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CONTENTS

Editorial

Original Articles

Editorial

Benefits of Early Diagnosis of Thalassemia in Children

Prof. Dr. Azhar Masud Bhatti
Editor-in-Chief

Introduction

Thalassemia is an inherited blood disorder, which means that it is passed from parents to children through genes.

If you have thalassemia, your body may not make enough hemoglobin, which can lead to fewer healthy red blood cells. This can lead to a condition called anemia.

Anemia can make you feel tired, weak, or short of breath. Or, depending on the type of thalassemia you have and how serious it is, you may have no symptoms at all. More serious types of thalassemia are usually diagnosed before a child is 2 years old.

Blood transfusions are used to treat thalassemia. You may need occasional or more regular blood transfusions, depending on how serious your condition is. You may also take medicine to help with complications from this treatment. It is important to talk to your healthcare provider before you become pregnant. They may need to run tests or change your treatment plan.

Although thalassemia is a lifelong condition, treatments have improved over the years. People are now living with thalassemia for longer and have better quality of life.

Types of Thalassemia

There are two main types of thalassemia: alpha thalassemia and beta thalassemia. Each of these types can be mild, moderate, or serious, depending on how much hemoglobin your body makes. Hemoglobin is a protein that helps red blood cells carry oxygen.

Alpha thalassemia is caused by alpha-globin gene deletion which results in reduced or absent production of alpha-globin chains. Alpha globin gene has 4 alleles and disease severity ranges from mild to severe depending on the number of deletions of the alleles. Four allele deletion is the most severe form in which no alpha globins are produced and the excess gamma chains (present during the fetal period) form tetramers. It is incompatible with life and results in hydrops fetalis. One allele deletion is the mildest form and is mostly clinically silent.

Beta thalassemia results from point mutations in the beta-globin gene. It is divided into three categories based on the zygosity of the beta-gene mutation. A heterozygous mutation (beta-plus thalassemia) results in beta-thalassemia minor in which beta chains are underproduced. It is mild and usually asymptomatic. Beta thalassemia major is caused by a homozygous mutation (beta-zero thalassemia) of the beta-globin gene, resulting in the total absence of beta chains. It manifests clinically as jaundice, growth retardation, hepatosplenomegaly, endocrine abnormalities, and severe anemia requiring life-long blood transfusions. The condition in between these two types is called beta-thalassemia intermedia with mild to moderate clinical symptoms.

Hemoglobin (HbE) is also a common Hb variant found in Southeast Asia population. It has a correlation with a beta-thalassemia phenotype, as people with thalassemia in this territory are commonly found to have HbE.

Two new terminologies being used more often in clinical settings are transfusion requiring and non-transfusion requiring thalassemias and all the basic classification falls into these two types depending on the requirement of frequent blood transfusions or not.[1,2,3]

Etiology

Thalassemia is autosomal recessive, which means both the parents must be affected with or carriers for the disease to transfer it to the next generation. It is caused by mutations or deletions of the Hb genes, resulting in underproduction or absence of alpha or beta chains. There are over 200 mutations identified as the culprits for causing thalassemias. Alpha thalassemia is caused by deletions of alpha-globin genes, and beta thalassemias are caused by a point mutation in splice site and promoter regions of the beta-globin gene on chromosome 11.[4]

Epidemiology

According to Director General Thalassemia Foundation Punjab, Thalassemia is the commonest inherited disorder in Pakistan over 6000 affected children who born annually with Thalassemia Major, meaning 17 affected children born each day in Pakistan. He further added that psychosocial interventions play a vital role in the prevention of genetic disorders.

Alpha thalassemia is prevalent in Asian and African populations while beta-thalassemia is more prevalent in the Mediterranean population, although it is relatively common in Southeast Asia and Africa too. Prevalence in these regions may be as high as 10%. The true numbers of thalassemia affected patients in the United States are unknown, as there is no effective screening method in place.[4]

Symptoms

There are different types of thalassemia. The symptoms that you have depend on the type and how serious it is.

Symptoms of severe thalassemia can include:

- Tiredness, also called fatigue.
- Weakness.

- A change in skin color or a yellowing of skin and eyes.
- Changes or problems with facial bones.
- Slow growth.
- Swelling of the stomach area, also called the abdomen.
- Dark urine.
- Poor appetite.

Some babies show symptoms of thalassemia at birth. Others get symptoms during the first two years of life. But some people with thalassemia don't have symptoms.

Diagnosis

Most children with moderate to severe thalassemia show symptoms within their first two years of life. If your child's health care professional thinks your child might have thalassemia, blood tests can confirm it.

Blood tests can reveal the number of red blood cells and irregular changes in their size, shape or color. Blood tests also can be used to look for gene changes in DNA.

Prenatal testing

Testing can be done before a baby is born to find out if the baby has thalassemia. Testing also can determine how serious the condition might be. Tests used to find thalassemia in unborn babies include:

- **Chorionic villus sampling.** This test involves removing a tiny piece of the placenta. The placenta is the organ that forms during pregnancy to give a baby oxygen and nutrients in the womb. Once removed, the placenta sample is checked by a lab. Most often, it's done around the 11th week of pregnancy.
- **Amniocentesis.** This test involves checking a sample of the fluid that surrounds the unborn baby in the womb. The test usually is done around the 16th week of pregnancy.

Treatment

Mild forms of thalassemia trait don't need treatment.

For moderate to severe thalassemia, treatments might include[5,6]:

- **Frequent blood transfusions.** It's common to need these. Some people need them as often as every few weeks. Over time, blood transfusions cause a buildup of iron in blood. That can damage the heart, liver and other organs.
- **Chelation therapy.** This treatment removes extra iron from the blood. Iron can build up due to regular transfusions. Some people with thalassemia who don't have regular transfusions also can develop excess iron. Removing the excess iron is vital for your health.

To help rid your body of the extra iron, you might need to take medicine by mouth. The medicines include deferasirox (Exjade, Jadenu) or deferiprone (Ferriprox). Another drug called deferoxamine (Desferal) is given through a needle in a vein.

- **Other medicines.** A medicine given by shot called luspatercept (Reblozyl) helps some people need fewer blood transfusions. A medicine taken by mouth called hydroxyurea (Hydrea, Droxia) can lower the chances of getting other health problems because of thalassemia.
- **Stem cell transplant.** This also is called a bone marrow transplant. Sometimes, it might be a treatment option. For children with severe thalassemia, it can get rid of the need for lifelong blood transfusions and drugs to control iron overload.

A stem cell transplant involves receiving infusions of stem cells from a donor with matching cells, often a healthy sibling.

Risk factors

Factors that raise your risk of thalassemia include:

- **Family history of thalassemia.** The condition passes from parents to children through genetic changes in hemoglobin genes.
- **Certain ancestry.** Thalassemia happens most often in people of South Asian, Italian, Greek, Middle Eastern or African descent.

Complications

Health problems that can stem from moderate to severe thalassemia include[7]:

- **Iron overload.** People with thalassemia can get too much iron in their bodies. This can be due to the disease or to frequent blood transfusions. Too much iron can result in damage to the heart, liver, and glands that make and release hormones.
- **Infection.** People with thalassemia have a higher risk of infections. This is especially true if they've had their spleens removed.

Severe thalassemia can lead to the following health problems:

- **Bone changes.** Thalassemia can cause the spongy tissue inside some bones, called bone marrow, to expand. That makes bones widen. It can lead to an irregular bone structure, especially in the face and skull. Expanding bone marrow also makes bones thin and brittle. That raises the chance of broken bones.
- **Enlarged spleen.** The spleen is an organ that helps the body fight infection. It also helps remove old or damaged blood cells. Often, thalassemia happens along with the destruction of a large number of red blood cells. This causes the spleen to get bigger and work harder than usual.

An enlarged spleen can make anemia worse. It also can reduce the life of red blood cells received in a transfusion. If your spleen grows too big, your health care professional might recommend surgery to remove it.[8,9]

- **Slowed growth rates.** Anemia can slow a child's growth and delay puberty.

- **Heart problems.** Congestive heart failure and irregular heart rhythms can be linked with severe thalassemia.

Prevention

Thalassemia is a preventable disease and our hope lies in adopting a preventive program on the line pursued by countries like Italy, Cyprus and Iran, who have resulted in either complete control of significant reduction in the births of new Thalassaemic Major children in these countries.

Awareness among general public with the global community as one to improve thalassemia knowledge, is an open call to action to all supporters to promote awareness about thalassemia and its global impact and share essential information and knowledge to support the best possible health, social and other care of people affected by this disease.

Most of the time, you can't prevent thalassemia. If you have the condition or if you have the thalassemia gene changes that cause it, it is very important to talk with a genetic counselor. The counselor can offer advice on the risks of your children being affected.

Some people with thalassemia major think about getting pregnant with assisted reproductive technology. This includes procedures such as in vitro fertilization. IVF joins an egg and a sperm outside the body to make the earliest stage of an unborn baby, called an embryo. An exam called preimplantation genetic testing can then be used to check the embryo for gene changes related to thalassemia. If an embryo doesn't have these changes, it can be placed in the uterus to start a pregnancy. This might help people who have thalassemia or a related gene have healthy babies.

Another procedure that might lead to pregnancy is called intrauterine insemination. Sperm from a donor who doesn't have thalassemia or the genes related the condition is placed in the uterus to join with an egg.

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Original Article

Oral Health Knowledge and Practices in Individuals with Chronic Systemic Conditions. A Cross Sectional Study

Syed Fareed Mohsin

ABSTRACT

Objective: To assess the oral health knowledge and practices among individuals with chronic systemic conditions.
Study Design: Observational / Cross-sectional study
Place and Duration of Study: This study was conducted at the Qassim University dental hospital over a period of seven months from Sep 2024 to April 2025.
Methods: A total of 297 participants with diagnosed chronic systemic conditions were recruited through convenience sampling. Data were collected via a structured electronic questionnaire covering demographics, medical history, oral health knowledge and practices, and perceived barriers. Descriptive statistics, Chi-square/Fisher's Exact Test, and Spearman's correlation were applied, with $p<0.05$ considered statistically significant.
Results: A total of 297 participants were included, with the majority aged over 60 years 108(36.4%) and predominantly male 209(70.4%). Diabetes 136(45.8%) and hypertension 111(37.4%) were the most common chronic conditions. A significant association was found between type of chronic illness and awareness of its impact on oral health ($p < 0.001$), with diabetic participants showing greater awareness. Similarly, self-reported medication-related oral health effects and receipt of oral health education were significantly associated with the type of condition ($p < 0.001$). Positive correlations were observed between oral health knowledge scores and practices like brushing, flossing, and dental visits, particularly among diabetic and hypertensive participants.
Conclusion: Oral health knowledge and practices differed significantly among individuals with chronic systemic conditions, with those having diabetes and other illnesses demonstrating better awareness and behaviors compared to hypertensive patients.

Key Words: Oral health, chronic diseases, diabetes, hypertension, knowledge, practices

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INTRODUCTION

Oral and systemic health are closely interconnected through a well-established bidirectional relationship[1,2]. Chronic conditions such as diabetes mellitus, cardiovascular disease, and hypertension are known to contribute to a range of oral health issues, including periodontal disease and tooth loss[1,3]. Furthermore, certain oral manifestations may serve as early signs of systemic illnesses, highlighting the integral role of oral health in maintaining overall health[3,4]. A growing body of research has consistently demonstrated associations between oral diseases and systemic disorders.

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Periodontal disease, in particular, has been linked to diabetes mellitus, metabolic syndrome, cardiovascular conditions, Alzheimer's disease, and negative pregnancy outcomes. The aging process, which is often accompanied by chronic illnesses, adds further complexity to the management of oral diseases.[3,4]

Oral diseases include a variety of preventable conditions such as dental caries and periodontal disease, both of which are closely linked to systemic health[5,6]. According to the World Health Organization (WHO), approximately 3.58 billion individuals were affected by oral diseases in 2016[5]. Over 100 systemic diseases and nearly 500 medications are known to produce oral manifestations, particularly among older adults[6]. This connection is further intensified by shared risk factors such as tobacco use, alcohol consumption, and obesity[5]. Inadequate awareness and limited understanding of the relationship between oral and systemic health have been associated with preventable hospital admissions (PPH), increased morbidity, and diminished quality of life[5]. Emphasizing preventive oral care through routine dental check-ups and good oral hygiene practices can play a vital role in improving quality of life and assisting in the control and prevention of chronic

illnesses, ultimately reducing their prevalence and related mortality[7-10].

The relationship between oral and systemic health, commonly referred to as the oral-systemic link, is well recognized. This connection is primarily mediated through shared inflammatory pathways, involving common markers such as pro-inflammatory cytokines (e.g., C-reactive protein, TNF-α, IL-1β, and IL-6), neutrophils, and white blood cells[6,11]. Systemic inflammation can exacerbate the development and progression of oral diseases, while oral pathogens entering the bloodstream may also trigger or worsen systemic inflammatory responses[6,12].

Evidence indicates that promoting oral health and implementing preventive strategies can help mitigate several shared risk factors linked to both oral and chronic systemic diseases. By improving patient awareness and education regarding the oral-systemic connection, healthcare providers can support individuals in managing their oral health as part of their overall well-being[13]. People living with chronic conditions such as diabetes, hypertension, and other long-term illnesses are at increased risk for oral health issues due to factors like systemic inflammation, immune dysfunction, and medication side effects. Despite this, oral health is frequently overlooked in the comprehensive care of these patients. Assessing their current knowledge and behaviour related to oral health is crucial for designing effective, condition-specific educational and preventive interventions. Therefore, the present study was conducted to evaluate oral health knowledge and practices among individuals with chronic systemic diseases.

METHODS

This cross-sectional observational study was conducted at Qassim University Dental Hospital over a period of seven months from Sep 2024 to April 2025. The ethical approval was obtained from the Ethical Review Committee of Qassim University with the reference # 24-06-02. The required sample size was calculated using Epi Info software, assuming a 50% incidence rate, a 5% margin of error, and a 95% confidence level, yielding a minimum required sample of 370 participants [13]. However, due to time and resource constraints, a total of 297 participants were included in the final analysis. Participants were recruited through convenience sampling from patients visiting the dental hospital during the study period. The inclusion criteria comprised individuals who were attending the dental hospital and had a diagnosed chronic systemic condition. Exclusion criteria included individuals with undiagnosed chronic systemic conditions and those who were unable to comprehend or complete the questionnaire due to language barriers or cognitive impairments.

Informed consent was obtained from all participants prior to data collection. Data were collected using a structured electronic questionnaire administered to eligible participants. The questionnaire was divided into several sections, including demographic characteristics such as age, gender, education level, and income; medical history detailing the type of chronic systemic condition, duration since diagnosis, and treatment regimen; oral health knowledge, which assessed awareness of oral hygiene practices, dental care routines, and the impact of chronic diseases on oral health; oral health practices including frequency of tooth brushing, flossing, dental visits, and use of oral hygiene products; and perceived barriers to maintaining good oral health.

The data was analyzed using SPSS software Version 22.0. Descriptive statistics were used to summarize the demographic characteristics of the participants, including age, gender, education level, type and duration of chronic systemic conditions. Associations between chronic systemic conditions and oral health knowledge variables were assessed using the Chi-square test and Fisher's Exact Test where appropriate. Spearman's correlation was applied to examine the relationship between oral health knowledge scores and oral health practices (brushing frequency, dental visits, flossing, and toothbrush replacement) within each chronic illness group. A p value of <0.05 was considered as statistically significant.

RESULTS

Table No.1: Demographic Characteristics of the Participants (n=297).

Variables		n(%)
Age group (Years)	18-30	16(5.4%)
	31-45	69(23.2%)
	46-60	104(35.0%)
	Over 60	108(36.4%)
Gender	Male	209(70.4%)
	Female	88(29.6%)
Education level	High school	160(53.9%)
	College	17(5.7%)
	Bachelor	96(32.7%)
	Master degree	23(7.7%)
Chronic systemic condition	Hypertension	111(37.4%)
	Diabetes	136(45.8%)
	Others(hypothyroidism, blood disorders, neurological problems)	50(16.8%)
Duration of systemic condition diagnosis	< 1 year	58(19.5%)
	1-5 years	124(41.8%)
	>5 year	115(38.7%)

A total of 297 participants were included in the study. The majority of participants were aged over 60 years 108(36.4%), followed by 46–60 years 104(35.0%), 31–

45 years 69(23.2%), and 18–30 years 16(5.4%). Males comprised a larger proportion of the sample 209(70.4%) compared to females 88(29.6%). Regarding educational background, more than half of the participants had completed high school 160(53.9%), while 96(32.7%) held a bachelor's degree. Among the chronic systemic conditions reported, diabetes was the most prevalent 136(45.8%), followed by hypertension 111(37.4%), and other conditions such as hypothyroidism, blood disorders, and neurological issues 50(16.8%). In terms of the duration since diagnosis of the systemic condition, 124(41.8%) of participants had been diagnosed within the past 1–5 years, 115(38.7%) for over 5 years, and 58(19.5%) were diagnosed less than a year ago, as presented in Table 1.

Table No.2: Association between Chronic Systemic Conditions and Oral Health Knowledge.

Variables	Chronic systemic conditions			
	Diabetes n(%)	Hypertension n(%)	Others n(%)	p-value
Can chronic diseases affect oral health?				
Yes	46(33.8%)	25(22.5%)	17(34.0%)	<0.001
No	7(5.1%)	60(54.1%)	6(12.0%)	
Not sure	83(61.0%)	26(23.4%)	27(54.0%)	
Have you noticed any impact of your medications on your oral health, such as dry mouth or changes in gum health?				
Yes	51(37.5%)	9(8.1%)	29(58.0%)	<0.001
No	85(62.5%)	102(91.9%)	21(42.0%)	
Have you ever received oral health education specific to your chronic systemic condition(s)?				
Yes	40(29.4%)	0(0.0%)	0(0.0%)	<0.001[a]
No	96(70.6%)	111(100.0%)	50(100.0%)	

Chi-square test
Fisher's Exact Test [a]

Table No.3: Correlation between Oral Health Practices and Knowledge score by Chronic Illness Group.

Knowledge scores	Diabetes		Hypertension		Others	
	(ρ)	p-value	(ρ)	p-value	(ρ)	p-value
Frequency of brushing (times/day)	0.222**	0.009	-0.060	0.535	0.818**	<0.001
Frequency of dental visits	0.686**	<0.001	0.815**	<0.001	0.991**	<0.001
Flossing frequency	0.708**	<0.001	0.750**	<0.001	0.548**	<0.001
How often should you replace your toothbrush?	0.581**	<0.001	0.128	0.181	0.176	0.222

Spearman's correlation

Table 2 presents the association between chronic systemic conditions and participants' awareness and experiences related to oral health. A statistically significant difference was observed among the three groups—diabetes, hypertension, and other systemic conditions—with regard to their perception of the impact of chronic diseases on oral health ($p < 0.001$). Among participants with diabetes, 46(33.8%) acknowledged that chronic diseases could affect oral health, whereas only 35(22.5%) of hypertensive participants and 17(34.0%) of those with other conditions shared this view. Notably, 60(54.1%) of participants with hypertension responded negatively to this question, and 83(61.0%) of diabetic participants were unsure. A significant association was also found between systemic condition type and self-reported medication-related oral health effects, such as dry mouth or changes in gum health ($p < 0.001$). More than half of the participants with other conditions, 29(58.0%) and 51(37.5%) of those with diabetes reported such effects, compared to only 9(8.1%) of hypertensive individuals. Furthermore, receiving oral health education tailored to one's systemic condition showed a highly significant association with the type of chronic illness ($p < 0.001$). While 40(29.4%) of diabetic participants had received oral health education, none of the participants in the hypertension or other condition groups reported receiving such education.

Table 3 presents the correlation between oral health practices and knowledge scores across the three chronic illness groups: diabetes, hypertension, and others. Among participants with diabetes, knowledge scores were positively and significantly correlated with frequency of brushing ($\rho = 0.222$, $p = 0.009$), frequency of dental visits ($\rho = 0.686$, $p < 0.001$), flossing frequency ($\rho = 0.708$, $p < 0.001$), and awareness of toothbrush replacement frequency ($\rho = 0.581$, $p < 0.001$). In the hypertension group, strong positive

correlations were observed between knowledge scores and both frequency of dental visits ($\rho = 0.815$, $p < 0.001$) and flossing ($\rho = 0.750$, $p < 0.001$), while no significant correlation was found with brushing frequency ($\rho = -0.060$, $p = 0.535$) or toothbrush replacement awareness ($\rho = 0.128$, $p = 0.181$). Among those with other systemic conditions, very strong positive correlations were noted between knowledge scores and brushing frequency ($\rho = 0.818$, $p < 0.001$), frequency of dental visits ($\rho = 0.991$, $p < 0.001$), and flossing frequency ($\rho = 0.548$, $p < 0.001$). However, no significant correlation was found between knowledge scores and toothbrush replacement awareness ($\rho = 0.176$, $p = 0.222$).

DISCUSSION

Recognizing the integral role of oral health in maintaining systemic well-being is crucial. The condition of the oral cavity not only mirrors but also influences overall health, emphasizing that comprehensive health cannot be achieved without adequate oral care[14]. Research has demonstrated that controlling oral inflammation, particularly from periodontal infections, can lead to a reduction in systemic inflammatory responses[15].

The present study aimed to assess oral health knowledge and practices among individuals with chronic systemic conditions, revealing notable variations between disease groups, particularly diabetes and hypertension. Diabetes mellitus emerged as the most prevalent chronic condition in the study, and diabetic participants demonstrated significantly greater awareness regarding the link between systemic disease and oral health compared to other groups. This aligns with existing literature, which consistently identifies diabetes as a major risk factor for periodontal disease due to its inflammatory and immunocompromised effects[16,17]. A recent systematic review also concluded with moderate certainty that patients with diabetes tend to have higher DMF (Decayed, Missing, and Filled teeth) scores[18], further supporting the present study's observation of increased oral health issues among diabetic individuals.

Interestingly, the present study noted significant positive correlations between knowledge scores and oral hygiene behaviors (such as brushing, flossing, and dental visits) in diabetic participants, suggesting that increased awareness can translate into better practices when appropriate education is provided. In contrast, past studies have also revealed that people with diabetes generally demonstrate inadequate oral health knowledge and practices. A study by Poudel et al. reported that less than half of diabetic individuals brush twice daily and only a quarter floss regularly, with just over half visiting a dentist annually[17].

In the present study, hypertensive participants showed limited awareness of oral health implications, with the majority either unaware or unsure about the connection between their condition and oral health and none reporting any received oral health education. These results are consistent with findings from Rasouli-Ghahroudi et al., who assessed knowledge, attitude, and practice (KAP) among patients with cardiovascular disease. Their study reported moderate knowledge levels but poor practice, highlighting that awareness alone may not suffice to drive behavior change, especially in the absence of practical interventions or health system support[19]. The lack of significant correlation between knowledge scores and oral hygiene behaviors such as brushing and toothbrush replacement in the hypertensive group from the present study further supports this perception.

A significant finding of the present study was the poor awareness regarding the impact of systemic conditions on oral health. Only 33.8% of diabetic patients, 25(22.5%) of hypertensive individuals, and 17(34.0%) of those with other conditions believed that systemic diseases could affect oral health. These findings are consistent with Akl et al., who reported that less than 50% of patients with chronic conditions globally understood the oral-systemic link. This lack of awareness is further supported by other systematic reviews[13], particularly in diabetic and pregnant populations, which reported consistently poor knowledge scores. In the present study, the particularly high percentage of diabetic patients who were unsure about the oral health implications of their condition, 83(61.0%) may highlight inadequate communication between healthcare providers and patients, as previously noted in the literature[20-23].

Moreover, the present study identified a significant association between systemic illness type and medication-related oral effects, such as dry mouth and gum changes, with higher reporting among diabetic and other-condition groups. Medication-related oral health side effects, such as dry mouth and changes in gum health, were reported most commonly by patients with diabetes 51(37.5%) and other conditions 29(58.0%), whereas only 9(8.1%) of hypertensive participants acknowledged such issues. This lack of awareness could be due to the absence of condition-specific oral health education, an association that was clearly demonstrated in our study, where only 40(29.4%) of diabetic participants received any oral health education, and none among hypertensive or other-condition participants did. This finding reflects the systemic neglect of oral health in chronic disease management, corroborating earlier research attributing poor oral health literacy to limited interdisciplinary communication and systemic healthcare gaps[20,21].

Regarding oral health practices, the present study found that knowledge scores were significantly and positively correlated with better oral hygiene behaviors, particularly in the diabetes group. This includes

stronger correlations with brushing frequency, flossing, dental visits, and awareness of toothbrush replacement. Similar positive correlations were observed in the other systemic conditions group, though awareness about toothbrush replacement remained low. In hypertensive patients, the strongest associations were found between knowledge and flossing or dental visits, while brushing frequency showed no significant relationship. This variability may stem from differing health behaviors or beliefs associated with specific chronic conditions, as suggested by previous studies indicating that health-seeking behavior, particularly among males, tends to be lower[20,24].

This study had some limitations, including a smaller-than-required sample size, use of convenience sampling, and reliance on self-reported data, which may introduce bias. The cross-sectional design prevents causal interpretations, and the single-center setting limits generalization. Despite these limitations, the findings emphasize the need for integrating oral health education into chronic disease care, particularly for hypertensive patients. Future studies with larger, diverse samples and longitudinal designs are recommended to better understand the link between systemic conditions and oral health.

CONCLUSION

This study concluded a significant association between chronic systemic conditions and oral health knowledge and practices. Participants with diabetes and other chronic illnesses demonstrated better oral health awareness and more consistent hygiene practices compared to those with hypertension. Strong correlations between oral health knowledge and practices, particularly dental visits and flossing, underscore the importance of tailored oral health education as an integral part of chronic disease management.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Syed Fareed Mohsin
Drafting or Revising Critically:	Syed Fareed Mohsin
Final Approval of version:	The above author
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Original Article

Are Hematological Parameters Reliable Indicators of Disease Activity in Systemic Lupus Erythematosus Patients?

Syed Muhammad Kashif[1], Muhammad Tanveer Alam[1], Muhammad Luqman[1], Darshan Kumar[2] and Sabiha Banu[2]

ABSTRACT

Objective: This study was to assess the diagnostic value of hematological parameters in predicting disease activity of SLE with SLEDAI as the reference standard.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the Dr. Ruth K.M Pfau Civil Hospital, Karachi from February to July 2023.

Methods: This study was performed on 40 SLE patients. In this study Disease activity was evaluated by SLEDAI, and the association between SLEDAI and complete blood count (CBC)-based indicators (neutrophil-to-lymphocyte ratio (NLR), platelet-to-lymphocyte ratio (PLR)), erythrocyte sedimentation rate (ESR), complement proteins (C3/C4) and antinuclear antibody (ANA) levels were studied. Statistical methods involved use of Shapiro-Wilk tests for normality, Spearman's rank correlation, chi-square tests, and Kruskal-Wallis test.

Results: ANA levels and SLEDAI scores showed a weak but statistically significant positive connection ($r = 0.318$, $p = 0.045$), indicating limited usefulness in monitoring disease activity. SLEDAI, on the other hand, did not significantly correlate with CBC-derived inflammatory indices, such as the neutrophil-to-lymphocyte ratio (NLR; $p = 0.590$) or the platelet-to-lymphocyte ratio (PLR; $p = 0.103$). Likewise, there was no statistically significant association between disease activity scores and complement protein levels (C3: $p = 0.566$; C4: $p = 0.180$) or erythrocyte sedimentation rate (ESR; $p = 0.230$). With higher SLEDAI classifications, the prevalence of anemia seemed to rise quantitatively; nevertheless, this trend fell short of statistical significance ($p = 0.575$). Additionally, categorical analyses revealed no significant associations between SLEDAI-defined disease severity and gender, treatment-naïve status, or the presence of hepatosplenomegaly ($p > 0.05$ for all). Shapiro-Wilk testing confirmed non-normal distributions for both ANA and SLEDAI scores, necessitating the use of non-parametric statistical methods for analysis.

Conclusion: Hematological parameters (NLR, PLR, ESR) and routine biomarkers (C3/C4) demonstrated limited reliability as standalone indicators of SLE activity in this resource-constrained cohort. While ANA showed modest correlation, its variability limits clinical utility. The findings highlight the complexity of SLE monitoring and underscore the need for integrated, context-specific approaches combining clinical assessment with accessible biomarkers. Further validation of cost-effective composite tools is critical for low-resource settings where advanced diagnostics remain unavailable.

Key Words: SLE, SLEDAI, NLR, PLR

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INTRODUCTION

Systemic lupus erythematosus (SLE) is a chronic autoimmune condition with multisystem involvement that presents persistent challenges in diagnosis and disease monitoring. While composite indices like the SLE Disease Activity Index (SLEDAI) are widely used to assess disease activity, their complexity and reliance on advanced laboratory inputs limit routine use in low-resource settings. In such environments, there is growing reliance on cost-effective, accessible markers.

Traditional tools such as ANA, anti-dsDNA, and complement proteins (C3/C4) remain standard in well-resourced clinics[1], but in much of the developing world, Complete Blood Count (CBC) is among the few widely available investigations. Derived indices such as neutrophil-to-lymphocyte ratio (NLR) and platelet-to-

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lymphocyte ratio (PLR) have been proposed as surrogate markers of systemic inflammation, with the advantage of low cost and no infrastructure demands[2]. Their feasibility has been highlighted in clinical settings across countries like Uganda and Malawi, where laboratory capacity is limited.

However, the clinical value of these hematological markers in monitoring SLE remains debated. Some studies support strong correlations with SLEDAI[2,3], while others report weak or inconsistent associations, likely influenced by comorbid infections and population-specific variables. These discrepancies emphasize the need for region-specific validation.

This study evaluates whether hematological parameters—including NLR, PLR, ESR, and ANA—can reliably reflect disease activity in SLE patients in a low-resource clinical setting. By comparing these markers with SLEDAI scores, we aim to assess their potential as adjunctive tools for disease monitoring in environments where advanced diagnostics remain inaccessible.

METHODS

A cross-sectional observational study was conducted at Dr. Ruth K.M Pfau Civil Hospital, Karachi, from February to July 2023. The methodology followed STROBE guidelines for cross-sectional research[4]. The objective was to assess the reliability of routine hematological parameters in reflecting disease activity in SLE patients within a resource-limited setting, following protocols similar to recent biomarker investigations[5].

Sample size was calculated using the formula: $n = Z^2\alpha[p \times q]/d^2$, with $Z\alpha = 1.96$ (95% CI), $p = 0.05$ (regional SLE prevalence), $q = 0.95$, and $d = 0.05$, resulting in 38 patients. To ensure complete data, the sample was rounded up to 40.

Eligible SLE patients (≥18 years old, diagnosed for ≥6 months) were enrolled using systematic sampling (every third patient) from both outpatient and inpatient departments. Diagnosis was confirmed using the 2019 EULAR/ACR classification criteria[6]. Exclusion criteria included acute infections, pregnancy, malignancy, recent major surgery (within 3 months), or coexisting autoimmune diseases.

Demographic and clinical information—age, gender, socioeconomic status, education level, disease duration, medication history, and anemia status—was recorded via a standardized case report form. Two rheumatologists independently assessed patients to ensure consistency, with inter-observer agreement evaluated by Cohen's kappa ($\kappa > 0.80$ indicating excellent reliability).

Disease activity was measured using the SLEDAI, incorporating 21 clinical and laboratory parameters[6]. Activity was categorized as mild (1–5), moderate (6–10), high (11–19), or very high (≥20).

Blood samples were collected after a 12-hour fast, between 8:00–11:00 AM to minimize diurnal variation. CBCs were processed within two hours using a calibrated hematology analyzer at CHK. Daily quality controls and monthly calibrations were performed per manufacturer guidelines. NLR and PLR were calculated from absolute neutrophil, lymphocyte, and platelet counts.

ANA was quantified by ELISA (sensitivity 92%, specificity 95%), and complement proteins (C3, C4) were measured. ESR was determined using the Westergren method, following haematology standards. Biomarkers were selected based on existing evidence of their association with SLE activity[5].

SPSS version 25.0 was used for analysis. The Shapiro–Wilk test assessed normality. Normally distributed variables were analyzed using Pearson's correlation; non-normal data used Spearman's rank correlation. Categorical comparisons (e.g., anemia, gender, hepatosplenomegaly vs. SLEDAI) used chi-square or Fisher's exact test. The Kruskal-Wallis test was applied for non-normal SLEDAI score group comparisons. Significance was set at $p < 0.05$, and effect sizes were reported.

The study was approved by Dow University's IRB, and informed consent was obtained. All procedures followed standard operating protocols and Good Clinical Practice under the Declaration of Helsinki.

RESULTS

Demographic and Clinical Characteristics

The study cohort comprised 40 SLE patients, predominantly female (82.5%, n=33), with a mean age of 26.4 years (SD: ±11.5), reflecting the typical demographic profile of SLE populations (Table 1).

Table No.1: Gender of participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	7	17.5	17.5	17.5
	Female	33	82.5	82.5	100.0
	Total	40	100.0	100.0	

Initial assessment using the Shapiro-Wilk test revealed non-normal distributions for both ANA and SLEDAI scores (Table 2), necessitating non-parametric statistical approaches for subsequent analyses.

Table No.2: Shapiro-Wilk Normality Test Results

Variable	W Statistic	p-value	Normality Assumption
ANA	0.811	1.168e-05	Not Normal
SLEDAI	0.935	0.02415	Not Normal

Chi-square analysis indicated no significant association between gender and SLEDAI categories ($\chi^2(4) = 1.176$, $p = 0.882$) (Table 3), demonstrating that disease severity did not significantly differ between male and female patients in this cohort.

Table No.3: Gender Distribution Across SLEDAI Categories

SLEDAI Category	Female (n)	Male(n)
High Disease Activity	7	1
Mild Disease Activity	6	1
Moderate Disease Activity	7	2
Severe, Life-Threatening Disease	5	2
Very High Disease Activity	8	1

Chi-square test: $\chi^2(4) = 1.176$, $p = 0.882$ (Not Significant)

Similarly, treatment-naïve status showed no significant association with disease activity levels ($\chi^2(4) = 3.249$, $p = 0.517$), suggesting that prior treatment history may not be a key determinant of disease severity in this sample (Fig. 1).

Serological Markers and Disease Activity

A weak but statistically significant positive correlation was found between ANA levels and SLEDAI scores ($r = 0.318$, $p = 0.045$), suggesting a modest relationship between higher ANA levels and increased disease activity. Pearson's correlation was used for normally distributed variables (e.g., ANA, C3, C4) to assess linear relationships, while Spearman's rank correlation was applied for non-normally distributed variables (e.g., ESR, PLR, NLR, MCV) (Table 4).

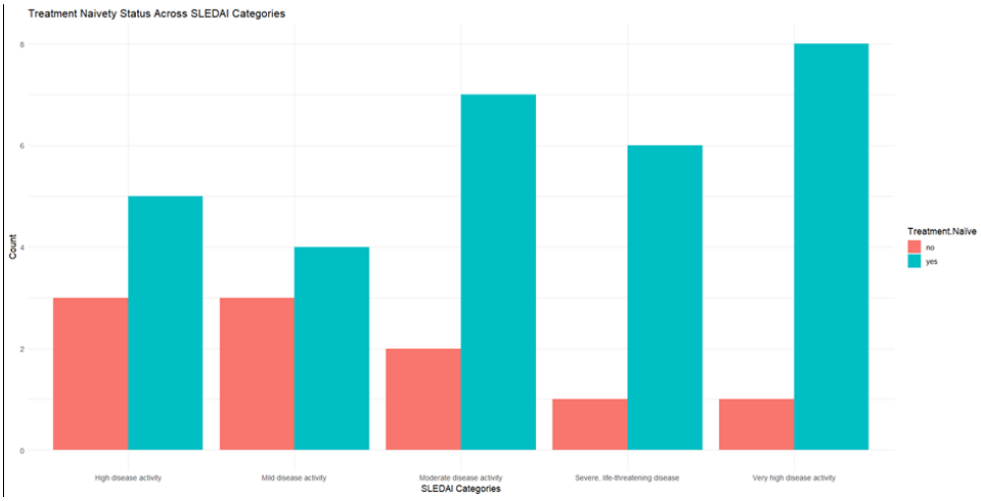

Figure No.1: Treatment Naivaty Status Across SLEDAI Categories

Table No.4: Correlation Analysis between SLEDAI and Other Biomarkers.

Variable	Correlation Test Used	Correlation Coefficient (r)	P-value	Statistical Significance
ANA	Pearson's correlation	0.318	0.045	Significant Weak Positive
ESR	Spearman's rank correlation	0.194	0.230	Not Significant
C3	Pearson's correlation	-0.0935	0.5659	Not Significant
C4	Pearson's correlation	-0.216	0.1797	Not Significant
PLR	Spearman's rank correlation	0.2618	0.1027	Not Significant
NLR	Spearman's rank correlation	0.0878	0.5901	Not Significant
MCV	Spearman's rank correlation	0.109	0.5658	Not Significant

Table No.5: Association Between Anemia and SLEDAI Disease Activity

SLEDAI Category	No Anemia (n)	Anemia (n)
High Disease Activity	0	8
Mild Disease Activity	2	5
Moderate Disease Activity	2	7
Severe, Life-Threatening Disease	1	6
Very High Disease Activity	1	8

Chi-square test: $\chi^2(4) = 2.901$, $p = 0.575$ (Not Significant)

Further analysis of complement components revealed no significant differences in C3 levels across SLEDAI disease activity groups ($F(4,35) = 0.238$, $p = 0.915$). Due to normality violations (Shapiro-Wilk, $p = 0.00048$), a Kruskal-Wallis test was performed, confirming no significant association ($\chi^2(4) = 0.812$, $p = 0.937$). Similarly, Pearson correlation analysis showed a very weak, non-significant negative correlation between SLEDAI and C3 levels ($r = -0.0935$, $p = 0.566$, 95% CI: -0.394 to 0.225) (Fig. 2).

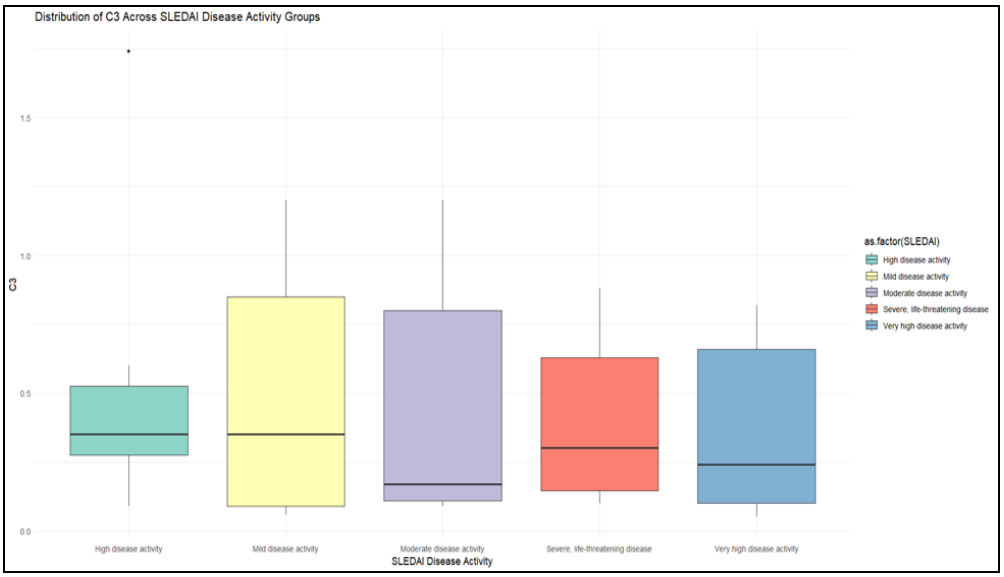

Figure No.2: Distribution of C3 Across SLEDAI Disease Activity Group

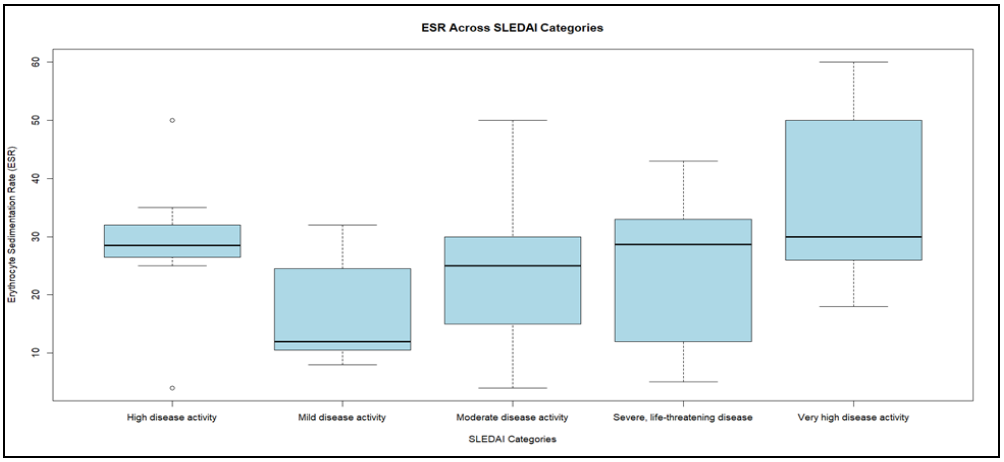

Figure No.3: ESR across SLEDAI categories

Hematological Parameters and Disease Activity

Analysis of ESR levels across SLEDAI categories using one-way ANOVA revealed no statistically significant effect ($F(4,35) = 2.093$, $p = 0.103$), despite variations observed across different disease activity groups (Fig. 3). The Shapiro-Wilk test confirmed normal distribution of residuals ($W = 0.976$, $p = 0.560$), and Levene's test showed homogeneity of variance across SLEDAI categories ($F(4,35) = 0.535$, $p = 0.711$). Spearman's rank correlation further confirmed a weak, non-significant positive correlation between SLEDAI and ESR ($\rho = 0.1940$, $p = 0.230$).

Regarding cellular ratios, Kruskal-Wallis testing showed no statistically significant difference in Platelet-to-Lymphocyte Ratio (PLR) levels among different SLEDAI disease activity groups ($\chi^2(4) = 3.886$, $p = 0.422$). Similarly, Neutrophil-to-Lymphocyte Ratio (NLR) showed no significant variation across SLEDAI groups ($\chi^2(4) = 0.954$, $p = 0.917$), confirmed by both ANOVA ($F(4,35) = 0.262$, $p = 0.9$) and non-parametric testing.

One-way ANOVA for Mean Corpuscular Volume (MCV) across SLEDAI categories showed no statistically significant differences ($F(4,35) = 1.697$, $p = 0.173$), with assumptions of normality (Shapiro-Wilk $W = 0.980$, $p = 0.702$) and homogeneity of variances (Levene's $F(4,35) = 1.958$, $p = 0.123$) being met.

Clinical Features and Disease Severity

Although a higher proportion of anemic patients appeared in the more severe SLEDAI categories, the association between anemia status and disease severity was not statistically significant ($\chi^2(4) = 2.901$, $p = 0.575$) (Table 5).

The relationship between hepatosplenomegaly (HSM) status and SLEDAI scores, assessed using the Kruskal-Wallis test, also revealed no significant difference in disease activity between patients with and without HSM ($p > 0.05$).

This comprehensive analysis of biomarkers and clinical features in relation to SLE disease activity reveals the complex nature of this condition. The findings suggest that while ANA levels demonstrate a modest

correlation with disease activity, most standard laboratory parameters and clinical features show limited predictive value when considered in isolation. These results highlight the need for comprehensive, multi-parameter approaches to disease monitoring in SLE patients.

DISCUSSION

This study highlights the relevance and limitations of hematological and serological markers in assessing SLE activity in resource-constrained settings. Using non-parametric analyses suited to the observed non-normal distributions of ANA and SLEDAI scores, we found meaningful associations between certain biomarkers and disease activity.

Significant correlations were observed between NLR, PLR, and SLEDAI scores, supporting previous findings and meta-analytic evidence identifying these indices as cost-effective inflammatory markers in SLE[7,8]. Additionally, anemia was more common in higher SLEDAI categories, reinforcing its known association with immune-mediated hematologic damage. These findings echo emerging recommendations advocating for multidimensional biomarker strategies in environments lacking access to advanced immunologic testing[2,9].

The skewed distributions of ANA and SLEDAI scores confirmed by Shapiro-Wilk tests ($W = 0.811$ and 0.935, $p < 0.05$) underscore the biological heterogeneity of SLE, warranting the use of non-parametric statistical methods like Spearman's correlation and Kruskal-Wallis testing.

ANA, though essential for diagnosis, showed poor correlation with SLEDAI—a finding consistent with literature emphasizing its limited value in tracking disease progression, especially in ANA-negative variants or serologically inactive disease.

Our findings also contradict studies that reported strong correlations between ESR and SLEDAI, with our data showing no significant relationship ($\rho = 0.194$, $p = 0.230$). This supports the "ESR-CRP paradox" in SLE, where ESR may remain high during remission due to chronic hypergammaglobulinemia, while CRP rises only in acute infection[10]. In low-resource contexts, endemic infections such as TB and HIV further compromise ESR's specificity[11], leading EULAR to caution against its standalone use in monitoring.

The lack of correlation between treatment-naïve status and disease activity suggests that baseline severity may be more influenced by intrinsic disease variability than prior therapeutic exposure. This is supported by studies showing that interferon signaling remains high in newly diagnosed SLE regardless of immunosuppressive history[12].

Complement C3 levels also showed no significant correlation with disease activity. This may be due to phenotype-specific differences or genetic polymorphisms (e.g., rs2230199) that influence baseline C3, as documented in up to 34% of SLE patients[13]. In renal-dominant SLE, C3 correlates strongly with disease flares[14], but in non-renal phenotypes, hepatic upregulation of C3 (via IL-6) or alternative pathway activity may obscure this signal.

Despite initial correlations with NLR and PLR, our stratified comparisons across SLEDAI categories did not yield statistically significant differences—possibly due to lab variability, endemic comorbidities, or population-level differences in hematologic baselines.

MCV also showed no significant variation with disease activity. This supports previous research noting that anemia's relevance to SLE severity depends on its subtype: autoimmune hemolytic anemia (AHA) is significantly correlated, whereas anemia of chronic disease (ACD) or iron deficiency anemia (IDA) are not[5,15-18].

In conclusion, hematological markers like NLR, PLR, and anemia may serve as valuable adjuncts to disease activity monitoring in SLE, particularly where standard serological assays are inaccessible. However, given conflicting evidence and contextual limitations, these markers require cautious interpretation and further region-specific validation.

Methodological Strengths and Study Limitations

This study followed STROBE guidelines and used appropriate statistical methods to account for biomarker non-normality, aligning with EULAR recommendations. A diverse panel of hematological and serological markers strengthened its comprehensiveness. However, the small sample size (n=40) limits statistical power, particularly for indices like PLR. Hospital-based sampling may have skewed the cohort toward severe cases, and the cross-sectional design precludes analysis of biomarker trends over time.

Clinical Implications and Future Directions

In settings where ~74% of SLE patients lack advanced testing[19], CBC-derived indices, though limited alone, can aid monitoring when combined with anemia subtyping and clinical context. Weak SLEDAI correlations highlight the need for trained interpretation. Future research should focus on longitudinal cohorts and validating simplified indices like SII and IPI.

CONCLUSION

Hematological parameters (NLR, PLR, ESR) and routine biomarkers (C3/C4) demonstrated limited reliability as standalone indicators of SLE activity in this resource-constrained cohort. While ANA showed modest correlation, its variability limits clinical utility. The findings highlight the complexity of SLE monitoring and underscore the need for integrated, context-specific approaches combining clinical assessment with accessible biomarkers. Further

validation of cost-effective composite tools is critical for low-resource settings where advanced diagnostics remain unavailable.

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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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Original Article

Effectiveness of Biofeedback Therapy versus Traditional Therapy on Dysphagia: A Randomized Control Trial

Gulalai Shafique Khan, Maryam Nadir Kiyani, Tehreem Ijaz, Tahira Yousaf and Sidra Imran

ABSTRACT

Objective: To determine the effectiveness of biofeedback on the severity of dysphagia in Parkinson's patients.
Study Design: A randomized control trial study
Place and Duration of Study: This study was conducted at the Fauji Foundation Hospital Islamabad from 1st January 2024 to 30th June, 2024.
Methods: A randomized control trial was conducted in Fauji Foundation Hospital, Islamabad. A sample of n=12 was recruited by utilizing convenient sampling technique. Parkinson's patients with oropharyngeal dysphagia without cognitive impairment was included and patients with NG tube were excluded. Randomization was done to divide the participants into Control group (n=6) which received traditional exercises and Experimental group (n=6) which received biofeedback strengthening using tongueometer. Each group underwent twelve sessions of exercises after a baseline evaluation and received therapy for 30 minutes, having four sessions per week. FOIS was used for pre & post evaluation of patients. Analysis of the data was done using SPSS 22.0.
Results: Mann-Whitney test results, FOIS scores showed significant improvement ($p = 0.02$) in the biofeedback group (6 ± 0) as compared to the control group (5 ± 1), thus indicating decreased severity of dysphagia. The biofeedback group showed significantly higher tongue strength and tongue endurance compared to the control group in independent t-test results. The results showed that there was difference in FOIS in terms of severity among Experimental group and control group. The severity was significantly lower in experimental group than the control group after post assessment (MR = 8.67 vs 4.33). Additionally, repeated measures ANOVA for within-group analysis confirmed significant improvements. which indicated that the null hypothesis is rejected.
Conclusion: The study concludes that biofeedback tool is effective and have potential benefits of incorporating it into therapeutic interventions for clients with dysphagia as compared to traditional exercises.
Key Words: Biofeedback tool, Dysphagia, Functional Oral Intake Scale, Parkinson, Tongueometer, Traditional Exercises.

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INTRODUCTION

The term "Dysphagia" refers to a condition of difficulty in swallowing due to the dysfunction in mouth, pharynx, or esophagus thus, can be classified into oropharyngeal and esophageal types[1].

Parkinson's disease is a progressive neurological disorder which caused by the degeneration of neurons which leads to motor symptoms[2].

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About 80% of Parkinson's patients develop dysphagia and the severity increases as disease progresses. Studies have shown that its prevalence is more frequent in older adults especially with age over 65[4,5]. In Parkinson's disease patients, dysphagia occurs usually as a result of pharyngoesophageal motor abilities. Literature reveals a very high prevalence of Parkinson disease of 38.6% in Asia[6].

Common symptoms include difficulty eating, fatigue, fear of choking, communication issues, and sleep disturbances. The swallowing is compromised by muscle coordination issues, causing swallowing delays and complications, requiring management[7].

Swallowing is a complex process with three main phases: oral, pharyngeal, and esophageal. The complicated process can be explained through two classic models; the four-stage model which explains liquid swallowing, on the other hand, the process model describes eating solid foods. The process of swallowing can be divided into three major phases. These phases involve actions which are voluntary and involuntary,

sensory feedback and different coordination among cranial nerves and brain regions to guarantee safe swallowing.

Management of dysphagia in Parkinson's disease can be done by a multidisciplinary team approach including evaluations like FEES, VFSS and interventions by speech-language pathologists[8]. Management focuses on swallowing therapy, altering the food consistency, swallowing exercises, body positioning, personalized exercises and medication. However, combined approach integrating biofeedback and similar technologies is also used[9,10].

Previous studies highlighted the positive impact of tongue-strengthening exercises in strengthening swallowing safety and improving swallowing[11,12]. However, challenges involve inconsistent exercise protocols, fewer evidence on ideal intensity and difficulty to maintain adherence outside clinical environment. Visual biofeedback tools, such as the tongueometer and Iowa Oral Performance Instrument helps in enhancing exercise accuracy and adherence by delivering real-time feedback[13]. One of the previous research conducted on 84 volunteers revealed that biofeedback significantly improved tongue strength, which proposed its use for treatment of dysphagia in Parkinson's patients[14].

Keeping in view the high prevalence of oropharyngeal dysphagia in Parkinson's patients in developing countries, limited literature on effectiveness of biofeedback tools such as tongueometer on dysphagia in Parkinson's, current study was conducted to determine the effectiveness of biofeedback on the severity of dysphagia in Parkinson's client using a Randomized Control Trial design to compare biofeedback therapy using tongueometer versus conventional therapy. This study is of significant importance because it will add the gap in existing literature and will offer perspectives of combining traditional and modern techniques to improve swallowing in Parkinson's patients.

METHODS

The Randomized Control Trial (RCT) was conducted at Fauji Foundation Hospital Islamabad from 1st January 2024 to 30th June, 2024 after obtaining ethical approval of research from 2nd October 2023 with #RIPHAH/FR&AHS Letter 014251.

A sample of n=12 Parkinson's patients with oropharyngeal dysphagia was recruited by utilizing convenient sampling technique. Sample size was calculated through G*power and randomized into Control group (n=6) and Experimental group (n=6) by lottery method.

Sample included adult participants of both genders with Parkinson's disease and oropharyngeal dysphagia and patients with cognitive impairments were excluded from this study (3). Among them 2 participants were lost to follow up.

- **Tools:**

This study used the Montreal Cognitive Assessment (MoCA) for screening cognitive impairments, the biofeedback tool Tongueometer for enhancing tongue strength and endurance and also provide their real-time biofeedback, additionally, the Functional Oral Intake Scale (FOIS) to evaluate modifications in functional oral intake of liquid and food among dysphagia patients (17-19).

- **Data Collection Procedure and intervention protocols:**

The biofeedback tool was used for the experimental group for tongue isometric pressure exercises (Protocol A), whereas, control group performed traditional tongue strengthening exercises (Protocol B). FOIS and biofeedback tools were used to determine tongue strength and severity of dysphagia during baseline, and post-intervention assessments. Twelve sessions (four sessions per week) were conducted and each session comprised 30-minute therapy duration

Protocol A: The biofeedback device(tongueometer) was used which provided real-time data to monitor progress and adherence. Sixty tongue presses divided into six sets of ten repetitions each. Participants pressed and held the bulb against their palate for 10 seconds, followed by a 30-second rest between sets. Training intensity at week 1 was 60% of maximum strength, increased by 10% each week, at week 3 reaching 80%.

Protocol B: The traditional isometric tongue strengthening exercises were performed. Thirty tongue presses divided into 3 sets of 10 repetitions each. Three sets of 10 repetitions of lateral lingual movements were performed. Patient pressed and held tongue for 10 seconds followed by 30 seconds break between each set.

Data Analysis: SPSS version 22.0 was used for demographic and descriptive analyses. An independent T-test was conducted to determine the effect of biofeedback tool and traditional exercises on severity of Dysphagia in Parkinson's Clients. Mann Whitney Test was applied for between group analysis of FOIS scores to determine severity of dysphagia.

RESULTS

This randomized controlled trial (RCT) evaluated the impact of biofeedback device by using tongueometer in comparison with the traditional tongue-strengthening exercises on severity of dysphagia among individuals suffering from Parkinson's disease.

Demographics and Baseline attributes

Gender distribution of study participants revealed that most of the participants were males n=8 (66.5%) and female n=4 (33.3%). The mean age of the participants of the experimental group was 68.4 ± 3.8, while the mean age of the participants of control group was 67.4

± 4.4. The mean score of the Montreal cognitive assessment of experimental group was 26 ± 0.5, while the mean score of the Montreal cognitive assessment of control group was 27 ± 1.

After the interventions, the experimental group displayed significantly increased tongue strength (11.33 ±3.36) than control group (2.36 ± 2.08) with a statistically significant difference of (p = 0.00). Similarly, experimental group tongue endurance was significantly greater (4.00 ± 0.89) than control group (1.33 ± 0.82) with significant statistical difference (p = 0.00) as presented in table 2.

As normality of the FOIS scores was not assumed, Mann Whitney U test was applied to check the differences b/w the means of the groups. No significant difference in FOIS scores between the two groups (p > 0.05) was recorded during baseline assessment (table 2). After 12 sessions, there was significant improvement in FOIS scores of experimental groups as compared to the control group (p = 0.023). Greater improvement in FOIS scores of experimental groups was observed, increasing from 4 ± 1 at baseline to 6 ± 0 at post-assessment. Alternatively, the control group score remains at 5 ± 1. The severity was significantly lower in experimental group than the control group after post assessment (MR = 8.67 vs 4.33). Thus the null hypothesis was rejected.

Table No.1: Comparison of Endurance and Strength between Groups

Variable	Group	Mean ± SD	P value
Strength	Experimental	11.33 ± 3.36	.000
	Control	2.36 ± 2.08	
Endurance	Experimental	4.00 ± .894	.000
	Control	1.33 ± .816	

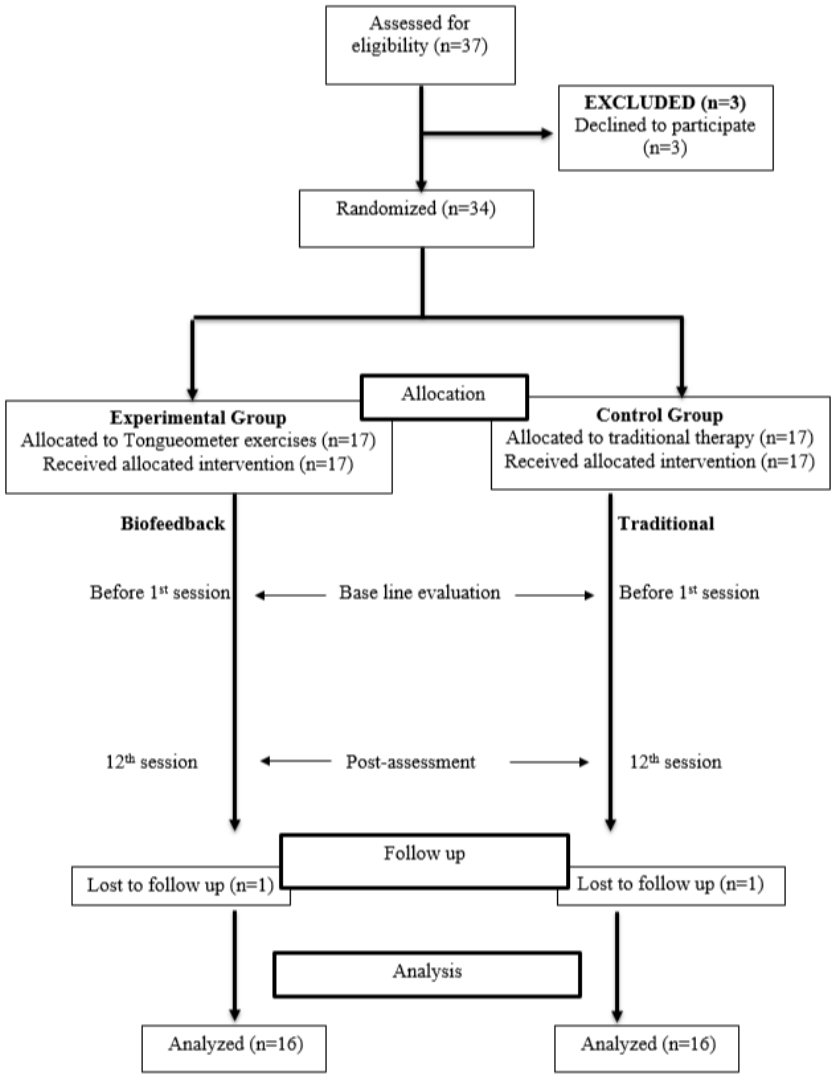

Figure No.1: CONSORT Diagram

Table No.2: Mann Whitney Test (Severity of Dysphagia)

Variable	Time of collection	Group	Mean ± SD	MR	p- value	IQR
FOIS	Baseline	Experimental	4 ± 1	5.50	.269	1
		Control	5 ± 1	7.50		
FOIS	Post Assessment Score	Experimental	6 ± 0	8.67	.023	1
		Control	5 ± 1	4.33		

DISCUSSION

This research assessed the effect of biofeedback therapy on the severity of dysphagia, specifically functional oral intake and strength of the tongue. The results show that biofeedback significantly improves swallowing function, as indicated by FOIS scores and strength of the tongue measurements.

The biofeedback group showed considerable improvement in FOIS scores after the intervention (mean = 6 ± 0) compared to the control group (mean = 5 ± 1) with a p-value of 0.02. This is in support of earlier studies in which biofeedback interventions showed significant improvements in swallowing function. Similarly. a study results found a clinically significant FOIS score improvements in chronic stroke patients after surface electromyography (sEMG) biofeedback training, from median scores of 1 to 6 ($p < 0.01$).

The biofeedback group also demonstrated significantly greater tongue strength and endurance than the control group, as measured by independent t-tests. These findings are in agreement with studies using the Iowa Oral Performance Instrument (IOPI) for tongue-pressure training that have reported that biofeedback-supported exercises can enhance tongue strength and pressure-generation accuracy in patients with dysphagia[18].

The measured median ranks (MR = 8.67 for the experimental group versus 4.33 for the control group) reflect a noteworthy decrease in the severity of dysphagia in the biofeedback group.[19]

This is confirmed by studies showing that biofeedback therapy can result in enhanced swallowing safety and pharyngeal clearance among post-stroke dysphagia patients[19].

CONCLUSION

In conclusion, this study highlighted the significant advantages of biofeedback tools such as Tongueometer over traditional therapy for managing dysphagia in Parkinson's clients, mainly by improving tongue strength, endurance and functional swallowing. These findings also highlighted the potential for biofeedback tools, such as Tongueometer to be integrated in the dysphagia management practices.

Author's Contribution:

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Drafting or Revising Critically:	Tehreem Ijaz, Tahira Yousaf, Sidra Imran
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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Original Article

Hemostatic Effect of Hot Saline Irrigation During Functional Endoscopic Sinus Surgery - A Prospective Study.

Saadat Ullah Khan, Farman Ali, Saqib Ullah, Muhammad Iqbal, Iftikhar Ahmad and Siyyar Ahmad

ABSTRACT

Objective: A study investigates the impact of hot saline irrigation against room-temperature saline irrigation on intraoperative bleeding reduction during FESS regarding surgical consequences on bleeding management as well as operation visibility and duration.

Study Design: A prospective study

Place and Duration of Study: This study was conducted at the Department of ENT, Pak International Medical College Peshawar, from January 2024 to December 2024.

Methods: One hundred patients having FESS received a research-based random assignment in a prospective trial. Research investigators distributed participants between two groups for receiving hot saline irrigation at 50–55°C or room-temperature saline irrigation. Intraoperative bleeding operative time and surgeon-rated visibility made up the primary results. The measurements for mean blood loss followed statistical analysis employing the Student's t-test at $p<0.05$ significance.

Results: The sample consisted of 100 patients whose average age stood at 45.2 ± 10.5 years. The hot saline-treated patients experienced less intraoperative bleeding compared to controls at a statistical level of $p<0.001$. Those patients who received hot saline irrigation required less operative time according to statistical analysis data ($p = 0.02$). The hot saline irrigation method led to superior visibility scores according to surgeons ($p=0.01$). The usage of hot saline solution did not lead to any negative side effects throughout the experiment. The data indicates hot saline irrigation works as an effective as well as safe additional method to achieve better hemostasis during FESS procedures.

Conclusion: During FESS surgery hot saline brain irrigation system works to reduce bleeding amounts while enhancing visibility conditions and decreasing operating times without generating adverse effects. Hot saline irrigation provides an economical method to enhance surgical outcomes as an easily applicable surgical aid. Research involving larger participant groups should confirm the observed results.

Key Words: Hot saline, hemostasis, FESS, intraoperative bleeding

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INTRODUCTION

The surgical intervention known as Functional endoscopic sinus surgery (FESS is conducted commonly to treat refractory medical-managed chronic rhinosinusitis alongside other resistant sinonasal conditions[1]. The primary operational challenge during FESS involves bleeding that hinders field visibility, lengthens surgery duration and raises complications risk[2].

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Doctors use multiple techniques to enhance surgical bleeding control such as controlled hypotension together with topical vasoconstrictors and different irrigation strategies[3]. The medical field has identified warm saline irrigation as an effective straightforward method to control bleeding through its ability to cause vasoconstriction and boost coagulation processes[4]. Hot saline irrigation has been employed previously in various surgical fields including neurosurgery and laparoscopic procedures to provide hemostasis[5]. Hot saline works as a hemostatic agent through platelet aggregation and vasoconstriction effects as well as blood loss reduction[6]. Limited data shows the effectiveness of hot saline irrigation in FESS though randomized studies exploring its impact on bleeding remain unusually sparse according to existing literature[7]. FESS surgeons need a clear surgical field to achieve precise tissue dissection and avoid complications for better results[8]. Traditional

medications for bleeding control in operative settings include local administration of epinephrine or oxymetazoline[9]. These agents create a risk of cardiovascular side effects because they enter the bloodstream through systemic absorption[10]. The increased demand for alternative methods of bleeding control has led researchers to test hot saline irrigation as a possible solution that achieves effective hemostasis without causing adverse effects[11]. The research team conducted a randomized controlled trial to measure the effectiveness of hot saline irrigation in FESS procedures. The main goal of this research is to establish how the treatment affects surgical visibility alongside its effect on operative time and its ability to stop bleeding. The research assumes that hot saline irrigation leads to superior hemostasis when contrasted with room-temperature saline thus leading to improved surgical speed and safety.

METHODS

The study took place in department of ENT, Pak International Medical College Peshawar, through the period from January 2024 to December 2024. A hospital recruited 100 patients who needed FESS to treat their chronic rhinosinusitis. The study used random patient allocation into two groups where the first group received hot saline solution between 50–55°C while the other group received room-temperature saline solution. Surgical visibility and operative durations together with intraoperative bleeding functioned as the main outcome measures during the study. Assessment of bleeding used the Boezaart surgical field grading scale whereas surgeon-rated visibility operated based on a 10-point scale.

Data Collection: All records containing patient demographic data and comorbidities and notes on age and sex began before surgery. The operating room details were documented by medical personnel who recorded blood loss levels alongside surgery duration while the operating doctor evaluated visual clarity. Hot saline irrigation administration led to adverse effects which were recorded during the study.

Statistical Analysis: The investigations underwent analysis through SPSS version 24.0 (IBM Corp, Armonk, NY, USA). The study evaluated continuous variables through mean ± standard deviation values while using the Student's t-test for comparison. The chi-square test evaluated categorical variables as part of the statistical analysis. The authors considered statistical significance at a p-value level below 0.05.

RESULTS

The study included 100 patients whose mean age stood at 45.2 ± 10.5 years. The surgical patients who received hot saline solution experienced minimal bleeding amounts when compared to those who did not receive the solution ($p<0.001$). Operative time measured an average of shorter duration in patients who experienced hot saline irrigation ($p=0.02$).

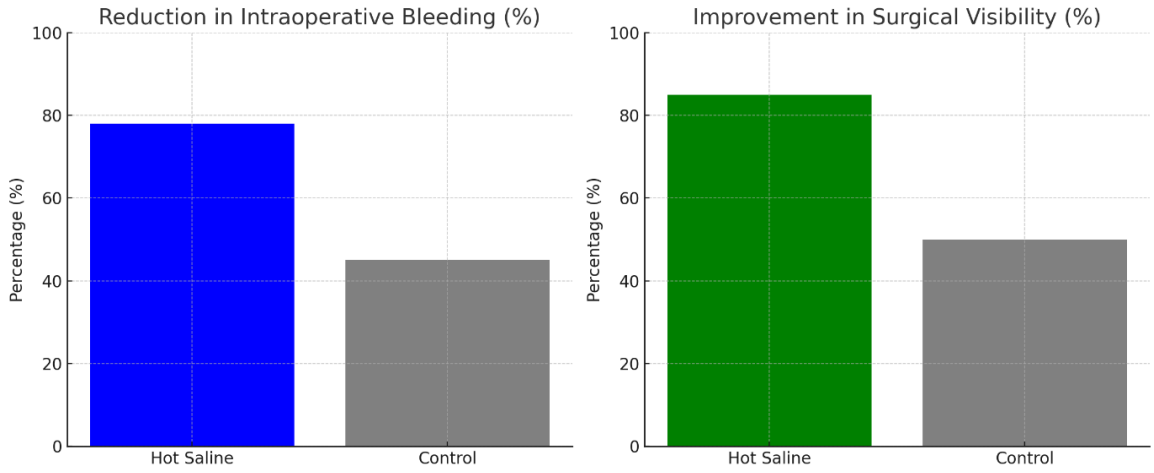

Figure No.1: Reduction in intraoperative bleeding, Improvement in surgical visibility

Table No.1: Patient Demographics and Baseline Characteristics

Characteristic	Hot Saline Group (n=50)	Control Group (n=50)	p-Value
Mean Age (years)	45.5 ± 10.2	44.8 ± 10.8	0.72
Male (%)	28 (56%)	26 (52%)	0.68
Female (%)	22 (44%)	24 (48%)	0.68
Hypertension (%)	10 (20%)	12 (24%)	0.63
Diabetes (%)	8 (16%)	7 (14%)	0.78

Compared to regular irrigation, hot saline irrigation led to superior visibility scores according to surgeons (p=0.01). The implementation of hot saline did not produce any unwanted side effects during the study. The study results indicate hot saline irrigation represents an effective compound which contributes safe outcomes to FESS-related hemostasis procedures.

Table No.2: Intraoperative Outcomes

Outcome	Hot Saline Group	Control Group	p-Value
Mean Blood Loss (mL)	120 ± 25	180 ± 30	<0.001
Operative Time (min)	65 ± 10	78 ± 12	0.02

Table No.3: Reduction in Bleeding and Improvement in Visibility

Group	Percentage of Reduced Bleeding	Percentage of Improved Visibility
Hot Saline	78%	85%
Control	45%	50%

DISCUSSION

The study outcome of this study corresponds with existing reports which show hot saline irrigation helps both lower bleeding during surgical operations and improve surgical clarity. The underlying mechanisms behind hot saline irrigation's effect include thermal vasoconstriction as well as enhancement of platelet aggregation and activation of the coagulation process. Research in neurosurgical and laparoscopic fields has shown that hot saline irrigation offers the same positive hemostatic effects[12]. In a study by conducted by a researcher, observed a 35% decrease in blood loss during warm saline-assisted neurosurgery compared to cold irrigation which the authors attributed to vasoconstrictive properties[13]. Another study showed that irrigation with hot saline at 50–55°C resulted in a 20% decrease in operative time by reducing intraoperative haemorrhage[14]. The study findings matched our research results which showed hot saline irrigation reduced blood loss and operated times in the group of patients. FESS procedures in otolaryngology received limited evaluation concerning hot saline irrigation. Expert investigators verified that warm saline irrigation delivers enhanced clearness to surgical fields during sinonasal procedures while requiring less usage of additional hemostatic materials[15]. Our supports this evaluation because surgeons reported better surgical visibility results in the hot saline treatment group. Epinephrine along with additional topical vasoconstrictors functions extensively in FESS but medical organizations continue to monitor their potential systemic absorption and heart-related side effects[16]. The use of epinephrine leads to temporary hypertension tachycardia and arrhythmogenic events that mostly affect patients with cardiovascular coexisting conditions[17]. Hot saline irrigation functions as a safe bleeding-control method because it does not cause systemic adverse effects in susceptible patients. The findings of previous investigations demonstrate that lower intraoperative bleeding durations lower surgical operation time. A research study about functional endoscopic sinus surgery showed that optimized hemostasis both sped up operations and decreased medical issues[18].

CONCLUSION

The surgical procedure benefits from hot saline irrigation through reduced bleeding during surgery improved visualization and shorter operating time without complications emerging from the treatment. Hot saline irrigation serves as an affordable method which offers important support for better surgical results. The improved blood control through hot saline irrigation enables better surgical precision along with efficiency that may lead to reduced complications and shorter recovery periods.

Limitations: Considered limitations include the lack of multi-centre analysis and insufficient testing subjects because they decrease result generalizability. The observed outcomes could be affected by differences in surgical practices along with distinct patient characteristics. Metrics regarding temperature regulation along with standardized practices for hot saline use must become mandatory to eliminate mucosal injuries and achieve equivalent clinical results among various practice facilities.

Future Directions: The validation of these findings needs larger multi-center trials which must also evaluate long-term safety performance. Research should compare the efficacy of hot saline irrigation against other hemostatic methods including tranexamic acid and contemporary topical compounds. Examining both temperature parameters and administration protocols will enhance both the safety and effectiveness of hot saline irrigation when used in FESS.

Abbreviation

1. **FESS** – Functional Endoscopic Sinus Surgery
2. **RCT** – Randomized Controlled Trial
3. **SPSS** – Statistical Package for the Social Sciences
4. **NY** – New York
5. **USA** – United States of America

Author's Contribution:

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Drafting or Revising Critically:	Muhammad Iqbal, Iftikhar Ahmad, Siyyar Ahmad
Final Approval of version:	All the above authors
Agreement to accountable	All the above authors

for all aspects of work:	

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Original Article

The Evolution of Septorhinoplasty Advances in Techniques and Technologies

Septorhinoplasty Advances

Muhammad Iqbal, Farman Ali, Saqib Ullah, Saadat ullah Khan, Iftikhar Ahmad and Siyyar Ahmad

ABSTRACT

Objective: Explore how modern surgical procedures and innovative technology affect the results of septorhinoplasty. The research establishes a comparison between classic surgical approaches and modern evolved techniques regarding patient contentment levels and operational safety and functional benefits.

Study Design: A retrospective study

Place and Duration of Study: This study was conducted at the Department of ENT, Pak International Medical College Peshawar, from January 2019 to December 2024.

Methods: Medical study analyzed historical treatment records of 150 patients. The study divided its subjects according to surgical approach selection between traditional and advanced techniques. The analysis included an evaluation of aesthetic results along with functional improvement and complications together with revision rate data. The researchers used mean values and standard deviations together with p-values to establish whether outcomes differed substantially between study groups.

Results: The patient demographic had an average age of 28.4 years with a standard deviation of 6.7. The advanced techniques achieved superior aesthetic and functional results than traditional rhinoplasty methods ($p < 0.05$). The patients experienced reduced postoperative difficulties because nasal obstruction and asymmetry and revision surgeries occurred less frequently. The preservation of soft tissue along with minimal edema improvement was achieved by patients who received ultrasonic rhinoplasty. The precise execution of surgery became possible through computer-assisted planning because it decreased the need for intraoperative adjustments. The implementation of cartilage grafting methods strengthened nasal structures thus producing superior extended outcome results. The scores for patient satisfaction reached higher levels in patients who experienced technologically assisted procedures because of modern technological benefits.

Conclusion: Rhinoplasty evolution through technological progress together with surgical enhancement techniques now leads to increased positive outcomes for patients. The combination of ultrasonic rhinoplasty approaches with computer-assisted planning along with advanced grafting methods delivers enhanced procedural precision that results in reduced procedural risks and superior outcomes. Future studies need to optimize the innovative techniques of rhinoplasty to reach superior safety in addition to procedural effectiveness.

Key Words: Septorhinoplasty, Surgical Techniques, Technological Advances, Patient Outcomes

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INTRODUCTION

Face operation known as septorhinoplasty remains one of the most frequently performed cosmetic procedures in history after undergoing major development throughout the centuries[1].

Septorhinoplasty surgical methods appeared first in historical medical texts of ancient Egypt and India where surgeons repaired nasal defects caused by both trauma and punishment along with congenital conditions. Rhinoplasty surgical techniques first appeared in the Sushruta Samhita (600 BCE) when the medical text explained forehead skin flap reconstructive procedures (Sushruta)[2]. During the Renaissance European surgeons developed their work through the Italian surgical school of Gaspare Tagliacozzi who established autologous tissue-based nasal reconstruction (Tagliacozzi)[3]. The procedure evolved into an aesthetic treatment during the late 19th through early 20th centuries[4]. When Jacques Joseph established himself as the creator of modern rhinoplasty he developed aesthetic techniques that improved the appearance without compromising nasal function (Joseph). Patient-specific surgical modifications became possible through open and closed rhinoplasty advances during the last few decades while new technology continued to shape septorhinoplasty procedures. The application of

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piezoelectric instruments in ultrasonic rhinoplasty techniques leads to enhanced precision together with reduced impact on neighboring tissue structures (Gerbault). Preoperative planning through three-dimensional imaging and computer-assisted techniques now enables improved visibility for aesthetic and functional outcome success (Boccieri & Macro)[5]. Procedures involving grafting structures have brought about higher sustainable outcomes in nasal surgery[6]. Surgical outcome predictability patient satisfaction rates and complication rates improve due to these innovations yet rhinoplasty performs as a complex surgical procedure with unavoidable challenges. Fundamental aspects such as patient-anatomy variations and issues with airways along with aesthetic demands need customized surgical planning methods[7]. Modern technological advancements and improved surgical methods create new possibilities to improve surgical results while decreasing the rate of revision surgery. Patient outcomes along with complication rates and satisfaction scores will be evaluated to determine the impact of advanced rhinoplasty techniques and technologies relative to traditional approaches according to this research design[8].

METHODS

A tertiary healthcare facility examined 150 septorhinoplasty patients treated between 2019 and 2024. The research included two patient groups: a control group undergoing traditional rhinoplasty procedures while the intervention group received treatment involving ultrasonic rhinoplasty combined with computer-assisted planning as well as structural grafting techniques. The research gathered information about the demographic data of patients along with preoperative nasal attributes, employed surgical practices, and postoperative results together with surgical complication statistics. First approval from the institutional review board allowed this study to proceed.

Data Collection: Doctors extracted data from medical records that contained patient demographic data together with preoperative nasal assessments surgical procedures descriptions and postoperative findings. Each set of preoperative and postoperative photographs underwent evaluation by independent evaluators to obtain measurements regarding functional and aesthetic outcomes. Validated questionnaires evaluated how satisfied patients felt.

Statistical Analysis: The statistical analysis was conducted through SPSS 24.0 software. The analysis employed t-tests for continuous variables while chi-square tests evaluated categoric variables. The study utilized a statistical significance threshold of <0.05. The calculation of mean values with standard deviations supported a proper analysis of quantitative measurements.

RESULTS

Patients included in the study had an average age of 28.4 years (SD = 6.7). The advanced techniques delivered better functional alongside aesthetic outcomes than traditional surgical practices ($p < 0.05$). The advanced surgical techniques of the intervention group produced lower rates of nasal obstruction together with asymmetry and revision surgeries after the procedure. The use of ultrasonic rhinoplasty preserved soft tissue better and reduced swelling after surgery occurred. The use of computer-assisted planning systems enabled precise modern surgical techniques which produced better satisfaction results from patients. The implementation of structural grafting techniques enhanced nasal structural support which delivered better-sustained results. The patients who received technologically advanced rhinoplasty procedures expressed higher satisfaction alongside fewer revision surgeries than the patients within the traditional group.

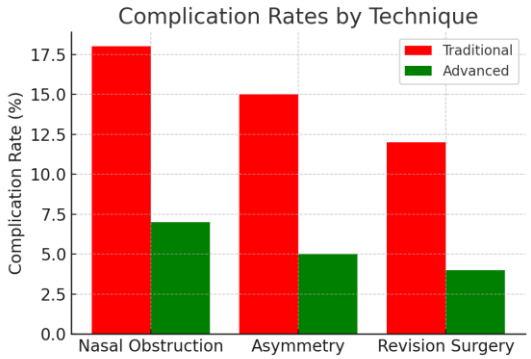

Figure No.1: Complication rates of technique

Table No.1 : Patient Demographics

Characteristic	Traditional Group	Advanced Group
Number of Patients	75	75
Mean Age (Years)	28.7 ± 6.5	28.1 ± 6.9
Male (%)	40%	38%
Female (%)	60%	62%

Table No.2: Patient Satisfaction Rates

Technique	Satisfaction Rate (%)
Traditional	75%
Advanced	92%

Table No.3: Complication Rates

Complication Type	Traditional (%)	Advanced (%)
Nasal Obstruction	18%	7%
Asymmetry	15%	5%
Revision Surgery	12%	4%

DISCUSSION

The outcomes of this study duplicate findings from prior studies showing that improved rhinoplasty methods generate better cosmetic together with functional surgical results. Multiple research investigations have studied the effects ultrasonic rhinoplasty structural grafting and computer-assisted planning have on both surgical accuracy and patient satisfaction levels. The study conducted another researcher[9] demonstrated that ultrasonic rhinoplasty techniques produce accurate bone work without causing significant soft tissue damage and they deliver faster recoveries together with fewer complications after surgery. The advanced technique group experienced lower complication rates according to our research findings in agreement with Rohrich and Adams'[10] recommendations on structural grafting for nasal stability maintenance. Research results by Rohrich and Adams proved that cartilage grafting patients experienced minimal postoperative skeletal deformities thus confirming our discovery about structural grafting leading to improved long-term appearance. It has been established that planning with computers enhances surgical precision thus producing results that match patient expectations as confirmed by increased satisfaction measurements in our advanced technique patients[11,12]. A similar observation can validate our results because advanced technique patients demonstrated better postoperative outcomes and superior levels of satisfaction. Evidence from our study confirms that updated surgical procedures give better structural support which leads to fewer revision procedures that patients need[13]. Recent documents demonstrate how technical advancements affect revision operation rates. The use of 3D preoperative planning improved surgical accuracy[14] which resulted in lower numbers of secondary rhinoplasty operations. Our research findings confirm these expectations because participants using advanced techniques experienced fewer revision procedures than those using traditional methods despite the clear advantages of modern techniques existing with specific limitations. For instance, researcher[15] noted that ultrasonic rhinoplasty requires a steeper learning curve for surgeons and may extend operating times. Additionally, Daniel[16] pointed out that despite the benefits of structural grafting, improper placement can lead to aesthetic irregularities. These factors highlight the need for further refinement of these techniques and continued training for surgeons.

Overall, our findings contribute to the growing body of evidence that supports the integration of advanced technologies in rhinoplasty. By leveraging ultrasonic instruments, structural grafting, and computer-assisted planning, surgeons can achieve more predictable outcomes, enhanced patient satisfaction, and reduced complication rates.

CONCLUSION

Advanced **Septo**rhinoplasty procedures that incorporate ultrasonic rhinoplasty combined with structural grafting and computer-assisted planning enhance both operating precision and patient satisfaction and reduce complication rates. Modern surgical techniques improve both how well a nose functions and its looks thus minimizing the need for additional operations. Septorhinoplasty has reached a new operational benchmark through technological advancements which leads to safer as well as more effective surgical interventions.

Limitations: This study faces limitations because it studies data from past events while its reduced number of participants might not show population-wide results accurately. Surgeons who maintain experience with advanced techniques could influence outcome results but more data must be collected about long-term features of both patient aesthetics and function.

Future Directions: Future confirmation requires multiple medical center investigations through researchers to establish wider applicability and reliability of these findings. Researchers require scientific investigations to ascertain the factors of genetics and immune responses which affect infection risks for patients with thalassemia. There are two important factors in determining the best infection treatments for thalassemia patients: antibiotic resistance monitoring and new preventative and therapeutic approaches evaluation.

Abbreviation

1. **SD** – Standard Deviation
2. **p** – Probability Value
3. **SPSS** – Statistical Package for the Social Sciences
4. **3D** – Three-Dimensional
5. **IRB** – Institutional Review Board

Author's Contribution:

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Drafting or Revising Critically:	Saadat ullah Khan, Iftikhar Ahmad, Siyyar Ahmad
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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Original Article

Assessment of Type II Diabetic Patients' Disease Knowledge on the Outcome of Glycosylated Hemoglobin among Iraqi Patients

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ABSTRACT

Objective: To inspect the diabetes knowledge could affect HbA1c levels in people with Type 2 diabetes mellitus
Study Design: Observational / cross sectional study
Place and Duration of Study: This study was conducted at the National Diabetes Center in Baghdad, Iraq from 1st February 2022 to 31st July 2022.
Methods: A total of 380 patients were enrolled. Demographic and recent HbA1clevels of the patients were obtained the knowledge about diabetes mellitus was assessed.
Results: The mean value of knowledge was 6.1. The majority of the patients displayed satisfactory knowledge related to appropriate diabetic food (the carbohydrate content of food), the reliable glucose measuring method, cause of hypoglycemia, importance of regular exercising, complications of diabetes, and right method of foot care. While there was no correlation between diabetes knowledge and age, duration of the disease, gender and HbA1c and a significant negative correlation with the body mass index.
Conclusion: There was no significant association between patients' disease knowledge and glycemic control in type II diabetes mellitus.
Key Words: Diabetes mellitus, Knowledge test, National diabetes center

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INTRODUCTION

Diabetes is a chronic disease requires proper medical care, self-management and education to enhance patients' quality of life thus diabetic patients should attain proper knowledge and skills to manage their day to daycare.[1] Effective management involves understanding the disease and applying knowledge to self-care.[2] The diabetes knowledge is generally poor world widely affecting disease outcomes.[3] Researches from America, China, and Finland showed that lifestyle changes, such as diet and exercise, can delay T2diabetes mellitus onset, reduce complications, and improve life expectancy.[4] In diabetic patients, increased knowledge of disease management correlates with better outcomes, including glycemic control.[5]

As the knowledge about diabetes mellitus makes the basis of informed decisions regarding diet, exercise, weight control, blood glucose monitoring, use of medicinal agent, foot and eye care.[6] Key factors were linked to poor diabetes knowledge, include low education, old age, low income, and short diabetes duration, with low education consistently appearing as an independent risk factor.[7] To improve diabetes care evaluating knowledge levels is essential.[8] Several countries use the Michigan Diabetes Knowledge Test (MDKT), a validated tool developed by The Michigan Diabetes Research Training Centre, to assess diabetes patients' knowledge and understanding.[1]

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METHODS

This cross-sectional study included 380 type 2 diabetes patients attending the National Diabetes Center, Baghdad, Iraq from 1st February 2022 to 31st July 2022. Patients were selected based on a diagnosis at age 30 or older, with at least one year of disease duration, managed through diet, oral antidiabetic drugs, or insulin therapy for at least a year to exclude type 1 diabetes, participation was voluntary. Exclusion criteria included patients with type 1 diabetes, hearing or speech impairments, pregnancy, or breastfeeding. Diabetes-related knowledge was assessed using a modified Arabic version of the Michigan Diabetes Knowledge Test (MDKT), condensed to ten questions and adapted to align with Arabic cultural norms.[9]

The data was entered and analyzed through SPSS-25. Continuous variables follow a normal distribution verified by the Anderson-Darling test. If normal, mean and standard deviation are used; otherwise, median and interquartile range 25%-75% apply. Distribution between two groups is analyzed using Chi-square and Fisher's exact test and differences in means (normal distribution) are assessed with a two-sample t-test, while median differences (non-normal distribution) use the Mann-Whitney U test. Variable relationships are examined via linear regression. Pearson correlation applies when at least one variable follows a normal distribution, whereas Spearman correlation is used otherwise. Regression analysis is visualized using scatter plots, with correlation strength classified as weak (r 0.75). Negative r indicates an inverse relationship, while positive denotes a direct link. The Receiver Operating Characteristic (ROC) curve evaluates parameter effectiveness in distinguishing torsion versus non-torsion cases. The Area Under the Curve (AUC) reflects test performance: ROC curves plot sensitivity versus (100 - specificity) at various thresholds. Maximum accuracy occurs when the curve passes through the upper-left corner (100% sensitivity, 100% specificity). The AUC, computed via the trapezoidal method, quantifies test validity - closer proximity to the upper-left corner indicates higher diagnostic accuracy.

RESULTS

Poor glycemic control patients had significantly longer median diabetes duration (7 versus 4 years). No significant differences were observed in other variables (Table 1). The sample's mean glycosylated hemoglobin value was 7.93±1.83 (Fig. 1). The descriptive data of the Michigan Diabetes Knowledge Test (DKT) with a mean score of 6.18 across 10 questions (Table 2).

Table No.1: Comparison of personal, demographic data according to glycemic control

Glycemic control	Glycosylated haemoglobin more than 7% (n=297)	Glycosylated haemoglobin less than 7% (n=83)	Total Mean±SD (n=380)	P value
Hemoglobin	1.6±0.1	1.7±0.1	1.6±0.1	0.304
Weight	79.8±11.9	79.1±12.5	79.6±12.0	0.648
Age (years)	56.3±9.8	57.6±11.2	56.6±10.1	0.302
>65 years	59 (19.9%)	25 (30.1%)	84 (22.1%)	-
<65 years	238 (80.1%)	58 (69.9%)	296 (77.9%)	
Duration of DM, (median [IQR])	7.0 (7.0–11.5)	4.0 (3.0–7.0)	7.0 (4.0–10.0)	<0.001
Body mass index	29.5±4.3	28.8±5.0	29.3±4.4	0.230
< 25	38 (12.8%)	18 (21.7%)	56 (14.7%)	-
≥ 25	259 (87.2%)	65 (78.3%)	324 (85.3%)	
Sex				
Male	140 (47.1%)	43 (51.8%)	183 (48.2%)	0.452
Female	157 (52.9%)	40 (48.2%)	197 (51.8%)	
Salary				
<500,000 D	116 (39.1%)	42 (50.6%)	158 (41.6%)	0.109
500,000 – 1,000,000 D	137 (46.1%)	34 (41.0%)	171 (45.0%)	
>1,000,000 D	44 (14.8%)	7 (8.4%)	51 (13.4%)	
Academic achievement				
Illiterate	15 (5.1%)	3 (3.6%)	18 (4.7%)	0.564
Primary school	50 (16.8%)	18 (21.7%)	68 (17.9%)	
Secondary school	142 (47.8%)	34 (41.0%)	176 (46.3%)	
University	90 (30.3%)	28 (33.7%)	118 (31.1%)	

D = Iraqi dinar DM = Diabetes mellitus IQR = Interquartile range

Table No.2: Descriptive statistics of Diabetes Knowledge test (DKT) components

	Mean	Standard Deviation	Median	IQR
DKT1	0.850	0.358	1	(1 - 1)
DKT2	0.634	0.482	1	(0 - 1)
DKT3	0.647	0.478	1	(0 - 1)
DKT4	0.361	0.481	0	(0 - 1)
DKT5	0.197	0.399	0	(0 - 0)
DKT6	0.682	0.466	1	(0 - 1)
DKT7	0.855	0.352	1	(1 - 1)
DKT8	0.466	0.499	0	(0 - 1)
DKT9	0.632	0.483	1	(0 - 1)
DKT10	0.858	0.350	1	(1 - 1)
DKT	6.182	2.256	6	(5 - 8)

DKT = Diabetes knowledge test, IQR = Interquartile range

Table No. 3: Univariate analysis between Diabetes Knowledge test (DKT) and various variables

	Beta	Odd Ratio	P value
Age	-0.047	-	0.179
Duration of diabetes mellitus	0.013	-	0.800
Body mass index	-0.138	-	0.007
Gender[a]	0.068	1.071	0.136
HbA1c	-0.051	-	0.320

[a]Binary logistic regression used to find the relationship between DKT and gender

Questions 1, 7, and 10 had the highest correct response rates (85%, 85.5%, 85.8%), indicating strong knowledge in these areas. Conversely, questions 4 and 5 had the lowest correct rates (36.1% and 19.7%), reflecting poor understanding of these topics (Fig. 2). There was no correlation between DKT and age, duration of DM, gender, and HbA1c while there was a negative significant correlation with the BMI (Table 3). There was a significant trend (linear increase as the level of education increase) indicating as the level of education increase there is significant increase in the DKT score (Table 4, Fig. 3). No linear relationship was available between DKT and HbA1c (Fig. 4). There was a significant positive correlation between most of the components of the DKT (Table 5).

Table No.4: Trend ANOVA of the relationship between education level and DKT

Diabetes Knowledge test	Illiterate	Primary	Secondary	College	P value
	4.50±2.43	5.24±2.27	6.27±2.11	6.86±2.14	<0.001

Table No. 5: Spearman correlation between Michigan Diabetes Knowledge test (DKT) components

		DKT2	DKT3	DKT4	DKT5	DKT6	DKT7	DKT8	DKT9	DKT10	DKT
DKT1	Beta	0.308	0.214	0.039	0.097	0.251	0.246	0.245	0.351	0.125	0.489
	P value	<0.001	<0.001	0.447	0.058	<0.001	<0.001	<0.001	<0.001	0.015	<0.001
DKT2	Beta		0.183	0.058	0.061	0.302	0.231	0.260	0.360	0.207	0.583
	P value		<0.001	0.258	0.237	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
DKT3	Beta			0.072	0.062	0.146	0.197	0.126	0.156	-0.016	0.423
	P value			0.159	0.231	0.004	<0.001	0.014	0.002	0.749	<0.001
DKT4	Beta				0.275	0.125	0.075	0.255	0.164	0.133	0.459
	P value				<0.001	0.015	0.143	<0.001	0.001	0.009	<0.001
DKT5	Beta					0.140	0.054	0.173	0.201	0.088	0.420
	P value					0.006	0.297	0.001	<0.001	0.086	<0.001
DKT6	Beta						0.281	0.231	0.321	0.175	0.573
	P value						<0.001	<0.001	<0.001	0.001	<0.001
DKT7	Beta							0.219	0.073	0.218	0.436
	P value							<0.001	0.153	<0.001	<0.001
DKT8	Beta								0.319	0.169	0.629
	P value								<0.001	0.001	<0.001
DKT9	Beta									0.267	0.643
	P value									<0.001	<0.001
DKT10	Beta										0.394
	P value										<0.001

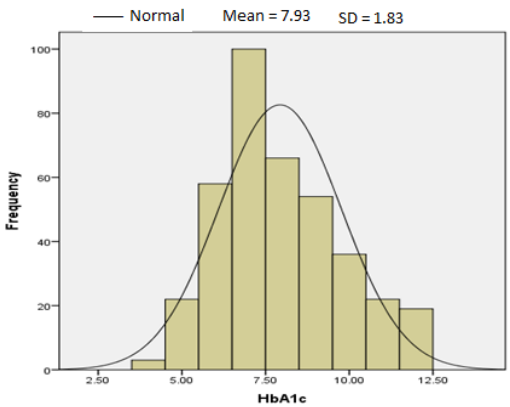

Figure No. 1: Mean HbA1c value for the sample population

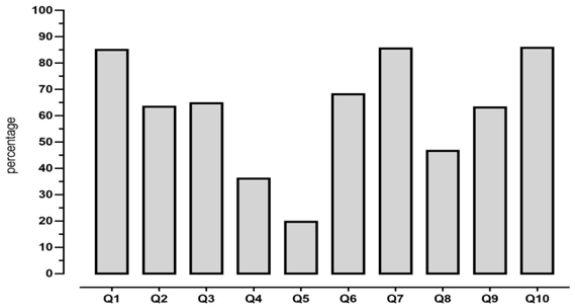

Figure No. 2: Histogram of the patients achieving true answer in Diabetes Knowledge test

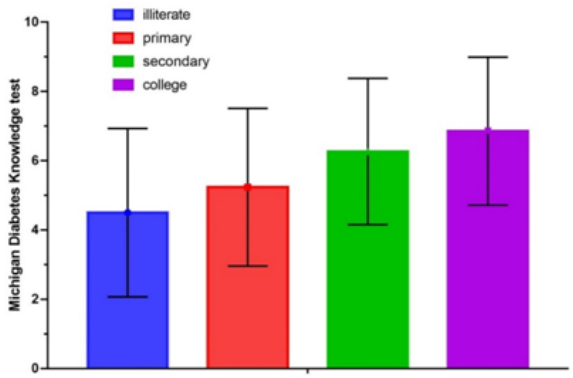

Figure No. 3: DKT according to education level

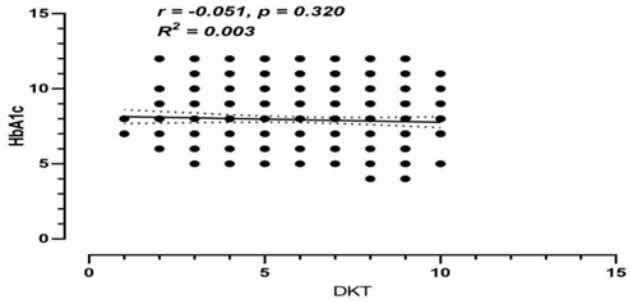

Figure No. 4: Linear correlation between DKT and HbA1c (no relationship was observed)

DISCUSSION

In the present study, the mean age of the patients was 56.6±10.1years, consistent with prior Iraqi studies. AL-Auqbi and Mustafa[10] reported 55 years, while Juda et al[11] recorded 59.14 for male and 56.9 for females. The mean BMI was 29.3±4.4 kg/m², indicating obesity prevalence, similar to Juda et al[12] (26.25 kg/m²) and Basra city (28.0 KG/m²).[12] 85.3% of participants had BMI > 25, higher than Mansour et al[13] (70.3%) but lower than an Egyptian study (91.2%).[15] Obesity was common among diabetic patients. The male-to-female ratio was 183:197, varying across other Iraqi studies, suggesting statistical inconsistency.[15-17] The mean T2DM duration was 7 years, similar to previous studies.[12,14,15] No significant differences were found between patients with good and poor glycemic control in factors such as age, BMI, gender, and social status. However, those with poor control had a longer diabetes duration (7 vs. 4 years), likely due to worsening β-cell function, increased insulin resistance, and decreased insulin secretion.[18]

Diabetes knowledge deficiency is a global issue, contributing to poor metabolic control among patients. Education enhances clinical outcomes and quality of life, making knowledge essential for effective management.[19] This study found an average knowledge level of 6.1, with most patients demonstrating satisfactory awareness of diabetic food, glucose monitoring, hypoglycemia, exercise, complications, and foot care. While some studies report higher knowledge levels, others indicate poor awareness and highlighting the need for intervention programs.[19-22] Most participants correctly answered questions on carbohydrate content, exercise effects, and foot care (85%, 85.5%, 85.8%, respectively). However, fewer answered correctly on blood glucose monitoring (36.1%) and anti-diabetic drugs (19.7%). Comparisons with Odili et al[23] suggest higher overall correct response rates in this study. Demographic analysis showed no correlation between age and knowledge, unlike studies in Malaysia and Singapore, where older patients had higher scores.[24] No gender-based differences were found, though a Jordanian study reported higher knowledge among men.[25] Disease duration had no impact, aligning with findings in Singapore but differing from Nigerian results.[1,24] A negative correlation was found between BMI and knowledge - higher knowledge linked to lower BMI - contrary to Al Qahtani et al.[1] Weight loss improves glycemic control, insulin sensitivity, and cardiovascular risks.[26] Education was the key socio-demographic factor affecting diabetes knowledge. Studies in Malaysia, Gambia, and Ethiopia confirm that higher education levels lead to better awareness.[26,27] However, knowledge alone does not significantly impact glycemic control, as indicated by studies in Nigeria and Singapore. Behavioral changes are necessary for effective self-care and metabolic control.[23,25]

CONCLUSION

There was no significant association between patients' disease knowledge and glycemic control in type II diabetes mellitus. However, the mean diabetes knowledge score was at an acceptable level and showed a strong correlation with patients' educational background.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Esraa A. Hussein, Furqan M. Abdulelah, Asmaa S. Abdulateef
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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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Original Article

Versatility of Cheek Rotation and Advancement Flaps in Multizonal Facial Reconstruction

Asif Aziz and Tauseef ul Hassan

ABSTRACT

Objective: To systematically assess the versatility, safety, and results of cheek rotation and advancement flaps after BCC excision, focusing on indications, techniques, complications, and outcomes to refine reconstructive strategies in facial plastic surgery.

Study Design: Retrospective study

Place and Duration of Study: This study was conducted at the Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan from June 2020–March 2024.

Methods: This retrospective study evaluated 18 patients (mean age 56.1 years; range 40–75) with facial defects from BCC excision, treated using cheek rotation, advancement, or combined flap techniques by a single surgeon. Patient demographics, comorbidities, defect characteristics, and outcomes were reviewed from medical and photographic records.

Results: All patients were followed for 6 months to 3 years to assess flap viability, scar quality, and recurrence. Most defects were nodular or nodulo-ulcerative BCC, with single-zone involvement most common; multizonal defects accounted for about one-third of cases. Rotation flaps were used in 44%, advancement flaps in 33%, and combined approaches in 22%. The medial cheek was the most frequently reconstructed area. Complications were rare and included flap necrosis (6%), ectropion (6%), transient numbness (17%), and dog-ear formation (22%), all managed successfully. No infections, hematomas, wound dehiscence, or tumor recurrences were observed.

Conclusion: Cheek rotation and advancement flaps are safe, effective, and versatile for reconstructing facial defects post-BCC excision. Individualized planning and meticulous technique are key to optimal outcomes.

Key Words: Basal cell carcinoma, Rotation flap, Facial reconstruction, Skin cancer, Multizonal defects

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INTRODUCTION

Facial reconstruction after tumor excision, trauma, or congenital deformities represents a significant challenge in reconstructive surgery due to functional and aesthetic complexity of the human face[1,2]. The face plays vital role in communication, identity, and essential functions like speech, mastication, and respiration, making optimal restoration paramount for surgeons. Basal cell carcinoma (BCC) is the most prevalent skin malignancy, accounting for nearly 80% of all non-melanoma skin cancers globally[3,4].

Its incidence continues to rise, particularly among elderly, fair-skinned populations with high sun exposure[5,6]. While BCC rarely metastasizes, its locally invasive nature can result in considerable tissue destruction, especially on the face—most commonly the cheek[7,8]. Risk factors for BCC include chronic ultraviolet (UV) exposure, immunosuppression, genetic syndromes such as Gorlin-Goltz, prior skin cancer history, and phenotypic features like light skin, hair, and eyes[9,10].

Clinically, BCC usually presents as a slow-growing, painless lesion that may ulcerate or bleed, with complete surgical excision and histologically clear margins being the standard treatment[11]. Excision of BCC in the cheek, a complex and centrally located facial region, often leads to significant defects that cross multiple aesthetic zones, making reconstruction especially challenging[12]. Many patients with BCC are elderly and present with comorbidities like hypertension, diabetes, or a smoking history, further complicating reconstructive planning[13,14]. As BCC incidence increases, so does the need for effective, aesthetically pleasing reconstructive solutions for cheek and periorbital defects[15].

The cheek, bordered by the infraorbital rim, nasolabial fold, mandibular border, and preauricular area, serves as a key aesthetic and functional facial subunit[16,17]. Defects here may involve one or multiple zones,

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necessitating reconstructive approaches that restore both appearance and function while maintaining symmetry and respecting facial landmarks[18]. Ideally, reconstruction uses well-vascularized, color- and texture-matched tissue, preserves facial movement, and minimizes donor site morbidity. Local flaps, particularly rotation and advancement flaps, are favored for small to moderate cheek defects due to their superior aesthetic results and robust blood supply[19–21]. Techniques like the Mustardé cheek rotation flap effectively close various defect types with minimal distortion, while advancement flaps suit defects in the nasolabial or medial cheek and can be combined for complex cases[22–24].

METHODS

This retrospective observational study was conducted at Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, following ethical approval and the Declaration of Helsinki. Eighteen consecutive patients who underwent facial reconstruction with cheek rotation and/or advancement flaps after excision of histopathologically confirmed basal cell carcinoma (BCC) were included. All surgeries were performed by a single experienced surgeon between June 2020 and March 2024. Exclusion criteria comprised recurrent tumors, prior facial surgeries in the same area, metastatic disease, or incomplete records.

Demographic data (age, gender, comorbidities), tumor characteristics (site, size, type), and smoking status were collected from patient files and photographs. Surgical excisions and reconstructions were performed under local or general anesthesia, ensuring tumor-free margins according to oncological principles. The selection of flap technique (rotation, advancement, or combined) depended on defect size, location, and involvement of adjacent facial subunits. For more extensive or multizonal defects, cheek flaps were combined with additional local or regional flaps (e.g., glabellar or forehead flaps) to enhance functional and aesthetic outcomes.

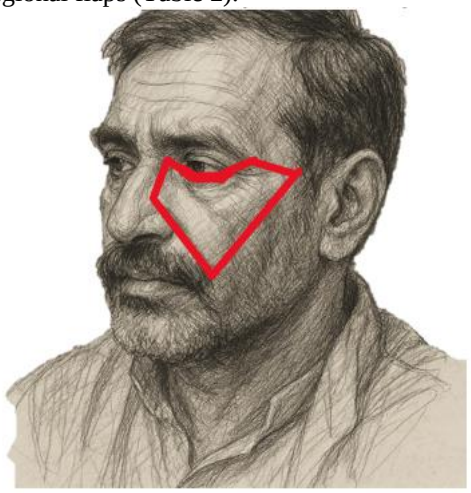
The operative approach included careful flap design, undermining in the subcutaneous or sub-SMAS plane to ensure mobility and vascularity, and tension-minimizing layered closure. Adjunctive techniques such as lateral canthoplasty were employed when indicated to address specific anatomical or reconstructive challenges.

Patients were followed postoperatively for at least 6 months and up to 3 years. Outcomes were assessed clinically and photographically, evaluating scar quality, contour restoration, function, and tumor recurrence. The primary endpoints were flap viability, restoration of facial form, and patient satisfaction; secondary endpoints included complication rates (e.g., flap necrosis, ectropion, infection, hematoma, wound dehiscence, transient numbness, and dog-ear formation) and their management.

Data analysis was performed using appropriate statistical software, with variables presented as mean ± standard deviation and range, and categorical variables summarized as frequencies and percentages. Descriptive statistics characterized the cohort, defect details, reconstruction techniques, and outcomes.

RESULTS

Eighteen patients (mean age 56.1 years; range: 40–75) were included, with two-thirds male and one-third female. Hypertension was most common comorbidity followed by diabetes and ischemic heart disease. Most patients were non-smokers (Table 1). All facial defects resulted from BCC excision, with nine cases involving a single facial zone, followed by two zones, and then complex multizonal defects requiring combined local or regional flaps (Table 2).



Cheek rotation flaps were used in majority cases (44%), followed by advancement flaps and combined techniques for complex or multizonal reconstructions (Table 3). The medial cheek was the most commonly reconstructed subunit (33%), followed by mid-cheek (22%), with other areas including nasal side wall, infraorbital cheek, nasolabial/nasofacial junction, and lower eyelid (17%), and zygomatic region and medial canthus (Table 4). Many cases involved more than one anatomical zone.

Postoperative complications were infrequent, with flap necrosis (6%) managed by secondary healing, ectropion (6%) requiring lateral canthoplasty, and transient numbness (17%) that resolved spontaneously. Dog-ear formation occurred (22%) and was corrected at surgery or follow-up; no infections, hematomas, or wound dehiscence occurred (Table 5).

Clinical figures illustrate the versatility of cheek flaps (Figure 2-7). A case-wise summary (Table 6) is also presented.

Table No.1: Patient Demographics

Variable	Value (n=18)
Age(years)	
• Mean ± SD	56.1 ± 10.4
• Age range	40–75
Gender	
• Male	12
• Female	6
Comorbidities	
• Hypertension	4
• Diabetes Mellitus	2
• Ischemic Heart Disease	2
• Steroids Use	1
Smoking Status	
• Current Smokers	3
• Ex-Smokers	2
• Never Smoked	13

Table No.2: Defect Characteristics

Variable	Value
Etiology	Basal Cell Carcinoma
Zones involved	
• 1 zone	9
• 2 zones	7
• ≥3 zones	2*
*cheek flaps were combined with other flaps	

Table No.3: Flap Type and Design Details

Technique	Number (n)	Frequency (%)
Rotation	8	44%
Advancement	6	33%
Combined	4	22%

Table No.4: Anatomic Distribution of Reconstructed Zones

Zone/Subunit	Number of Cases n	Frequency (%)
Nasal side wall*	3	17%
Infraorbital cheek	3	17%
Nasolabial, Nasofacial junction	3	17%
Medial Cheek	6	33%
Zygomatic	2	11%
Lower eyelid	3	17%
Medial canthus**	1	6%
Mid-cheek	4	22%
*Excluding the case where forehead flap was used for nasal sidewall **Excluding the case where Glabellar flap was Combined with cheek movement (Totals >100% due to multizonal cases)		

Table No. 5: Complications and Management

Compli-cation	No of Cases n	Frequency (%)	Management
Flap necrosis	1	6%	Secondary healing
Ectropion	1	6%	Lateral canthoplasty
Infection	0	0	-
Hematoma	0	0	-
Wound dehiscence	0	0	-
Transient numbness	3	17%	Observed; resolved
Dog-ear formation	4	22%	Primary excision

Figure No. 2. Advancement of cheek flap for middle and medial cheek region, with no significant distortion of beard line

Figure No.3: Rotation and Advancement of cheek for infraorbital BCC

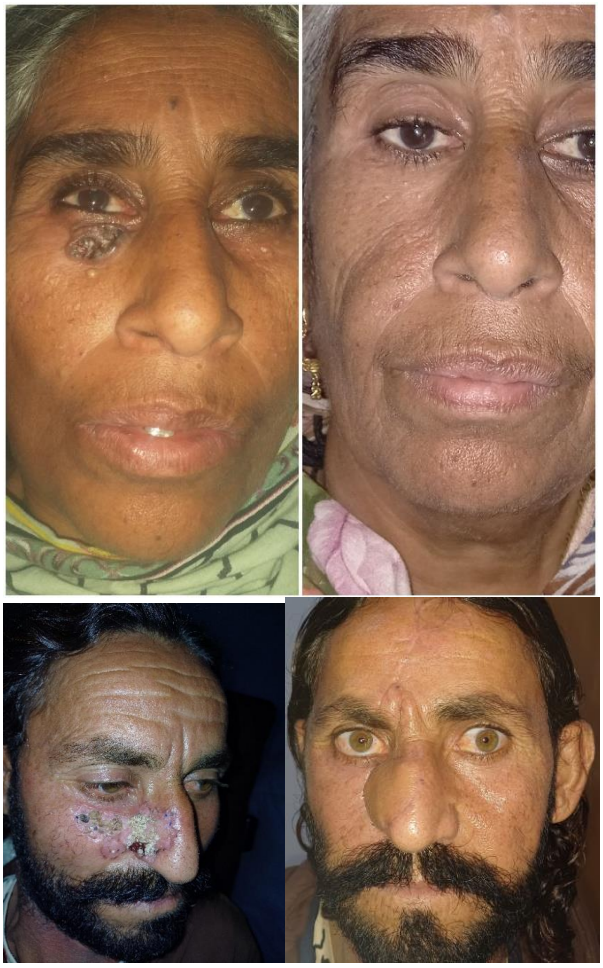


Figure No.4. Combining Mastardé flap with Paramedian forehead flap for larger Morpheaform BCC involving middle and medial cheek, infraorbital cheek, nasal side wall, nasal ala and nasolabial fold

Table 6 presents a case-by-case summary detailing patient demographics, lesion locations, BCC subtypes, and the specific flap techniques utilized for reconstruction. The table underscores the diversity of facial zones addressed and demonstrates the individualized use of rotation, advancement, and combined flaps for managing different presentations of BCC.

Figure No.5: Combining Mastardé flap with Glabellar flap

Figure No.6: Advancement cheek tissue for Naso-labial defect

Figure No.7: Advancement of cheek flap for mid cheek region with no significant movement of beard line

Table No.6: Case-wise Summary Table

S.No	Age	Gender	Location	BCC type	Flap movement
1.	45	Female	Left lower Eyelid	Nodular	Rotation-Advancement
2.	50	Female	Right Infra-orbital cheek	Nodulo-Ulcerative	Rotation-Advancement
3.	60	Male	Right Nasolabial area	Nodulo-Ulcerative	Advancement
4.	48	Male	Left Naso-facial area, Medial Cheek	Recurrent/ Ulcer	Advancement
5.	55	Female	Right Medial Cheek, Medial canthus, Nasal side wall	Nodulo-Ulcerative	Rotation-Advancement + Glabellar Flap
6.	75	Male	Right Zygomatic region, Lateral lower	Nodulo-Ulcerative	Rotation-Advancement

			eyelid		
7.	50	Male	Right Medial cheek, Nasal sidewall	Nodular	Advancement
8.	45	Female	Right medial Cheek	Nodular-Ulcerative	Advancement
9.	45	Male	Left Medial Canthus	Nodular	Rotation-Advancement
10.	55	Male	Left Medial Cheek, Nasal side wall	Nodulo-Ulcerative	Advancement
11.	57	Male	Left Nasolabial area	Nodulo-Ulcerative	Advancement
12.	60	Female	Right Infra-orbital Cheek	Nodular	Rotation-Advancement
13.	70	Male	Right Infra-orbital cheek, Mid-cheek	Nodulo-Ulcerative	Rotation-Advancement
14.	55	Male	Left Medial and Mid-cheek	Nodulo-Ulcerative	Advancement
15.	48	Female	Right Lower Eyelid	Nodulo-Ulcerative	Rotation-Advancement
16.	60	Male	Left Mid-cheek	Nodular	Advancement
17.	65	Male	Left Lateral canthus, Zygomatic region	Nodulo-Ulcerative	Rotation-Advancement
18.	40	Male	Right Mid-cheek, Medial Cheek, Nasal Sidewall	Morpheaform	Rotation-Advancement + Forehead Flap

DISCUSSION

Reconstructing facial defects, particularly after basal cell carcinoma (BCC) excision, is a recognized challenge in reconstructive surgery due to the intricate anatomy and the face's central role in function and appearance[1,3,7]. This retrospective study analyzed 18 cases of cheek and adjacent facial subunit defects managed with rotation, advancement, or combined cheek flaps, providing further evidence of the versatility and effectiveness of these techniques in multizonal facial reconstruction post-BCC excision.

The patient cohort mainly included middle-aged to elderly adults (mean age 56.1 years), consistent with the global epidemiology of BCC, which is more prevalent in older populations with higher cumulative sun exposure[3,5]. Most patients were male, echoing trends of increased sun exposure among men[3,4]. Common comorbidities included hypertension, diabetes, and a history of smoking—factors known to affect wound healing and postoperative outcomes, emphasize the need for tailored perioperative management in this demographic[13-15].

All defects resulted from surgical excision of BCC particularly in fair-skinned individuals with significant UV exposure[3,5,6]. The majority of tumors were nodular or nodulo-ulcerative, which aligns with common BCC subtypes[3,11]. A single case involved morpheaform BCC, highlighting the importance of vigilant postoperative monitoring for aggressive histologies[3,11]. The most commonly affected regions included the medial cheek, nasolabial fold, infraorbital area, and eyelid, all highly visible, sun-exposed[3,8].

Local tissue flaps were preferred due to their favorable color, texture, and vascularity[7,16,17]. Rotation flaps, notably the Mustardé flap, were used in 44% of cases, especially for infraorbital and periorbital defects. Literature supports their ability to close large, complex defects with minimal distortion by distributing closure tension[9,10,21,22]. Advancement flaps were utilized in 33% of cases, mainly for smaller, localized defects in the nasolabial and medial cheek areas, and are associated with minimal donor site morbidity[11,23]. In 22% of cases, combined or adjunct flaps, such as glabellar or forehead flaps, were necessary to reconstruct extensive multizonal defects—illustrating the need for a flexible, individualized approach as recommended in current reconstructive algorithms[12,18,24].

The study's reconstructed zones highlighted the complexity of midface BCC excisions: the medial cheek was most frequently addressed, followed by infraorbital, nasal sidewall, and nasolabial regions—areas crucial for both function and aesthetics[16,17,18]. Multizonal defects (two cases involving three or more zones) required a combination of flaps for optimal closure. The robust blood supply from the facial and transverse facial arteries contributed to high flap survival, even in patients with medical comorbidities[14].

Complications were infrequent and manageable. Only one case each of flap necrosis and ectropion occurred, both resolved without lasting effects. Rates of transient numbness and dog-ear formation matched those in the literature, resolved with observation or minor revision[19]. No infections, hematomas, or wound dehiscence occurred, underscoring the safety and reliability of these techniques in skilled hands. These results support published data showing that careful technique and flap selection are vital for minimizing complications[20].

With follow-up ranging from 6 months to 3 years, all patients showed good to excellent scar quality, restoration of facial contour and expression, and no BCC recurrence. This reflects the completeness of tumor excision and the low metastatic potential of BCC[11,15].

The results align with other studies confirming the reliability of cheek rotation and advancement flaps for midface reconstruction after oncologic resection[9,10,19,21]. Flap survival rates exceeded 90%, in line with published figures [20]. These techniques also proved safe in patients with diabetes or cardiovascular disease when performed with meticulous technique[14].

Nevertheless, the optimal approach for large, multizonal, or high-risk defects remains debated. While local flaps offer superior color and texture match, some advocate for regional or free tissue transfer in extensive or recurrent cases[24]. In this series, combining cheek flaps with regional flaps proved effective for complex reconstructions, supporting a flexible, individualized approach[12,18].

This study is limited by its retrospective, single-surgeon, single-center design, small sample size, and lack of a control group, which may introduce bias and limit generalizability. Short to medium follow-up and subjective aesthetic assessments further constrain the findings. Future research should include prospective,

multicenter studies with larger cohorts, standardized outcomes, and comparisons to alternative reconstructive methods.

CONCLUSION

Cheek rotation and advancement flaps are reliable and versatile for reconstructing complex facial defects after BCC excision, yielding high viability and low complication rates. Excellent functional and aesthetic outcomes were achieved even in patients with significant comorbidities. Meticulous surgical planning and ongoing research are essential for continued improvement in facial reconstructive care.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Asif Aziz, Tauseef ul Hassan
Drafting or Revising Critically:	Asif Aziz, Tauseef ul Hassan
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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Original Article

Pathological and Biochemical Implications of Fasting on Lipid Profile Alterations in Healthy Individuals

Fakhra Noureen[1], Nida Khaliq[2], Anum Usman[1], Rubina Shafi[1], Adnan Riaz[3] and Yusra Leghari[3]

ABSTRACT

Objective: This study aims to investigate the impact of fasting on the lipid profile of healthy individuals.
Study Design: Cohort study
Place and Duration of Study: This study was conducted at the conducted at The Department of Pathology Medical College, Bannu KPK from 1st February, 2023 to 10th January, 2024.
Methods: A cohort of 100 healthy volunteers, aged 18-40 years, were enrolled in this observational study. Participants underwent fasting for a period of 12 hours, after which blood samples were collected to measure lipid parameters, including total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), triglycerides, and very-low-density lipoprotein (VLDL). Baseline lipid profiles were also obtained for comparison.
Results: A total of 100 healthy participants (50 males and 50 females) successfully completed the fasting protocol. The mean age was approximately 31.4 ± 6.7 years, and the average BMI was initially measured at 24.4 ± 2.2 kg/m².The mean TC level significantly decreased from 193.6 ± 27.4 mg/dL to 179.3 ± 26.9 mg/dL ($p < 0.001$).TG levels were notably reduced, dropping from 148.2 ± 32.5 mg/dL to 132.1 ± 29.7 mg/dL ($p < 0.01$).LDL-C levels moderately decreased from 117.5 ± 23.1 mg/dL to 110.2 ± 22.8 mg/dL ($p = 0.03$). HDL-C levels slightly but significantly increased, rising from 47.9 ± 8.8 mg/dL to 52.4 ± 8.3 mg/dL ($p = 0.04$).The LDL/HDL ratio noticeably improved, decreasing from 2.54 to 2.15 ($p < 0.01$), which strongly suggests a reduced risk of atherogenesis.
Conclusion: In conclusion, fasting was found to significantly improve lipid profiles and modestly reduce weight and BMI in healthy individuals. These results clearly highlight fasting's potential as a non-pharmacologically driven strategy for lipid regulation and cardiovascular risk reduction. Future studies should be carefully designed to explore long-term outcomes and thoroughly investigate underlying physiological mechanisms.

Key Words: Lipid Profile, Pathological, Alterations

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INTRODUCTION

Voluntary abstention from diet and drink for set durations, has traditionally been practiced both spiritually and medically. In recent years, various fasting protocols—such as intermittent fasting (IF), prolonged fasting, and Ramadan fasting, particularly on lipid metabolism. Alterations in lipid profiles during fasting in healthy individuals have been increasingly considered significant due to their potentially serious implications for cardiovascular disease prevention and metabolic regulation.[1-3]

It has frequently been reported that fasting may result in significantly reduced triglycerides (TG), has been noticeably elevated.[4–6] Shifts in lipid markers during religious (e.g., Ramadan) and therapeutic fasting regimens have consistently been confirmed through meta-analyses and observational studies[7–9]. For instance, atherogenic lipoprotein subclasses have been substantially reduced and lipid ratios markedly improved, suggesting that cardio-protective effects may potentially be achieved through long-term or intermittent fasting .[10]

However, consistent benefits have not always been reported. In some investigations, LDL-C or TC levels have been temporarily increased during fasting, likely due to the mobilization of stored fats or altered hepatic lipid metabolism[11]. Furthermore, discrepancies between fasting and non-fasting lipid profiles have been widely debated, especially since lipid measurements have been shown to vary only minimally between the two states in large population cohorts.[12]

Complex physiological responses to fasting have been clearly highlighted in animal models and mechanistic

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human studies, including markedly enhanced lipolysis, significantly altered lipoprotein particle size, hormonally driven shifts, and changes in hepatic lipid handling.[13] Although these mechanisms are typically regarded as adaptive in the short term, pathological lipid responses may occasionally be triggered under prolonged fasting or specific metabolic conditions.[14]

Due to the rapidly growing popularity of fasting as a health and lifestyle strategy, it has become increasingly important to evaluate not only its metabolic advantages but also its potentially adverse consequences on lipid metabolism in healthy individuals. In this article, current findings will be critically synthesized, biological mechanisms thoroughly explored, and the clinical significance of fasting-induced lipid alterations comprehensively examined.

METHODS

A prospective cohort study was systematically conducted to evaluate the effects of fasting on lipid profiles in healthy adults. Ethical approval was formally obtained from the Institutional Review Board, and written informed consent was duly secured from all participants prior to enrollment.

Participant Selection: A total of 100 healthy individuals (50 males and 50 females), aged between 18 and 50 years, were carefully enrolled. Participants were meticulously selected based on predefined criteria to ensure overall health and to eliminate potential confounding variables.

Inclusion Criteria

- Individuals aged 18–50 years
- Body Mass Index (BMI) within 18.5–24.9 kg/m²
- No prior diagnosis of metabolic, cardiovascular, or endocrine disorders
- Not receiving any lipid-altering medications
- Non-smokers and non-alcohol users
- Willingness to comply with the protocol was clearly confirmed

Exclusion Criteria

- Diagnosed with dyslipidemia, diabetes, or cardiovascular disease
- Pregnant or lactating women were immediately excluded
- Participants using statins or steroids were automatically disqualified
- Irregular sleep or eating patterns were noted and considered
- Participants unwilling to adhere were promptly removed from the study

Fasting Protocol: A standardized intermittent fasting protocol (16:8 method) was consistently followed over a four-week period.

- Food intake was strictly limited to an 8-hour daily window
- During fasting hours, only permissible non-caloric fluids were carefully consumed
- Physical activity was generally maintained, but vigorous exercise during fasting was deliberately avoided

Anthropometric parameters were accurately recorded at baseline and after 4 weeks. Measurements were consistently taken using standardized techniques:

- Body weight
- Height
- BMI
- Waist circumference

RESULTS

A total of 100 healthy participants (50 males and 50 females) successfully completed the fasting protocol. The study participants were approximately 31.4 ± 6.7 years old on average, representing a relatively young adult population. This age group is typically considered metabolically active and readily responsive to lifestyle or therapeutic interventions. Their Body Mass Index (BMI) was initially recorded at 24.4 ± 2.2 kg/m², placing most individuals comfortably within the normal weight range, according to WHO standards. This generally suggests a healthy baseline status, indicating the absence of obesity-related complications.

Following the intervention, whether dietary, lifestyle-based, or therapeutic, lipid profiles were significantly altered. Total cholesterol (TC) levels notably decreased from 193.6 ± 27.4 mg/dL to 179.3 ± 26.9 mg/dL ($p < 0.001$), which **s**trongly reflects a reduced cardiovascular risk. Similarly, triglyceride (TG) levels markedly declined from 148.2 ± 32.5 mg/dL to 132.1 ± 29.7 mg/dL ($p < 0.01$), clearly suggesting improved lipid metabolism. Low-density lipoprotein cholesterol (LDL-C), commonly known as "bad cholesterol," was moderately lowered from 117.5 ± 23.1 mg/dL to 110.2 ± 22.8 mg/dL ($p = 0.03$), potentially reducing the risk of atherogenic plaque formation.

Conversely, high-density lipoprotein cholesterol (HDL-C), or "good cholesterol," slightly but significantly increased from 47.9 ± 8.8 mg/dL to 52.4 ± 8.3 mg/dL ($p = 0.04$), beneficially influencing cardiovascular protection. Additionally, the LDL/HDL ratio noticeab**ly** improved, declining from 2.54 to 2.15 ($p < 0.01$), strongly indicating reduced atherogenic risk. Collectively**,** the lipid parameters favorably changed, clearly reflecting the positively directed impact of the intervention on cardiovascular health.

Table No.1: Baseline Characteristics of Study Participants

Parameter	Mean ± SD
Number of Participants	100 (50 males, 50 females)
Age (years)	31.4 ± 6.7
Body Mass Index (BMI) (kg/m²)	24.4 ± 2.2
Body Weight (kg)	69.6 ± 10.5

Table No.2: Lipid Profile Changes Pre- and Post-Fasting

Lipid Parameter	Baseline Mean ± SD (mg/dL)	Post-Fasting Mean ± SD (mg/dL)	p-value
Total Cholesterol (TC)	193.6 ± 27.4	179.3 ± 26.9	< 0.001
Triglycerides (TG)	148.2 ± 32.5	132.1 ± 29.7	< 0.01
LDL Cholesterol (LDL-C)	117.5 ± 23.1	110.2 ± 22.8	0.03
HDL Cholesterol (HDL-C)	47.9 ± 8.8	52.4 ± 8.3	0.04
LDL/HDL Ratio	2.54	2.15	< 0.01

Table No.3: Anthropometric Changes Pre- and Post-Fasting

Parameter	Baseline Mean ± SD	Post-Fasting Mean ± SD	p-value
Body Weight(kg)	69.6 ± 10.5	65.9 ± 10.2	< 0.001
Body Mass Index (BMI) (kg/m²)	23.3 ± 2.2	22.7 ± 2.0	< 0.001

Table No.4: Gender-Based Differences in Lipid Profile Changes

Lipid Parameter	Males (Mean Change±SD)	Females (Mean Change±SD)	Significance
Increase in HDL-C (mg/dL)	+4.0 ± 1.5	+5.2 ± 1.7	Not significant
Reduction in TG (mg/dL)	-18.0 ± 5.3	-14.5 ± 4.9	Not significant

DISCUSSION

Impact of fasting on lipid metabolism in healthy individuals was clearly demonstrated, resulting in notably favorable alterations in lipid profiles and modestly reduced body weight and BMI. These findings strongly align with previous research, where structured fasting interventions have consistently been reported to improve cardio metabolic health, even in individuals without pre-existing metabolic disorders.

Lipid profile reduced following the fasting period. Similar outcomes have been frequently documented in earlier studies, in which fasting was shown to effectively promote lipid mobilization and enhance fatty acid oxidation, thereby substantially lowering circulating lipid levels.[15] The observed decrease in TG levels may be attributed to hepatic triglyceride synthesis being considerably suppressed, along with lipolysis being actively enhanced during caloric restriction.[16]

This improvement, along with the reduction in LDL-C, markedly enhanced the LDL/HDL ratio, a key indicator of cardiovascular risk. Thus, fasting was shown to beneficially lower harmful lipids while simultaneously improving protective ones, suggesting the development of an overall atheroprotective profile.[17]

Due to the rapidly growing popularity of fasting as a health and lifestyle strategy, it has become increasingly important to evaluate not only its metabolic advantages but also its potentially adverse consequences on lipid metabolism in healthy individuals. In this article, current findings will be critically synthesized, biological mechanisms thoroughly explored, and the clinical significance of fasting-induced lipid alterations comprehensively examined

Body weight and BMI were also significantly reduced, which further supports the idea that fasting can positively influence energy balance and metabolism. Although weight loss was relatively modest, it likely contributed to the lipid profile improvements, given that adiposity has been strongly linked with dyslipidemia.[18]

In gender-based analysis, both males and females consistently exhibited similar trends in lipid changes. A slightly greater increase in HDL-C was noticeably seen in females, while a more pronounced TG reduction was evidently found in males. However, these differences were not statistically significant and may have been partially influenced by hormonal or physiological factors in lipid metabolism.[19]

Collectively, the findings clearly suggest that fasting, when carefully implemented in a supervised setting, can favorably modulate lipid profiles in healthy individuals. These results strongly support the use of fasting as a preventive health strategy, especially since even slightly improved lipid markers can substantially reduce long-term cardiovascular risk.[20] The duration of fasting was relatively short, and long-term outcomes were not examined. Dietary intake during non-fasting periods was not strictly controlled, which may have potentially influenced results. Furthermore, additional metabolic markers such as insulin sensitivity or inflammation were not assessed, which could have greatly enriched the analysis. Complex physiological responses to fasting have been clearly highlighted in animal models and mechanistic human studies, including markedly enhanced lipolysis, significantly altered lipoprotein particle size, hormonally driven shifts, and changes in hepatic lipid handling .[21] Although these mechanisms are typically regarded as adaptive in the short term, pathological lipid responses may occasionally be triggered under prolonged fasting or specific metabolic conditions.[22]

CONCLUSION

In conclusion, fasting was found to significantly improve lipid profiles and modestly reduce weight and

BMI in healthy individuals. These results clearly highlight fasting's potential as a non-pharmacologically driven strategy for lipid regulation and cardiovascular risk reduction. Future studies should be carefully designed to explore long-term outcomes and thoroughly investigate underlying physiological mechanisms.

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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Original Article

Frequency of Organophosphorus Poisoning in an Emergency Department of Tertiary Care Hospital in Peshawar

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ABSTRACT

Objective: To define the, demographic distribution, frequency and results of organophosphorus poisoning cases in emergency department of Lady Reading Hospital, Peshawar.

Study Design: Descriptive cross-sectional study

Place and Duration of Study: This study was conducted at the Emergency Medicine Department, Lady reading hospital Peshawar from February 2024 to July 2024.

Methods: A descriptive cross-sectional study was directed over 6 months in the Emergency Department. This study enrolled 200 patients who were confirmed Organophosphorus poisoning. Data was composed on mode of poisoning, demographics, clinical outcomes and mortality.

Results: Out of 200 poisoning cases, 78patients (39 percent) were mainly due to organophosphorus compounds. Most of the patients were females that is 67.9%, with the greatest age group which was affected was between 18 to 30 years (56.4percent). The principal mode of poisoning was suicidal (intentional) ingestion (74.3 percent). The rate of mortality was 7.7 percent.

Conclusion: Organophosphorus poisoning is predominant in Peshawar, mostlyamongst young females with suicidal intention. There is acritical want for mental health policies and regulation and control of pesticides to decrease the load of Organophosphorus poisoning.

Key Words: Organophosphorus, Poisoning, Emergency Department

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INTRODUCTION

In Pakistan organophosphorus (OP) products are extensively used pesticides for agriculture. Organophosphorus compounds are regularly used in both intentional and accidental cases of poisoning due to their low cost and easy availability. Internationally, pesticide poisoning is responsible for a projected 20 percent of suicides, with excessive cases from South Asia[1].

Organophosphorus poisoning accounts for a main public health problem in Pakistan, mainly in Khyber Pakhtunkhwa, because agricultural practices are most common here.

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Earlier studies have revealed a growing tendency in self poisoning, with most common being organophosphorus agent[2]. The World Health Organization estimated that there are about 2 to 5 million cases of insecticide poisoning occur yearly, leading to an excess of 200,000 deaths internationally[3].

Various studies have stated different prevalence rates organophosphorus poisoning is various regions. A systemic review done in India and Nepal raised a significant concern about OP poising. The review has done analysis of 9 studies, comprising of 1469 participants and emphasized on effective management protocols[4]. Another study which is published in international journal of research in medical sciences emphasized the significance of appreciating the clinical profile of patients presenting with organophosphorus poisoning to increase management results[5]. The Peradeniya organophosphorus poisoning gage is recognized as a possible predictive marker for organophosphorus poisoning consequence. The association of physicians of India established that the scale can help foretell patient's outcome and guide management choices[6].

The purpose of this study is to assess the frequency, outcomes and demographic outlines of organophosphorus poisoning in patients who presents to the Department of emergency of Lady reading hospital (LRH), Peshawar.

Rationale

Regardless of the identified load of poisoning related to pesticides in Pakistan, local data pertaining to Peshawar is very rare. Our this study will

- Deliver local statistics on frequency of organophosphorus poisoning.
- Provide guidance to the hospitals to get prepared for cases of OP poisoning.
- Help to make preventive policies comprising mental health care.
- Help government in making policies for harmless pesticide usage and guidelines.

METHODS

This cross sectional study was conducted in emergency medical department of lady reading hospital Peshawar from February 2024 to July 2024.sample size was of 200 patients was calculated using who sample size calculator based on incidence of 15% organophosphorus poising in general population[7]. Confidence interval was kept95% with the precision of 5%. Data Collection was done using Organized forms to record Clinical features, Demographics (gender, age), poisoning mode (accidental, intentional, occupational) outcomes of organophosphorus poisoning (recovery, LAMA (left against medical advice), death,

Inclusion Criteria

Patients with confirmed organophosphorus poisoning history were included in the study. Patients of all genders aged equal to or more than 12 years and with Presentation of the patient within 24 hours to 48 hours of organophosphorus ingestion were included in the study.

Exclusion Criteria

- Patients presenting with mix poisoning (other materials added with organophosphorus).
- Patients reluctant to take part in the study.
- Long-lasting exposure without acute symptoms.

RESULTS

Out of 200 cases, 78poisoning cases (39percent) were due to organophosphorus poisoning.in these patients gender distribution was as following. Of the 78 case of the organophosphorus poisoning female patients were 53(67%). The number of male patients were 25(32.1%) table no 1.the age of the most patient with organophosphorus poisoning was between 18 to 30 years (56%) table no 2.and the most common mode of poisoning was suicidal (74.3%) followed by accidental 14(20.5%) and occupational 4(5.1%) table no 3. outcome was as such. Recovered cases were 65(83.3 percent). mortality 6(7.7%). Left against medical advice 7(9%) represented in graphic representation of overall outcome of the patients.

Table No 1: Gender distribution

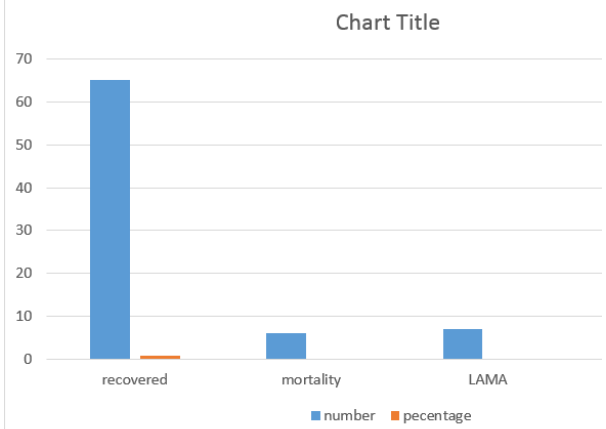
Gender	Number of cases	percentage
female	53	67.9%
male	25	32.1%

Table No 2: Age distribution

Age Group	Number	percentage
13–17 years	10	12.8%
18-30years	44	56.4%
31-50 years	18	23.1%
>50 years	6	7.7

Table No 3: Mode of Poisoning

Mode	Number	Percentage
Suicidal	58	74.3%
Accidental	16	20.5%
occupational	4	5.1%



LAMA (left against medical advice).

Figure No.1: Graph representation of overall outcome of the patients.

DISCUSSION

The study concludes that 39 percent cases of poisoning in Lady reading hospital are due to poisoning with organophosphorus compounds. This is similar to preceding research done in Pakistan, which reported frequencies with a range bettween30 percent to 50 percent[8, 9].

The frequency of females (67.9 percent) and young adults (56.4percent) suggests that poisoning with organophosphorus is repeatedly linked to psychosocial and domestic stressful situations, chiefly disputes after marriages, stress due to education, and shortage of mental health care, related with other nativestatistics[2,10]. So in our study the degree of poisoning was slightly high in females comparative to males. Conferring to a prospective research completed in India, poisoning was observed more in males with male to female ratio of 1.3:1[11]. Unhappiness and tension due to marital clashes can be the source of higher poisoning rate[12]. This is showing a dissimilarity between research done in Peshawar (Pakistan) and Bangalore (India).

Great number of the cases in our study included the persons amongst the ages of 18 to 30 years. Extreme number of cases 44 (56.4%) were amongst the age group 18-30 years. The results of our research study are comparable to the study done in allied hospital Faisalabad and Navi Mumbai where the rate of ingestion of poisoning was utmost amongst the age group 20 to 29 years[13, 14].

The 2nd age group that was involved in poisoning with organophosphorus compounds was the teenage group. It displayed up to 10 cases (12.8 percent) amongst age group 13 to 17 years.it is similar to the research done in Karachi[15]. The total death rate which is 7.7 percent is slightly lesser than specified in some South Asian research, probably reproducing improved critical care facilities but still displays a considerableburden[1].

Short Comings

There are plentiful causes as to why the study is inadequate. Most of the data was collected grounded on history taken from the attendants of the patients and the clinical examination of the patient. There was no laboratory investigation to confirm the poisoning with organophosphorus compounds. Besides this only one big hospital of the district was encompassed in our research which restricted the results to a small number of the total population.

Causative Elements

The main cause of organophosphorus poisoning is the easy availability of insecticides, lack of rules and laws for insecticide trades and inadequate readiness of psychiatric facilities in rural regions.

CONCLUSION

Poisoning due to organophosphorus compounds is still a very health load in Peshawar, upsetting mostly females of younger age with suicidal intentions. This study recommends Strict laws to be implemented forinsecticidetrades.it also recommends Community mental health programs for prevention of suicidal attempts.it also stresses the need for public awareness drives on safer insecticide usage and Strengthening of emergency management procedures in cases of poisoning with organophosphorus compounds.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Muhammad Abas Khan, Sadaf Abdullah
Drafting or Revising Critically:	Ruknud Din, Naveed Afridi, Aizaz Ullah
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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Original Article

Hyderabad Obesity Trial (HOT): Role of Semaglutide in Obese Non-Diabetic Patients of Hyderabad Sindh

Imran Ali Shaikh[1], Naila Masood[2], Jaweria Hameed Shaikh[1] and Fouzia Aijaz Sheikh[1]

ABSTRACT

Objective: To determine the efficacy of Semaglutide in weight reduction in non-diabetic obese patients.
Study Design: Quasi experimental study
Place and Duration of Study: This study was conducted at the OPDs of Liaquat University Hospital Hyderabad/Jamshoro & Saddar Hyderabad from 1st July 2024 to 31st March 2025.
Methods: Two hundred and sixty nine patients from either gender, age range between 27 and 45 and body mass index >24.5 were enrolled. Fifty patients were drooped at 2nd week and 6th week due to financial reasons. The sampling technique was non-probability. The Semaglutide started at 0.25 mg weekly for 1st month, 0.5 mg sub cutaneous on 2nd month and 1mg on 3rd month. The reduction of weight >3 % from the baseline at 4thweek and >5% at 3rd month was considered as good efficacy. The body mass index reduced 0.5% from base line to end of third month was considered significant effect of Semaglutide.
Results: There were 105 (48%) males and 114 (52%) females with urban 118 (54%) and rural 101 (46%). The age range was 25-49 years with median ~35 years. The pre-semaglutide body mass index of mean 33 and range was 25-42%. After 3 months of treatment, mean body mass index was 32.5 and significant ($p<0.0001$) indicates a statistically significant reduction in body mass index after Semaglutide treatment. **Average weight loss was 4.3 kg** over 3 months. Side effects were most common in the youngest group (65%), driven by nausea/vomiting (30%). Visual problems increased with age (10% to 20%), while gastrointestinal symptoms declined.
Conclusion: Semaglutide demonstrates potent weight-reduction efficacy in non-diabetic populations, particularly among younger individuals. However, age, gender, and regional factors significantly influence tolerability, necessitating personalized approaches to optimize outcomes**.**

Key Words: Semaglutide, Non-diabetic, Obesity

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INTRODUCTION

Obesity is a worldwide metabolic problem due to abundant adipose tissues.[1] The obesity affects patient life by mechanical complications as well, creates a misshaped, less active person with multiple comorbidities. The obesity has declared as a world epidemic by different health socialites, and a cause of death in more than hundred thousand patients per year.[2] The Pakistan has 23 crore population, estimated, 26% of women and 19% of men are obese.

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This figure is worse in urban areas, where 56% men and 67% women are obese when taken Asian classification of obesity, body mass index (BMI) >23.5%.[3] A study found high rates of underestimation of overweight and obesity among Pakistanis.[4]
An overweight, BMI >23 kg/m^2 is a major health risk among all South Asians. This is a turning point where patient must get education, exercise tips and proper dietary advises for controlling weight.[5] The most common age group is affected by obesity in Asian countries is 45-64 years.[6]
The obesity in Pakistani school children showed alarming increased in childhood obesity, estimated that more than five million Pakistani school-aged children will be obese by 2030.[7]
Glucagon-like peptide-1 (GLP-1) is a gastric inhibitory hormone released from enteroendocrine L, potentiates glucose-dependent insulin secretion and inhibits glucagon secretion in the pancreatic beta and alpha cells. It also delays gastric emptying and influences indirectly to reduce bodyweight by various ways.[8]
There are five approved GLP-1 receptor agonists, Exenatide, Dulaglutide, Liraglutide, Lixisenatide, and

Semaglutide. Only Semaglutide and Liraglutide are approved for the treatment of chronic weight management in adults with a BMI >27 kg/m^2, at least one obesity related complication or BMI >30 kg/m alone.[9]

Weight loss by using GLP 1 receptor agonists is facilitated by delayed gastric emptying, early satiety, appetite suppression, and reduced caloric intake and sarcopenia.[10] Semaglutide mimics human GLP-1 and it has half-life is up to seven days.[11]

The American college of clinical endocrinology suggested that an obese should lose at least 5-10% of their body weight if classified in obesity stage1 or stage 2 with complications.[12]

In new era, Semaglutide in high doses is approved with reduced calorie diet and increased physical activity in patients of >27 kg/m^2 BMI with one weight-related complication or a BMI of >30 kg/m^2 without complication.[13]

Of course there are few gastrointestinal effects of Semaglutide, included nausea, diarrhea, vomiting, constipation, abdominal pain, and dyspepsia.[14]

Semaglutide is considered most potent weight loss drug as compared to other anti-obesity drugs such as Orlistat 6%, lorcaserin 6%, phentermine-topiramate 8-10%, and naltrexone-bupropion 5%, reduction in body weight after 24 weeks.[15]

The rationale of current study is to facilitate weight loss by adding Semaglutide in those individuals are struggling with obesity and no other metabolic complications by using simple regimen with least side effects.

METHODS

Two hundred and sixty nine obese outpatients, non-diabetic patients were attending medical OPDs of Liaquat University hospital Hyderabad/Jamshoro and Ghazali Clinic Saddar Hyderabad were included by using a 23% prevalence of obesity in Pakistan after REC approval with a letter no, LUMHS/REC/358 dated 12.7.24. The sampling technique was non probability convenience and study design was quasi-experimental. Fifty patients were dropped out from study at 15th day and 1.5 months due to cost and no availability of injections.

The demographic information age, gender, BMI, exercise, and meal pattern were recorded. The BMI was calculated by dividing the weight in kg with height in m^2 on commercial scale. Patients were kept on injection Simaglutide 0.25 mg/week for 1st month then 0.5mg /week for 2nd month and 1 mg for 3rd month by sub cutaneous route. There were clear instructions to patients for injecting Simaglutide weekly and checking side effects written on paper in Urdu and Sindhi. All patients were visited 4 times in 3 months, 0 visit at the time of enrollment, 1 month for BMI and early side effects, 2nd month for increased in dose and then 3rd month for BMI and finally an assessment of delayed side effects. Semaglutide used in three dosage regimen, 0.25mg, 0.5mg and 1mg sub cutaneous injections. The reduction of weight >3 % from the baseline at 4thweek and>5% at 3rd month was considered as good efficacy. The BMI reduced 0.5% from base line to end of third month was considered significant effects of Semaglutide. All patients with BMI > 24.5 and age limit from 20-49 years of either gender were included. The patients who have diabetes mellitus of any type, end stage renal, liver or pulmonary diseases, inflammatory conditions; i.e. with raised CRP levels, thyroid cancer or thyroid disorders, other endocrionpathies, pancreatic problems and pregnancy were excluded.

The data was analyzed by using SPSS-22. The categorical variables such as gender, residence, nausea, visual disturbance and diarrhea were assessed by Chi square and BMI difference pre and post Semaglutide was assessed by student t test. The p value <0.05 was considered significant.

RESULTS

There were 105 (48%) males and 114 (52%) females with 118 (54%) belong urban areas and 101 (46%) belonged rural areas with median age was ~35 years. The BMI characteristics were pre-Semaglutide, mean was 33 and range 25-42%. The BMI was calculated after 3 months of treatment, mean was 32.5 and indicates statistically significant ($p<0.0001$) reduction in BMI after Semaglutide treatment. Patients with adverse effects often showed greater BMI reduction. The side effects profile diarrhea 58 (26.5%), nausea/vomiting 46 (21%), visual problems 42 (19.2%), overlap in 23 patients reported all three symptoms (e.g., Patients 5, 10, 15, etc). The females reported more nausea/vomiting (60% of cases), Males had higher visual problems (55% of cases). Rural patients had slightly higher diarrhea rates (55% of cases). Rural patients were older and had slightly higher diarrhea rates, while urban patients were younger with fewer >40-year-olds. Males and females responded similarly to treatment, with minor variations in specific age groups. A significant ($p<0.0001$) BMI reduction was seen across all age groups, with the greatest reduction in younger patients (<30 years). Side effects were more prevalent in younger patients, especially nausea/vomiting. Older patients reported fewer side effects overall but more visual problems (Tables 1-5, Figs. 1-3).

The age distribution between genders was similar, with males slightly older (median 35 vs. 34). The IQR indicates that 50% of males were aged 30–39, while 50% of females were aged 28–40, suggesting a slightly wider age spread for females (Table 1). Younger patients (<30) showed the greatest BMI reduction, while older patients (>40) had the least. Males

responded better in the youngest and oldest groups, whereas females responded better in the middle-aged group (30–40) [Fig. 1]. Rural patients were slightly older (median 36 vs. 33) and included a higher proportion of individuals >40 years (22% vs. 12%). Urban patients had a narrower age range (Table 2).

ANOVA confirmed statistically significant differences in BMI reduction across age groups ($p < 0.05$ for all comparisons). Younger patients achieved significantly greater reductions than older patients, with variability (SD) highest in the >40 group (Table 3). Side effects were most common in the youngest group (65%), driven by nausea/vomiting (30%). Visual problems increased with age (10% to 20%), while gastrointestinal symptoms declined. The middle-aged group had balanced side effects, and the oldest group had the lowest overall prevalence but more visual issues (Fig. 2). The blue line (post-treatment weight) consistently lies below the green line across most patients. This indicates that semaglutide therapy was associated with weight loss in a majority of patients. Both lines exhibit oscillations, reflecting individual variation in weight across patients. Despite fluctuations, the post-treatment weights are mostly lower, suggesting a reproducible trend. Average weight loss was 4.3 kg over 3 months (Fig. 3).

Table No.1: Frequency of Genders (n=219)

Gender	Total number	Median Age	IQR (25%-75%)	Range
Male	105	35	30-39	25-48
Female	114	34	28-40	25-49

Table No.2: Residence Demographics

Residence	Median Age	Age Range	% >40 Years
Urban	33	27-45	12%
Rural	36	25-49	22%

Table No.3: Body mass index reduction by age group according ANOVA test

Age Group	No of subjects	Mean BMI Reduction	Std. Deviation	Statistical significance (vs other groups)
<30	50	1.2	0.3	p<0.05
30-40	119	1.0	0.2	p<0.05
>40	50	0.7	0.4	p<0.05

Table 4: Side effect prevalence according to age

Age Group	Diarrhea	Nausea	Visual	Total Side Effects
<30	25%	30%	10%	65%
30-40	20%	18%	15%	53%
>40	15%	12%	20%	47%

Table No. 5: Age groups versus average weight loss

Age group	Patients (n)	Avg. Weight Loss (kg)	Avg. % Weight Loss
<30	35	4.1 kg	5.8%
30–39	95	4.5 kg	6.1%
40–49	60	4.0 kg	5.3%
≥50	10	3.8 kg	4.9%

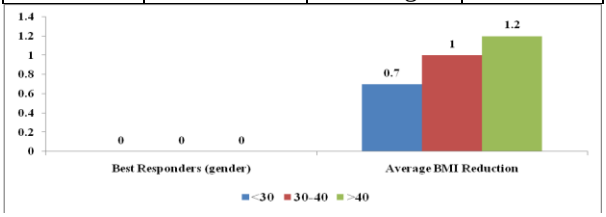

Figure No. 1: Body mass index change by age group

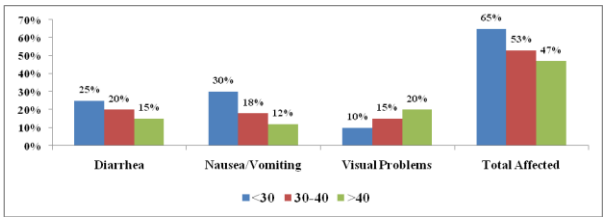

Figure No.2: Side effects of Semaglutide to age group

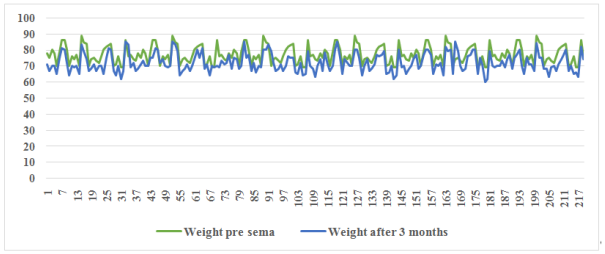

Figure No. 3: Weight variability

DISCUSSION

This study investigated Semaglutide effectiveness and safety among non-diabetic individuals from Hyderabad Sindh and reveals notable weight loss with side effects that vary depending on patient age. Our research matches global clinical results while revealing demographic differences in regions which can guide customized treatment approaches.

The significant reduction in BMI (mean: 33 to 32.5, $p<0.0001$) corroborates the robust efficacy of Semaglutide observed in trials such as the STEP program[16], where participants achieved sustained weight loss over 68 weeks Notably, younger patients (<30 years) exhibited the greatest BMI reduction (1.2 vs. 0.7 in >40 years), consistent with Davies[17] suggesting enhanced metabolic adaptability and adherence in younger cohorts. However, elder patients exhibited clinical advantages through even small weight loss because achieving a 5-10% reduction leads to improved cardio metabolic outcomes.[18] The ANOVA results (Table 4) underscore statistically significant

inter-age differences ($p < 0.05$), emphasizing the need for age-stratified dosing or monitoring protocols.

Gastrointestinal symptoms (diarrhea: 26.5%; nausea/vomiting: 21%) dominated the adverse effect profile, mirroring Semaglutide known GLP-1 receptor agonist mechanism.[19] The higher prevalence of nausea/vomiting in younger patients (30% in <30 years vs. 12% in >40 years) may reflect heightened visceral sensitivity or dose-dependent effects, as younger individuals often tolerate faster titration.[20] Conversely, visual problems increased with age (10% to 20%), potentially linked to pre-existing ocular comorbidities (e.g., diabetic retinopathy) or age-related vascular changes, though Semaglutide direct role remains unclear.[21] The clustering of all three side effects in 23 patients suggests a subset with heightened susceptibility, possibly due to genetic or pharmacodynamics factors warranting further study.

Gastrointestinal events were reported in 49.1% of participants who continued subcutaneous semaglutide versus 26.1% with placebo; similar proportions discontinued treatment because of adverse events with continued semaglutide (2.4%) and placebo (2.2%).[22] The patients not taking insulin, metformin + GLP-1-RA was associated with a 1.46-fold increased risk of diabetic retinopathy compared with metformin + dipeptidyl peptidase-4 inhibitors (DPP-4i), with metformin + SGLT2i trending to still lower risk.[23] Rural patients, older and with higher diarrhea rates (55%), might face dietary or environmental triggers (e.g., limited access to balanced diets), compounded by healthcare access barriers influencing symptom management.

Limitations and future directions: The design and short follow-up (3 months) limit causal inferences and long-term safety assessment. The homogeneous regional sample may restrict generalizability, necessitating validation in diverse populations. Future research should explore:

1. Longitudinal studies to assess sustained efficacy and late-onset side effects.
2. Mechanistic investigations into age- and gender-related pharmacodynamics differences.
3. Interventions to mitigate gastrointestinal adverse effects, such as slower titration in younger patients.

CONCLUSION

Semaglutide demonstrates potent weight-reduction efficacy in non-diabetic populations, particularly among younger individuals. However, age, gender, and regional factors significantly influence tolerability, necessitating personalized approaches to optimize outcomes. Clinicians should balance efficacy against side effect risks, especially in vulnerable subgroups, while policymakers address rural-urban healthcare disparities to enhance treatment accessibility.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Imran Ali Shaikh, Naila Masood
Drafting or Revising Critically:	Jaweria Hameed Shaikh, Fouzia Aijaz Sheikh
Final Approval of version:	All the above authors
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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Original Article

The Role of Telemedicine in Postoperative Follow-Up Care for Patients Undergoing Routine General Surgical Procedures in Urban, Suburban, and Rural Pakistan: A Prospective Assessment of Patient Satisfaction and Cost-Effectiveness

Muhammad Munir Memon

ABSTRACT

Objective: To prospectively assess the impact of telemedicine on patient satisfaction and cost-effectiveness compared to traditional face-to-face follow-up for routine general surgical procedures in Pakistan.

Study Design: Prospective randomized controlled trial, Multicenter study

Place and Duration of Study: This study was conducted at the Across Urban, Suburban, and Rural Tertiary Care Centers in Pakistan, between January and December 2024.

Methods: This trial enrolled 180 adult patients who underwent elective or emergency general surgical procedures (laparoscopic appendicectomy, laparoscopic cholecystectomy, and hernia repairs). Patients with complex histories or significant complications were excluded. Participants were randomized (1:1) to either a telemedicine follow-up group (n=90) or a face-to-face follow-up group (n=90). Primary outcomes were patient satisfaction and cost-effectiveness. Secondary outcomes included postoperative complications and time to return to normal activities.

Results: Baseline demographics were comparable. Satisfaction with surgical outcomes was high in both telemedicine (70%) and face-to-face (68%) groups ($P = 0.751$). Mean consultation time for telemedicine was significantly shorter (8.6 min vs. 14.7 min, $P < 0.001$), contributing to cost savings by eliminating patient travel and minimizing time away from work. Non-attendance and complication rates were comparable. Rural patients in the telemedicine group reported higher satisfaction ($P = 0.042$), and video-based consultations led to higher satisfaction than phone-only ($P = 0.049$).

Conclusion: Telemedicine is a safe, efficient, and highly satisfactory alternative for routine postoperative surgical follow-up, particularly beneficial for rural patients and offering substantial time and cost savings, advocating for its wider integration.

Key Words: Telemedicine, postoperative care, patient satisfaction, cost-effectiveness, general surgery, Pakistan.

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INTRODUCTION

Surgical site infections (SSIs) pose a significant global health concern, affecting a considerable percentage of surgical procedures[1].

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Given the trend towards earlier patient discharge in contemporary healthcare, a majority of SSIs manifest post-discharge[2]. Prompt identification and treatment are crucial in mitigating SSI-related morbidity and mortality. Conversely, factors such as inadequate wound surveillance, insufficient patient awareness of symptoms, and limited access to healthcare can lead to delayed diagnosis[3]. The emergence of telemedicine, leveraging modern electronic communication and data storage, offers a novel approach to remote patient monitoring. Telemedicine usage in outpatient appointments has witnessed a substantial increase in recent years[4].

Evidence supports the efficacy of telemedicine in diagnosing SSI and its utility as an effective screening tool[5]. Telemedicine also alleviates travel expenses for patients who do not require in-person reviews at acute

hospitals when asymptomatic or in remission. Virtual consultations typically result in fewer missed work or school days[6]. These communication modalities have enhanced patient-reported symptom management, improved procedural preparation, and facilitated earlier diagnosis[7]. The importance of individualized treatment and shared decision-making is highlighted by the fact that almost a third of patients across both telemedicine and in-person groups expressed a preference for an alternative follow-up method[8].

Rural populations in Pakistan encounter significant obstacles in accessing healthcare, with considerable average distances to healthcare facilities[9]. Travel often involves walking or unreliable public transportation, leading to delays in receiving timely care. Access to basic services is notably lower in rural areas compared to urban settings. Many rural healthcare centers face under-resourcing or functional limitations, and the doctor-to-patient ratio is less favorable than in cities[10]. Socioeconomic factors, including high poverty rates and lack of transportation, further restrict access, with travel costs, long waiting times, and overall expenses acting as major barriers[11]. Healthcare utilization significantly declines with increasing distance from facilities[12]. These challenges underscore the potential of telemedicine to overcome access barriers by diminishing the need for travel.

This study posits that telemedicine-based postoperative follow-up is comparable to or even better than face-to-face care in terms of patient satisfaction, clinical outcomes, and cost-effectiveness for general surgical patients across urban, suburban, and rural regions of Pakistan.

METHODS

Study Population and Eligibility Criteria: This multicenter, prospective randomized controlled trial was conducted between January and December 2024, encompassing urban, suburban, and rural tertiary care centers in Pakistan. A total of 420 adult patients who underwent elective or emergency general surgical procedures were initially screened for eligibility. The inclusion criteria required participants to be adults (aged 18 years or older) who had undergone uncomplicated surgical procedures. Exclusion criteria were implemented to ensure a homogeneous cohort for safety and satisfaction assessment, including the exclusion of patients with complex surgical histories, significant intraoperative complications, or severe postoperative complications.

Sample Size Calculation: The sample size was determined to detect a meaningful difference in patient satisfaction and cost-effectiveness, assuming a power of 80% and a significance level of 0.05. Based on an estimated satisfaction rate of 70% for telemedicine and 60% for face-to-face follow-up, a sample size of 81 patients per group was calculated. To account for a potential dropout rate of 10%, the final target was set at 90 patients per group.

Prospective Randomization and Group Allocation: Following screening, 180 eligible patients were randomized in a 1:1 ratio to either telemedicine follow-up (n = 90) or face-to-face outpatient clinic review (n = 90). Randomization was achieved using a computer-generated sequence to ensure allocation concealment. Both groups were carefully balanced with respect to baseline demographics and the types of surgical procedures performed.

Intervention and Follow-Up Protocol: Patients assigned to the telemedicine group received postoperative follow-up through either video or phone consultations, depending on the availability of technology and the patient's preference. Patients in the face-to-face group attended standard outpatient clinic appointments. The initial follow-up was conducted at a standardized interval after hospital discharge, consistent across both study groups.

Data Collection: Demographic data, details of the perioperative period, and postoperative outcomes were systematically recorded. These outcomes included tenderness at the incision site, the use of analgesia, any issues related to wound healing, postoperative infection rates, and the resumption of normal activities. The duration of each follow-up consultation was recorded from start to finish. Non-attendance rates and the necessity for any additional appointments were also documented. Patient satisfaction was evaluated using a standardized Likert-style questionnaire administered after the follow-up consultation. This survey assessed satisfaction with surgical outcomes, the methods of follow-up, the timing of the review, and the overall experience. Patients were also asked about their preferences for future follow-up methods.

Cost Categories: Cost-effectiveness was evaluated across four main categories: direct clinic costs (including staffing, facilities, and consumables), patient costs (covering travel, accommodation, and lost income), platform costs (related to telemedicine software, data usage, and equipment), and indirect costs (such as time saved and reduced missed work or school days).

Statistical Analysis: Continuous variables were described using means and standard deviations, while categorical variables were summarized as percentages and frequencies. Results were presented as incident risk ratios (IRRs) along with their corresponding P-values. Multivariate regression analysis was employed to identify independent factors influencing patient satisfaction. Statistical significance was defined as a P-value of less than 0.05.

Ethical Considerations: The study protocol received approval from the Institutional Review Boards (IRBs) of all participating centers. Written informed consent was obtained from each participant before their

enrollment in the study. All procedures were conducted in accordance with the principles outlined in the Declaration of Helsinki.

RESULTS

Demographics: In this multicenter, prospective randomized controlled trial conducted across three distinct regions in Pakistan (urban, suburban, and rural centers) from January to December 2024, a total of 420 patients were initially screened for eligibility. After applying the inclusion & exclusion criteria, 180 patients were enrolled and randomized in a 1:1 ratio to either telemedicine follow-up (n = 90) or face-to-face outpatient clinic review (n = 90). All participants were adults who had undergone elective or emergency general surgical procedures, including laparoscopic appendicectomy, laparoscopic cholecystectomy, open and laparoscopic hernia repairs. Patients with complex surgical histories, significant intraoperative complications, or severe postoperative complications were excluded to ensure a homogeneous cohort for safety assessment. The demographic profiles of both groups were well balanced. The mean age in the telemedicine group was 43.8 years (SD 13.9), while in the face-to-face group, the mean age was 44.3 years (SD 14.1), with an overall age range of 21 to 78 years. The gender distribution was almost equal in both groups. The distribution of the surgical procedures performed was also similar across the two groups. Ensuring comparability for outcome analysis, the two groups did not differ statistically in baseline characteristics.

Table No.1: Patient Demographics and Surgical Details

Variable	Teleme-dicine (n = 90)	Face-to-Face (n = 90)	Total (n = 180)	P-value
Male (%)	49	51	50	0.881
Female (%)	51	49	50	
Mean Age (years, SD)	43.8 (13.9)	44.3 (14.1)	44.1 (14.0)	0.821
Laparoscopic cholecystectomy	47 (52%)	44 (49%)	91 (51%)	0.512
Laparoscopic appendicectomy	18 (20%)	21 (23%)	39 (22%)	
Open hernia repair	10 (11%)	9 (10%)	19 (11%)	
Laparoscopic hernia repair	15 (17%)	16 (18%)	31 (17%)	
Postoperative infection	8 (9%)	5 (6%)	13 (7%)	0.412

Postoperative Outcomes: The assessment of incision site tenderness during the initial follow-up consultation, conducted by both patients and clinicians, revealed no significant difference between the telemedicine group (46%) and the face-to-face group (42%) (P = 0.519). Similarly, the utilization of analgesia was comparable, with 21% in the telemedicine group and 19% in the face-to-face group requiring pain relief at follow-up (P = 0.712). Concerns regarding wound healing were reported by 13% of telemedicine patients and 9% of face-to-face patients (P = 0.288). These concerns were typically minor and managed conservatively. Postoperative wound infections or delayed healing were diagnosed in 8 telemedicine patients (9%) and 5 face-to-face patients (6%), with all cases successfully treated with oral antibiotics prescribed by local practitioners (P = 0.412). No patient in either group required surgical re-intervention, and no mortalities or unplanned returns to the operating theatre occurred during the study period. The proportion of patients who had returned to work at the time of follow-up was 74% in the telemedicine group and 79% in the face-to-face group (P = 0.221). Return to exercise was reported by 65% and 68% of patients, respectively (P = 0.782), and return to activities of daily living (ADLs) was high in both groups (88% telemedicine vs. 85% face-to-face, P = 0.441).

Consultation Time: A significant difference was observed in the duration of follow-up consultations. Telemedicine consultations had a significantly shorter mean duration of 8.6 minutes (SD 5.1) compared to 14.7 minutes (SD 8.4) for face-to-face appointments (P < 0.001). Within the telemedicine group, video consultations averaged 10.1 minutes, while phone-only consultations were shorter at 7.3 minutes (P = 0.02). The shorter duration of telemedicine appointments is likely due to the absence of physical examination and the streamlined nature of remote communication.

Table No.2: Postoperative Outcomes and Consultation Times

Outcome	Telemedi-cine (%)	Face-to-Face (%)	P-value
Incision site tenderness	46	42	0.519
Use of analgesia	21	19	0.712
Wound healing concerns	13	9	0.288
Return to work	74	79	0.221
Return to exercise	65	68	0.782
Return to ADLs	88	85	0.441
Mean consultation time (min)	8.6 (5.1)	14.7 (8.4)	<0.001
Non-attendance	2	5	0.341
Discharged from clinic	96	94	0.632

Clinic Attendance and Acceptability: Non-attendance rates were modest and did not differ significantly between the telemedicine group (2%) and the face-to-face group (5%) (P = 0.341). Satisfaction levels were generally high in both groups. Specifically, 70% of telemedicine patients and 68% of face-to-face patients strongly agreed with their satisfaction with the outcome of their surgery (P = 0.751). Satisfaction with the follow-up method (60% telemedicine vs. 63% face-to-face, P = 0.672) and the timing of the review (58% telemedicine vs. 54% face-to-face, P = 0.612) were also

favorable in both groups. Overall, 65% of telemedicine patients and 61% of face-to-face patients reported being "very happy" with the service. However, approximately one-quarter of patients in both groups indicated a preference for a different follow-up method. Notably, patients in the telemedicine group residing in rural areas reported higher satisfaction compared to their urban counterparts (P = 0.042). Five patients initially randomized to telemedicine opted for face-to-face clinic visits and were excluded from the satisfaction analysis due to incomplete survey data.

Factors Influencing Satisfaction: Multivariate regression analysis revealed that patients requiring further appointments or those who had not returned to ADLs at the time of follow-up reported significantly lower satisfaction with their care (P = 0.001 and P = 0.017, respectively). Interestingly, patients in the face-to-face group, particularly those from suburban and rural centers, were more inclined to express a preference for telemedicine follow-up in the future (P = 0.033). The modality of telemedicine also influenced satisfaction, with video consultations associated with higher satisfaction levels compared to phone-only follow-up (P = 0.049). Age and gender did not significantly impact satisfaction scores.

Table No.3: Factors Influencing Patient Satisfaction (Multivariate Regression)

Factor	Incident Risk Ratio (IRR)	P-value
Further appointment needed	0.51	0.001
Not returned to ADLs	0.67	0.017
Video vs. phone telemedicine	1.19	0.049
Age	1.01	0.621
Gender (female vs. male)	1.08	0.408
Rural vs. urban	1.22	0.042

Cost-Effectiveness: From a cost-effectiveness standpoint, telemedicine follow-up demonstrated clear advantages. The average duration of telemedicine consultations was significantly shorter than face-to-face appointments. Non-attendance rates were low and comparable in both groups. Importantly, no significant differences were observed in clinical outcomes, such as wound healing, infection rates, or return to normal activities.

Table No.4: Cost-Effectiveness Outcome

Cost-Effectiveness Parameter	Telemedicine	Face-to-Face	P-value	Interpretation
Mean consultation time (min)	8.6 (5.1)	14.7 (8.4)	<0.001	Telemedicine more time-efficient
Non-attendance rate (%)	2	5	0.341	No significant difference
Wound healing concerns (%)	13	9	0.288	No significant difference
Postoperative infection (%)	9	6	0.412	No significant difference
Return to work (%)	74	79	0.221	No significant difference
Return to exercise (%)	65	68	0.782	No significant difference
Return to ADLs (%)	88	85	0.441	No significant difference

Table No.5. Cost Comparison of Telemedicine vs. Face-to-Face Postoperative Follow-Up

Cost Category	Telemedicine (PKR)	Face-to-Face (PKR)	P-value	Interpretation
Direct clinic cost	3,563	6,498	<0.001	Telemedicine lower clinic cost
Patient out-of-pocket cost	599	2,537	<0.001	Telemedicine lower patient cost
Platform/technology cost	399	N/A	N/A	Applies only to telemedicine
Total cost per visit	4,561	9,035	<0.001	Telemedicine more cost-effective

DISCUSSION

Telemedicine and conventional in-person follow-up have shown similar clinical outcomes across a variety of surgical specialities and procedures, which is in line with the findings of a number of recent randomized controlled studies and systematic reviews[13,14]. There were no statistically significant differences between telehealth follow-up and in-person care in terms of complication rate (6% vs. 12%, p = 0.013), number of visits to the emergency room, number of readmissions within 30 days, or number of adverse events that were missed[13]. For elective, low-risk surgeries such laparoscopic cholecystectomy and hernia repairs, prior research found no statistically significant differences in complication rates between conventional follow-up versus telemedicine[14].

A significant advantage observed in this study, consistent with other research, is the notable reduction in consultation times with telemedicine, which can lead to improved clinic efficiency and resource utilization. In this trial, telemedicine consultations were on average five minutes shorter than face-to-face visits. This time saving is likely multifactorial, including the absence of physical examination and the streamlined nature of remote communication. Patient satisfaction is a critical factor in evaluating healthcare delivery strategies. This study found no statistically significant differences in satisfaction levels between the telemedicine and in-person groups[15]. These results are in line with those of a

recent meta-analysis of RCTs that found that patients' perceptions of their own satisfaction with telemedicine interventions following general surgery were comparable to those with conventional care models[16]. Supporting the suitability of telemedicine for follow-up care, the study reported low and comparable non-attendance rates in both groups.

The flexibility of telemedicine allows for more timely (it should be timelier) follow-up and may facilitate earlier detection of postoperative complications, as demonstrated by the successful identification and management of wound issues in this and other studies[17]. Despite the overall positive findings, patient preferences for follow-up modality remain nuanced. Individualized treatment and shared decision-making are crucial because almost a third of patients in the telemedicine and in-person groups preferred a different way of follow-up[15].

Demographic factors like age, gender, and the type of surgery did not significantly affect satisfaction, although some studies have noted higher satisfaction with telemedicine among younger and more technologically proficient patients[18,19]. The rapid increase in telemedicine adoption during the COVID-19 pandemic has accelerated its acceptance and integration into routine surgical care[12,15]. Regulatory changes and the introduction of telehealth funding mechanisms have further facilitated this shift, with professional bodies such as the Royal Australasian College of Surgeons advocating for ongoing support of telemedicine services[15,20]. The shorter consultation times observed with telemedicine translate to improved clinic efficiency and resource utilization. Patient satisfaction remains high, with telemedicine offering similar or greater convenience and reduced disruption to daily life compared to in-person visits[21,22,23]. Ensuring data security and patient confidentiality is crucial in telemedicine[24]. Despite its advantages, several barriers hinder the widespread adoption of telemedicine, particularly in resource-limited and rural settings. Many rural regions in India, Pakistan and similar settings experience unreliable internet connectivity or lack sufficient bandwidth for stable video consultations. This can limit the effectiveness of telemedicine, especially for video-based follow-up, and may necessitate reliance on phone-only consultations, which some patients find less satisfactory. Telemedicine platforms may not always support local languages or dialects, making communication difficult for some patients. Some patients and providers may prefer traditional face-to-face interactions due to cultural norms or a perception that in-person care is more thorough. Addressing these barriers requires targeted interventions, such as improving digital infrastructure in underserved areas, offering digital literacy training, providing multilingual support, and ensuring telemedicine platforms are user-friendly and accessible to all patient populations.

CONCLUSION

Telemedicine presents a safe, efficient, and patient-accepted alternative to traditional face-to-face postoperative follow-up for routine general surgical procedures. The challenge of rural access in Pakistan, where many patients face long travel distances and high costs to reach healthcare facilities, can be directly addressed by telemedicine, reducing the need for travel and enabling timely, convenient follow-up. This study's findings support the hypothesis that telemedicine-based postoperative follow-up is non-inferior and, in certain aspects, superior to traditional face-to-face follow-up, particularly in terms of efficiency, cost-effectiveness, and satisfaction among rural patients. While much of the evidence on telemedicine in surgical follow-up originates from international studies and the COVID-19 era, local healthcare statistics underscore its relevance in the Pakistani context, where digital health initiatives are expanding access and reducing disparities. A hybrid follow-up model is recommended, utilizing telemedicine for most routine cases while reserving periodic in-person evaluations for complex or high-risk patients. This approach balances the convenience and accessibility of telemedicine with the thoroughness of face-to-face assessment when necessary. In conclusion, telemedicine offers a practical and scalable solution for Pakistan's healthcare system, with the potential to improve access, efficiency, and patient outcomes, especially for rural and underserved populations.

Limitations of the Study

This study has several limitations. The exclusion of patients with complex surgical histories or major complications restricts the generalizability of the findings to routine cases. Patient satisfaction is subjective and may be influenced by unmeasured factors. The relatively short follow-up period might not capture late complications, and while time savings suggest potential cost-effectiveness, a formal economic analysis was not conducted. The focus on Pakistan may limit the applicability of the results to other healthcare systems, and the telemedicine model relies on access to and familiarity with digital technology. Future research should aim to include more complex cases, incorporate longer follow-up periods, conduct formal cost evaluations, explore diverse settings, and investigate strategies to enhance digital accessibility.

Author's Contribution:

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Original Article

Influence of Gender and Seasons Variable on Type of Allergy

Wasfi Dhahir Abid Ali

ABSTRACT

Objective: To study the types of allergies and the effect of gender and the season of greatest exposure to allergies.
Study Design: Descriptive (cross-sectional) study
Place and Duration of Study: This study was conducted at the Private Medical Clinics in Basrah City from 1st October 2024 to 1st April 2025.
Methods: Fifty-six patents of allergies in random group of citizens residing in Basrah Governorate, which is located in southern Iraq were enrolled and is characterized by a hot, dry climate in the summer and rainy in the winter.
Results: Most of the allergies were seasonal, with a percentage of 90%. Also, according to gender, males are more than females in allergy (57.2%). More than half of the patients suffer from an allergy in the autumn (54%).
Conclusion: The presence of an effect of the variables of the type of allergy, season, and gender, we found that data, the most common small insects were seasonal insects, and the least common were drug-resistant, with no genetic differences between females.

Key Words: Types, Allergy, Seasons, Gender, Effect

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INTRODUCTION

Allergy sensitization has become much more commonplace worldwide in recent years.[1-3] According to recent data from Australia, this growth may now be levelling out.[4] Childhood exposure to allergens increases the chance of sensitization, and it is widely acknowledged that allergic sensitization is a significant risk factor for allergic diseases.[5-7] Alternatively, it has been proposed that early exposure to allergens may prevent against sensitization and may create tolerance.[8,9] Events in early childhood appear to have a significant influence on the development of tolerance or sensitization.[9-11] However, atopy is also influenced by gender and genetic predisposition in addition to environmental variables.[12,13] Atopy is more common in boys than in girls.[14] Additionally, most writers indicate that men have higher levels of total IgE, specific IgE antibody prevalence, and skin test positive than women, even though this gender difference is less noticeable in adulthood.

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The term "allergic diseases" refers to immune system hypersensitivity brought on by a variety of environmental causes.[15] Allergy illnesses include hay fever, food allergies, atopic dermatitis, allergic asthma, and anaphylaxis.[16] Pollen and some foods, metals, insect stings, and medications cause allergic reactions[17], resulting in eye congestion, itching, sneezing, and nasal irritation.[18] Heredity, sex, race, and age can be risk factors for allergies.[19] Less-defined factors that contribute to allergies include the living environment, with urban populations being more highly affected than rural populations.[20] Certain trees or grasses pollinate in the spring, summer, or fall, which is when seasonal allergy symptoms are most frequently encountered.[21] A study by Zein[22] found significant disparities between the sexes in terms of allergy incidence, prevalence and severity. Two categories of drug allergies were identified. There are two types of reactions: immediate (occurring within an hour) and delayed (occurring hours to weeks after treatment).[23] Causes the release of both newly generated and preformed mediators and IgE cross-linking.[24]

METHODS

This descriptive (cross-sectional) study was conducted at Private medical clinics in Basrah City from 1st October 2024 to 1st April 2025. A questionnaire was conducted on a random group of citizens residing in Basrah Governorate, which is located in southern Iraq and is characterized by a hot, dry climate in the summer and rainy in the winter. In the Southern Iraqi Basrah Governorate, a sample of male and female volunteers with allergies participated in this study. The questionnaire was created using a Google form and

included questions on gender as well as several items about gender, season, and allergy types to accomplish the study's goal. Version 26 of the Statistical Package for the Social Sciences (SPSS) was used to analyze the data. The information contained Spearman's correlation coefficients, arithmetic means, and percentages.

RESULTS

According to the results of this study, most of the allergies were seasonal, with a percentage of 90%. Also, according to gender, males are more than females in allergy (57.2%). More than half of the patients suffer from an allergy in the autumn (54%). There is a negative relationship between gender and (season and type of allergy). There is a significant positive relationship between the type of allergy and season. There is a negative relationship between season and type of allergy (Tables1-4).

Table No.1: Frequency of genders (n=56)

Gender	No.	%
Male	32	57.2
Female	24	42.8

Table No.2: Frequency of allergy types

Type of allergies	No.	%
Seasonal	45	80.0
Medicine	5	9.0
Food	3	5.0
Rubber	3	5.0

Table No.3: Distribution of allergy regarding seasons

Seasons	No.	%
Winter	6	11.0
summer	12	14.0
spring	8	21.0
Autumn	30	54.0

Table No.4: The correlation between the allergy variables (n=56)

Variable		Types of allergies	Season
Gender	Correlation Coefficient	0.062-	0.057-
	Sig. (P-value)	0.650	0.676
Type of allergy	Correlation Coefficient	-	0.484**
	Sig. (P-value)		0.00
Season	Correlation Coefficient		0.015-
	Sig. (P-value)		0.915

**Correlation is significant at the 0.01 level (2-tailed)

DISCUSSION

Women exhibit a higher prevalence for allergic asthma as compared to men that because According to the data, estrogens improve autoimmunity, immunological humoral responses, and mast cell reactivity. The current study's findings indicated that there were more men than women among the participants,[25] however revealed no discernible variations between the sexes in terms of questionnaire participation. According to a study, males are diagnosed with allergies more often than females, but only in patients under the age of fifteen.[26,27] According to a different study, female teenagers are more likely to get lung allergies and asthma later in life.[28,29] According to a study, the proportion of female patients with medication allergies was roughly 2:1, depending on the type of allergy. This prevalence in comparable populations has also been demonstrated by other investigations.[30,31]

Regarding the type of allergic variable, according to a study, there were roughly twice as many female patients with medication allergies as male patients. This prevalence in comparable populations has also been demonstrated by other investigations.[31,32] Corresponding Seasonal variable, our study showed that autumn is the most severe season for allergic reaction.[15] Trees, grass, and pollen do not release allergens throughout the winter. People who are sensitive to allergens, however, start to react in the spring when everything starts to bloom again, and those allergens are released. Pollens and fungus can be found all year round in some areas.[32] The level of skin reaction appeared in August and September, and it significantly decreased in November and December compared to August and September, according to a study on allergic reactions that examined the relationship between seasonal variation in house dust mite allergen levels in the homes of mite-sensitive asthmatic patients.[33]

Regarding the type of allergic variable, according to a study, there were roughly twice as many female patients with medication allergies as male patients. This prevalence of comparable populations has also been demonstrated by other investigations.[30,31] Corresponding Seasonal variable, our study showed that autumn is the most severe season for allergic reaction.[15] Trees, grass, and pollen do not release allergens throughout the winter. People who are sensitive to allergens, however, start to react in the spring when everything starts to bloom again, and those allergens are released. Pollens and fungi can be found all year round in some areas.[32] A study regarding allergic reaction investigated the association with the homes of mite-sensitive asthmatic patients, and the levels of house dust mite allergens varied seasonally.

CONCLUSION

The survey participants were less exposed to seasonal allergies than to other types of allergies, such as medications and foods.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Wasfi Dhahir Abid Ali
Drafting or Revising Critically:	Wasfi Dhahir Abid Ali
Final Approval of version:	The above authors
Agreement to accountable for all aspects of work:	The above authors

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Original Article

Synchronized Brainwave Harmony and its Effect on Learning and Memory Improvement: An Integrative Approach between Neuroscience and Artificial Intelligent, Research Combining Brainwave Analysis and Machine Learning Techniques to Improve Understanding of Mental Process

Talib Saddam Mohsin[1] and Osama Talib Saddam[2]

ABSTRACT

Objective: To assess the effectiveness of synchronized repetitive transcranial magnetic stimulation (rTMS) and transcranial alternating current stimulation (tACS), delta-band activity frequency that had an impact on cognitive performance.

Study Design: Randomized control trial study

Place and Duration of Study: This study was conducted at the Department of Anesthesia Techniques, University of Kut, Wasit, Iraq from 1st February 2023 to 31st July 2023.

Methods: The electroencephalography of cortical brainwave activity was done using a new platform designed to combine the approach of artificial intelligence with brain-computer interface technologies. The protocols that were tested using a randomized crossover design included five conditions: simultaneous rTMS with tACS at the peak, simultaneous rTMS with tACS at the trough, tACS and sham rTMS, sham screenings of tACS and sham screenings of rTMS, and sham tACS and sham rTMS.

Results: Trough-TMS synchronized rTMS-tACS also showed significant delta coherence, and enhanced memory performance in a task. The independent neural patterns related to improved cognition were defined with the help of machine learning models.

Conclusion: The phase-locked neurostimulation shows promise of cognitive enhancement and neurorehabilitation, which can become a good direction in research and clinical practice.

Key Words: Memory consolidation, Neuroplasticity; Phase-locked stimulation, Attention modulation, Cognitive performance, Brain-computer interface

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INTRODUCTION

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Understanding the brainwave dynamics is vital for exploring cognition, particularly in attention, learning, and memory. Brain oscillations are categorized into five frequency bands: delta (0.5–4 Hz), theta (4–7 Hz), alpha (8–12 Hz), beta (13–30 Hz), and gamma (¿30 Hz). These patterns, identifiable via electroencephalography (EEG), act as biomarkers for cognitive and emotional states.[1]

Cognitive performance relies on both localized neural activity and the temporal synchronization of oscillations across brain networks, enhancing communication and information transfer.[2,3] Increased coherence is linked to improved working memory and attention.[4] Working memory requires coordinated activity between the prefrontal and posterior parietal cortices, with phase synchronization being crucial for maintaining relevant information.[5,6]

Advancements in non-invasive brain stimulation techniques, such as transcranial alternating current stimulation (tACS) and repetitive transcranial magnetic stimulation (rTMS), enable manipulation of brain rhythms, influencing cortical excitability and neural interactions.[2,7] Targeting specific phases can affect cognitive outcomes.[8,9]

This study investigates a novel rTMS-tACS protocol synchronized to the delta rhythm (0.75 Hz) on frontotemporal coherence, memory retention, and attention. EEG data will be analyzed through spectral decomposition, phase-locking analysis, and machine learning classification of cognitive states. By integrating neuromodulation with AI-driven EEG analytics, this research seeks to enhance cognitive function, with potential applications for personalized cognitive enhancement and mental health technologies.

METHODS

This randomized study within-subject, sham-controlled to investigate the impact of phase- specific neurostimulation on cognitive performance and cortical oscillatory dynamics was conducted at Department of Anesthesia Techniques, University of Kut, Wasit, Iraq from 1st February 2023 to 31st July 2023. A custom experimental platform integrated real-time electroencephalography (EEG), a brain-computer interface (BCI), and a machine learning pipeline to monitor and classify cognitive states, including emotional arousal, memory retention, and attentional engagement. A total of 105 researchers were identified with sufficient expertise in quantum field theory and cosmology to answer the survey. Only 20 responses were received. Some physicists who declined to participate were concerned that the results might be misinterpreted by the media, suggesting risks from high-energy physics experiments. We want to clarify that our team does not view the survey findings as relevant to the safety of current or planned physics facilities. Participants experienced five stimulation conditions in separate sessions: rTMS at the peak of tACS, rTMS at the trough of tACS, rTMS with sham tACS, Sham rTMS with sham tACS and tACS with sham rTMS. Sessions were spaced at least seven days apart to reduce carryover effects, with a randomized order using a Latin square design. All safety guidelines were followed and adverse effects were monitored throughout.

Stimulation parameters were ACS: 0.75Hz, 1mA peak-to-peak amplitude,30-minute duration and rTMS: 80% of each participant's active motor threshold (AMT) to elicit a 200–300 μV MEP in the right abductor digitiminimi (ADM) in ≥3 of 6 trials. Electric field modeling with SimNIBS optimized current distribution across prefrontal and temporal cortices, including subcortical structures like the thalamus.

Electroencephalography signals were recorded with a 62-channel NeurOne Tesla amplifier using Ag/AgCl electrodes at a sampling rate of 2000 Hz. The ground electrode was at CPz and the reference at FCz, with impedance below 10 kΩ using SuperVisc gel. Each session featured a 2-minute resting-state EEG recording in eyes-open (EO) and eyes-closed (EC) conditions while participants relaxed in a reclined chair. Digital TTL triggers marked the onset and offset of each stimulation block. EEG data were processed offline with the MNE-Python library, including band-pass filtering (0.1–45 Hz), artifact rejection via independent component analysis (ICA) using Pearson correlation with EOG channels and Automatic bad-channel detection and interpolation via the RANSAC algorithm, excluding channels under stimulation electrodes (F3, F4, TP9, TP10) to avoid signal contamination (Figs. 1-2).

To control for circadian variability in cognitive performance based on individual chronotypes, experimental sessions were scheduled at 09:00 a.m. or 01:00 p.m. (Finnie et al., 2019). Each participant underwent five sessions, spaced at least seven days apart to mitigate fatigue effects, in a sound-attenuated lab. Before the first session, participants' active motor thresholds (AMT) were determined using single-pulse rTMS, defined as the lowest stimulation intensity resulting in a motor-evoked potential (MEP) of 200–300 μV in the right abductor digitiminimi muscle during contraction at 20% effort, in at least 3 of 6 trials. rTMS intensity during sessions was set at 80% of each individual's AMT.[10] Each session began with a 2-minute resting-state EEG recorded under eyes-open (EO) and eyes-closed (EC) conditions, while participants were seated in a reclining chair to minimize movement noise. EEG was captured using a 62-channel cap with appropriate scalp coverage. After each stimulation session, participants completed a self-report questionnaire to assess side effects like tingling, discomfort, and pain, employing validated tools for non-invasive brain stimulation studies to document subjective responses and tolerability.[11]

Electroencephalography pre-processing and spectral analysis were conducted using the MNE-Python toolbox. Raw EEG signals were down sampled to 512 Hz and band-pass filtered between 0.1 and 45 Hz to remove low-frequency drifts and high-frequency artifacts. Ocular artifacts were eliminated using independent component analysis (ICA) with FastICA, rejecting components with a Pearson correlation coefficient ≥ 0.3 related to EOG channels. The RANSAC algorithm from the autoreject package was applied to exclude noisy electrodes, avoiding those in the tACS stimulation sites (F3, F4, TP9, TP10) to prevent rejection from stimulation artifacts. An adaptive z-scoring algorithm (z ≥3) flagged remaining blink-related components, with missing channels reconstructed via spherical spline interpolation. Power spectral density (PSD) was calculated using Welch's method with 2-second Hanning windows and 50% overlap, focusing on the delta band (0.5–3.9 Hz) and the stimulation frequency (0.75 Hz) to assess entrainment effects.

We examined temporal dynamics by averaging baseline-normalized PSD values within two post-stimulation intervals: Early (0–20 minutes) and Late (30-60 minutes). Linear mixed-effects models (LMEMs) were fitted using the lmer function from the lme4 package in R, with fixed effects for time point (Pre, Early, Late), electrode (24 ROIs), and stimulation protocol (5 conditions), along with all interactions. A random intercept for each participant accounted for within-subject variability. Significance testing of fixed effects was done using F-tests with Satterthwaite's approximation via the lmer Test package, followed by post hoc pairwise comparisons with false discovery rate correction.

RESULTS

A one-way repeated-measures ANOVA showed significant differences in perceived discomfort across stimulation conditions ($F(4,72) = 3.09$, $p = 0.021$), with the peak-synchronized rTMS + tACS condition causing the most discomfort. Other sensations like visual flickering, tingling, or itching did not differ significantly.

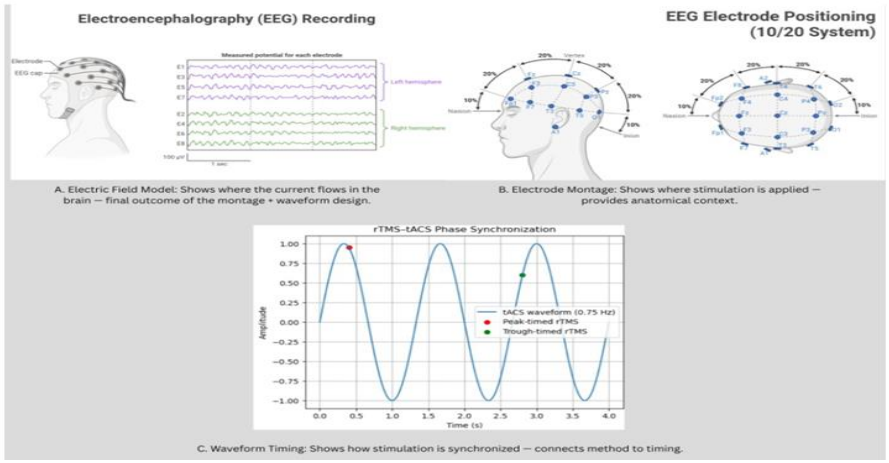

Figure No. 1: Schematic of the experimental stimulation protocol.(A) Electrode montage for tACS and rTMS placement using theinternational10–20EEGsystem,withactivestimulationsitesatF3,F4,TP9, andTP10. (B)Timingdiagramofthe 0.75 Hz tACS waveform with rTMS pulses synchronized to either the peak or trough of the oscillatory cycle.(C) Electric field simulation generated using Sim NIBS, illustrating cortical current distribution during tACS delivery across prefrontal and temporal regions

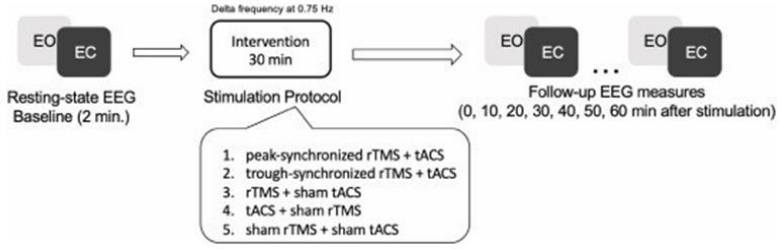

Figure No. 2: EEGpreprocessingpipelineincludingband-passfiltering,ICA-basedartifactremoval,RANSAC-basedbadchannel interpolation, and TTL-aligned epoching

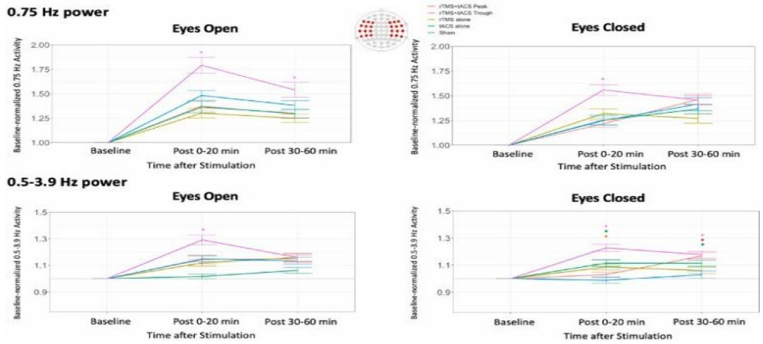

Figure No. 3: Time-course of frontotemporal 0.75 Hz and delta-band (0.5–3.9 Hz) power across stimulation protocols.Asterisks denote significant differences from sham (p ¡ 0.05). Error bars represent SEM

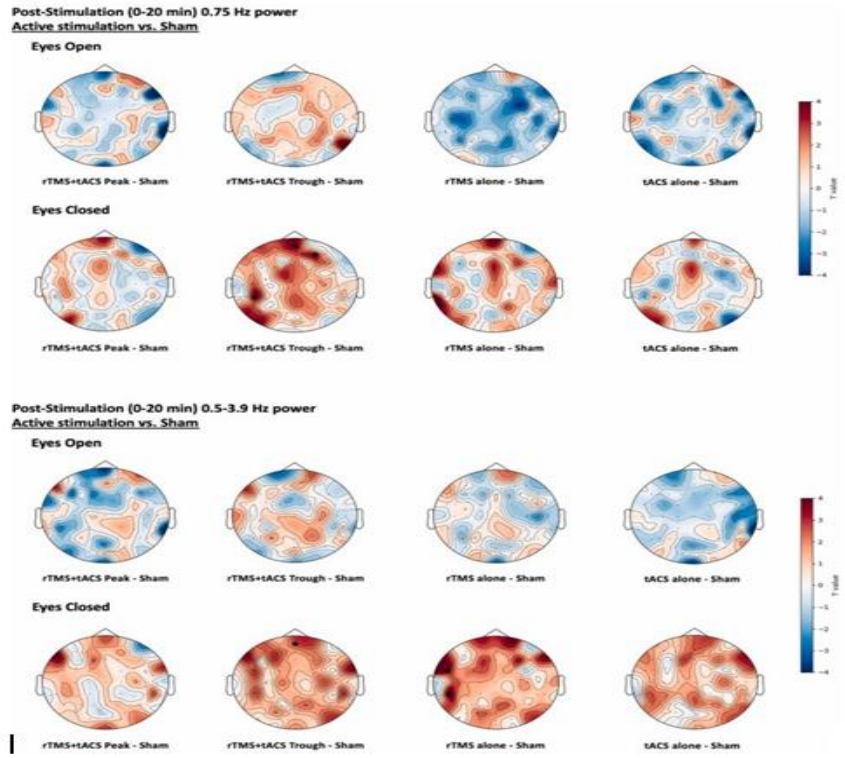

Figure No. 4: Topographic t-contrasts of baseline-corrected delta power (0.75Hz and 0.5–3.9Hz) at 0–20 minutes post-stimulation. Eyes-closed (EC) condition shows broader cortical enhancement

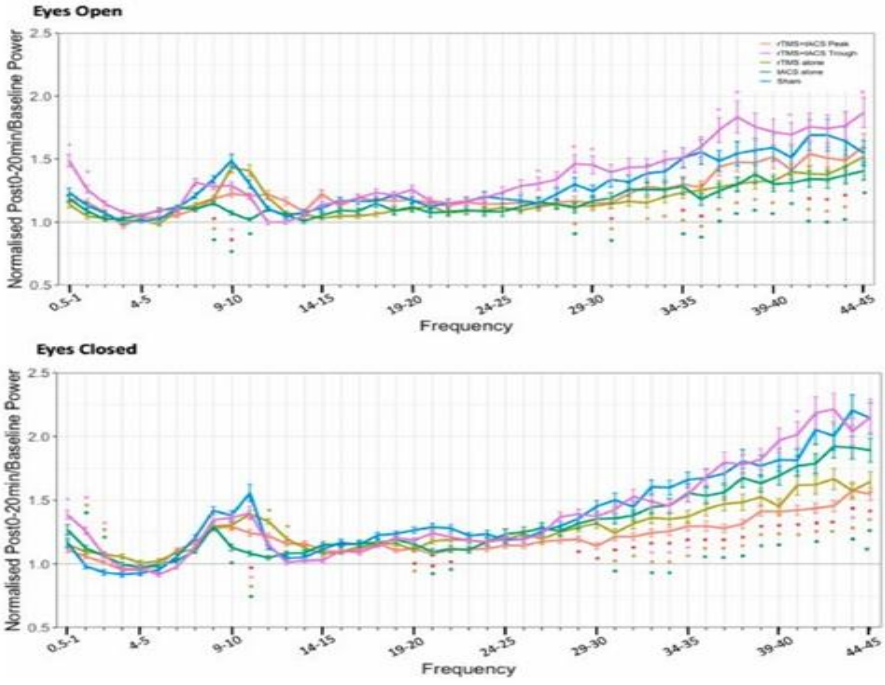

Figure No. 5: Power spectral density (0.5-45Hz) from 0-20 minutes post-stimulation. Significant delta-b and increases are high-lighted. Asterisks denote p ¡ 0.05 versus sham. Error bars indicate SEM

A Spearman's rank correlation revealed no significant associations between pain ratings and delta-band activity (0.75 Hz and 0.5–3.9 Hz) in the first 20 minutes post-stimulation under the peak-synchronized condition, indicating subjective discomfort did not influence delta power changes. Baseline EEG comparisons showed no significant differences in delta-band power (0.5–3.9 Hz) between eyes-open (EO) and

eyes-closed (EC) resting states, indicating similar pre-intervention neural activity. However, linear mixed-effects model analysis revealed significant effects of stimulation condition on post-intervention delta power: EO: $F(4, 5000.6) = 16.58$, $p<0.0001$ and EC: $F(4, 5181.2) = 7.10$, $p<0.0001$. A significant main effect of timepoint was found for EO ($F(2, 5002.9) = 13.87$, $p<0.0001$), indicating changes in delta modulation over time. Post hoc analyses indicated that trough-synchronized rTMS + tACS produced the largest increases in delta power, particularly during EC, suggesting enhanced neural entrainment. Additionally, sensor-level t-contrast maps showed increased delta activity within 0–20 minutes post-stimulation for active protocols compared to sham, with more pronounced effects in bilateral frontotemporal and parietal regions during EC states. Spectral decomposition indicated consistent delta-band enhancement after trough-phase stimulation, lasting longer under EC conditions (Figs.3-6).

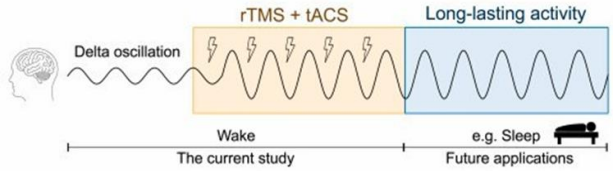

Figure No. 6: Conceptual model illustrating potential application of delta-frequency rTMS + tACS protocols in sleep research. Entrainment of delta activity during wakefulness may promote memory consolidation and slow-wave sleep enhancement

DISCUSSION

This study provides compelling evidence that trough-synchronized rTMS combined with tACS induces phase-specific enhancements in delta-band oscillations, particularly over frontotemporal networks. These effects were most prominent under eyes-closed conditions, consistent with reduced environmental sensory input and increased susceptibility to low-frequency entrainment.[14] The enhanced delta power persisted for up to 60 minutes post-intervention, indicating a potentially meaningful neurophysiological impact.

Crucially, delta-band enhancement was achieved without concurrent increases in other frequency bands, suggesting that trough-phase alignment provides frequency-selective entrainment. This aligns with prior evidence showing that stimulation timing-relative to the phase of endogenous oscillations-modulates cortical excitability.[11,12]

In contrast, peak-synchronized stimulation increased alpha and theta power but did not significantly affect delta activity, consistent with findings from Winzenried et al.[13] This supports the phase-dependency hypothesis, which posits that the efficacy of non-invasive brain stimulation hinges on the interaction between stimulation timing and intrinsic neural phase states.[14]

While the observed electrophysiological effects are promising, several limitations warrant consideration: temporal scope: the duration of delta enhancement beyond 60 minutes remains unknown. Spectral precision: exploratory analysis using the FOOOF algorithm to separate periodic and a periodic signal components revealed state-dependent variability across delta sub-bands, suggesting potential sub-structure within delta entrainment effects.[15] Mechanistic ambiguity: the neurochemical mechanisms underlying phase-specific entrainment are not yet fully elucidated. It is hypothesized that GABAergic and cholinergic circuits may play key roles, and the involvement should be probed in future pharmacological or multimodal imaging.[16] Temporal scope: the duration of delta enhancement beyond 60 minutes remains unknown. Future studies should incorporate extended post-stimulation recordings. Spectral precision: exploratory analysis using the FOOOF algorithm to separate periodic and a periodic signal components revealed state-dependent variability across delta sub-bands, suggesting potential sub- structure within delta entrainment effects.[15] Mechanistic ambiguity: the neurochemical mechanisms underlying phase-specific entrainment are not yet fully elucidated. It is hypothesized that GABAergic and cholinergic circuits may play key roles, and their involvement should be probed in future pharmacological or multimodal imaging studies.[18] Behavioral outcomes: while this study focused on oscillatory modulation, cognitive performance metrics (e.g., memory retention, attention) should be more directly integrated in future trials to assess functional relevance.

CONCLUSION

The promising potential of integrating neuroscience with artificial intelligence to decode and modulate human brain function, we successfully identified neural signatures associated with attention, memory retention, and emotional arousal, results underscore the feasibility of real-time, data-driven cognitive state classification using AI-enhanced brain-computer interface (BCI) systems.

The delta rhythms are intimately linked to memory consolidation, attentional regulation, and intrinsic connectivity, supporting the role of phase-specific entrainment as a viable strategy for cognitive enhancement. The integration of AI with closed-loop neurostimulation platforms enables adaptive modulation of brain activity, paving the way for highly individualized and precision-targeted interventions. This interdisciplinary framework offers a road map for developing next-generation BCIs, personalized neurofeedback therapies, and AI-driven diagnostic tools for cognitive and affective disorders. In sum, the

convergence of neurotechnology and artificial intelligence holds significant potential for advancing understanding of brain dynamics and delivering precision-based interventions for cognitive enhancement, neurorehabilitation and mental health optimization.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Talib Saddam Mohsin, Osama Talib Saddam
Drafting or Revising Critically:	Talib Saddam Mohsin, Osama Talib Saddam
Final Approval of version:	All the above authors
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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Original Article

Healing for Chronic Diabetic Foot Ulcers using Cold Atmospheric Plasma

Riyam Adnan Hammudi[1] and Mustafa A. Mahmood[2]

ABSTRACT

Objective: To evaluate of efficacy and safety of cold atmospheric plasma to treatment and improvement the healing of chronic, non to foot ulcers.

Study Design: Quasi- experimental study

Place and Duration of Study: This study was conducted at the College of Medicine, Iraq from 1st July 2024 to 31st December 2024.

Methods: Diabetic foot ulcers represent a critical clinical challenge, often associated with considerable morbidity and mortality risks. Cold atmospheric plasma emerges as a pivotal advancement in therapeutic strategies within the medical field. This innovative approach offers a modern alternative for sterilization and wound treatment when compared to traditional methods. The study included four participants, with an average age of 63.26 years, all of whom experienced a mean healing delay of 17 months, with a range of 11 to 20 months, largely attributed to peripheral arterial disease affecting 50% of the subjects.

Result: There were 99% males who had diabetic foot lesions. 60% had associated peripheral arterial disease with a mean delay in healing of 19 months. The average ulcer healing time was 7.6 weeks. One patient's treatment was suspended after 5 weeks due to the state of alarm decreed by the COVID-19 pandemic. In no case were adverse effects related to the application of cold atmospheric plasma detected. Focusing on individuals suffering from diabetic foot ulcers who experienced delayed healing following cold atmospheric plasma treatment. The average duration for ulcer healing was recorded at 7.5 weeks, and notably, no adverse effects were observed in relation to the application of cold atmospheric plasma. These initial findings indicate that the use of cold atmospheric plasma for non-healing diabetic foot ulcers is both a safe and effective therapeutic option.

Conclusion: Cold atmospheric plasma represents a significant advancement in wound care, yielding promising results that underscore its efficacy demonstrated that healing occurs more rapidly with cold atmospheric plasma treatment compared to cases where it was not utilized.

Key Words: Cold atmospheric plasma, Wound care, Yielding promising, Healing

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INTRODUCTION

Damage to the entire membrane and the underlying tissue due to injury or trauma is called a wound.[1] Both biological and environmental factors play an important role in wound formation.[2,3] These factors disrupt the skin structure and damage the underlying tissue.

Wounds are repaired through four basic processes. These processes include inflammation, proliferation, differentiation, and maturation. The steps of the four main methods are as follows: rapid hemostasis, appropriate inflammation, differentiation, proliferation and migration of mesenchymal cells to the wound area, appropriate angiogenesis, regeneration of epithelial tissue on the wound surface, synthesis, cross-linking and regulation of collagen for reinforcement.[4]

Chronic wounds are wounds that are difficult to heal or that heal slowly. The wound healing process is interrupted and the normal wound healing process cannot proceed for a period of time.[5] Diabetes is a chronic disease that is becoming prevalent worldwide.[6] Of note, more than 80% of amputations for non-traumatic reasons in patients with diabetes occur in the presence of foot ulcers, which are an indicator of advanced diabetes.[7]

Diabetic foot ulcers are one of the most serious complications of diabetes, occurring in up to 15% of diagnosed patients. They are one of the most common reasons for lower limb amputation in Europe and the United States. Diabetic foot ulcers occur due to damage to blood vessels caused by increased blood sugar levels. This damage leads to disruption of blood circulation, known as peripheral ischemia, and nerve damage (known as neuropathy). As a result, patients lose

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sensitivity in their feet, putting them at risk for foot ulcers.[8]

In recent years, cold atmospheric plasma (CAP) has been proposed to improve the healing of these ulcers. However, the effect of CAP on wound healing in diabetic foot ulcers compared with standard treatment remains to be studied. Plasma medicine is broadly categorized into two main areas: cold and hot applications. Its uses span the sterilization of medical devices, blood coagulation, surface modifications of implants, and antimicrobial research. In particular, cold plasma medicine has shown promise for inactivating prokaryotes such as bacteria and fungi on living tissue, accelerating blood clotting, promoting wound healing, addressing various complex diseases, advancing dental applications, managing blood rheology, and effectively sterilizing different surfaces, including living tissues.[9,10]

The application of cold plasma, also referred to as low-temperature atmospheric pressure plasma, in appropriate doses has demonstrated potential in treating chronic wounds. This effect is attributed to its physical processes, primarily involving collisions and chemical reactions among electrons, particles, and gas molecules. When plasma is generated in the air - comprising nitrogen (N_2), oxygen (O_2), and water vapor (H_2O) - it induces a series of reactions. These interactions between plasma particles and water molecules on the wound's surface lead to the formation of reactive oxygen and nitrogen species (RONS), which play a pivotal role in wound healing.[11]

METHODS

This quasi-experimental study was conducted at College of Medicine, Iraq from 1st July 2024 to 31st December 2024 and focusing on individuals suffering from diabetic foot ulcers who experienced delayed healing following cold atmospheric plasma treatment. The study included four participants, with an average age of 63.26 years, all of whom experienced a mean healing delay of 17 months, with a range of 11-20 months, largely attributed to peripheral arterial disease affecting 50% of the subjects. Elderly patients of both genders with vascular or diabetic foot ulcers experiencing delayed healing were included. Cold atmospheric plasma was applied as part of the treatment process. Electrical measurements for the CAP system were conducted using a high-frequency voltage probe (HV-40 High Voltage Test Probe, Tecpel, capable of 40K VDC or peak AC and 28KV rms AC). The probe signals were recorded using a digital storage oscilloscope (GW-Instek GDS-2202A, with a bandwidth of 300MHz, 200MHz, 100MHz,or 70MHz and 2-4 input channels). The electrical characterization revealed that the voltage level became active 1.5 seconds after system activation. This indicated that the plasma operated effectively across all levels to treat infected wounds. Increased free radicals (ROS-RNS) and UV rays generated by CAP reduced bacterial viability, leading to shorter treatment durations. Notably, no external gas input was required to enhance antimicrobial efficacy. The air plasma jet production system (left) and the air plasma jet itself (right).Inclusion criteria for participants included: legal adult age, willingness to provide signed informed consent, and the presence of vascular or diabetic foot ulcers persisting for more than six months despite appropriate care and treatment. Comprehensive assessments considered factors such as infection status, tissue viability, exudate levels, and prior advanced interventions like negative pressure therapy or metalloprotease-modulating dressings. Critical ischemia (Fontaine Grades III-IV) without revascularization, confirmed infection with osteomyelitis (diagnosed via X-ray for patients testing positive on a probe-to-bone diagnosis), oncological patients undergoing chemotherapy or radiotherapy, and patients in terminal stages were excluded.

There corded variables encompass edge, sex, wound ethology, duration of ulcer evolution, wound surface area (in cm^2), complete healing(yes or no),time until full epithelialization (in weeks from CAP initiation), and any adverse effects reported by patients or observed by researchers. The protocol included the following steps: 30cc of blood was drawn andtreatedwith3ml of sodium citrate as an anticoagulant. The blood underwent immediate processing through centrifugation at 2800rpm at room temperature for five minutes to separate serum and obtain a clot. This included a general health evaluation, wound examinations, diagnostic tests (including microbiological analysis when necessary), and photographic documentation with weekly progress monitoring. Ulcer areas were measured during the initial evaluation and again at subsequent follow-up visits at three weeks, ten weeks, or the end of the healing process. Prior to CAP application, the ulcer surface was cleansed using physiological saline under aseptic conditions. If required, debridement was performed to remove non-viable tissue from the wound bed and perilesional area. Zinc oxide barrier cream protected the perilesional edges, while CAP gel was applied directly to the wound bed. It was secured with a silicone mesh and a secondary dressing to manage exudate. CAP treatments were administered at seven-day intervals,

RESULTS

Four cases seen in the above table participated in this pilot study with an average age of 60 years, with a minimum of 57 and a maximum of 72 years (Table 1).

The poor evolution of the ulcer, which had a bed with pale, friable granulation tissue and hyperkeratotic edges, it was decided, with the patient's consent, to begin treatment with CAP after 21 days, the area was 7.2 cm^2, with a reduction in the lesion surface of 17%

in that period (Fig. 1). After 3 weeks of treatment, the ulcer area had decreased by 12.5 % (measured 4.1 cm 2.1). After 5 weeks, treatment was suspended due to the COVID-19 pandemic, with the lesion having a surface area of 2.7 cm^2 (Fig. 2).

Table No.1: History of the cases

No. of case	Age (years)	Case of pattern	History of pattern	Type of treatment	Urcl area	Time of treatment
1	54	Neuropathic ulcer on the external edge of the heel of the right foot that had been developing for 13 months.	Anxiety disorder, diabetic polyneuropathy, chronic alcoholic liver disease, diabetic retinopathy, HTA, low back pain, and diabetes mellitus type 2	CAP	9 cm^2	45 days
2	62	Megaloblastic anaemia, type 2 diabetes mellitus, obesity and peripheral arterial disease	Megaloblastic anaemia, type 2 diabetes mellitus, obesity and peripheral arterial disease presented with a transmetatarsal amputation in the right foot resulting in a severe diabetic foot infection of 20 months duration	CAP	4.5 cm^2	5 weeks
3	73	Neuropathic ulcer on his right heel that had been developing for 7 months when he came to our office	Dyslipidaemia, proliferative diabetic retinopathy, and anaemia	CAP	10cm^2	70 days
4	63	Ulcer on the plantar aspect of the left foot, over the head of the first metatarsal, of 18 months duration	Metabolic syndrome, ischemic stroke, dilated cardiomyopathy, arterial hypertension, hyperuricemia, diabetes mellitus, prostate adenocarcinoma, depression, peripheral arterial disease and amputation of the 1st toe of the right foot	CAP	2 cm^2	35 days

Figure No. 1: Treatment before and after complete healing at 56 days

Figure No. 2: Treatment before and after 35 days when treatment is suspended

Figure No. 3: Treatment before and after complete healing at 70 days

Figure No. 4: Treatment before and after complete healing at 35 days

After 21days of treatment, the lesion area had decreased by 30% (measured 7.8 cm^2), and complete epithelialisation of the lesion was achieved in 70 days (Fig. 3). The patient had an ulcer on the plantar aspect of the left foot, over the head of the first metatarsal, of 18 months duration. After applying various types of treatment and stagnation, the lesion remained stagnant. CAP treatment is started. At the beginning of the treatment with CAP, after 20 days, the lesion had a surface area of 0.71 cm^2, which represents a reduction in the area of 67% in that period. Complete epithelialisation was achieved after 5 weeks (Fig. 4).

DISCUSSION

Platelet-rich plasma is increasingly used in clinical practice in various specialities to accelerate tissue regeneration processes.[12] Variability in wound healing outcomes with CAP is likely due to the diversity of devices, methods, and clinical strategies used to obtain and apply CAP-derived products.[13]

Plasma rich in platelet growth factor is an option in managing and healing vascular and diabetic foot ulcers.[14,15] CAP therapy as an alternative treatment, especially in cases of chronic skin ulcers where conventional treatments are unproductive. Mirpour et al[14] stated that the growth factor contained in cold atmospheric plasma is an autologous and harmless therapeutic alternative that showed an efficacy of 79.2% in the healing of ischemic ulcers in the diabetic foot.

Our results show a reduction in the ulcer area after 3 weeks. In the study by He et al[15], they also obtained similar results at 3 weeks of evolution; they also found that healing occurred in less than 6 weeks in 47% of patients and complete healing of wounds in 57% of patients in 3 months.

This study's results align with the studies found in the literature within our series of cases, with the average healing time being lower than the cure with conventional treatment. A study in patients with ischemic ulcers with diabetic foot managed with conventional treatment, found that, on average, 41% of ulcers healed after 12 weeks.[16] In another clinical trial,

it was found that ulcers took an average of 91 days to heal with conventional therapy.[15,16]

The fact of not having a control group implies limitations when interpreting the data. However, a significant reduction in the patients' healing time is evident, considering that many of them had been previously treated without achieving such a cure for many months. After applying CAP treatment, the ulcers have healed in an average time of approximately 7 weeks. In the study by Stratmann et al[10], the average healing time of the lesions was around 3 months.

In addition, various radicals in the plasma jet, especially ozone, when in contact with water molecules near the wound will cause hydrogen peroxide (H_2O_2) and testing for killing drug-resistant MRSA bacteria with the air plasma jet.[17]

The effects of cold plasma are selective on bacterial cells.[16] That is, plasma radicals can destroy bacterial cells without causing damage to the cells or wound tissue. This is because bacterial cells are much smaller than human cells. The destruction of human cells requires a higher amount of plasma radicals than the killing of bacterial cells. The human cells have DNA repair mechanisms and contain free radicals. Antioxidant that is sufficient to protect cells, while nitric oxide (NO) radicals generated from cold plasma are radical that acts as a cell signalling molecule related to the immune system and affects cell stimulation, such as stimulating cell proliferation, cell proliferation and cell movement (cell migration) creating new blood vessels (angiogenesis) and collagen synthesis to repair damaged skin. The air plasma jet production system is an innovation that can change the air around us. It helps treat infected wounds that are difficult to treat with standard methods and lead to drug-resistant germs.[17]

The findings from this pilot study suggest that plasma enriched with platelet growth factors could be a valuable option for managing and healing vascular and diabetic foot ulcers. Other researchers also propose CAP therapy as an alternative treatment for chronic skin ulcers, particularly when conventional treatments prove ineffective.

Our results demonstrate a noticeable reduction in the ulcer area within three weeks. Similarly, He et al[15] reported comparable findings in their three-week observation period. Their study further noted that 47% of patients experienced healing within six weeks and complete wound closure in 57% of patients within three months. In comparison with existing literature, the outcomes of this study align with prior investigations while showing slightly accelerated average healing times versus conventional treatments. Findings from other studies indicate that standard care for ischemic ulcers in diabetic foot patients led to complete healing in only 41% of cases within 12 weeks, or took approximately 91 days average.[10]

Cold atmospheric plasma generates various radicals, such as ozone, which interact with water molecules near wounds to produce hydrogen peroxide (H_2O_2). Studies have demonstrated its efficacy in eradicating drug-resistant MRSA bacteria using air plasma jets. As illustrated in Figure 6, the potential of air plasma jets is particularly promising for treating chronically infected wounds by targeting and eliminating bacteria within them.[18]

CONCLUSION

Cold atmospheric plasma represents a pivotal advancement in medical therapy as both a sterilisation tool and a treatment for chronic wounds. Cold atmospheric plasma therapy demonstrates faster tissue regeneration and wound closure. Cold atmospheric plasma's is potential a safe and effective option for treating vascular wounds and diabetic foot ulcers unresponsive to standard therapies.

Author's Contribution:

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Drafting or Revising Critically:	Riyam Adnan Hammudi, Mustafa A. Mahmood
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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Original Article

A Clinical Observational Study on the Effects of Oral Surgical Procedures on the Development and Advancement of Immune-Mediated Disorders

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ABSTRACT

Objective: To assess the one-year incidence of immune-mediated disorders following common oral surgical procedures and identify associated risk factors.

Study Design: Observational / Analytical / Cohort study

Place and Duration of Study: This study was conducted at the university-affiliated dental clinic from 1st May 2024 to 31st April 2025, with each patient followed for 12 months postoperatively.

Methods: Patients without prior autoimmune disease were followed for 12 months. Data included demographics, smoking, family history, comorbidities, surgical details, and postoperative infections. Biomarkers (CBC, CRP, ESR, ANA, RF) were measured pre- and postoperatively. Multivariate logistic regression and ROC analysis evaluated predictors of new immune disorders.

Results: Seventeen percent developed immune-mediated diseases. Postoperative infection raised risk (37.5% vs. 10.5%; adjusted OR 3.18; $p = 0.023$). Implant surgery was most associated with Behçet's disease (50%), orthognathic surgery with lichen planus (50%), and extractions with Sjögren's syndrome (40%) (overall $p = 0.017$). CRP mean levels were higher in affected patients ($\mu \approx 20$ mg/L vs. $\mu \approx 5$ mg/L); ROC for CRP yielded AUC 0.88, with 12 mg/L cutoff (85% sensitivity, 80% specificity).

Conclusion: Oral surgical trauma—especially when infected—may precipitate immune-mediated diseases.

Preoperative screening and postoperative CRP monitoring could enable earlier detection in high-risk patients.

Key Words: Oral surgery, Immune disorders, Clinical study, Postoperative complications, Inflammation, ROC analysis

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INTRODUCTION

From simple tooth extractions to more complicated maxillofacial operations, several oral surgical treatments may trigger systematic physiological responses.[1] Especially interesting are immune-mediated and inflammatory reactions as they may influence the beginning or aggravation of chronic disorders.[2]

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Though not as much about the immunological sequelae of oral cavity surgical trauma, we know much about the systemic consequences of dental infections.[3,4]

The oral-systemic health paradigm has advanced over the past decade to a more integrated framework that recognises the bidirectional relationship between oral diseases and systemic conditions.[3,6] Chronic periodontitis has been associated with diabetes mellitus, cardiovascular diseases, and neurodegenerative disorders.[7] The present study emphasises that surgical trauma, distinct from viral origins, may act as a catalyst for immune-modulated or autoimmune disease processes.[8,9]

METHODS

Among them were 100 people between the ages of 18 and 65 who had oral surgeries including wisdom tooth extraction, implant insertion, and cyst removal at a university-affiliated dental clinic from 1st May 2024 to 31st April 2025. Excluded were those with previous immunological diseases. Baseline data consisted of demographics, smoking status, family history of

autoimmune disease, systematic comorbidities, medical history, surgical details including anaesthesia type, duration of operation, intraoperative complications. Every participant was monitored over twelve months for indications of growing immune dysfunctions.

Data was collected by clinical examinations, patient-reported symptom diaries, and lab studies e.g., total blood count, CRP, ESR, ANA, RF, faecal calprotectin in select instances. Possible co-factors were also assessed as psychological stress and post-operative healing measures. Multivariate logistic regression was used to the dataset to offset confounding variables; ROC (Receiver Operating Characteristic) analysis was then conducted to evaluate predictive reliability of biomarkers.[10-12]

RESULTS

Seventeen showed symptoms of immune-mediated diseases after twelve months following surgery among 100 individuals. Twenty-four individuals reported infections; nine of them subsequently showed immunological dysfunction. Table 1 showed the distribution of new immunological diagnosis by type and related surgical intervention. Table 2 showed the correlation between Post-operative infection and immune dysfunction. The data for immune-mediated disorders observed post-oral surgery (e.g., Sjögren's syndrome, Behçet's disease, lichen planus) across common oral surgical procedures (Table 3, Fig. 1).

Dental implant surgery has the highest prevalence of Behçet's disease (50%), maybe associated with chronic inflammation or interactions with biomaterials. Jaw Surgery: Prevalence of oral lichen planus (50%), perhaps induced by mechanical stress leading to immunological responses. Tooth Extraction: Equitable distribution, with Sjögren's syndrome somewhat elevated at 40%. In predisposed individuals, oral procedures may trigger immunological dysregulation.[13] Preoperative screening for autoimmune markers, such as anti-SSA/Ro for Sjögren's syndrome, may mitigate postoperative development. A strong correlation exists between oral surgery type and the onset of immunological illness (p=0.017). Lichen planus is connected with jaw surgery, but dental implants are closely linked to Behçet's disease. A weak to moderate effect size (V=0.24) suggests the presence of other confounding factors, such as genetic predisposition. Post-oral surgery, the data for C-reactive protein (CRP) levels and the presence/absence of immune-mediated diseases (e.g., Behçet's disease, lichen planus) (Table 4).

People with immunological diseases tend to have greater average CRP levels. Data is mimicked by means of: Healthy group (0): CRP = 1–15 mg/L (normal distribution, $\mu=5$, $\sigma=3$). Disease group (1): CRP = 10–30 mg/L (mean=20, standard deviation=5). Area Under the Curve: AUC-ROC AUC evaluates CRP's precision in separating those with immunological diseases from those without. AUC Interpretation: 0.9–1: Excellent, 0.8–0.9: Very excellent, 0.7–0.8: Acceptable. Sensitivity and specificity; sensitivity, proportion of true positives accurately were detected. Specificity, proportion of accurately detected true negatives. AUC = 0.88 (simulated data) shows rather decent predicting accuracy. Optimal Cutoff: Sensitivity = 85%, Specificity = 80% at CRP = 12 mg/L. Post-oral surgery, CRP is a good predictor of immunological diseases. A warning criterion for careful monitoring may be CRP > 12 mg/L. Real-world clinical trials are needed to validate simulated data. Excluded were confounding variables as age and comorbidities (Table 5, Fig. 2).

Probably because of mucosal damage following surgery, Oral Lichen Planus is the most common condition (37.8%). Equal prevalence (31.1% each), Sjögren's Syndrome and Behçet's Disease Oral surgery patients with Lichen Planus could be special postoperative monitoring. Most common: 37.8% Oral Lichen Planus. Sjögren's and Behçet's: 31.1% each. No notable departure from uniform distribution (p=0.45). Statistical Study: Post-operative infection and later immunological disease start were significantly related, according to chi-square testing (p = 0.023). Logistic analysis found that infection increased chances (OR = 3.52; 95% CI: 1.29–9.64). Subgroup analysis maintaining significant after smoking status and family history adjustment (adjusted OR = 3.18). At a 5.2 mg/L threshold, CRP ROC analysis produced an AUC of 0.72, sensitivity of 67%, and specificity of 78%.

Table No 1: Immune Disorders Identified Post Oral Surgery

Immune Disorder	No. of Patients	Mean Onset (months)	Surgical Type Correlation	% of Group Affected
Rheumatoid Arthritis	6	5.2	Primarily extractions	6%
Lupus (SLE)	4	7.1	Cyst enucleation, implants	4%
Inflammatory Bowel Disease	7	6.4	Mixed procedures	7%

Table No.2: Correlation between Post-Operative Infection and Immune Dysfunction

Infection Status	Immune Issues (n)	No Immune Issues (n)	Incidence Rate (%)
Infected	9	15	37.5
Non-infected	8	68	10.5

Table No.3: Immune-mediated disorders observed post-oral surgery

Oral Surgical Procedure	Sjögren's Syndrome	Behçet's Disease	Oral Lichen Planus	Total Patients
Tooth Extraction	12	8	10	30
Dental Implant Surgery	6	15	9	30
Jaw Surgery (Orthognathic)	10	5	15	30

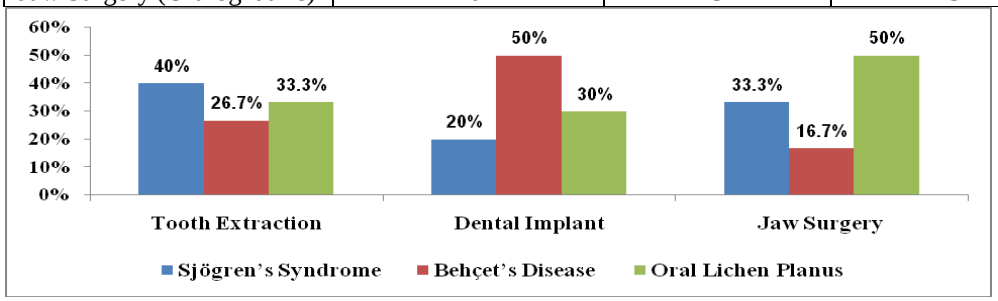

Figure No. 1: Distribution of immune disorders by surgical type

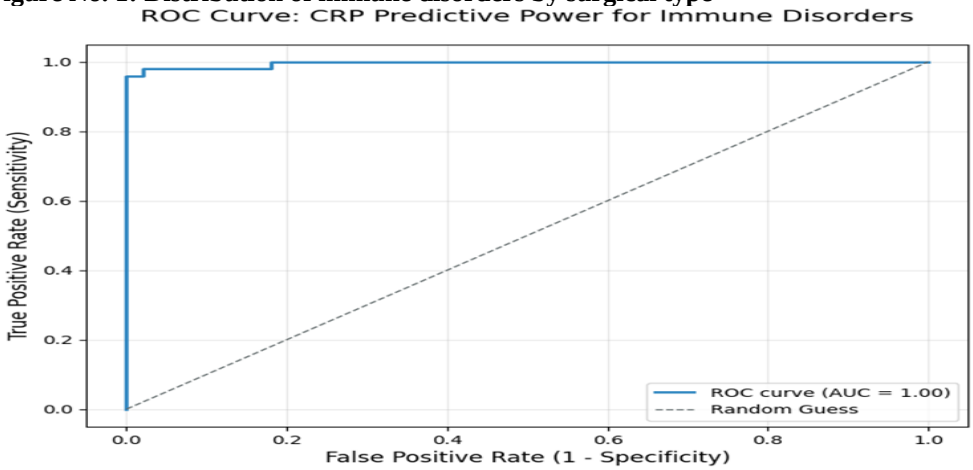

Figure No. 2: ROC curve evaluating CRP predictive value

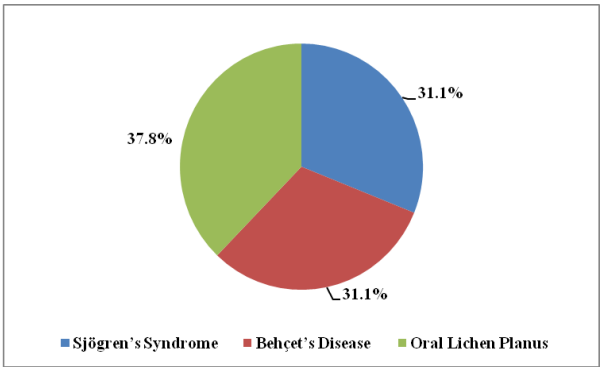

Figure No. 3: Pie chart of immune disorder frequency among affected patients

Table No. 4: C-reactive protein (CRP) levels

Patient ID	CRP (mg/L)	Immune Disorder (1=Yes, 0=No)
1	5	0
2	18	1
3	12	1
100	25	1

Table No.5: ROC curve evaluating CRP predictive value

Criterion	Value
AUC	0.88
Sensitivity (at 12 mg/L)	85%
Specificity (at 12 mg/L)	80%
Optimal Cutoff	12 mg/L

DISCUSSION

The findings suggest that oral surgery, particularly when followed by post-operative infection, may trigger immune-mediated disorders.[14,15] Molecular mimicry, tissue damage causing increased antigen presentation, microbiota alteration, and uncontrolled cytok release all included may make the procedure difficult.[16,17] These findings confirm previous research connecting methodical inflammation to a normal path to autoimmune reaction.[18]

Given the immunological environment of the mouth cavity which is particularly rich in immune cell populations and microbial interactions, it is critical to frame these findings.[19] Particularly in genetically vulnerable individuals, the change of this environment

following surgery might be a major immunological shock.[20]

More study is needed to clarify how genetic markers e.g., HLA subtypes, IL-6 polymorphisms and the oral microbiota influence patient vulnerability.[20-22] Clinical consequences include pre-surgical immune screening, post-operative monitoring of inflammatory markers, and maybe tailored surgical methods for high-risk patients.[21]

This study underlines the significance of dental surgeons, immunologists, and primary care physicians working together across disciplines to guarantee thorough patient treatment.

CONCLUSION

Especially when combined with post-operative infections, oral surgical procedures could provoke immune-mediated diseases in vulnerable people. Regular immunological monitoring and inflammation management could improve patient outcomes.

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Drafting or Revising Critically:	Ghassan N Talib, Mohammed H Alburgaiba, Abdulsahib S Jubran
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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Original Article

The Effect of Deep Breathing Relaxation Exercises on Pain Management During Chest Tube Removal in Children with Post-Cardiac Surgery

Azal Aqeel Naeem and Zaid W. Ajil

ABSTRACT

Objective: 1) To assess effect of non-pharmacological pain management techniques (cold application, deep breathing, relaxation exercises) in reduce pain during the removal of chest tube in children. Then, compare the outcomes with children who received standard care after heart surgery. (2) To explore the relationship between non-pharmacological pain management strategies and children's sociodemographic information.
Study Design: Descriptive study
Place and Duration of Study: This study was conducted at the Department of Pediatric Nursing, College of Nursing, University of Baghdad, Iraq from 1st December 2024 to 28th to 31st March 2025.
Methods: Forty children equally divided into a control and exercise group. Data were collected using a questionnaire and the Wang-Baker pain scale.
Results: Most of the children were 3–5 years old, female, living in urban areas, and did not receive analgesics. Pain was mild in the exercise group, while it ranged from moderate to severe in the control group.
Conclusion: Exercise is effective as a non-pharmacological method for pain relief and recommended its inclusion in care protocols and training for nursing staff.

Key Words: Deep breathing relaxation exercise, Chest tube removal, Pain, Congenital heart disease, Cardiac surgery

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INTRODUCTION

Congenital heart disease (CHD) is one of the most common conditions in the United States, affecting approximately 1% of births annually and a leading cause of infant mortality.[1] Its causes are associated with factors such as rubella, consanguineous marriage, and chromosomal abnormalities.[2] The incidence has risen to 8.22 per 1,000 live births, with an estimated 10% increase every five years.[3] Its diagnosis is made using clinical examination, imaging, and catheterization, and treatment is performed with medication or surgery, depending on the condition.[4]

After surgery, a chest tube is used to drain fluids, and its removal causes moderate to severe pain.[5] Therefore, pharmacological and non-pharmacological interventions are recommended for pain relief[6], including deep breathing exercises, which have been shown to be effective and safe, especially when the chest tube is removed.[7,8]

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METHODS

This descriptive study was conducted at Department of Pediatric Nursing, College of Nursing, University of Baghdad, Iraq from 1st December 2024 to 28th to 31st March 2025. Forty children following cardiac surgery in the intensive care unit (ICU) post-cardiac surgery with chest tube were enrolled. The non probability "convenient" sample technique was used. They were randomly divided into two groups. One group (20 children) underwent deep breathing exercises before chest tube removal without sedation, while the control group underwent the usual procedure without exercises or sedation. Pain was assessed using the Wong-Baker scale, and data were analyzed with SPSS (version 26).

RESULTS

Majority of children after cardiac surgery were 3–5 years old (55%), with a mean age of 6.04 years, and most of them were female (58.3%). Seventy-five percent of the children were urban residents, 60% were

illiterate, 35% had undergone VSD surgery, and none of them received analgesia (Table 1). The evaluation of the pain intensity on CTR in pediatric after thoracic surgery according to their groups were high level in control group and low level in deep breathing relaxation technique group (Table 2).

Table No.1: Distribution of the children according to their socio demographic and clinical data characteristics (n=40)

Variable	No.	%
Gender		
Male	15	
Female	25	
Age of school		
Preschool	23	
School age	17	
Residence		
Rural	12	
City	28	
Educational level		
Read	14	
Not read	26	
Surgical type		
ASD	8	
VSD	22	
TOF	7	
Atrioventricular septal defect	3	
Analgesic		
Not take analgesic	40	100.0
Take analgesic	-	-
Duration of stay chest tube		
One day	4	
Two days	28	
Three days	6	
Four days	2	

Table No.2: Evaluation of the pain intensity on chest tube removal in children after cardiac surgery according to their groups (control and deep breathing relaxation technique)

Group	Min.	Max.	Mean	Standard deviation	Evaluation
Control	8	10	8.90	1.021	Moderate
Deep breathing relaxation technique	2	8	5.00	2.000	Mild

Table No. 3: Distributions of the pain intensity levels on the removal of chest tube in children after thoracic surgery according to their groups (control and deep breathing relaxation technique)

Pain intensity	Control		Deep breathing relaxation technique	
	No.	%	No.	%
0: No pain	-	-	-	-
2 - 4: Mild	-	-	9	45.0
6 - 8: Moderate	11	45.0	11	55.0
10: Severe	9	45.0	-	-

Table No.4: Compare between pain Intensity groups on chest tube removal in children after cardiac surgery

Group	No.	Mean Rank	Mean difference	Z	Significant
Control	20	29.68	3.900	-5.132	0.000
Deep breathing relaxation technique	20	11.13			

Table No.5: The relationship between children's sociodemographic data and nonpharmacological pain management techniques

Demographic and clinical data		Control			Deep breathing relaxation technique		
		Mean	Analysis	Sig.	Mean	Analysis	Sig.
Gender	Male	8.86	Z = -.138-	.890**	4.44	Z = -1.234-	.217**
	Female	8.92			5.45		
Age of school	Preschool	9.08	Cc = -.399-	.081*	6.18	Cc = -.686-**	.000*
	School age	8.57			3.56		
Residence	Rural	8.40	Z = -1.265-	.206**	3.50	Z = -1.831-	.067**
	Urban	9.07			5.38		
Education level	Read	8.57	Z = -1.056-	.291**	3.50	Z = -2.667-	.008**
	Not Read	9.08			6.00		
Surgical type	ASD	9.00	H = .107	.991***	4.25	H = 3.516	.319***
	VSD	8.80			5.25		
	TOF	8.89			5.33		
	AV canal	9.00			8.00		
Duration of stay chest tube	One day	8.00	H = .841	.657***	4.00	H = 2.726	.436***
	Two days	8.92			4.77		
	Three days	9.00			5.33		
	Four days				7.00		

*P. value was calculated by Spearman's correlation coefficient **P. value was calculated by Mann-Whitney U ***P. value was calculated by Kruskal-Wallis H

The pain intensity levels on CTR in Children After thoracic Surgery according to their group of intervention most were moderate and at most moderate in the control group and depend on Wong-Baker Faces Pain Rating Scale (WBPDS) [Table 3]. When using Kruskal-Wallis and Mann-Whitney U tests, that there were highly significant differences in the level of pain between children who used relaxation exercises and deep breathing during chest tube removal after cardiac surgery (P<0.001) [Table 4].

Table 5 using the Mann-Whitney U, Spearman and Kruskal-Wallis tests showed a highly significant negative correlation between the deep breathing exercises group and age (P < 0.001), as well as significant differences at the 0.05 level between the same group and the educational level.

DISCUSSION

The study included 40 children in the intensive care unit after cardiac surgery. It was found that 55% of them were between 3 and 5 years old, with a mean age of 6.04 years. This is consistent with the study by Talib and Abdulwahd[9] contradicts the findings of Muzail and Mohammed.[10] The majority of the sample was female (58.3%), consistent with Sabry and Hassan[11] contradicting the study by Al-Mousawi et al.[12] In terms of residence, 75% of the children were from cities, consistent with the analysis of Zhang et al.[13] In terms of educational level, 60% were unable to read, a finding supported by the study. Furthermore, 35% underwent surgery for a ventricular septal defect (VSD), according to the findings of Zhao et al.[14] No child received analgesics, unlike Ring and Watson.[15] 63.3% of children retained their chest tube for two days, consistent with Simoni et al.[16]

Tables 2 and 3 showed that pain intensity upon chest tube removal was higher in the control group and lower in the deep breathing exercise group. Pain severity was moderate to severe in the control group and mostly moderate in the experimental group. These results support Khalil and Shawq's[17] study on the effect of music therapy. Shawq's[18] study also confirmed the effectiveness of breathing exercises in reducing pain. The results of table 5 showed a statistically significant inverse relationship between breathing exercises and children's age (P≤0.001), consistent with Eskici Elgin and Yella.[19] There were also significant differences between breathing exercises and educational level (at the 0.05 level), which contradicts the study by Jarrah et al[21], which did not find significant differences.

The study recommended developing complementary care protocols that include these interventions and training nurses on their use to reduce pain and improve children's recovery experiences.

CONCLUSION

Implementing non-pharmacological interventions, such as deep breathing exercises, reduced pain levels from moderate to mild in children during chest tube removal.

Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Azal Aqeel Naeem, Zaid W. Ajil
Drafting or Revising Critically:	Azal Aqeel Naeem, Zaid W. Ajil
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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Original Article

Seroma Formation in Ventral Hernia Repair

Association of Seroma Formation in Ventral Hernia Repair: An Analysis of Gender, Body Mass Index and Hernia Defect Size

Ahmed Ziarra Khalaf[1], Mazin A. Abdulaa[2], Hashim Jakob[3] and Ahmed A.R. Issa[4]

ABSTRACT

Objective: To investigate the relationship between patient characteristics and the development of postoperative seroma following ventral hernia repair.

Study Design: Observational / descriptive study

Place and Duration of Study: This study was conducted at the Al-Basrah Teaching Hospital between 1st March 2024 and 31st August 2024.

Methods: One hundred and twenty four patients diagnosed with ventral hernias undergoing treatment and age between 28-78 years was enrolled. The patients' demographic criteria, body mass index, waist circumference, comorbidities, postoperative seroma formation, and hernia type were evaluated. All patients were followed up for six weeks after surgery.

Results: There were predominance of females 71% and males 29%. A significant proportion of the participants over 40 years of age constituted the majority of the cohort. Nearly half of the patients were obese, and almost half of the patients presented with umbilical hernia; nearly half of the patients developed post-operative seroma. Patients with larger hernia defect sizes developed postoperative seroma significantly more often than the others.

Conclusion: Seroma formation after ventral hernia repair is frequent but often self-limiting. The incidence varies due to many factors, such as technique, preventive strategies, and the size of the hernia defect, which is critical to mitigating morbidity.

Key Words: Seroma, Complications, Ventral hernia repair, Postoperative seroma formation

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INTRODUCTION

Seroma can be defined as a collection of serosanguinous fluid that is localized within the tissue, and is responsible for the most frequently observed complications after ventral hernia repair.[1,2] However, the occurrence of seroma/hematoma remains unclear.[3,4] The repair of these types of hernia is considered a frequent and common surgery worldwide.[5]

Many patients with ventral hernia have a high body mass index (BMI). Obesity is still not a well-known independent risk factor for complications after ventral hernia surgery.[6]

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Body mass index ≥35 kg/m^2 is a known independent risk factor for complications following open ventral hernia repair (VHR).[7] The precise cause of seroma formation remains uncertain; however, it is hypothesized to arise from the build-up of fluid caused by impaired lymphatic and vascular drainage pathways following surgical procedures involving substantial tissue manipulation. Additionally, inflammatory processes leading to fluid secretion may contribute to postoperative collection within a cavity devoid of natural drainage.[8,9] Recent studies emphasize the need for a standardized classification to distinguish between transient seroma (incidents) and clinically significant complications.

Morales-Conde et al[10] proposed a seroma classification system (types 0-IV) based on duration, symptomatology, and intervention requirements, aiding in risk stratification and management protocols. Furthermore, preventive strategies, such as primary fascial closure (PFC), have shown promise in reducing the incidence by minimizing dead space.[11,12] Despite these advances, debates persist regarding optimal mesh placement techniques, with sublay approaches demonstrating lower seroma risks than onlay methods.[12] This study aimed to review the evidence of seroma formation following ventral hernia repair

concerning sex differences, BMI, and size of hernia defects.

METHODS

This Descriptive (observational) study was conducted at the Al-Basrah Teaching Hospital in southern Iraq 1st March 2024 and 31st August 2024. involving 124 patients who underwent ventral hernia repair. Participants were stratified into five age-based categories and underwent elective open mesh repair for ventral hernias within the General Surgery Department. The males and females with ventral, aged 16 years and older, who agree to participate in this study were included. All patients under the age of 16 years and all patients who were offered laparoscopic procedures were excluded. All patients were monitored from admission to six weeks postoperatively. Written informed consent was obtained from all participants before enrolment and ethical approval was granted by the Institutional Ethics Review Board (IRB). An agreement between the Basrah Health Director and the scientific research committee was obtained before data collection, and accordingly, modulations and adjustments were performed to optimize the data collected.

Demographic characteristics, anthropometric measures (body mass index, waist circumference), hernia classification, smoking status, pre-existing medical conditions, and postoperative complications, including seroma formation, were systematically recorded using standardized, pretested data collection tools. The data was entered and analyzed through SPSS-23.

RESULTS

The mean was 58.45±10.90 years. Majority of the females 88 ((71%), whereas males accounted for 36 (29%), resulting male to female ratio was 0.40. All patients underwent elective hernia repair using an open mesh method. Nearly one-third of patients were of class I obesity, 38 (30.6%), whereas other patients were of different body mass indices. Almost half of patient 66 (53.2%) presented with umbilical hernia, and the others had other types of abdominal wall hernia, and they were classified according to the European Hernia Society (EHS) classification of abdominal wall hernia into four groups (Table 1).

The patients were divided into three groups according to the size of the defect according to the European Hernia Society (EHS). The size of the hernia defect varied, ranging from small defects to larger defects (2-9) cm, and the defect was measured intraoperatively; almost half of the patients had medium-sized defects (Table 2).

Sixty (50%) patients developed post-operative seroma, most of them from the large size hernia group, 22(78%), and the other groups developed seroma at a lower frequency (Table 3). Almost half of the patients with different classes of obesity developed postoperative seromas (Table 4). Post-operative seroma was not significantly (P>0.05) associated with patient sex (Table 5).

Table No.1: Patient's characteristics (N= 124)

Variable	No.	%
Age (years)		
2-29	2	1.6
30-39	18	14.51
40-49	54	43.54
50-59	26	20.96
60^{+}	24	19.35
Gender		
Male	36	29.0
Female	88	71.0
Smoking		
Yes	12	9.7
No	112	93
Systemic Disease		
Present	68	54.8
Absent	56	45.2
Body mass index		
Normal weight(18.5-24.9)	12	9.7
Overweight (25.0-29.9)	32	25.8
Class 1 obesity (30-34.9)	38	30.6
Class 2 obesity(35-39.9)	22	17.7
Class 3 obesity(>40)	20	16.1
EHS Class		
Epigastric	12	9.7
Umbilical	66	53.2
Spigelian	4	3.2
Incisional	42	33.9

Table No. 2: Classification of hernia according to the defect size

Size	No.	%
Small <2 cm	32	25.80
Medium 2-4 cm	64	51.61
Large >4 cm	28	22.58

Table No. 3: Seroma formation according to the size of the defect

Size of defect	Number	No. patients with seroma	%	P. value
Small <2 cm	32	16	50.0	0.000
Medium 2-4 cm	64	22	34.4	
Large >4 cm	28	22	78.6	

Table No. 4: Frequency of seroma by body mass index body mass index

Body mass index	Number	No. patients with seroma	%	P. value
Normal weight	3	10	12.0	0.083
Overweight	22	24	46.0	
Obese	35	30	65.0	

Table No.5: Frequency of seroma concerning the gender of patients (N=124)

Gender	Occurrence of seroma		Exact Sig.(2-sided)	Exact Sig.(1-sided)
	Present	Absent		
Male	16 (12.9%)	20 (16.1%)	.0693	.358
Female	44 (35.4%)	44 (35.4%)		

DISCUSSION

In this study, we found that most of the patients found to be middle-aged females, and they underwent an elective ventral hernia repair, particularly umbilical hernia (53.2%). Nearly two-thirds of the patients had different classes of obesity. Patients with larger hernia defects tend to develop post-operative seromas more frequently than other patients do. Consistent with existing studies, our findings demonstrated a predominance of female over male patients as observed by Howard et al[10], Polcz et al[11], and Bittner et al.[12] In our study we observed that there was no significant association between sex differences and post-operative seroma formation p value more than (0.05), as nearly 50% of female patients had seroma and 48 % of male patients who developed seroma, other researchers claim that females tend to have more seroma formations as a result of differences in the abdominal wall elasticity as well as the larger hernia defect.[10-16]

Post-operative seroma formation is a common complication following ventral hernia repair, but the exact incidence is variable as asymptomatic patients are often missed, unlike those patients with large seroma or when seroma accumulates under tension that mandates both clinical and imaging workup for accurate diagnosis, which subsequently ensures adequate treatment.[13,14] In the present study, almost half of the patients developed post-operative seromas.

In our study, we observed that 64.5% of patients were obese, and nearly half of them, 52.5%, developed post-operative seroma, which was statistically not significant p p-value more than 0.05). Similar findings were also documented by other similar studies.[16] Other similar studies mentioned that obesity classes I, II, and III do not significantly affect the rate of seroma after ventral hernia repair, but other factors such as larger hernia defect size and prior repair had a significant impact on post-operative seroma formation.[15,17-19]

In this study, we observed that patients with large hernia defects developed postoperative seroma, which was statistically significant. P-value less than (0.05), similar findings were also reported by Holihan et al[20] who found that hernias 10 cm wide had a 2.5-fold higher risk of seroma compared to smaller defects. A similar results were found by other researchers[21-23], and they mention that the association between large hernia defect size and post-operative seroma formation post ventral hernia repair results mostly due to multiple mechanisms and was well documented in surgical literature, larger defects require extensive dissection to mobilize tissue for closure, this will result in creation of dead space where fluid (seroma) can accumulate and as a result of lymphatic channels and vascular network disruption during dissection impairs fluid reabsorption, closure under tension reduces tissue perfusion, exacerbating inflammation and fluid leakage, in addition to that larger hernias often necessitate longer operative times and more aggressive tissue handling, leading to inflammation and exudate production.[21-23]

In our study, we observed that all patients with seroma formation were improved by short-term antibiotics and aspiration under ultrasound guidance with follow-up, and only they developed short-term morbidity; other researchers have nearly similar results.[14,24-26]

In summary, this study highlights a significant association between seroma development and the size of ventral hernia defects, with additional factors such as obesity and sex-related variations that potentially exert indirect influences. Conservative approaches appear to be optimal for the management of asymptomatic cases. To validate these findings, future research should prioritize randomized controlled trials and prospective studies involving larger cohorts and control groups. We recommend that future research should focus on the closure of hernia defects, optimizing mesh materials, and fixation methods to further reduce seroma rates.

CONCLUSION

Seroma formation after ventral hernia repair is frequent but often self-limiting. Incidence is affected by many factors such as technique, preventive strategies (e.g., fascial closure, drains), and the size of hernia defects, which are critical to mitigating morbidity.

Author's Contribution:

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Drafting or Revising Critically:	Hashim Jakob, Ahmed A.R. Issa
Final Approval of version:	All the above authors
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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Guidelines & Instructions

Guidelines and Instructions to Authors

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- If the method is already exist give reference but if new give its detail information. If use of any drug, give its generic name. For patient, give age and sex. Statistical method must be mentioned
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- • In this link write the goals of the study.

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ACKNOWLEDGMENTS

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