origin and physical properties with the native penile skin, hence offering better healing and integration^{18,19}. On the other hand, labial mucosa remains a vital second option in circumstances when local skin may not be available (after circumcision) or in re-operative cases and its selection should be made with anticipation of its associated higher risk of complications.

CONCLUSION

The decisions in the management of proximal hypospadias, should not be driven by the number of stages required to achieve the goals set, but rather should be focused on the choice of the graft source used, because the evidence indicates that the two or three stage approaches yield equivalent outcomes, but the use of preputial graft definitely offers greater advantage over labial mucosal grafts in reducing the incidence of urethrocutaneous fistulas and recurrent curvature. This also emphasises the need for public and health personnel awareness to refrain from the practice of circumcision, whenever there is the slightest doubt of penile dysmorphism.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Asif Aziz
Drafting or Revising Critically:	Asif Aziz
Final Approval of version:	The above author
Agreement to accountable for all aspects of work:	The above author

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REFERENCES

1. Springer A. Assessment of outcome in hypospadias surgery: A review. *Frontiers in Pediatr* 2014;2:2.
2. Mouriquand PD, Persad R, Sharma S. Hypospadias repair: Current principles and outcomes. *Nature Reviews Urol* 2017;14(10):657–667.
3. Chan YY, Bhatia NN, Lorenzo AJ. Prognostic factors in hypospadias surgery: Systematic review and meta-analysis. *BJU Int* 2020;125(1):23–39.
4. Snodgrass W, Bush N. Staged tubularized autograft repair for primary proximal hypospadias with severe curvature. *J Urol* 2017;198(3):680–686.
5. Bhat A, Mandal AK. Acute and staged repair of proximal hypospadias: An overview. *Ind J Plastic Surg* 2020;53(2):151–162.
6. Bracka A. A versatile two-stage hypospadias repair. *Br J Plastic Surg* 2015;68(5):654–662.
7. Hadidi AT. Single-stage versus two-stage repair for proximal hypospadias: Personal experience. *J Pediatr Surg* 2019;54(1):96–101.
8. Snodgrass W, Bush N. Staged Tubularized Autograft Repair for Primary Proximal Hypospadias with 30-Degree or Greater Ventral Curvature. *J Urol* 2017;198(3):680–686.
9. Snodgrass W, Bush N, Cost N. Tubularized incised plate proximal hypospadias repair: Continued evolution and extended applications. *J Pediatr Urol* 2011;7(1):2–9.
10. Long CJ, Canning DA. Hypospadias: Are we as good as we think when we correct proximal hypospadias? *J Pediatr Urol* 2016;12(4):196.e1–196.e5.
11. Tourchi A, Hoebeke P. Long-term outcome of severe hypospadias. *J Pediatr Urol* 2014;10(5):871–875.
12. Deng D, Chen H, Lv J, Zhu L, Zhang Y. Oral mucosa versus penile skin graft for urethroplasty in hypospadias: A meta-analysis. *J Pediatr Urol* 2021;17(3):400.e1–400.e8.
13. Leslie B, Lorenzo AJ, Figueroa V, et al. Critical analysis of the use of buccal mucosa for urethral reconstruction in children. *J Urol* 2011;186(4 Suppl):1678–1682.
14. Castagnetti M, El-Ghoneimi A. Surgical management of primary severe hypospadias in children: systematic 20-year review. *J Urol* 2013;190(4):1536–1543.
15. Bracka A. Hypospadiology. *BJU Int* 2011;108 Suppl 2:1–33.
16. Springer A. Assessment of outcome in hypospadias surgery - a review. *Front Pediatr* 2013;1:2.
17. Johal NS, Nitkunan T, O'Malley K, Cuckow PM. The two-stage repair for severe primary hypospadias. *Eur Urol* 2006;50(2):366–371.
18. Soergel TM, Cain MP, Kaefer M, et al. Complications of small intestinal submucosa for corporal body grafting for proximal hypospadias. *J Urol* 2003;170(4 Pt 2):1577–1578.
19. Hensle TW, Kearney MC, Bingham JB. Buccal mucosa grafts for hypospadias surgery: long-term results. *J Urol* 2002;168(4 Pt 2):1734–1736.

Effect of Combination of Different Postures and Pursued Lips Breathing on Dyspnea and Pulmonary Functions among Patients with Asthma

Different
Postures and
Pursued Lips
Breathing on
Dyspnea

Haider Nawaf Abed-Ali and Shatha Saadi Mohammed

ABSTRACT

Objective: To evaluate the effect of tripod and prostration positions with pursed-lip breathing on dyspnea and pulmonary function in adult asthma patients.

Study Design: Quasi-experimental study

Place and Duration of Study: This study was conducted at the emergency units of Imam Hussein Medical City in Karbala, Iraq 1st December 2024 to 30th September 2025.

Methods: In this study 90 adult asthma patients were enrolled. The patients were divided into control, tripod, and prostrate groups (n=30 for each group).

Results: The significant improvements in the intervention groups: tripod positioning reduced respiratory rate by 45.4% ($p<.001$, $d=2.23$) and increased SpO_2 by 3.8% ($p<.001$, $d=1.46$), while prostrate positioning showed moderate effects (respiratory rate $d=0.67$, peripheral oxygen saturation $d=0.86$). Dyspnea severity decreased markedly, with tripod positioning doubling mild dyspnea cases (16.7% to 40%) and halving severe cases (43.3% to 20%).

Conclusion: The tripod positioning, when combined with pursed-lip breathing, offers superior clinical benefits for acute asthma management compared to prostrate positioning.

Key Words: Asthma, Prostration position, Tripod position, Pursued-lip breathing

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INTRODUCTION

Globally, nearly 300 million individuals had been identified as having asthmatic as of 2005 and 400 million people are predicted to have the illness by 2025. While asthma is more common in high-income nations, the majority of deaths from the condition happen in third-world, low-income nations.^{1,2} Asthma is a heterogeneous disease, varying greatly among individuals in symptoms, severity, triggers, and responses to treatment. This variability complicates diagnosis and necessitates individualized management plans, as a one-size-fits-all approach is ineffective.³ Asthma is classified into four categories, with intermittent asthma featuring symptoms occurring less than twice a week, nighttime symptoms occurring less

than twice a month, and minimal interference with daily activities.⁴ Adults with asthma were more likely than adults without asthma to report limits in daily activities, missed workdays, and decreased productivity. In order to manage their disease, people with asthma may need to take time off from work or school due to symptoms and exacerbations that interfere with everyday routines.⁵

Mild persistent asthma: Symptoms in this category occur more than twice a week but not every day, nighttime symptoms occur more than twice a month, and minor limitations in daily activities are present.⁶ Moderate persistent asthma features daily symptoms and nighttime symptoms more than once a week with moderate activity limitations, while severe persistent asthma entails constant symptoms, frequent nighttime occurrences, and severe activity limitations.⁴

Body postures significantly influence lung volumes, making them clinically relevant in various activities, including surgery and therapy. Poor patient positioning can worsen V/Q matching, whereas optimal positions may lead to improved PaO_2 levels and are essential in managing pulmonary dysfunction by reducing shunt or dead space effects.⁷ Non-pharmacological therapies for asthma, like positional changes to improve lung function, lack adequate evidence.⁶⁻⁷ The purpose was to identify the more effective positions (prostrating vs.

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tripod) for alleviating dyspnea and enhancing respiratory parameters [respiratory rate (RR) and peripheral oxygen saturation (SPO₂)] in asthma patients.

METHODS

This quasi-experimental study was conducted at emergency units of Imam Hussein Medical City, Karbala, Iraq 1st December 2024 to 30th September 2025 vide letter 77 dated 24/3/2025. A total of 90 patients with asthma who selected purposively and divided into 3 groups (control, tripod, and prostrate), 30 patients in each group were included. Data was collected from three groups before the interventional procedure and re-evaluated dyspnea level and pulmonary parameters for patients in the study groups (tripod or prostrate) after asked them to do the pursed lip breathing exercise 3 times in a row, then apply the (tripod or prostrate position) for 5 minutes, and then re-apply the pursed lip breathing exercise 3 times in a row. The hospitalized patients who were already diagnosed with asthma, both male and female sex, those who had dyspnea, and patients who are willing to participate in the study were included. The participants in the experimental study, patients who did not have shortness of breath, those who refused to participate, children under the age of 18, the elderly who could not tolerate prone positions, and individuals with various health conditions or fever were excluded. Pursed lip breathing is a basic technique that involves inhale slowly through the nose to the count of tow then utilizing mouth to exhale via pursed lips to the count of four (Fig. 1). The patient lies down so that his knees, forehead, and hands are close to the ground and the elbows are flexed and

relaxed to bear the weight of the patient. The abdominal area remains unsupported so that the position of the patient is the same as the position of prostrate during prayer.

Tripod position also called orthopnic or leaning forward position, places the patient either sitting in chair or on the side of the bed, with many pillows resting on the over bed table in front for them to rely on (Fig. 2). The data was entered and analyzed through SPSS-25.

RESULTS

The mean age was 54.4±14.0 years. 46.7% of the patients in control & tripod group and 50% of them in prostrate group were age of 30-49 years. Males of the control, tripod and prostrate group were 53.3%, 53.3%, and 56.7% respectively. 36.7% of control group and 30% of prostrate group were educated, while 36.7% of tripod group had intermediate education. A 26.7% of patients in tripod group were factory workers and the same percent for cleaners and Janitors while 40% of control group were retired and 23.3% of prostrate group were factory workers. 43.4%, 36.7, and 40% of asthmatic patients in control, tripod, and prostrate groups, respectively, were previously smokers with p-values were significance (0.05). There are no statistically significant differences in demographic characteristics (age, sex, education, occupation, or smoking status) between the control, tripod, and prostrate groups (Table 1).

36.7%, 26.7%, and 30% of the patients in the control, tripod and prostrate group respectively had obesity class I.

Table No. 1: Demographical characteristics of the asthmatic patients

Variable		Control group		Tripod group		Prostrate group		P value
		No.	%	No.	%	No.	%	
Age (years)	30-49	14	46.7	14	46.7	15	50.0	.346
	50-69	11	36.7	15	50.0	12	40.0	
	≥ 70	5	16.6	1	3.3	3	10.0	
Educational status	Illiterate	-	-	-	-	-	-	.542
	Educated	11	36.7	4	13.3	9	30.0	
	Primary	6	20.0	8	26.7	8	26.7	
	Intermediate	9	30.0	11	36.7	8	26.7	
	Institute	2	6.7	4	13.3	2	6.7	
	Collage or more	2	6.7	3	10.0	3	10.0	
Occupation	Construction Workers	4	13.3	1	3.3	3	10.0	.976
	Factory Workers	4	13.3	8	26.7	7	23.3	
	Cleaners and Janitors	4	13.3	8	23.7	4	13.3	
	Agriculture Workers	3	10.0	3	10.0	3	10.0	
	Retired	12	40.0	6	20.0	7	23.3	
	Housewife	3	10.0	4	13.3	6	20.0	
Smoking status	Never	10	33.3	12	40.0	12	40.0	.624
	Previously	13	43.4	11	36.7	12	40.0	
	Currently	7	23.3	7	23.3	6	20.0	

Table No. 2: Distribution of the asthmatic patients according their clinical data

Clinical data		Control group		Tripod group		Prostrate group		P value
		No.	%	No.	%	No.	%	
Body mass index	Normal	5	16.7	6	20.0	8	26.7	.489
	Overweight	4	13.3	8	26.7	5	16.7	
	Obesity I	11	36.7	8	26.7	9	30.0	
	Obesity II	8	26.7	7	23.3	7	23.3	
	Obesity III	2	6.7	1	3.3	1	3.3	
Duration of suffering from asthma (years)	1-10	8	26.7	10	33.3	10	33.3	.744
	11-20	11	36.7	13	43.3	12	40.0	
	≤ 21	11	36.7	7	23.3	8	26.7	
Chronic medication use of asthma	Inhaled corticosteroids (ICS)	3	10.0	1	3.3	3	10.0	.746
	Long-acting beta-agonists (LABAs)	11	36.7	12	40.0	11	36.7	
	Short-acting beta-agonists (SABAs)	2	6.7	2	6.7	3	10.0	
	Inhaled ICS + (LABAs)	12	40.0	13	43.3	12	40.0	
	Inhaled ICS + Leukotriene receptor antagonists	2	6.7	2	6.7	1	3.3	
Type of current asthma attack	Allergic asthma	10	33.3	5	13.7	9	30.0	.386
	Non- allergic asthma	16	53.3	21	70.0	19	63.3	
	Exercise-induced asthma	4	13.3	4	13.3	2	6.7	

Table No. 3: Effect of combination of different postures and pursed lip breathing on pulmonary parameters

Groups	Cardiopulmonary parameters	Paired sample t test					
		Mean		df	t value	p value	Sig.
		Pre-test	Post-test				
Control	HR	92.3	91.7	29	.088	.123	NS
	RR	25.8	25.7	29	.093	.926	NS
	SPO ₂	92.2	92.3	29	5.56	.582	NS
Tripod	HR	96.3	90.1	29	6.12	.012	S
	RR	28	15.3	29	12.21	.000	S
	SPO ₂	91.2	95	29	7.99	.000	S
Prostrate	HR	94.7	90.3	29	2.88	.042	S
	RR	24.7	20.1	29	3.65	.001	S
	SPO ₂	91.7	93.5	29	4.69	.000	S

Table No. 4: Levels of dyspnea in two tests (pre & post) for three groups

Level of dyspnea	Control Group		Tripod Group		Prostrate Group	
	Pre-test (%)	Post-test (%)	Pre-test (%)	Post-test (%)	Pre-test (%)	Post-test (%)
Mild	16.7	13.3	167	40.0	13.3	36.7
Moderate	60.0	66.7	40.0	40.0	56.7	50.0
Severe	23.3	20.0	43.3	20.0	30.0	13.3

Table No. 5: Effect Size of application of tripod position or prostration and breathing with pursed lips on HR, RR, SPO₂ and dyspnea comparing with control group

Dependent variables	Tripod group		Prostrate group	
	d	Effect Size	d	Effect Size
HR	0.526	Medium	0.234	Small
RR	2.230	Large	0.666	Medium
SPO ₂	1.458	Large	0.856	Large
Dyspnea	0.598	Medium	0.474	Small

d: Cohen's d, Small effect size: $d \approx 0.2$, Medium effect size: $d \approx 0.5$, Large effect size: $d \approx 0.8$)⁹

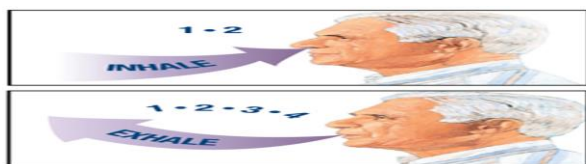


Figure No. 1: Pursed lips breathing

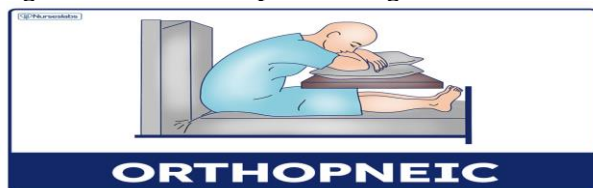


Figure No. 2: Tripod position⁸

Also it revealed that 36.7%, 43.3%, and 40% of the patients in the control, tripod and prostrate group respectively had (11-20 years) as duration of suffering from asthma. 40% of patients in each group (control and prostrate) were use inhaled (ICS) & (LABAs) as a chronic medication use for asthma while 43% in tripod group. 53.3%, 70%, and 63.3% of the patients in the control, tripod and prostrate group respectively had non-allergic asthma attack. There is no statistically significant (>0.05) differences in BMI, asthma duration, medication use, or asthma type between the control, tripod and prostrate groups (Table 2).

There is no statistically significant (.123) difference in heart rate between pretest and posttest in the control group, while there is a clear difference at the p value of .012 and .001 in the two experimental groups (tripod and prostrate groups) respectively. There is no statistically significant difference in respiratory rate between pretest and posttest in the control group at the p value of .926, while there is a clear difference at the p value of .000 and .001 in the two experimental groups (tripod and prostrate groups) respectively. Regarding SPO_2 this study indicates that there is no statistically significant (.582) difference in SPO_2 readings between pretest and posttest in the control group while there is a clear difference at the p value of .000 in the both experimental groups (tripod and prostrate groups) [Table 3].

As for as change in dyspnea level due to application of change position and breathing with pursed lips, at pretest was 16.7% of asthma patients in control group had mild dyspnea and become 13.3% at pretest, while there was a significant change in the tripod group, as 16.7% of them had mild dyspnea in the pretest and 40% in the posttest, as well as in the prostrate group, 13.3% and 36.7% in the pretest and posttest, respectively. The moderate level of dyspnea at pretest was 60% of asthma patients in control group had moderate level of dyspnea and become 66.7% at pretest, and in tripod group, 40% of patients had moderate dyspnea in both tests (pretest and posttest). In prostrate group, 56.7% of patients had moderate dyspnea at pretest and 50% at posttest. As for severe level dyspnea, there was no change in the

percentage of patients in the control group within this level in the pre- and post-tests, where the results were 23.3% and 20%, respectively, while there was a change in the percentage of patients in the tripod group, as it was in the pre-test 43.3% and in the post-test, it was 20%. The prostration group showed that 30% in the pre-test and 13.3% in the post-test (Table 4).

Effect sizes are expressed using Cohen's d, which serves as an indicator of the strength of the interventions' impacts on the dependent variables studied. Regarding heart rate, the tripod group demonstrated a medium effect size ($d=0.526$), signifying a moderate impact on reducing heart rate. In contrast, the prostrate group showed a smaller effect size ($d=0.234$), indicating a less significant influence on this metric. The tripod position may be more effective in managing heart rate than the prostration position. The respiratory rate, the tripod group exhibited a substantial large effect size ($d=2.230$), indicating a strong reduction in respiratory rates. The prostrate group also presented a medium effect size ($d=0.666$), albeit significantly weaker than that of the tripod position and underscores the effectiveness of the tripod position in promoting a more favorable respiratory outcome. Oxygen saturation (SPO_2), both groups demonstrated large effect sizes, with the tripod group at $d=1.458$ and the prostrate group at $d=0.856$. This indicates that both positions are effective in enhancing oxygen levels, although the tripod position appears to yield a more pronounced improvement. Regarding dyspnea, the tripod group displayed a medium effect size ($d=0.598$), suggesting a notable reduction in the perception of breathlessness. The prostrate group reported a smaller effect size ($d=0.474$), indicating that while both interventions provide some relief, the tripod position is more effective in alleviating dyspnea (Table 5).

DISCUSSION

The mean age was 54.4 ± 14 years, with 46.7%–50% aged 30–49, aligning with asthma exacerbation peaks in middle adulthood.¹⁰ Gender distribution was balanced (~53% male, ~47% female), consistent with asthma epidemiology¹⁴. Former smokers (36.7–40%) and occupational exposures (13.3–26.7%) were noted but did not differ between groups, supporting internal validity. The tripod position may optimize accessory muscle use¹¹, while prone positioning (analogous to prostrate) could improve ventilation-perfusion matching.¹² Combining these with pursed-lip breathing known to reduce dynamic hyperinflation offers a novel comparison in asthma management.¹³

The study found no significant differences ($p>0.05$) in clinical characteristics between groups. Obesity class I was prevalent (26.7–36.7%), consistent with known asthma-obesity links.¹⁴ Most participants 36.7–43.3% had 11–20 years' asthma duration, indicating chronic

disease management. Medication patterns reflected standard care, with 40-43.3% using ICS+LABA combination therapy.⁴ Non-allergic asthma predominated (53.3-70%), aligning with adult-onset asthma phenotypes.¹⁵ The body mass index, duration of illness, medication use, and type of asthma, suggesting that the intervention's effects are attributable to positioning, which supports the generalizability of the findings to diverse groups of adults with asthma.

The pulmonary parameters improved when combining body positioning with pursed-lip breathing while control group showed no significant changes (HR $p=.123$, RR $p=.926$, SpO₂ $p=.582$), both intervention groups achieved clinically meaningful improvements. The tripod position showed particularly robust effects, reducing RR by 12.7 breaths/min (45.4% reduction, $p<.001$) and increasing SpO₂ by 3.8% ($p<.001$). Prostrate positioning also showed significant benefits (RR reduction 4.6 breaths/min, $p=.001$; SpO₂ increase 1.8%, $p<.001$). These findings align with previous research showing tripod positioning optimizes respiratory mechanics by reducing accessory muscle work^{16,17} while prone/prostrate positions improve ventilation-perfusion matching.¹⁸ The greater improvement in tripod position may relate to its ability to decrease intrinsic PEEP in obstructive lung disease.¹³ These results suggest that tripod positioning; can relief during asthma exacerbations when combined with pursed-lip breathing, offering nurses an effective non-pharmacological intervention.

The dyspnea severity improved when combining body positioning with pursed-lip breathing while the control group showed minimal change (severe dyspnea: 23.3% vs. 20%), both intervention groups achieved clinically meaningful reductions. The tripod position produced good effects, with mild dyspnea increasing from 16.7% to 40% and severe dyspnea decreasing from 43.3% to 20%. The prostrate position also showed benefits, with severe dyspnea dropping from 30% to 13.3%. These findings support previous research showing tripod positioning reduces dyspnea by decreasing accessory muscle work¹⁰, while prone/prostrate positions improve breathing efficiency.^{18,19} The improvement in tripod positioning may relate to its ability to optimize thoracic mechanics in obstructive lung disease.^{13,20} These results suggest that nurses can effectively use these positions, particularly the tripod stance, to rapidly alleviate dyspnea during asthma exacerbations.

For heart rate, the tripod position showed a large effect ($d=0.526$), which was twice the effect of the prostrate position ($d=0.234$). Also for respiratory rate (RR), the tripod position showed an exceptionally large effect ($d=2.23$), nearly three times greater than the prostrate position's medium effect ($d=0.67$). Similarly, SpO₂ improvements were substantial in both interventions, though tripod positioning again showed superior effects ($d=1.46$ vs. 0.86). These findings align with Watson's⁹

framework, suggesting tripod positioning may be more effective for acute physiological stabilization. The moderate effect on dyspnea ($d=0.60$) in the tripod group versus small effect ($d=0.47$) in prostrate group suggests additional psychological benefits from this position. The differential effects may relate to tripod positioning's ability to optimize thoracic biomechanics^{17,22}, while prostrate positioning primarily affects ventilation distribution.^{19,23} These effect sizes support prioritizing tripod positioning in acute asthma management, particularly when rapid RR reduction and oxygenation improvement are needed.

CONCLUSION

Combining tripod/prostrate positions with pursed-lip breathing significantly improves cardiopulmonary parameters and reduces dyspnea in asthma patients, with tripod positioning showing superior effects (large effect sizes: HR $d=0.526$, RR $d=2.23$, SpO₂ $d=1.46$). Asthma patients often experience symptoms like decreased SpO₂ levels, tachypnea, tachycardia, and dyspnea. Nurses should teach strategies to minimize symptoms and enhance quality of life. Integrating tripod or prostrate posture with pursed-lip breathing into routine care can improve patient condition and reduce dyspnea.

Author's Contribution:

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REFERENCES

1. Wolpert T. Asthma pathophysiology. Nursing Student Class Projects 2021; 477.
2. Bentué-Martínez C, Rodrigues M, Llorente González JM, Sebastián-Ariño A, Zuñiga-Martínez M, Zúñiga-Antón M. Spatial Patterns in the Association between the Prevalence of Asthma and Determinants of Health. *Geographical Analysis* 2024;56(2): 265-83.
3. Cevhertas L, Ogulur I, Maurer DJ, Burla D, Ding M, Jansen K, Akdis CA. Advances and recent developments in asthma in 2020. *Allergy* 2020; 75(12), 3124-46.

4. GINA Global Initiative for Asthma. Global strategy for asthma management and prevention, 2023;25.
5. Lee LK, Ramakrishnan K, Safioti G, Ariely R, Schatz M. Asthma control is associated with economic outcomes, work productivity and health-related quality of life in patients with asthma. *BMJ* 2020;7(1):e000534.
6. National Heart, Lung, and Blood Institute. What is asthma? 2024; 7.
7. Mohammed J, Abdulateef A, Shittu A, Sumaila FG. Effect of different body positioning on lung function variables among patients with bronchial asthma. *Arch Physioth Global Res* 2017; 21(3): 22-4.
8. Vera M. Patient Positioning: Complete Guide and Cheat Sheet for Nurses 2024;15.
9. Watson P. Rules of thumb on magnitudes of effect sizes. *Univ Cambridge, MRC Cognition and Brain Sci* 2021; 19.
10. Dharmage SC, Perret JL, Custovic A. Epidemiology of asthma in children and adults. *Frontiers Pediatr* 2019; 7, 246.
11. O'Neill S, McCarthy DS. Postural relief of dyspnoea in severe chronic airflow limitation: Relationship to respiratory muscle strength. *Thorax* 2023; 38(8): 595-600.
12. Ding L, Wang L, Ma W, He H. Efficacy and safety of early prone positioning combined with HFNC or NIV in moderate to severe ARDS. *Crit Care* 2020; 24(1).
13. Nield MA, SooHoo GW, Roper JM, Santiago S. Efficacy of pursed-lips breathing: A breathing pattern retraining strategy for dyspnea reduction. *Chest* 2007; 131(3): 711-5.
14. Dixon AE, Holguin F, Sood A, Salome CM, et al. An official American Thoracic Society Workshop report: Obesity and asthma. *Thorax* 2010; 65(1): 77-82.
15. Wenzel SE. Asthma phenotypes: The evolution from clinical to molecular approaches. *Nat Med* 2012; 18(5): 716-25.
16. Cabral LF, D'Elia TC, Marins DS, et al. Diaphragmatic and abdominal muscle activity in response to different postural lung volumes in healthy subjects. *Respiratory Care* 2015; 60(6): 876-83.
17. Abed-Ali HN, Athbi HA. Effect of prostrate position and coughing exercises upon level of dyspnea and persistent cough among non-intubated patients with COVID 19. *Int J Health Sci* 2022; 6(S2): 2797-2810.
18. Bloomfield R, Noble DW, Sudlow A. Prone position for acute respiratory failure in adults. *Cochrane Database Syst Rev* 2016; 2016(3).
19. Abed-Ali HN, Athbi HA. Benefits of prostrate position and coughing exercises in the management of cardiopulmonary parameters alteration among patients with COVID-19. *PJMHS* 2022; 16(3): 680.
20. Sarkar M, Bhardwaz R, Madabhavi I, Modi M. Physical signs in patients with chronic obstructive pulmonary disease. *Lung India* 2019; 36(1): 38-47.
21. Zuriati Z, Surya M. Effectiveness Active Cycle of Breathing Technique (ACBT) with Pursed Lips Breathing Technique (PLBT) to tripod position in increase oxygen saturation in patients with COPD, West Sumatera. *Enfermeria Clin* 2020; 30: 164-7.
22. Abed-Ali HN, Mashallah NH, Al-khaqani MAY. Effectiveness of Applying Coughing Exercises during Prostration in Improvement of Pulmonary Parameters among COVID-19 Patients Using a Face Mask for Oxygen. *J Reattach Therap Develop Diversities* 2023; 6(2s): 101-8.

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