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**Editorial**

# Calcium and Parathyroid Hormone

**Dr. Mohsin Masud Jan**

Editor

Women who supplemented their diets with modest amounts of calcium had a lower risk for the hormone disorder known as primary hyperparathyroidism.

The study, which is published in BMJ, also found that women with diets low in calcium may be more likely to get the disorder, which erodes bones and potentially sets the stage for depression, fatigue, and kidney stones. The research may be a reason to revisit the idea of taking a daily calcium supplement. Many women shelved their calcium pills last year after an expert panel concluded they don't prevent osteoporosis-related fractures, at least in postmenopausal women. Recent studies have also tied calcium supplements to a higher risk of heart attacks and strokes.

For example, a 2010 report on dietary calcium by the Institute of Medicine concluded that most healthy adults don't need supplements because national surveys show average intakes are adequate. The problem here is that the average is not exactly what everybody gets. To take a supplement of about 500 milligrams a day, that amount makes up the difference.

The Institute of Medicine recommends that nearly all adults get 1,000-1,200 mg of calcium a day to meet their daily needs for strong bones. For the new study, researchers tracked more than 58,000 women taking part in the long-running Harvard Nurses' Health Study. Every four years, the women were asked about their diets and overall health. Over the 22 years of the study, 277 women were diagnosed with primary hyperparathyroidism.

In hyperparathyroidism, the parathyroid glands release excess hormones that pull more than the needed amount of calcium out of the bones and then deposit it into the blood. Diets low in calcium may chronically stimulate the parathyroid glands, which normally work like thermostats. When calcium levels dip, they effectively "turn on" and pull calcium from bone. When

there's enough calcium coming in through food and other sources, they shut off. Their job is to keep calcium levels stable.

The high blood calcium caused by hyperparathyroidism can cause trouble with the body's electrical system so that people become tired, fatigued, depressed. They get bad osteoporosis. Calcium collects in their kidneys and causes kidney stones.

Hyperparathyroidism often goes unrecognized because doctors aren't used to looking for it. Hyperparathyroidism affects about 1 in 800 people, but it's more common as we age and especially in postmenopausal women. One in 250 women over age 55 will get a parathyroid tumor in her lifetime. Previous studies have suggested that when the parathyroid glands are overworked because of low calcium, they may go haywire and lose their ability to shut off.

This study is the first to look at the relationship between calcium intake and hyperparathyroidism. When researchers divided women in the study by their average calcium intakes, they found those with the highest calcium intake had the lowest risk for developing hyperparathyroidism. That was true even after researchers adjusted their results to eliminate the influence of a variety of things that can raise a person's risk for hyperparathyroidism, like age, body weight, taking in other nutrients like vitamins A and D, and protein, and smoking and drinking alcohol. What's more, women who supplemented their diets with at least 500 mg of calcium a day had a 40%-70% reduced risk of being diagnosed with the disease compared to women who didn't take calcium supplements. Women who have questions about the risks and benefits of taking calcium supplements should talk to their doctors. Ultimately, more research is needed to know if the benefits of supplements will outweigh any risks.

# Vitamin A Status in Measles Patients of District Abbottabad

1. Yasmeen Bibi 2. Sohail Babar 3. Fazal Rabbani

1. Asstt. Prof. Physiology, Women Medical &amp; Dental College, Abbottabad. 2. Asstt. Prof. Paediatrics, Women Medical &amp; Dental College, Abbottabad. 3. Child Specialist, Captain Ali Children Hospital, Mingora, Swat.

## ABSTRACT

**Objective:** This study was carried out to assess the vitamin A supplementation status in pediatric measles patients.

**Study Design:** Analytical study

**Place and Duration of Study:** This study was conducted at Pediatric Department of Women and Children Hospital, Abbottabad from January 2014 to December 2014.

**Materials and Methods:** Detailed history and physical examination of 200 patients was recorded in a proforma. Vitamin A supplementation and vaccination status were recorded along with demographic profile.

**Results:** 103 (51.5%) were males and 97 (48.5%) were females. Majority of these patients (55.5%) were residents of rural area of Abbottabad district. 77% of the children were low weight. The mean age of the children was  $37 \pm 9$  months. Out of 173 patients who were eligible for vaccination, only 34.5 % of the patients were vaccinated for measles, and 47% of the eligible patients did not receive measles booster dose. 79% of the patients did not receive vitamin A supplementation in the last 6 months. Conjunctivitis (86%) and oral ulcers (73.5%) were the most common complications. Other complications included pneumonia (25.5%), diarrhea (19%), congestive cardiac failure (1%), epistaxis (1%), otitis media (0.5).

**Conclusion:** Majority of the patients did not receive vitamin A supplementation. The most common complication were conjunctivitis and oral ulcers, which can be associated with vitamin A deficiency during measles.

**Key Words:** Vitamin A, Measles, Conjunctivitis

**Citation of article:** Bibi Y, Babar S, Rabbani F. Vitamin A Status in Measles Patients of District Abbottabad. Med Forum 2016;27(1):2-4.

## INTRODUCTION

Measles, the disease with its first written description in the 9<sup>th</sup> century, still remains a killer disease, despite of the discovery of its vaccine in 1980.<sup>1</sup> It is a highly contagious viral disease caused by morbillivirus, that spreads primarily through coughing and sneezing.<sup>2,3,4</sup> The disease has made a comeback even in the unexpected parts of the world. The reason for the outbreak has been the same, whether developed or underdeveloped, that is – failure to vaccinate.<sup>5</sup>

Severe measles is more common in poorly nourished children especially with vitamin A deficiency. Since there is no treatment of measles, the severe complications can be avoided through adequate hydration and vitamin A supplementation.<sup>6</sup>

Vitamin A supplements have been associated with approximately 50% reduction in morbidity and mortality.<sup>7</sup> Vitamin A refers to a subclass of retinoic acids, long understood to help regulate immune functions and to reduce morbidity of infectious disease.<sup>8</sup> The various functions of vitamin A includes normal functioning of the visual system, maintenance of cell function for growth, epithelial integrity, production of red blood cells, immunity and reproduction.<sup>9</sup> Vitamin A is an essential nutrient, so it

must be obtained through diet. The WHO has long recommended vitamin A supplementation for children below 5 years of age. It consists of 2 doses of 50,000 IU for infants less than 6 months of age, 100,000 IU for those 6 months to 1 year of age and 2 lac IU for more than 1 year of age.<sup>10</sup> Previous meta-analysis has suggested that vitamin A supplementation for children in developing countries is associated up to 30 % reduction in mortality.<sup>11</sup>

## MATERIALS AND METHODS

This analytical study was conducted in Pediatric department of women and children hospital, Abbottabad, from January 2014 to December 2014, and of both out patient and admitted cases. Measles was confirmed by physical findings. Measles vaccination status and vitamin A supplementation was confirmed by either seeing the vaccination card or verbal recall of parent. Patients were managed accordingly along with vitamin A supplementation.

## RESULTS

A total of 200 patients presenting with measles were studied, out of which 103 (51.5%) were males and 97 (48.5%) were females. Majority of these patients (55.5%) were residents of rural area of Abbottabad district. 81 % of the patients belonged to low family income, and 77% of the children were low weight. The

**Correspondence:** Dr. Yasmeen Bibi

Asstt. Prof. Physiology, Women Medical & Dental College, Abbottabad  
contact No.: 0347-770464

E-mail: ysmmanwar@yahoo.com

mean age of the children was  $37 \pm 9$  months. Minimum age of the patient presenting was 4 months, and maximum was 15 years. Majority of the patients (51%) were between the age 6 to 12 months. 95.5% presented with rash, whereas 94.5% of the patients presented with fever. Out of 173 patients who were eligible for vaccination, only 34.5 % of the patients were vaccinated for measles, and 47% of the eligible patients did not receive measles booster dose. Unawareness of the parents (50%) was the major reason for the children not being vaccinated. 38.5 % of children's parents were uneducated.

**Table No.1: Demographic profile of the measles patients ( n=200)**

Demographic profile	Number	%age
<b>Age categories</b>		
Below 6 months	6	3
6 to 12 months	51	25.5
12 to 24 months	44	22
24 to 36 months	33	16.5
36 to 60 months	35	17.5
Above 60 months	31	15.5
<b>Sex</b>		
Male	103	51.5
Female	97	48.5
<b>Weight</b>		
Low	154	77
Normal	46	23
<b>Area of residence</b>		
Rural	111	55.5
Urban	42	21
Peri urban	47	23.8
<b>Presence of lady health worker</b>		
Yes	177	88.5
No	20	10
Don't know	03	1.5
<b>Measles vaccination status (1<sup>st</sup> dose)</b>		
Yes	9	34.5
No	96	48
Don't know	8	04
<b>Vitamin A supplementation</b>		
Received in last 6 months	39	19.4
Not received in last 6 months	159	79.1
Don't know	01	0.5

Our study showed that 79% of the patients did not receive vitamin A supplementation in the last 6 months, in spite of the fact that 88.5% of the residence areas had the availability of lady health workers. Conjunctivitis (86%) and oral ulcers (73.5%) were the most common complications. Out of the 172 patients which presented with conjunctivitis, 84.3 % had not received vitamin A and out of 147 patients who presented with oral ulcers, 74.8% did not receive vitamin A supplementation.

Other complications included pneumonia (25.5%), diarrhea (19.5%), congestive cardiac failure (1%), epistaxis (1%), otitis media (0.5%). Majority of the patients were managed for measles and discharged, except for one which died out of congestive cardiac failure.

## DISCUSSION

The results of the study showed that majority of the patients were not provided with vitamin A supplementation, in spite of presence of lady health workers. Studies regarding vitamin A supplementation in children in Pakistan are lacking. Vitamin A plays an essential role in reducing morbidity in infectious disease, especially in the epithelial integrity.<sup>8,9</sup> In our study, the most common complication are conjunctivitis and oral ulcers, followed by pneumonia and diarrhea, in contrast to other studies where pneumonia and diarrhea are the most common complications<sup>12,19</sup> Only 42% of the patients were vaccinated for measles, which was similar to study held in Islamabad.<sup>13</sup> Serum concentration of retinol are significantly lowered during measles<sup>14</sup>. Two doses of vitamin A resulted in decreased mortality of measles patients<sup>13,14</sup>. A significant reduction in the complications like diarrhea, pneumonia, cough was also observed in patients supplemented with vitamin A.<sup>16-19</sup> There was a 64% reduction seen in mortality in children who were given two doses of vitamin A supplementation.<sup>19, 20, 21</sup> The high number of complications associated with lack of vitamin A supplementation in our study, indicates the necessity to improve vitamin A supplementation coverage in Pakistan.

## CONCLUSION

Majority of the children of Abbottabad district are not provided with vitamin A supplementation. Lack of this supplementation can be the major cause of complications, which could have been prevented. Hence, apart from the awareness programs, there is a need to supervise our primary health care system. In spite of vaccinations, the patients are presenting with measles along with complications. So, there is also a need to improve the substandard performance of immunization programs.

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

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# Need Improvement in Healthcare Via Demand Side Financing in Pakistan

1. Qatadah Idrees 2. Rab Nawaz Lodhi 3. Kiran Farooq 4. Saad Nisar

1.M. Phil Student, 2,3. Lecturers 4. M. Phil Student, Institute of Business Management, UET, Lahore

## ABSTRACT

**Objective:** To see the effect of maternal mortality rate and life expectancy on the death rate via demand side financing intervention in Pakistan.

**Study Design:** Time Series Experimental Study.

**Place and Duration of Study:** The study was conducted in IBM, UET, Lahore during August to September, 2015.

**Materials and Methods:** This was a time series experimental study where time series data from World Bank Indicators (WBI) from 2000 to 2013 was used to see the effect of maternal mortality rate and life expectancy on the death rate. Dependent variable is death rate in the country and independent variables are maternal mortality rate and life expectancy of the country of Pakistan. I have applied regression through Eviews software to see the effect and results are significant.

**Results:** There is a positive significant effect of MMR on the death rate and negative significant effect of LE on the death rate. MMR has significant positive impact on the death rate its P value is .0004 and Life expectancy has negative significant impact on the death rate its P value is .0000. There is no multicollinearity as Durbin Watson value is 1.785 which is near 2. There is no heteroscedasticity as R-Squared value is .99 almost 1.

**Conclusion:** It is essential to decrease the death rate by providing healthcare facilities although government allocate budget to healthcare and trying to facilitate especially poor via providing free medicines and many other healthcare incentives (Primary and Secondary healthcare) which somehow affect the death rate. However healthcare needs more funds to increase the usage of accessible and timely healthcare facilities to people. This can be possible via acquiring fund to facilitate poor through a proper system i.e Demand side financing.

**Key Words:** LE (Life Expectancy), MMR (Maternal Mortality Rate), Healthcare Financing.

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## INTRODUCTION

Maternal deaths all over the world are around 25,000 out of which 16,000 mothers die each year in Pakistan. There are many factors including low income, poor healthcare. This could be affected through demand side financing which is essential to enhance and fuel up the healthcare system in low income countries. Maternal mortality rate and life expectancy may control and decrease the overall death rate in the country. Healthcare Financing Model: Finance quality healthcare is worldwide challenge for industrialized and developing nations respectively. There is no per capita measure of per head spending, upcoming 2015 measures has forecasted that there is less spending on the healthcare services which is US\$ 45. Selected countries by UN lagging behind achievement of health-related Millennium Development Goals (MDGs) identified by the Countdown to 2015 initiative (including Pakistan) which is sustainable development goals now and maternal health is still one of the outcome, 21 have spending of less than US\$45 per capita.<sup>1</sup>

Countries which have low spending on healthcare have

less health output, appropriate HR, and low investment in healthcare infrastructure and logistics. There was 2.6 percent expenditure of gross domestic product for developing countries were reported and 7 percent reported in developed nations. South region had the lowest spending on healthcare, which is 1.1 percent and Pakistan is one of them. Countries along with funding agencies are tremendously feeling the importance of delivering essential health care. Governments are developing different programs to help families to handle the usual and emergency expense for healthcare. There are many ways to reduce direct user cost by take into effect the cash transfer or vouchers along with some specific or unspecific conditions, offering health insurance nationwide or community based for the poor.<sup>2</sup> To be truly efficient these measures must take place within a development outcomes that further grow and correlate strategies with healthcare and an environment supportive of communities' rights.

**Eliminating fee:** Important factor in health financing is the cost which is directly imposed to the user which is a problem especially for the poor. There are many countries which have removed the direct cost partially or completely and result in increases the access to healthcare services. There is no action taken in Pakistan to remove such cost. Previous researches show where there is no policy or action taken to remove fee;

**Correspondence:** Qatadah Idrees

M. Phil Student, Institute of Business Management, UET, Lahore

Contact No.: 0313-4074839

E-mail:qatadah.contech@hotmail.com

increase in the budget for healthcare or vigilant planning and calculated implementation strategies, healthcare quandary increased and less output. Countries where fee removal implemented there is increase in the health status of the people and decrease in the expenditure of the poor and poor got the most benefit.<sup>3</sup>

There are not just the direct cost, cost of medicine, x-ray and laboratory and emergency check up cost, accommodation, food and traveling cost incurred informally by the poor which health facilities of government do not provide. These cost make most of the total cost and affect the poor. Without doing effort for the change in cultural hurdles poor are not able to get benefit of healthcare services. We have seen that these hurdles also affect the poor. User fee and these costs are the willing areas of action by the effective and appropriate policy. In Uganda fee removal shown Government and policy makers to foster other issues, such as purchase and supply of the medicines, allocation of funds, which is a hurdle in the progress. There is no proper policy to address the issue or to support the decisions.

**Insurance, cash transfers and cost sharing:** There is a health insurance scheme which increases the access for the poor women to maternal care. Due to low incomes these kind of financing are not possible. Community health insurance work informally compared to social insurance schemes had increased the organizational outputs in Rwanda and Gambia 45 and 12 percent respectively. In Burkina Faso cost sharing scheme in a year has increased the emergency referrals by 599.<sup>4</sup> It is difficult to inflate such schemes without any hurdle and without the help of government and donor agencies.

Conditional cash transfers and voucher schemes are also effective in generating demand for specific services among the poor. In Mexico and Honduras conditional cash transfer increased antenatal care during among needy women. India has provided financial incentives for women from marginalized cluster in Gujarat. This measure has increased easy approach to healthcare services on the other hand proper improvement in MNCH along with quality of healthcare is required.

**Experience of social safety nets in Pakistan:** SehatSahulat Cards (SSCs) scheme was implemented on a pilot basis in districts of Kasur and Rawalpindi through a public private partnership between Contech International and Punjab Devolved Social Services Program, funded by Asian Development Bank. Under this scheme, social safety nets were provided to pregnant women living below poverty line in rural union councils of these districts for ensuring free and quality MNCH services. The selection of beneficiaries was made on the basis of poverty scoring of pregnant ladies in catchment areas. Besides providing the

resources, community awareness was also emphasized in this initiative as in Pakistan; in rural areas women are restricted due to culture and religion. Findings of the pilot revealed substantial improvement in health indicators (Figure 1). A third party evaluation was also commissioned which validated the impact of the scheme<sup>6</sup> and scaling up of the initiative for achieving maximum impact was proposed by the Asian Development Bank.<sup>7</sup>

This is clear from the intervention and results that Demand side financing i.e social safety net can increase the Antenatal care, postnatal care, Newborn Immunization and ultimately maternal mortality rate may decrease.

## MATERIALS AND METHODS

This is time series experimental study and conducted in the IBM, UET from August-September, 2015. I have collected data from World Development Indicators (WBI) from 2000 to 2013 of independent variables Life Expectancy and Maternal Mortality Rate and Dependent variable Death Rate. I have applied Ordinary Least Square method in Eviews software to check the regression and results are significant.

### Inclusion Criteria:

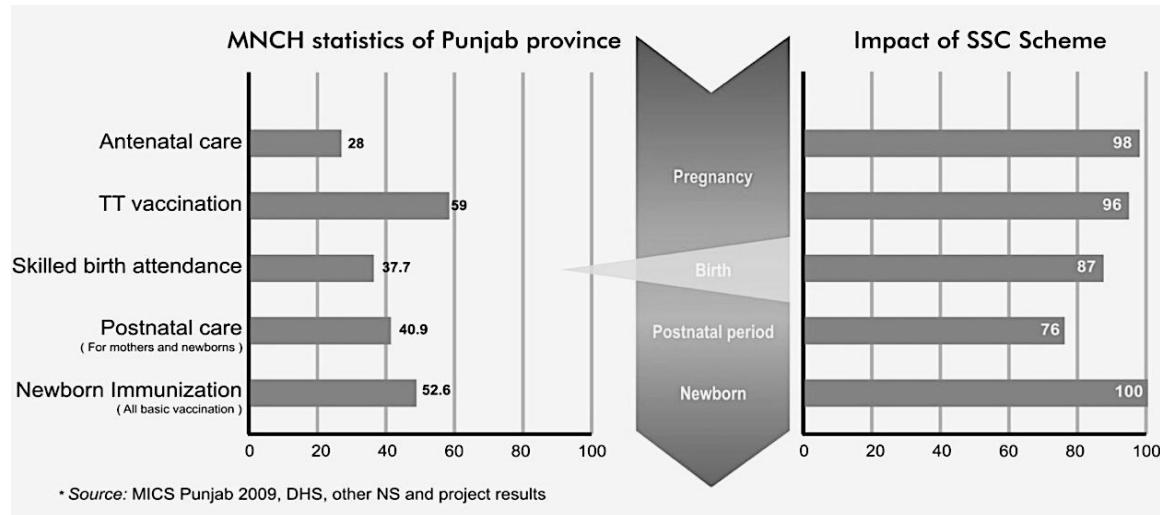
- 1) All indicators of demand side financing.
- 2) All Population of Pakistan for death rate.
- 3) All Population of Pakistan for Life expectancy.

### Exclusion Criteria:

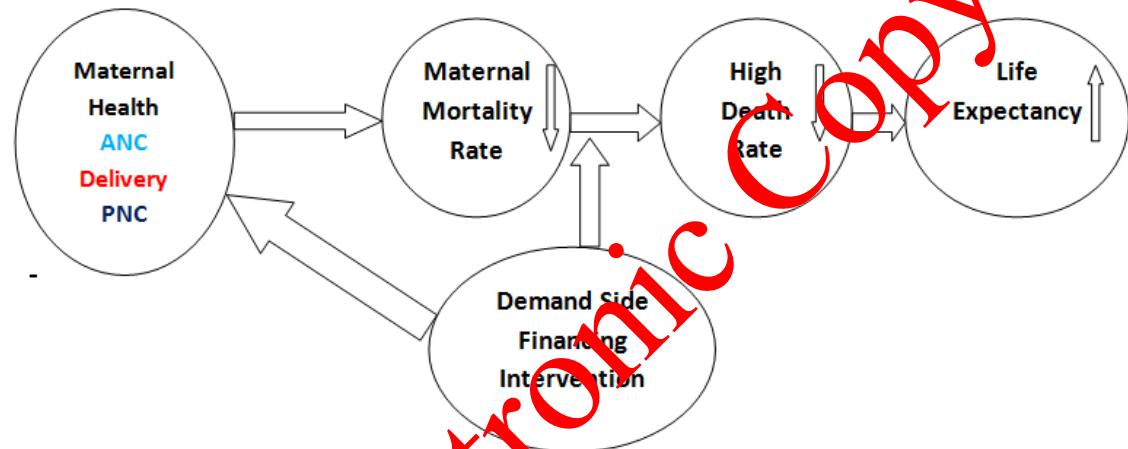
Deaths of population other than pregnant women for maternal mortality rate.

## RESULTS

Maternal Mortality rate significant positive impact on the death rate its P value is .0004 and Life expectancy has negative significant impact on the death rate its P value is .0000. There is no multicollinearity as Durbin Watson value is 1.785 which is near 2. There is no heteroscedasticity as R-Squared value is .99 almost 1. Death rate could be addressed if we control the maternal mortality rate through providing proper healthcare services well in time and especially to poor as we have the examples of Bangladesh, Nigeria, and India even in Pakistan. However more quick and efficient actions are required to enhance demand side financing to empower people of Pakistan to access healthcare services. Approaches may be different but efficient and effective. Health Insurance, health vouchers, social safety net, and health package may address this serious phenomena. We cannot control or remove the Life expectancy directly but we can reduce it through providing better and in time healthcare services.



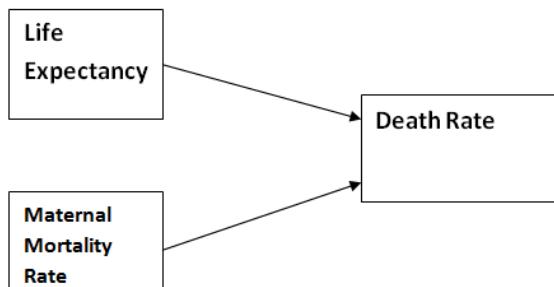
Indicators from MICS and implemented by Contech International  
**Figure No.1: Outcomes of piloting SSC Model on MNCH services**



**Figure No.2: Theoretical Model - Impact of Demand Side Financing Intervention**

**Table No.1: Results in EViews**

Dependent Variable: DR				
Method: Least Squares				
Date: 09/29/15 Time: 18:06				
Sample: 2000 2013				
Included observations: 14				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27.43724	1.660021	16.52825	0.0000
LE	-0.309124	0.025082	-12.32434	0.0000
MMR	9.48E-05	1.90E-05	4.996995	0.0004
R-squared	0.991104	Mean dependent var		7.432857
Adjusted R-squared	0.989486	S.D. dependent var		0.389552
S.E. of regression	0.039944	Akaike info criterion		-3.415284
Sum squared resid	0.017550	Schwarz criterion		-3.278343
Log likelihood	26.90699	Hannan-Quinn criter.		-3.427960
F-statistic	612.7280	Durbin-Watson stat		1.785850
Prob(F-statistic)	0.000000			

**Equation**

$$Y = \beta_0 + \beta_1 LE + \beta_2 MMR + e$$

Y= Death Rate

LE= Life Expectancy

MMR= Maternal Mortality Rate

**Figure No.3: Relationship of Variables****DISCUSSION**

Better the use of maternity care better the maternal and new born care.<sup>8</sup> Developing countries posing serious situation regarding maternal care which allow controlling the death rate in the country including Pakistan. Many International and National Organizations are focusing on this problem that how to reduce this maternal mortality rate as it is not possible put aside this issue in the development of the healthier Nation. However, it is critical even after providing free facilities in the Government hospitals like free medicine and round the clock examination of patients in the hospitals we are unable to control the Maternal Mortality Rate.

Higher the family planning higher the healthier birth spacing.<sup>9</sup> Birth spacing is another important factor which can reduce the Maternal Mortality Rate. Family planning utilization result the Healthier birth spacing. In low income countries like Pakistan people do not bother to get their women admit into the male hospital whether it is necessary for Patient or not. Religious factor involved regarding birth spacing also impose some hurdles in the utilization of family planning.

Mortality is also associated with other sexually transmitted infections and *human immunodeficiency virus* Aids.<sup>10</sup> These kinds of diseases may kill the mother before giving birth. Many researchers, organizations are working to control these diseases including UNDP agencies. There are different strategies available to increase the reproductive health services use like voucher scheme, conditional cash transfer and safety nets. Demand side financing may decrease the maternal mortality rate whether in any one of the strategies. In voucher scheme where Government and organization stimulate demand by association of benefits to the user and focused on the outcomes rather inputs.<sup>11</sup>

Voucher scheme or consumer led finance refer to the situation where money is associated to complete

specific task or results whether it is quality or quantity indications or outcomes.<sup>12</sup> There is also a condition between choosing Public oriented or Private oriented demand side financing. Public oriented approach is more effective because through this most of the people get benefit rather as it focus on the demand and without increasing supply. Private oriented approach may lead to increase the competition and ultimately increase the supply.<sup>13</sup> Public sector approaches are suitable for the developing countries along with the private sector approaches like Pakistan.

Transparency in the voucher system is greater than the other strategies as we can record data, view data and track voucher distribution.<sup>11</sup> Funds required to initiate voucher schemes are high in the starting phase of registration and reimbursements.<sup>14</sup> The mortality rate in developing countries is getting lower but further enhancements require more investment on low income household.

Crucial dilemma that communities and household with low income countries are the main target of consumer led financing. Countries where vouchers scheme implemented as in Pakistan also selection of the community and household is based on poverty scoring approach in the areas where it need the most.

Conditional cash transfer is an approach where cash is transferred to low income families to cater the need of preventive healthcare services.<sup>15</sup> conditional cash transfer tremendously increases the antenatal care in Honduras.<sup>16</sup>

In Mexico conditional cash transfer decrease mortality.<sup>17</sup> we need proper planning to implement the demand side financing whether in any of the form to ultimately decrease the overall death rate. There is very low investment in the consumer led finance which needs proper attention and immediate course of action by policy makers and donors get better results.

**CONCLUSION**

This study shows the high impact of maternal mortality rate on death rate in the country. Maternal Mortality rate could be boost up with the easy access of people to healthcare services and this is achievable if demand side financing is implemented via Public or Private Channel whatever the form is the results are toward betterment. If we want to decrease death rate in the country we should provide good healthcare to every individual at affordable prices or at low cost. And Healthcare should be provided to everyone everywhere because access to medical facilities Pathological and diagnostic procedures are necessary parts of health providence. Ample budget should be allocated to the Healthcare Staff. Correct and realistic policies both long term and short term should be designed to co-op with the normal treatment procedures as well as for the emergency needs. Demand side financing need funds from Government and agencies and lead to policy

maker's behavior. If policy makers are averse to social policy makers behavior to benefit the low income people.

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

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# Prevalence of Iron Deficiency Anemia during Pregnancy in Tertiary Care Hospital of Lahore

1. Alia Masood 2. Amna Khanum 3. Masood Akhtar

1. Senior Registrar, Gynae& Obs.,Lady Aitchison Hospital. Lahore. 2. Asstt. Prof., Gynae& Obs.,Lady Aitchison Hospital. Lahore 3. PG Student of Ph.D. in Epidemiology, UVAS, Lahore.

## ABSTRACT

**Objective:** The objective of this study was to determine prevalence of iron deficiency anemia during pregnancy in tertiary care hospital of Lahore

**Study Design:** Cross sectional study

**Place and Duration of Study:** This study was conducted at the Department of Obs and Gynae, Lady Aitcheson Hospital Lahore and was completed in 6 months.

**Materials and Methods:** Data was collected using random sampling from 985 females in their last trimester. All pregnant females aged 16-40 years during their 3<sup>rd</sup> trimester were taken whereas the pregnant women with known history of thalassemia and sickle cell anemia were excluded from the study. Their demographic information regarding age, gestational age and parity was taken on predesigned Proforma. Various blood sample was obtained and sent to hospital laboratory for analysis of their hemoglobin (Hb) level. All data was collected by principle investigator.

**Results:** In this study the mean age of all pregnant females was  $26.42 \pm 4.51$  years with age range of 24 years (16 - 40 years). The average Hb level during third trimester was  $9.18 \pm 0.98$  with minimum Hb recorded as 4 and maximum Hb as 12. According to WHO classification 93.8% females were anemic and rest of 6.2% females were non-anemic but their Hb was not more than 12 mg/dL. On further classification it was found that 761 (77.3%) had moderate anemia, 157(15.9%) had mild anemia, and 6 (0.6) were severe anemic. We found insignificant negative correlation of Hb with maternal age ( $r = -0.009$ ,  $p$ -value = 0.767) and found significant positive correlation with number of antenatal visits ( $r = 0.090$ ,  $p$ -value = 0.005)

**Conclusion:** Moderate to severe anemia was highly prevalent in our study that may have serious feto-maternal outcomes. Further studies are suggested to address the problem of anemia and its associated causal factors.

**Key Words:** Pregnancy, Iron Deficiency Anemia, Maternal Risk

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## INTRODUCTION

Anemia is a condition in which the red blood cell count in RBC's Hemoglobin of a person's blood is less than normal; which is an iron rich protein responsible for carrying blood from lungs to rest of the body and gives the red color to blood. The WHO criterion for a woman being anemic during last trimester is when she has hemoglobin level below 11gm%. Anemia is a frequently occurred pregnancy related complication and can be classified as mild (when Hb is 10.0 – 10.9), moderate (7- 9.9 ) or severe (< 7 gm/dL).<sup>1</sup> The physiological changes typically going on during pregnancy alter the level of Hb concentration in body causing it to reduce relatively or in some cases, severely which leads to iron deficiency and Anemia.<sup>2</sup> The etiology of anemia can be explained by various factors that vary geographically and racially. However,

some common factors include malnutrition, menstruation and consecutive pregnancy which are accompanied by physiological changes and demands by the fetus and blood volume expansion during pregnancy. Moreover any genetic problem, history of blood loss in some previous recent event/ trauma and post-operative blood loss should also be considered.<sup>3,4</sup> Anemia has serious implications on maternal health and has been documented to significantly contribute to maternal mortality and morbidity. Also, it may cause perinatal mortality or morbidity due to complications like preterm birth and intrauterine growth retardation.<sup>5</sup> The global prevalence of anemia is around 56%, while around 50-70% prevalence is reported in Southeast Asia.<sup>6, 7</sup> In India, the inconsistent prevalence with a wide range of around 33-89% has been observed, with acceptable hemoglobin level of as low as 10gm%.<sup>6</sup>

In Pakistan, the reported prevalence of Anemia during pregnancy is vaguely reported in recent years with range of 26.66%<sup>8</sup> - 90.5%.<sup>9</sup> So, we aimed to find prevalence of anemia during pregnancy at a tertiary care hospital in Lahore.

**Correspondence:** Dr. Amna Khanum,  
Asstt. Prof., Gynae& Obst., Lady Aitchison Hospital, Lahore  
**Contact No.:** 0321-4976622  
**E-mail:** amnakhanum@hotmail.com

## MATERIALS AND METHODS

This Cross sectional study was conducted at department of Obs and Gyne Lady Aitcheson Hospital Lahore and study was completed in 6 months.

**Sampling:** Random sampling was used to collect the data

**Sample size:** A total of 985 females in their last trimester were taken in this study.

**Sample Selection Criteria:** All pregnant females aged 16-40 years during their 3<sup>rd</sup> trimester were taken

**Exclusion Criteria:** Pregnant women with known history of thalassemia and sickle cell anemia,

**Data Collection Method:** In this study a total of 985 pregnant women meeting inclusion criteria were included. The study was commenced after formal written permission, the informed consent. Their demographic information regarding age, gestational age and parity was taken on predesigned proforma. Venous blood sample was obtained and sent to hospital laboratory for analysis of their hemoglobin (Hb) level. During last trimester the anemia was defined at Hb level  $\leq 10.5$  mg/dL and was further classified as,  $\leq 7$  mg/dL severe, 7.1-9.9 was taken as moderate. All data was collected by principle investigator. All data was entered and analyzed using SPSS version 22. Qualitative data like frequency of maternal anemia was presented by bar graph along with frequency (%). Mean  $\pm$  S.D, median, mode and other relevant statistics were calculated for maternal age, parity, number of antenatal visits and Hb level. Pearson correlation was used to measure strength of relationship of Hb level with maternal age and number of antenatal visits.

## RESULTS

In this study the mean age of all pregnant females was  $26.42 \pm 4.55$  years with age range of 21 years(16 -40 years). Most of the subjects (55.1%) were nulliparous while rest of the patients (44.9%) had parity 1-6.

**Table No.1: Descriptive Statistics of age, parity, Antenatal visits and Hb level**

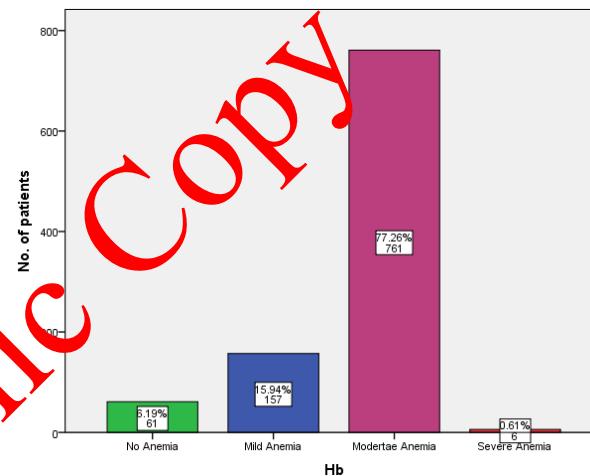
	Age (years)	Parity	Antenatal Visits	Hemoglobin level
Mean	26.42	1.02	4.35	9.18
Median	26	0	3	9
Mode	30	0	3	9
Std. Deviation	4.55	1.42	2.98	0.98
Inter quartile range	7	2	3	1

The average antenatal visits were  $4.35 \pm 2.98$  with minimum and maximum number of visits 1-12. The average Hb level during third trimester was  $9.18 \pm 0.98$  with minimum Hb of 4 and maximum Hb of 12. According to WHO classification 93.8% females were

anemic and rest of 6.2% females were non-anemic but their Hb was not more than 12 mg/dL. On further classification 157(15.9%) had mild anemia, 761 (77.3%) had moderate anemia and 6 (0.6%) were severe anemic. We found insignificant negative correlation of Hb with maternal age ( $r = -0.009$ ,  $p$ -value = 0.767) and found significant positive correlation with number of antenatal visits ( $r = 0.090$ ,  $p$ -value = 0.005).

**Table No.2: Correlation of Maternal Hb with maternal age and number of antenatal visits during pregnancy**

	Age (years)	Antenatal Visits
Maternal Hb	Correlation	-0.009
	p-value	0.767
	No. of patients	985



**Figure No.1: Maternal status of anemia**

## DISCUSSION

Anemia is one of major nutritional health disorders affecting significant proportion of population not only in developing countries but also in developed countries. The risk is more alarming in developing countries where factors like poverty and illiteracy may contribute to high risk for cause of anemia. Although it effects all age group, but more prevalent in pregnant women affecting 2/3<sup>rd</sup> pregnant women <sup>10</sup>. The World Health Organization (WHO) estimated prevalence of anaemia is approximately 23% in industrialized countries, with the prevalence in non-industrialized countries being at least twice as high.<sup>11</sup> Prevalence of anaemia among pregnant women in developing countries average 56% with a range of 35 % to 100 % among various region of the world.<sup>12</sup> Various women start pregnancy with some degree of iron deficiency anemia which is further aggravated with physiological changes of haemodilution of pregnancy, beginning in the first trimester up to 32 weeks of pregnancy and so on. WHO standard of diagnosing anaemia in pregnancy is a hemoglobin level of 11gm/dl or less. The commonest

cause being iron deficiency but folic acid deficiency, B12deficiency and beta thalassemia trait besides are other common contributing factors. There is still a very high prevalence of anemia, especially during third trimester which significantly affects the maternal and fetal outcome during pregnancy.<sup>13</sup>

In this study we found that The average Hb level during third trimester was  $9.18 \pm 0.98$  with minimum Hb = 4 and maximum Hb was 12. According to WHO classification 93.8% females were anemic and rest of 6.2% females were non-anemic but their Hb was not more than 12 mg/dL. On further classification 157(15.9%) had mild anemia, 761(77.3% had moderate anemia) and 6(0.6) were severe anemic. We found insignificant negative correlation of Hb with maternal age ( $r = -0.009$ ,  $p$ -value = 0.767) and found significant positive correlation with number of antenatal visits ( $r = 0.090$ ,  $p$ -value = 0.005)

Anaemia in pregnancy is associated with adverse consequences both for the mother and the fetus. Studies have shown that the adverse consequences of maternal anaemia may affect not only the neonate and infant but also increase the risk of non communicable diseases when the child grows into an adult and the risk of low birth weight in the next generation. Technology for detection of anemia and its effective treatments are available and affordable and it is possible to effectively implement these even in primary health care settings.<sup>14, 15</sup>

## CONCLUSION

Moderate to severe anemia was highly prevalent in our study that may have serious feto-maternal outcomes. Further studies are suggested to address the problem of anemia and its associated causal factors.

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

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# Gastroesophageal Reflux Disease in Patients with Chronic Obstructive Pulmonary Disease

1. Babar Bashir 2. Munir Hussain Siddiqui 3. Jawwad us Salam 4. Akhtar Ali 5. Adil Khan

6. Pyar Ali Fazel 7. Mohammad Masroor

1. Assoc. Prof. of Medicine, SMBB Medical College, Karachi 2. Assoc. Prof. of Medicine, DUHS, Karachi 3. Asstt. Prof. of Neurology, DUHS, Karachi 4. Prof. of Medicine, DUHS, Karachi 5. Asstt. Prof. of Medicine, FJDC & General Hospital, Karachi 6. Asstt. Prof. of Medicine, DUHS, Karachi 7. Prof. of Medicine, Principal, DIMC, DUHS, Karachi

## ABSTRACT

**Objective:** To evaluate the gastroesophageal reflux symptoms in Chronic Obstructive Pulmonary Disease (COPD) patients and Upper Gastrointestinal (GI) endoscopy findings in these patients.

**Study Design:** Cross sectional study.

**Place and Duration of Study:** This study was conducted at Dow University Hospital & Civil Hospital Karachi from January 2013 to December 2013.

**Materials and Methods:** 100 of COPD were selected and assessed for presence of gastro esophageal reflux (GERD) symptoms. Data was analyzed on SPSS version 13. Frequency and percentage were computed for categorical variable like gender, gastro-esophageal reflux symptoms and upper GI endoscopy finding in COPD patients with gastro esophageal reflux symptoms. Mean standard deviation was computed for quantitative variables like age, smoking (pack year), solid fuel and tea consumption (cup/day).

**Results:** In this study of 100 patients 95 were males and 5 were female. Cough was the commonest symptom that was found in 85% patients followed by sputum production in 71% patients, retrosternal burning (68%), acid reflux (54%) and dysphagia (11%). Gastro-esophageal reflux symptoms were observed in 54 patients. Out of these 54 patients who had GER symptoms, 33(61%) patients had erosive gastro-esophageal reflux disease while 21(39%) patients non-erosive gastro esophageal reflux disease on upper GI endoscopy.

**Conclusion:** Our study shows that higher proportion of Gastroesophageal reflux symptoms is present in COPD patients. Moreover, upper GI endoscopy can be normal in COPD patients with significant GERD symptoms.

**Key Words:** COPD, GERD, NEGERD

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## INTRODUCTION

Gastro esophageal reflux disease (GERD) affects as much as 20-30% of Population, particularly elderly<sup>1</sup>. GERD is one of the most common cause of chronic cough<sup>2</sup> & a potential risk factor for exacerbation of COPD<sup>3,4</sup>. Gastro esophageal reflux (GER) is a normal Physiological phenomenon in which gastric contents escapes into esophagus. GERD occurs when amount of gastric juice that reflexes into esophagus exceeds normal limit. Different antireflux mechanisms have been developed normally to prevent GER<sup>5</sup>. The normal antireflux mechanisms consist of Lower esophageal sphincter (LES), esophageal motility and anatomical Configuration of gastro esophageal junction. GER occurs if LES pressure Decreases due to muscle weakness or inappropriate relaxation of LES Without physiological stimulus (Peristalsis)<sup>6</sup>. There are several

mechanisms by which GERD can induce symptoms in patients with COPD<sup>7</sup>.

50 % of patients with proven acid reflux have visible esophageal mucosal Damage known as reflux esophagitis on upper Gastrointestinal Endoscopy (GI Endoscopy). It is characterized by single or multiple erosions or ulcers in distal esophagus. However, endoscopy is normal in up to 50% of patients with GERD, a condition sometimes referred to as Non-erosive Reflux Disease (NERD)<sup>8</sup>.

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of chronic Morbidity and mortality<sup>9</sup> throughout the world it is 4th leading cause of death worldwide<sup>10</sup>. About 25% of all medical admissions occur as a result of respiratory disorders and more than 50% of these are due to COPD<sup>11</sup>. COPD is a disease state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of lungs to noxious particles or gases<sup>9,12</sup>.

The association between GERD & COPD has established. Prevalence of GERD in COPD patient observed in different studies& in different ethnic

**Correspondence:** Dr. Munir Hussain Siddiqui

Associate Professor of Medicine,  
Dow University of Health Sciences, Karachi.

**Contact No.:** 0345-2160441

**E-mail:** [muneer\\_hus\\_sid@yahoo.com](mailto:muneer_hus_sid@yahoo.com)

groups ranging from 28% <sup>13</sup> in Korea, 32-37% in USA & 53.6% in Iran<sup>14, 15</sup>. With this we conducted this study in our setup & more overtheir UGI endoscopic findings. Upper GI endoscopy was performed in all patients of COPD having GER symptoms, to evaluate mucosal change at lower end of esophagus. Presence of erosions and ulcers was named as Erosive GERD and their absence was named as non-erosive GERD (NERD).

## MATERIALS AND METHODS

The study was conducted at DUH& CHK from January 2013 to December 2013. All patients admitted either through emergency or Out Patient Department (OPD) in medical wards DUH& CHK with different presentations of COPD was included in the study. Patients presenting with dyspnea and/or cough productive of mucopurulent sputum having history of 10 or more pack years of smoking and/or use of solid fuels like wood and animal dung for more than 10 year were considered for COPD. Among these who had forced expiration time more than 5 seconds and reduced peak expiratory flow rate (PEFR) that is not corrected after bronchodilator therapy, were diagnosed as COPD. All these patients were asked about presence or absence of GER symptoms & complications. GER symptoms were defined as heart burn (a burning feeling originating from stomach or lower part of chest up towards neck) & acidregurgitation (flow of sour or bitter fluid into mouth) and a complication dysphagia as difficulty in swallowing. Patients with ongoing treatment of peptic ulcer with antisecretory or anti helicobacter pylori therapy (Proton pump inhibitor, H<sub>2</sub> blockers, prokinetics, antibiotics) were excluded. Patients with other respiratory or esophageal disorders were also excluded.

The data was entered and analyzed into Statistical packages for social science (SPSS version 13.0). Frequency and percentage were computed for categorical variable like gender, gastro-esophageal reflux symptoms and upper GI endoscopy finding in COPD patients with gastro esophageal reflux symptoms. Mean standard deviation was computed for quantitative variables like age, smoking (pack year), solid fuel and tea consumption (cup/day).

## RESULTS

The total number of study patients was 100.95 were male and 5 were female (male to female ratio 19:1).The average age of patients was 59.87±10.5 years. All male patients were smokers with average pack years of smoking of 28.71±5.2. Female patients were using solid fuels, on average for 31.6±7.76 years. Average tea consumption in these patients was 5.34±0.98 cups/day (Table 1). Out of 100COPD patients retrosternal burning was present in 68, acid reflux in 54 and dysphagia in 11 patients (Table 2).GER symptoms were observed in 54 patients. These 54 patients underwent

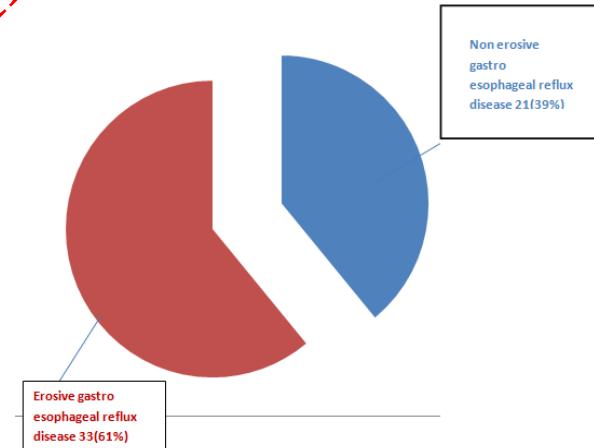
upper GI endoscopy 33(61%) patients were found to have erosive GERD while 21(39%) patients had NERD on upper GI endoscopy (Fig 1). The average age of COPD patients with GERD was 66.04±8.56 years.

**Table No.1: 1descriptive Statistics of COPD Patients**

Variables	N	Mean ± SD	95%CI	Median (IQR)
Age(years)	100	59.87±10.5	58.78 to 62.96	60(20)
Smoking (pack year) only male	95	28.71±5.21	27.64 to 29.77	29(5)
Solid Fuel (only female)	05	31.6±7.76	21.9 to 41.24	35(14)
Tea Consumption (Cup/day)	100	5.34±0.98	5.14 to 5.54	5(1)

**Table No.2: Symptoms of Patients with COPD**

History	Count	Percentage
Cough	85	85%
Sputum	71	71%
Retrosternal Burning	68	68%
Acid reflux	54	54%
Dysphagia	11	11%



**Figure No.1: upper GI endoscopy findings in COPD patients with gastroesophageal reflux symptoms=54**

## DISCUSSION

GERD symptoms are very common in general population. Several small studies have been conducted to establish a relationship between COPD and GERD symptoms<sup>16,17</sup>. GERD is common in advanced COPD patients who often asymptomatic and have relatively high prevalence of isolated abnormal proximal reflux<sup>9, 18</sup>.

In this study we were aimed to determine proportion of GERD symptoms in COPD patients. Upper GI endoscopy was also performed in those patients having GERD symptoms to determine the proportion of patients with GERD symptoms having reflux esophagitis. Recently published study showed that history of Gasroesophageal reflux or heart burn is associated with frequent exacerbation phenotype in COPD patients<sup>13</sup>.

In our study male predominance was noted among COPD patients (male to female ratio of 19:1). This male predominance is evident from previous studies conducted on COPD<sup>19</sup>. Slight increase in female proportion in our study could because of use of solid in our rural areas.

The most important finding of our study was that GERD symptoms are more prevalent in patients with COPD as compared to general population. Proportion of heartburn/acid regurgitation in our study population (patient with COPD) was 68% and 54% respectively. This was supported by a study conducted by Mohklessi et.al<sup>20</sup>. In another study conducted by Casanova C, supported same idea<sup>21</sup>. Another study by Adel Khatabet al<sup>22</sup> which showed that prevalence of GERD in COPD patient was 53.3% in moderate group and 73.3% in severe group. GERD severity increases as the degree of COPD increases. Thus it has also been suggested that increase in frequency of COPD exacerbation can be associated with the presence of GERD<sup>23</sup>.

A study was conducted by Phulpoto MA et.al<sup>6</sup>. It was aimed to determine the proportion of GERD symptoms in COPD patients. It showed that proportion of heartburn and acid regurgitation in COPD patient is 70% & 56% respectively. In this study dysphasia was reported in 15% of patients while in our study this proportion was 11%.

We also observed that COPD patients with GERD symptoms were slightly older than whole study population (66.04+8.56 vs 59.87+10.5), this also has supported by Kim et al<sup>4</sup>. We also performed upper GI endoscopy in all these patients with GERD symptoms. (n=54) to assess the presence or absence of reflux esophagitis of these 54 patients 33 (61%) had reflux esophagitis indicating that all those patients who have GERD symptoms do not necessarily have abnormal endoscopy. In other study by Adel Khatabet al<sup>22</sup> found 66.6% in moderate group 93.3% in severe group.

## CONCLUSION

In conclusion, our study shows that a higher proportion of Gasroesophageal reflux symptoms are present in COPD patients. Moreover, upper GI endoscopy can be normal in COPD patients with significant GERD symptoms.

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

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# Intestinal Obstruction Caused by Postoperative Adhesions: 5 Years' Experience at a Teaching Hospital

1. Ansar Latif 2. Muhammad Qasim Butt 3. Kamran Hameed

1. Assoc. Prof. / Head of Department of Surgery, Khawaja Muhammad Safdar MC, Sialkot 2. Senior Registrar, Surgical Unit I, AIMTH, Sialkot 3. Postgraduate Trainee, Surgical Unit I, AIMTH, Sialkot.

## ABSTRACT

**Objective:** The objective of this study was to determine the common abdominal surgical procedure causing postoperative adhesive intestinal obstruction, and outcome of its surgical management.

**Study Design:** Retrospective as well as prospective analysis.

**Place and Duration of Study:** This study was conducted in the Department of Surgery, Khawaja Muhammad Safdar Medical College, Sialkot from June 2010 to November 2015.

**Materials and Methods:** Patients operated on for intestinal obstruction with at least one abdominal surgical scar were included in the study. A total of 152 patients were eligible, all ages were eligible irrespective of gender. A minimum of 6 months follow up was set for inclusion in the study. Patients with intestinal obstruction presenting with surgical scars for renal, ureteric and urinary bladder surgery were not included as these surgeries did not involve opening of peritoneum. Patients with Crohn's disease, ulcerative colitis, known malignancies, a past history of abdominopelvic irradiation were excluded. Patients with less than 6 months follow up were excluded from the study.

**Results:** Out of 152 patients, 74 (48.68%) surgeries for appendicular pathologies, 18 (11.84%) lower segment caesarean section and 9 (5.92%) total abdominal hysterectomy were the main pathologies causing obstruction; while patients had recurrence in 11(7.23%) and 8(5.26%) mortality.

**Conclusion:** Operated adhesive postoperative intestinal obstruction proves to be a clinical entity with high incidence and specific risk factors of recurrence: age <40 years, presence of adhesion or matted adhesion, and postoperative surgical complications. Infected cases of appendicitis, enteric perforations, lower segment caesarean section and total abdominal hysterectomy are the main causes and the treatment may lead to stoma formation, recurrence and mortality.

**Key Words:** Small Bowel, Obstruction, Adhesion, Water-Soluble Contrast Agent, Recurrence

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## INTRODUCTION

All abdominal surgeries how meticulous it may be; culminate in adhesion formation. These adhesions can be localized, wide spread and may or may not cause any symptoms and complications. In surgical practice; patients with intestinal obstruction due to postoperative adhesions are regularly admitted to wards with varied presentations and have a range of treatment modalities<sup>2</sup>. Recurrence after operated adhesive postoperative intestinal obstruction are a potential threat for patients and a difficult problem faced by the surgeons. These patients have a lifelong association to the surgical setups and are a reason of frustration to them as well as the treating staff. Recovery or recurrence after one surgery or repeated surgeries; is a hope or surety; one finds it difficult to council the sufferers because of

unpredictable natural history of the problem<sup>3</sup>.

Adhesiolysis laparoscopic or open laparotomy is done to treat the situation depending upon the problem. Retrospective studies suggest that laparoscopic approach shortens hospital stay and reduces complications in these patients<sup>4,5</sup>. But open laparotomy to handle the complicated adhesions and subsequent resections and stoma formation remains the mainstay of surgical management<sup>6,7,8</sup>. The brunt of this problem is generally faced and managed at public sector hospitals and the teaching hospitals in particular. We wanted to determine the cause and effects of such patients with intestinal obstruction treated with surgical intervention at our teaching hospital<sup>9,10</sup>.

## MATERIALS AND METHODS

Treatment data of the patients was collected from June 2010 to November 2015. Last patient was enrolled in May 2015. We enrolled 215 who were admitted with intestinal obstruction in the surgical department of Allama Iqbal Memorial Teaching Hospital, affiliated to

**Correspondence:** Dr. Ansar Latif,

Assoc. Prof. / Head of Department of Surgery, Khawaja Muhammad Safdar Medical College, Sialkot

Contact No.: 0321-7103994

E-mail: ansarlatif2013@gmail.com

Khawaja Muhammad Safdar Medical College, Sialkot city, Pakistan.

**Inclusion Criteria:** Patients operated on for intestinal obstruction with one abdominal surgical scar were included in the study. A total of 152 patients were eligible, all ages were eligible irrespective of gender. A minimum of 6 months follow up was set for inclusion in the study.

**Exclusion Criteria:** Patients with intestinal obstruction presenting with surgical scars for renal, ureteric and urinary bladder surgery were not included as these surgeries did not involve opening of peritoneum.

Patients with Crohn's disease, ulcerative colitis, known malignancies and past history of abdominopelvic irradiation were excluded. Patients with more than one abdominal surgical scars were excluded from the study. Patients with less than 6 months follow up were excluded from the study. The patient with follow up of 12 months postoperative but were not traceable for follow up were labeled as lost to follow up; as they were not available to assess recurrences.

In all the patients, fluid balance and electrolyte disturbances were corrected. Prophylactic cefuroxime 1500 mg and metronidazole 500 mg are administered intravenously just before the incision. A nasogastric tube is inserted. A midline incision was made and the abdominal cavity is inspected. The small bowel is examined until the obstructed site is located. Adhesions causing obstruction were divided. Depending upon the circumstances, the state of intestine and soiling with infected contents; resection anastomosis, or stoma formation was carried out. Omeprazole was used during the hospital stay. Prophylaxis for deep venous thrombosis for patient with high risk i.e. DVT. Abdominal binder advised to patients with poor musculature and infected cases.

Retrospective study to determine the indications of abdominal operative procedures as well as prospective analysis of treatment of the obstruction, procedures and its postoperative course was done and findings were recorded in the proforma devised for the study.

The endpoint was dates of recurrences or completion of 24 months followup. The recurrence was strictly defined as a readmission with a clinical presentation of SBO that required conservative or surgical treatment in the surgical ward. In that way, two different points were considered: overall recurrence including operated and non-operated recurrences. Recurrence was precisely defined as postoperative obstruction presenting in 2 years after surgery but not caused by any other pathology. The variables were entered in SPSS version 21 and statistics calculated.

## RESULTS

From June 2010 to November 2015. Last patient was enrolled in May 2015. (5 years; end of enrollment and 6 months' follow up period).

During a period 5 years, the patients of intestinal obstruction with varied histories and abdominal surgical scars were admitted and operated: laparotomies were performed in surgical department of Allama Iqbal Memorial Teaching Hospital affiliated with Khawaja Muhammad Safdar Medical College Sialkot, Pakistan. Total of 152 laparotomies were carried out; about 63 patients with intestinal obstruction having abdominal surgical scar, admitted and managed successfully conservatively were not included in the study. The general data of our patients in the study is shown in Table I.

**Table No.I: General Demographic Data – Patients admitted with intestinal obstruction**

Total no. of patients admitted with intestinal obstruction having one abdominal surgical scar	215
No. of patients managed conservatively/excluded	63
No. of patients requiring surgery	152 (100%)
Age	5 to 85 years
Sex	M:F 61: 91 (40.13: 59.86)
Duration of hospital stay	7-95 days(13± 5 days average)

**Table No.2 Retrospective analysis of abdominal incisions-n= 152 (100%)**

Surgical Incision	Indications of previous surgery	No.
Grid iron incision	Acute appendicitis Appendicular abscess Ruptured ovarian cyst Torsion of ovary	46(30.26%) 7(4.60%) 2(1.31%) 1(0.65%)
Lanz incision	Acute appendicitis Typhoid ( enteric )Perforation	21(13.81%) 4(2.63%)
Right Upper quadrant transverse incision	Cholecystectomy Intussusception	4(2.63%) 1(0.65%)
Right subcostal incision	cholecystectomy	2(1.31%)
Midline incision	Perforated duodenal ulcer Enteric perforation Penetrating injuries/ small intestine Blunt trauma/ small intestine Jejunal diverticuli causing intestinal obstruction Mesenteric ischaemia	9(5.92%) 7(4.60%) 3(1.97%) 2(1.31%) 2(1.31%) 2(1.31%)
Pfannenstiel incision	Lower segment caesarean section Total abdominal hysterectomy	18(11.84%) 9(5.92%)
Transverse incision (umbilical scar excised)	Para umbilical hernia	8(5.26%)
Umbilical scar/ laparoscopic port site	Laparoscopic cholecystectomy	4(2.63%)

The patients with intestinal obstruction due to adhesion formation caused by previous abdominal surgeries are a regular feature of surgical floor. Those patients who delay in seeking treatment for pathologies requiring opening of peritoneum are more vulnerable to present with intestinal obstruction consequent upon these surgeries; moreover poor surgical technique especially inadequate hemostasis and placement of drains are risk factors for getting into this situation. Treatment of such patients are mostly laparotomies with different surgical procedures and quite a big proportion of these patients land up with intestinal stomas. Previous gynaecological surgery increases the likelihood of operative treatment and complicated obstruction.

Details of the previous surgical scar and pathology are shown in table 2.

Details of prospective analysis of surgical interventions done for intestinal obstruction and outcome data are given in tables 3 & 4.

**Table No.3: Spectrum of Surgical procedures carried ( n=152 )**

Adhesiolysis only	23	15.13%
Excision of bands	8	5.26%
Ileostomy	32	21.05%
Colostomy	27	17.76%
Primary repair of intestine	42	27.63%
Resection and anastomosis of intestine	20	13.15%
Associated Omentectomy	31	17.39%

**Table No.4: Outcome of the surgical interventions n=152 (100%)**

No complications reported for 6 months	84(55.21%)
Recurrence ( with follow up of >24 months )	18(11.82%)
Wound infection	26(17.10%)
Wound dehiscence	6(3.94%)
Incisional hernia formation	12(7.89%)
Mortality	8(5.26%)
Lost to follow up (before 24 months)	5(3.28%)

## DISCUSSION

Opening the abdomen and peritoneal cavity, in any surgery, may lead to the formation of adhesions and bands) in majority of the patients. With the increased quantum of abdominal surgery these fibrotic tissues are the most common cause of intestinal obstruction. After surgery for such obstruction, the risk of recurrence remains there and the literature reports a rate of recurrence range, 8.7%–53% at 3 years and more afterwards.

Recurrence rate was  $11.84\% \pm 3.2\%$  of our study, Fevang et al<sup>11</sup> reported a rate of 29% at 25 years, 50% appearing during the 5 first years, ie, 14.5% at 5 years

comparable with our results. Higher rates (33%–55%) were reported in studies by Williams SB<sup>12</sup>, Landerasper J<sup>13</sup> and Miller G<sup>14</sup>. This difference may be due to their overall long-term follow up (10–12.8 years) readmissions and especially to their wider inclusion criteria. The incidence in our study may have been different as almost 12 patients who were being followed up were not available for end point decision for recurrence. The median follow-up was 29 months (range, 6–47 months).

The most common surgical procedure which culminated in causing postoperative adhesions leading to obstruction was appendectomy by Grid Iron incision for acute appendicitis; followed by Enteric perforation. Similarly in females; a significant no of patients were having Pfannenstiel's incision for lower segment caesarean section and total abdominal hysterectomy. A small no of patients managed for ovarian pathologies were also had a significant share in our study.

The risk factors of recurrence following an operated adhesive postoperative small bowel obstruction were; age <40 years, complex adhesions, and postoperative wound infections.

Higher mortality in our patients can be attributed to the illiteracy of patients who did significant delay in seeking surgical treatment and reported in established septicemia. Our death rate (5.26%) and complication rate (11.82%) are consistent with those reported in recent studies by Dayton MT<sup>15</sup> and Miller B<sup>16</sup>. These results confirm those recently published stressing the deleterious effects of postoperative complications on early and late survival.<sup>17</sup>

The study indicates that operated adhesive postoperative SBO to be graded as a high-risk recurrence condition comparable to that of abdominopelvic malignancies.

## CONCLUSION

In cases of postoperative intestinal obstruction, the surgeries for acute appendicitis remains the leading cause followed by cases of enteric perforation; while lower segment caesarean section and total abdominal hysterectomy makes the main bulk in female patients. The port site hernias especially at umbilical port is also being reported but less common. The treatment of the postoperative obstruction is quite rewarding but many a patients end up with stomas and recurrences as well; while mortality in patients with delayed presentations has its impact on the outcome.

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

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# Anemia in Children of Hazara Division

**1. Sohail Babar Khan 2. Yasmeen Bibi 3. Mohammad Fayaz**

1. Asstt. Prof. of Pediatrics, WM&DC, Abbottabad 2. Asstt. Prof. of Physiology, WM&DC, Abbottabad  
3. Consultant Respiratory Physician, Durham Hospital, UK

## ABSTRACT

**Objectives:** To determine the frequency of anemia in children of Hazara Division.

**Study Design:** Cross-sectional / observational study.

**Place and Duration of Study:** This study was carried out at the Pediatric Outpatient of Ayub Teaching Hospital Abbottabad from 1<sup>st</sup> January, 2015 to 30<sup>th</sup> June, 2015.

**Materials and Methods:** Three hundred and seventy five children were selected randomly using random number tables from Hazara Division coming to Pediatric Outpatient of Ayub Teaching Hospital Abbottabad. Their age range was 0-18 years. Their diagnoses were ascertained, recorded and analysed.

**Results:** Majority of the patients were male and were in the age-range of 2-10 years. Anemia was present in 3.9999% of children. Iron deficiency anemia was the most common cause of anemia in these children.

**Conclusions:** Majority of the children were male and were in the age range of 2-10 years. Anemia was present in 3.9999% of these children and iron deficiency was the most common cause of it.

**Key Words:** Children, Anemia, Iron deficiency.

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## INTRODUCTION

Worldwide anemia is common in children. This is especially true in developing countries like Pakistan. Iron deficiency is the commonest cause worldwide. Anemia besides causing excess morbidity and mortality in children, also adversely affects their mental development. The latter leads to less ability to get education and work, resulting in another economically deprived generation.

Therefore control of anemia in children can change the future of nations.<sup>1,2,3</sup>

Iron deficiency anemia (IDA) is the most common cause of anemia. Prior to six months of life, it is caused by low iron stores, prematurity, low birth weight, perinatal blood loss or hemorrhage. Between 6-24 months it is caused by poor dietary intake of iron. After 24 months of age it is caused by chronic blood loss.

Iron deficiency anemia produces pallor and fatigue. Microcytic hypochromic anemia with low serum iron, ferritin and transferrin saturation with increased iron binding capacity is diagnostic of IDA. Treatment is with elemental iron in a dose of 4-6mg/kg/d. Increase in reticulocyte count confirms the diagnosis and documents compliance and response to therapy. Anemia corrects in 4-6 weeks of iron therapy. Iron is continued for further 3 months to replenish iron stores<sup>4</sup>.

**Correspondence:** Dr. Sohail Babar Khan,  
Assistant Professor of Pediatrics, Women Medical & Dental  
College, Abbottabad, KPK  
Contact No.: 0303-3339988  
E-mail: drsohail01@gmail.com

Megaloblastic anemia is caused by deficiency of vitamin B12, folic acid or both. The causes of vitamin B12 deficiency are dietary (vegans), intestinal malabsorption, inborn error of metabolism and pernicious anemia. The causes of folic acid deficiency are dietary (severe malnutrition, use of goat's milk), malabsorption, drugs (anticonvulsants or cytotoxics) and increased requirements (rapid growth, chronic hemolytic anemia). This anemia presents as pallor, mild jaundice, smooth beefy red tongue, irritability, paresthesias, weakness or an unsteady gait. The laboratory findings are macrocytosis, hypersegmented neutrophils with normal or decreased WBC and platelet count.

Diagnosis of vitamin B12 deficiency is based on abnormal serum methylmalonic acid and homocysteine levels. Folic acid deficiency is diagnosed by low red cell folate level.

Treatment of vitamin B12 deficiency requires i.m. or parenteral vitamin B12. Folic acid deficiency is treated with oral folic acid<sup>5</sup>.

Aplastic anemia is characterized by peripheral pancytopenia with a hypocellular bone marrow. It is classified as congenital and acquired aplastic anemia. Acquired aplastic anemia is the most common form. Its causes are idiopathic (50% of cases), drugs (chloramphenicol, phenylbutazone, sulfonamide, N SAID's, anticonvulsants), toxins (benzene, insecticides, heavy metals) and infections (non-A, non-B and non-C viral hepatitis, infectious mononucleosis, HIV).

Aplastic anemia produces weakness, fatigue, pallor, petechiae, purpura, bleeding and fevers. There is

normocytic anemia with low reticulocyte count, leucopenia and thrombocytopenia. Bone marrow aspiration & biopsy is diagnostic. Complications include overwhelming infection and hemorrhage.

The treatments available are bone marrow transplantation (BMT) or immune suppression.

The prognosis is extremely poor (death within 6-12 months) if BMT is not available and immune-suppression is not effective. BMT produces greater than 80% long term survival, while many treated with immune suppression have sustained complete remissions.<sup>5,6</sup>

There are very few studies about anemia in Pakistani children. Khan F.R. et al studied anemia in 85 children in department of hematology Sheikh Zayed Hospital and FPGMI Lahore and found out that iron deficiency anemia was most common (92%).<sup>7</sup>

Syed SSM et al studied anemia in 32 children aged 1 month to 12 years in DHQ hospital of Sialkot and found that 44.44% of them had anemia.<sup>8</sup>

Manzoor A. et al studied anemia in school children of ages 6 to 12 years in Lahore and found that 10.5% had anemia and most common anemia was microcytic hypochromic.<sup>9</sup>

Alam M. et al studied anemia in 978 school children in Skardu and found out that 37.01% had anemia.<sup>10</sup>

Kazi MY et al studied aplastic anemia in children in Mayo Hospital Lahore and found that 80% of them had drug induced aplastic anemia.<sup>11</sup>

Hazara Division comprises of Abbottabad, Mansehra and Haripur Districts. There is virtually no study about anemia in pediatric population of Hazara division after searching the published literature in www.pakmedinet.com.

This study was conducted to evaluate the frequency of different anemias in children of Hazara Division. This study was carried out in Ayub Teaching Hospital Abbottabad (ATH), because it is the only tertiary care hospital of Hazara Division and patients from all areas of Hazara Division come to. Thus study conducted in ATH is true representative of Hazara Division. The information gathered from this study will help in early recognition and treatment of major causes of anemia in children of Hazara Division. This information will also be useful for proper focusing and planning of health care activities like preventive measures and education of health personnel regarding burden of anemia in children of Hazara Division. All this will lead to reduction in morbidity and mortality due to anemia in children of Hazara Division.

## MATERIALS AND METHODS

This cross sectional study was conducted in Pediatric OPD of Ayub Teaching Hospital Complex Abbottabad from 1<sup>st</sup> January, 2015 to 30<sup>th</sup> June, 2015.

The number of children studied was 375. This sample size was calculated by using the equation provided by

Yamane T

$$n = N/1+N(e)^2$$

where  $n$  is the sample size

$N$  is the anticipated population size

$e$  is the level of precision and is assumed to be  $\pm 5\%$  precision.

A 95% confidence interval is assumed for this equation. The anticipated pediatric population attending pediatric OPD of ATH was calculated by counting the number of patients attending the Pediatric OPD over a period of 12 weeks and comparing the counted result with the available records and this came out to be 6000 children for six months.

Sampling technique was simple random using random number tables. Only children with definitive diagnosis from Hazara Division aged 0-18 yrs were included. The consent of parents was obtained and study was approved by Ethical Committee of ATH. Age on last birthday was recorded and ascertained through birth certificate or school certificate or form B or mother's statement.

The data was analyzed using SPSS (version 21.0) for windows.

Descriptive statistics was used to calculate mean and SD for age. Relative frequency (%) was calculated for sex and each disease.

## RESULTS

Majority of children were male (66.6666%; n=250). Females constituted 33.3334% (n=125) of the total. The male to female ratio was 2:1 (Table No.1). Majority children were in the age-range of 2-5 yrs (31.7333%).

**Table No 1: Sex Distribution Of Children Of Hazara Division**

Sex	Number of patients	Relative frequency
Males	250	66.6667%
Females	125	33.3333%

**Table No 2: Age Distribution of Children of Hazara Division**

Age group	No. of patients	Relative frequency	Male:female ratio
0-28 days	10	2.6666	4:1
2mo-1yr	92	24.5333	2.2857:1
2yrs-5yrs	119	31.7333	1.975:1
6yrs-10yrs	81	21.6	1.4545:1
11yrs-15yrs	68	18.1333	2.5789:1
16yrs-18yrs	5	1.3333	1:1.5

The mean for age was 5.588 yrs and the SD for age was 4.7567 yrs (Table No.2).

Anemia was the fifth (3.9999%) most common disease of children in this study. Iron deficiency was the most common anemia seen in children of Hazara Division in this study. It had equal sex incidence with mean age of 4.7708 yrs.

Megaloblastic anemia was the second most common cause of anemia seen in this study. The mean age for this anemia was 6.6666 yrs.

A single case of aplastic anemia was seen in a 12 year old boy in the present study (Table No.3).

## DISCUSSION

This study showed that number of male children (66.6666%) was greater than that of female children (33.3333%) with a male to female ratio of 2:1. This finding was similar to the observation of Memon IA et al<sup>12</sup> that majority (69.36%) of children brought to a consultant pediatric chamber in Nawab Shah were males.

Majority (56.2666%) of children were in the age-range of 2-5 yrs (31.7333%). This finding was similar to the observation of U.S. Census Bureau International Database<sup>13</sup>. There was minimal representation of 0-28 days and 16-18 years age-groups due to routine presentation and referral of these groups to neonatal unit and adult medicine unit respectively at ATH.

Anemia was the fifth most common disease (4%) seen in children of Hazara Division in this study and iron deficiency anemia was the most common cause of it (80%). Internationally iron deficiency anemia is most common form of anemia and is more common in children &

women and in developing countries due to poor diet and intestinal worms<sup>4</sup>. Khan FR et al<sup>7</sup> found that 92% of children studied had iron deficiency anemia. Study of Memon IA et al<sup>12</sup> found out that 26.66% of children had anemia. This study revealed low incidence of anemia in children in Hazara Division. Further studies are required to elaborate this.

Megaloblastic anemia and aplastic anemia were other causes of anemia. One case of acquired aplastic anemia secondary to cotrimoxazole was seen in a 12 year old boy in this study. The profile of this case was similar to study of Kazi MY et al<sup>11</sup> in which he noted that drug induced aplastic anemia was most common form of aplastic anemia in Pakistani children.

## CONCLUSION

Majority of children were male and were in the age-range of 2-10 years. Anemia was present in 3.9999% of

these children and iron deficiency was the most common cause of it.

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

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# Association of Serum CTX-I Levels with Hormone Replacement and Interleukin Inhibitor Therapy in Peri-Menopausal Women Presenting in a Tertiary Care Hospital of Peshawar, KPK

1. Mehwish Durrani 2. Muhammad Aslam Qamar 3. Muhammad Abubakar

4. Muhammad Shafiq

1. Asstt. Prof. of Biochemistry, Hayatabad Medical Complex (HMC), Peshawar 2. Assoc. Prof. of Anatomy, HMC, Peshawar 3. Registrar, HMC, Peshawar 4. Prof. of Biochemistry, Rehman Medical College Peshawar

## ABSTRACT

**Objective:** To determine the association of serum CTX-I levels with hormone replacement and interleukin inhibitor therapies

**Study Design:** Descriptive cross sectional study

**Place and Duration of Study:** This study was conducted at the Hayatabad Medical Complex (HMC), Peshawar from June 2012 to August 2012.

**Materials and Methods:** A total of 100 peri-menopausal women were included in the study to determine the association of serum of CTX-I levels with hormone replacement therapy (HRT) and interleukin inhibitors. These females were randomly selected and screened for osteoporosis. The age of study population was between 45-55 years. Informed consent was taken. Detailed history was obtained regarding occupation, income, family history, number of pregnancies and medications. Women with complaints of joint pains, history of osteoarthritis, rheumatoid arthritis and any other bone disease were excluded from the study. They were radiologically assessed for osteoporosis by using Singh index as I to VI. Ethical approval for the study was taken from the Institutional Ethical Research Committee (IERC) of HMC. Blood samples were taken for estimation of hemoglobin, ESR, calcium, alkaline phosphatase and CTX-I.

**Results:** The levels of CTX-I were elevated in peri-menopausal women who were radiographically diagnosed as osteoporotic patients. However CTX-I levels were either normal or insignificantly raised in women taking either HRT or interleukin inhibitors. The data were subjected to statistical analysis using Chi-square test on computer software SPSS-17. Results were expressed in form of tables.

Association and their significance were sorted out on the software. There was a significant association of CTX-I levels with both HRT & interleukin inhibitors ( $p = 0.000$ )

**Conclusion:** This study revealed a significant association of serum CTX-I levels with both hormone replacement and interleukin inhibitor therapies.

**Key Words:** osteoporosis, CTX-I, hormone replacement therapy, peri-menopausal women

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## INTRODUCTION

Osteoporosis is a global problem of old age caused by more bone resorption as compared to bone formation. Osteoporotic bones are prone to fractures leading to disability and treatment costs. Majority of postmenopausal women suffer from osteoporosis. This is caused by deficiency of estrogen leading to excessive

bone loss. It is classified as one of public health problems and treated as a social disease.<sup>1</sup>

According to the estimated data of the National Osteoporosis Foundation (USA), every second woman at the age of 50 years experiences an osteoporosis fracture, and the risk of such fracture in women is higher than the risk of breast, ovary or uterus body cancers together.<sup>2</sup>

According to Peters et al., a high calcium intake may decrease the osteoporosis fracture risk as much as by 60% due to the fact that it plays an important role in decreasing the bone remodeling and age-related bone mass loss.<sup>3</sup>

**Correspondence:** Mehwish Durrani,  
Asstt. Prof. of Biochemistry, Hayatabad Medical Complex,  
Peshawar  
**Contact No.:** 0333-9313716  
**E-mail:** aslam.qamar@rmi.edu.pk

Bone is constantly repaired and remodeled. Approximately 20% bone tissue is replaced annually varying by site and type.<sup>4</sup> The prevalence of osteoporosis increases with age. Bone loss is reportedly more rapid in females in the first few years post menopause and is influenced by estrogen deficiency.<sup>5</sup> The World Health Organization (WHO) has defined osteoporosis as bone mineral density (BMD) measured by dual-energy X-ray absorptiometry (DXA) 2.5 standard deviations (SD) or more below the mean peak bone mass of premenopausal females (T-score  $\leq -2.5$  SD).<sup>6</sup> Technical developments in the measurement of BMD have led to its adoption as the standard for diagnosis of osteoporosis, however its relatively poor sensitivity contrasting with high specificity means that many potential fractures will be missed if BMD assessment is used alone.<sup>7</sup>

During the past decade, bone turnover markers (BTMs) have been established as tools in the clinical management of bone disease in addition to their use in research for a long time. The majority of bone resorption markers are degradation products of collagen. These markers have become the preferred means of measuring resorption and examples include carboxy-terminal and amino-terminal cross-linked telopeptide of type I collagen (CTX and NTX respectively).

CTX is a marker of bone degradation. It is derived from the enzymatic degradation (hydrolysis) of type I collagen; CTX is a peptide related to regions of cross-linking with pyridinoline.<sup>8,9</sup>

Type I collagen comprises over 90% of the total bone protein. High levels of CTX-I are indicative of excessive bone degradation and indicate osteoporosis. It is a sensitive marker for bone resorption in osteolytic diseases such as osteoporosis and osteoarthritis.<sup>8</sup> Bones continuously remodel according to body requirement and resources. Osteoclasts are responsible for enzymatic hydrolysis of type I collagen. Acidic and neutral proteases break down collagen into fragments, releasing cross-linked N-terminal and C-terminal telopeptide CTX-I.<sup>9</sup> CTX-I, as biochemical marker of bone degradation, is the most sensitive marker to assess bone degradation and formation.<sup>10</sup> The normal serum levels of CTX-I range from 50-409 pg/ml. The major disadvantage of CTX is its large circadian variation necessitating a morning fasting sample for accurate interpretation.<sup>11</sup>

A comprehensive drug history should also be taken into account when interpreting bone marker levels. Anti-resorptive drugs such as bisphosphonates<sup>12</sup> and hormone replacement therapy (HRT)<sup>13</sup> have a major effect on markers of bone resorption and long-term corticosteroid therapy is known to suppress bone formation<sup>14</sup>

A large number of peri-menopausal women presenting in orthopedic outpatient department of HMC suffer

from either backache or bone pains. They were assessed radiologically for any signs of osteoporosis. We conducted this study in order to determine the association of HRT and anti-resorptive therapy with the serum levels of CTX-I in these patients with radiological evidence of osteoporosis.

## MATERIAL AND METHODS

This descriptive cross-sectional study was carried out in a tertiary health care facility, Hayatabad Medical Complex (HMC), Peshawar, Pakistan to determine association of serum CTX-I levels with HRT and interleukin inhibitors in radiographically assessed peri-menopausal women. These females were randomly selected and screened for osteoporosis. After explaining aims and objectives, informed consent was taken from each subject for participation in study. Ethical approval for the study was taken from the Institutional Ethical Research Committee (IERC) of Postgraduate Medical Institute (PGMI), Peshawar. Sample size was 100 subjects and this was calculated by using 30% proportion of osteoporosis, 95% confidence level and 5% margin of error according to WHO software for sample size determination.

The age of women ranged from 45-55 years reporting to orthopedic outpatient department, HMC, Peshawar. Variables like age, age at marriage, education, husband's education, occupation and monthly income along with number of pregnancies, number of still births and number of alive children were recorded. ESR, serum albumin, serum calcium and serum alkaline phosphatase were determined as individual values to set control and to exclude any preexisting condition. The subjects having an ESR above 25 mm in 1<sup>st</sup> hour, alkaline phosphatase above 260 IU/L, serum albumin above 3 g/dL and subjects with comorbid diseases and any history of joint diseases were excluded from the study.

The analytic work was done in Pakistan Medical Research Council Research Centre, Khyber Medical College, Pathology laboratory of Institute of Kidney Diseases and PGMI, HMC, Peshawar. Subjects were also assessed according to their lifestyle, education, husband's education, occupation, monthly income, previous family history regarding the disease, previous medications like steroids, number of pregnancies, age in years, ambulatory status as community ambulant, house hold ambulant and bed ridden were recorded.

History of medication like HRT, interleukin inhibitors, anti-inflammatory drugs and any supplement was particularly obtained to determine the association of medication with CTX levels.

Hemoglobin in g/dL, ESR by Westergren method as millimeter in 1<sup>st</sup> hour, serum albumin (g/dL), serum calcium as mg/dL, serum alkaline phosphatase as international units per liter, radiographic grade of osteoporosis according to Singh index as I-VI and

CTX-I level in pg/ml were estimated. Association and their significance were sorted out on SPSS version 17. All individual variables were analyzed as independent variables. Chi-square test was applied to determine association of CTX levels with various variables and with osteoporosis.

## RESULTS

The mean age of the study population was 48.24 years  $\pm$  2.78. The mean hemoglobin level was 10.85 g/dL  $\pm$  1.4. Serum CTX-I minimum level was 102 pg/ml and maximum level was 2016 pg/ml.

The mean values of CTX-I for Singh grades VI, V and IV were 454.69, 1047.64 and 1672.00 respectively. The average value was  $574.45 \pm 41.65$ . On application of

ANOVA on serum levels of CTX-I and Singh grades, a P value of 0.05 was obtained showing a significant correlation with Singh index i.e. serum levels of CTX-I and radiographic index were negatively correlated with each other.

Seventy two percent subjects were taking supplements, 12% were taking interleukin inhibitors, 11% were taking anti-inflammatory drugs and 5% were on HRT. No subject on HRT was having more than double the normal value of CTX-I. Only two subject taking interleukin inhibitors had triple the normal value of CTX-I.

The levels of CTX-I and their distribution among various age groups of study population are shown in Table 1.

**Table No.1: Cross tabulation between the age of study group and levels of CTX-I**

Age (years)	45	46	47	48	49	50	51	52	53	54	55	Total	
Serum CTX (pg/ml)	50-410	17	7	2	6	3	6	2	0	3	0	2	48
	411-920	2	1	3	2	3	3	4	1	0	2	0	21
	921-1230	6	0	2	2	2	6	2	2	0	0	0	24
	1231-1640	1	1	0	1	0	0	1	0	0	0	0	4
	1641-2050	0	1	0	1	1	0	0	0	0	0	0	3
Total		26	10	7	12	9	15	9	3	5	2	2	100

**Table No.2: Cross tabulation between the levels of serum CTX-I and grades of Singh index of the study group**

Serum CTX-I (pg/ml)	Singh Index			Total
	Grade IV	Grade V	Grade VI	
50-410	0	2	46	48
411-920	0	1	20	21
921-1230	1	6	17	24
1231-1640	0	4	0	4
1641-2050	2	1	0	3
Total	3	14	83	100
P value = 0.000				

The levels of CTX-I and their distribution related to grades of Singh index are depicted in Tables 2 & 3.

**Table No.4: Cross tabulation between serum CTX-I levels and medications**

Serum CTX(pg/ml)	Medication				
	HRT	Interleukin inhibitors	Anti-inflammatory	Supplements	Total
50-410	2	8	1	37	48
411-920	3	2	0	16	21
921-1230	0	2	5	17	24
1231-1640	0	0	3	1	4
1641-2050	0	0	2	1	3
Total	5	12	11	72	100
P Value = 0.000					

## DISCUSSION

This study was conducted to find out an association between serum CTX-I levels with HRT and interleukin inhibitor therapy. Peri-menopausal women of 45-55 year of age with radiographic evidence of osteoporosis

were evaluated in relation to serum CTX-I levels. Singh index was used to provide radiographic evidence of osteoporosis. It was recorded from digital antero-posterior radiographs of pelvis.

Rosen H.N. (2000)<sup>15</sup> described CTX as sensitive marker of bone anti-resorptive therapy and found serum CTX-I levels as sensitive markers of response to treatment.

In a randomized controlled trial, Forsbladd'Elia et al.<sup>16</sup> found that treatment with HRT in postmenopausal women reduced markers of bone turnover. They found that reduction in bone turnover markers was associated with improved bone mass after 2 years, with CTX-I providing the most sensitive prognostic value.

CTX-I is an early indicator of bone degradation as it was increased in grade VI women which shows bone loss without radiological evidence. This is supported by Greenspan et al<sup>17</sup> who described CTX-I as more reliable marker for bone anti-resorptive therapy.

In present study, it was observed that majority of perimenopausal women were taking various supplements and medications like HRT, interleukin inhibitors, anti-inflammatory drugs.

A significant association (negative correlation) was found between hormone replacement and anti-resorptive therapies and CTX-I levels by applying Chi-square test. (p =0.000).

## CONCLUSION

The levels of CTX remain low in patients taking HRT and interleukin inhibitors indicating their protective role in osteoporosis. Thus we conclude from our study that there is a significant association of serum CTX-I levels with both hormone replacement and interleukin inhibitor therapies.

**Recommendation:** It is recommended that both hormone replacement and interleukin inhibitor therapies should be encouraged in peri-menopausal women.

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

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# Comparison of Accuracy of Schild's Gender Specific Fetal Weight Formula with Hadlock's, Shepard's and Aoki's Fetal Weight Formulae in Pakistani Population

Gender Specific Fetal Weight Calculation

1. Syed Nudrat Nawaiid Shah 2. Nuzhat Hassan 3. Mohammad Tameem Akhtar 4. Farah Ahmad 5. Syed Hasan Danish

1. M. Phil Student, Department of Anatomy, Ziauddin University. 2. Chairman & Prof. of Anatomy, Ziauddin University. 3. Chairman & Prof. of Radiology, Abbasi Shaheed Hospital, Karachi. 4. Asst. Prof. Community Health Services, Ziauddin University. 5. Asst. Prof. Community Health Services, Ziauddin University.

## ABSTRACT

**Objective:** Large number of fetal weight formulae derived using different populations suggest that there is no fetal weight formula which is acceptable worldwide. Ethnicity and gender of the fetus are the well reported and recognized causes of inaccuracies in these fetal weight formulae. The aim of this study was to compare the accuracies of Schild's gender specific formula with Hadlock's, Shepard's and Aoki's formulae in Pakistani population.

**Study Design:** Cross sectional study

**Place and Duration of Study:** This study was conducted at Ziauddin University Hospital, from May 2014 to May 2015.

**Material and Methods:** This cross sectional study recruited 150 primary gravida with singleton pregnancy. Patients with hypertension, diabetes and smoking were excluded. Sonographic evaluation for fetal parameters was done during  $36.39 \pm 0.684$  weeks of gestation. Mean fetal weight was estimated from these formulae. Mean error, mean percentage error and the limit of agreement by Bland –Altman plot was determined. Anova was applied to compare the means of estimated fetal weight, error and percentage error. Gender and weight was noted after birth.

**Results:** No significant difference was found between the means of estimated fetal weight obtained by these formulae. Statistically significant difference was found between mean error of these formulae ( $p$  -value = 0.012) ranging between -217.24 gram to -310.93 gram. Insignificant difference in mean percentage errors was noted which was between - 6.74% to - 9.37%. The narrowest and widest limit of agreement was found with Schild's formula and Hadlock's formula respectively.

**Conclusion:** In our population, for pregnancies with in normal range of fetal weight, Hadlock's, Shepard's, Aoki's and Schild's fetal weight formulae, all showed low values of mean errors and mean percentage errors which were within acceptable range.

**Key Words:** Pregnancy, fetal weight, fetal weight formula

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## INTRODUCTION

Evaluation of fetal weight is an essential part of obstetrics as it can monitor the growth of the fetus and can minimize fetal, maternal complications by influencing clinical decision making during and after delivery.<sup>1,2</sup> During the last 30 years, many fetal weight formulae were developed and applied all over the world. Most of the fetal weight formulae are based on

different combinations of fetal biometric parameters like head circumference (HC), biparietal diameter (BPD), abdominal circumference (AC) and femur length (FL).<sup>3</sup> The inaccuracies of these formulae are well reported and recognized.<sup>4</sup> Accurate fetal weight estimation is more important when dealing with high risk pregnancies but unfortunately error in fetal weight estimation is greatest for low weight and high weight babies.<sup>5</sup> Apart from the ethnicity and breech presentation, fetal gender is also reported as a factor influencing the accuracy of the fetal weight formulae.<sup>6,7</sup> None of the standard fetal weight formulae considers the effect of fetal gender. In 2004 Schild et al published a gender specific formula for fetal weight

**Correspondence:** Syed Nudrat Nawaiid Shah  
M. Phil Student, Department of Anatomy, Ziauddin University, Karachi.  
**Contact No.:** 03332369238  
**E-mail:** syednudratshah@gmail.com

estimation whose better accuracy has been reported by few studies.<sup>8</sup> To date, no study has been reported comparing the accuracy of Schild's fetal weight formula with commonly used formulae in Pakistani population.

The aim of this study was to compare the accuracy of fetal gender specific Schild's fetal weight formula with commonly used formulae in Pakistani population.

## MATERIALS AND METHODS

We conducted a cross sectional study conducted at Ziauddin University hospital after the approval of local ethical review board. The duration of study was one year from May 2014 to May 2015. 150 patients were recruited for the study. Convenience sampling was done. Gender of the babies was determined after birth and birth weight (BW) was also measured. Sonographic evaluation of the fetus was done by expert sonographer on standard 2D ultrasound machine with standard 3.5 MHz convex probe at 36 weeks ( $36.39 \pm 0.684$ ) within 7 days prior to delivery. Only primary gravida with normal singleton pregnancy were included. Patients with history of drug abuse, hypertension, diabetes, smoking and high risk pregnancies were excluded. Standard fetal biometric parameters (Biparietal diameter, head circumference, abdominal circumference, femur length) and additional fetal measurement (abdominal area) were calculated. Accuracy of Hadlock's, Shepard's, Aoki's and Schild gender specific fetal weight formulae (Table 1) were assessed by calculating the mean estimated fetal weight (EFW), mean error (EFW - BW), mean percentage error  $[(EFW-BW)/BW \times 100]$  and by determining the limit of agreement by Bland-Altman plot. Descriptive analysis was performed. Anova was applied to compare the means.  $p$ -value  $< 0.05$  was considered significant.

## RESULTS

150 mothers were evaluated for fetal sonographic parameters with age ranging from 16 to 39 years ( $27.21 \pm 4.2$ ) and mean gestational age by ultrasound ranged from 36 weeks to 39 weeks ( $36.39 \pm 0.684$ ). The birth weight of the babies were from 2200 grams to 4100 grams ( $3076 \pm 331$ ) as shown in Table 2.

Mean estimated fetal weight ranged between 2767.27 gram and 2859.42 gram with Aoki's formula showing the least estimated fetal weight while highest by Shepard formula. No significant difference was found between the means of estimated fetal weight obtained by these formulae. Mean error in fetal weight estimated by these formulae were found to be between -217.24 gram to -310.93 gram with Aoki's formula showing the least error while Shepard's formula showing highest error. Significant difference was found between the mean errors of these formulae. ( $p$ -value = 0.012).

**Table No.1: Demonstrates the fetal weight formulae evaluated in the study**

Name of formula	Year of publication	Equation <sup>8,9</sup>
<b>Hadlock's formula:</b>	1985	$\text{Log}_{10}\text{EFW} = 1.3596 - 0.00386(\text{AC} \times \text{FL}) + 0.0064(\text{HC}) + 0.00061(\text{BPD} \times \text{AC}) + 0.0425 (\text{AC}) +$
<b>Shepard's formula:</b>	1982	$\text{Log}_{10}\text{EFW} = 1.2508 + (0.166 \times \text{BPD}) + (0.046 \times \text{AC}) - (0.002646 \times \text{AC} \times \text{BPD})$
<b>Aoki's formula:</b>	1990	$\text{EFW} = (1.25647 \times \text{BPD}^3) + (3.50665 \times \text{FAA} \times \text{FL}) + 6.3$
<b>Schild formula</b>	2004	<b>For Male:</b> $\text{EFW} = 43576.579 + 1913.853 \times \text{log}_{10} \text{BPD} + 0.01323 \times \text{HC}^3 + 55.532 \times \text{AC}^2 - 13602.664 \times \text{AC}^{1/2} - 0.721 \times \text{AC}^3 + 2.31 \times \text{FL}^3$ <b>For Female:</b> $\text{EFW} = -4035.275 + 1.143 \times \text{BPD}^3 + 1159.878 \times \text{AC}^{1/2} + 1.079 \times \text{FL}^3 - 81.277 \times \text{FL}^2$

**Table No.2: Shows the general characteristics of the patients.**

	N	Minimum	Maximum	Mean	Std. Deviation
Age in years	150	16	39	27.21	4.208
Gestational age by US in weeks	150	36	39	36.39	0.684
Birth weight (gram)	150	2200	4100	3076.67	331.443

**Table No.3: Comparison of mean estimated fetal weight, mean error, mean percentage error of Hadlock's, Shepard's, Aoki's and Schild's fetal weight formulae.**

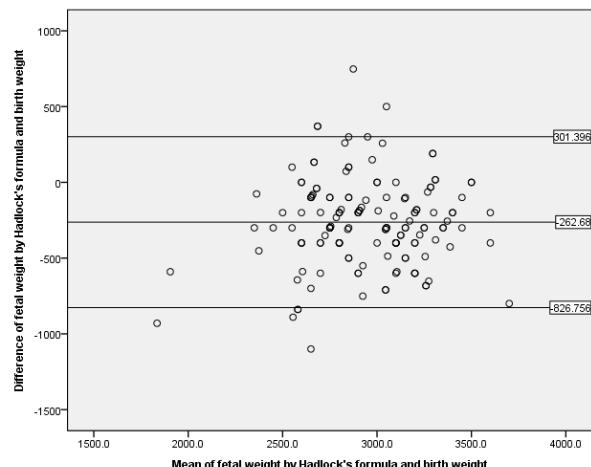
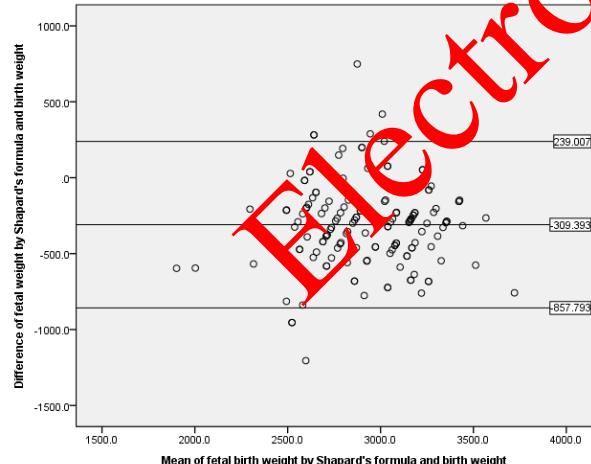
Fetal weight formula	Mean estimated fetal weight (gram)	Mean error (gram)	Mean percentage errors
Hadlock	2813.99	-254.96	-7.96
Shepard	2767.27	-310.93	-9.37
Aoki	2859.42	-217.24	-6.74
Schild	2854.93	-221.74	-6.92
P-value	0.062	0.012*	0.057

\*indicates  $p$ -value  $< 0.05$

Mean percentage error in fetal weight estimated by these formulae were found to be between -6.74% to -9.37% with Aoki's formula showing the least percentage error while Shepard's formula showing highest percentage error. No significant difference was found between the mean percentage errors of these formulae. All the formulae tend to underestimate the fetal weight as shown in Table 3.

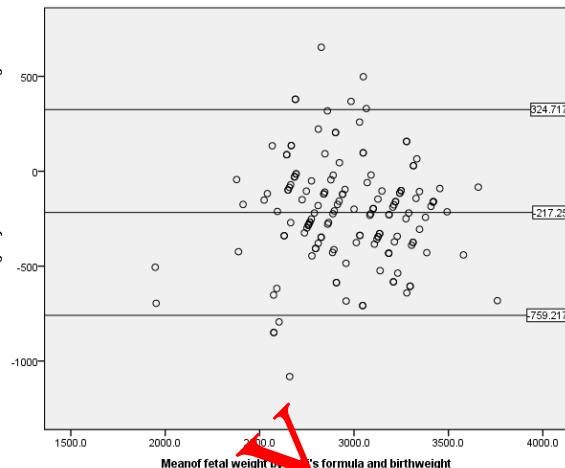
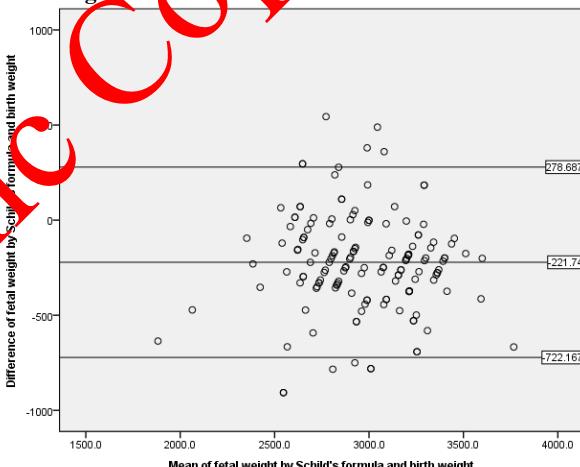
**Table 4: Demonstrates the mean disagreement and 95% limit of agreement of Hadlock's, Shepard's, Aoki's and Schild's fetal weight formulae.**

Fetal weight formula	Mean disagreement (gram)	SD of disagreement (gram)	95% limit of agreement (gram)
Hadlock	-262.68	287.79	-826.75 to 301.39
Shepard	-309.39	279.79	-857.79 to 239.00
Aoki	-217.25	276.51	-759.21 to 324.71
Schild	-221.74	255.32	-722.16 to 278.68

**Figure No.1: Bland Altman plot illustrating agreement between fetal weight estimated by Hadlock's formula with birth weight.****Figure No.2: Bland Altman plot illustrating agreement between fetal weight estimated by Shepard's formula with birth weight.**

Mean disagreement of these formulae was between -217.25 gram and -309.39 gram with Aoki's formula showing the least disagreement and Shepard's formula showing largest disagreement. The narrowest limit of agreement was found with Schild's formula and widest limit of agreement was found with Hadlock's formula.

(Table 4). Bland Altman Plots demonstrating the limit of agreement of fetal weight estimated by Hadlock, Shepard, Aoki and Schild formulae are illustrated in figure 1, figure 2, figure 3 and figure 4 respectively.

**Figure No.3: Bland Altman plot illustrating agreement between fetal weight estimated by Aoki's formula with birth weight.****Figure No.4: Bland Altman plot illustrating agreement between fetal weight estimated by Schild's formula with birth weight.**

## DISCUSSION

Fetal weight estimation is an essential part of sonographic evaluation done for assessing fetal well-being, deciding appropriate management plan for pregnancy and to minimize fetal and maternal complications during delivery. Precise fetal weight estimation is of key importance when dealing with high risk pregnancy, preterm labor, small for gestational age pregnancy and cases of macrosomia. Unfortunately the inaccuracies are reported to be greatest at the two extremes of fetal weight.<sup>10, 11, 12, 13</sup>

It is well reported in literature that ethnicity is one of the causes of inaccuracy in the results of fetal weight formula as majority of them were developed for Western population but applied also another

populations of the world.<sup>14,15</sup> In our study it was found that all fetal weight formulae (Hadlock, Shepard, Aoki and Schild) estimate fetal weight with statistically significant errors (p-value = 0.012) ranging between -217.24 gram and -310.93 gram, and statistically insignificant percentage errors ranging between -6.74 % to -9.37 % (p-value = 0.057) for normal weight singleton pregnancies. These values of mean errors and mean percentage errors are low for causing any significant influence on clinical decision. Though our study also includes few pregnancies of babies with birth weight less than 2500 gram and greater than 4000 gram but they were very few to make any substantial conclusion. All the fetal weight formulae showed a tendency to underestimate the fetal weight, this may be due to the reason that in our study fetal weight was not adjusted for the period of days between sonographic evaluation and delivery which is reported to cause underestimation of fetal weight.<sup>16</sup> Adjusting the fetal weight for the period of days between sonographic evaluation and delivery could increase the accuracy of the formula.<sup>17</sup>

Another factor causing discrepancy in fetal weight estimation, which is well reported and recognized in the literature, is the gender of the fetus.<sup>18</sup> None of fetal weight formula except Schild's formula has taken into consideration the effect of gender difference in formula equation in spite of the reports that fetal biometric parameters like BPD, HC, AC are smaller in female babies.<sup>19</sup> Different rates of growth of two genders is also reported in literature with male fetus growing faster than the female fetus.<sup>20</sup> In our study Schild's gender specific formula gives the least value of mean error and mean percentage error after Aoki's formula suggesting better performance of the Schild's formula over Hadlock's and Shepard's formula, as reported by Schild et al.<sup>21</sup> Lowest mean error and percentage error observed with the Aoki's formula could be due to the fact that Aoki's formula was derived using Japanese population belonging to the same continent as that of Pakistani population and may have some similarities with Pakistani population. But this needs to be further evaluated as no previous study, to the best of our knowledge, has reported the better performance of Aoki's formula over Hadlock's and Shepard's formula for Pakistani population. The narrowest limit of agreement, found with Schild's formula in our study, is in accordance with the study of Melamed et al<sup>22</sup> which has suggested that incorporation of effect of gender in Schild's formula favors the accuracy of fetal weight formula. The limitation of this study is that these results could only be applied on normal weight babies. Another limitation of the study was that samples were inducted using convenience sampling technique.

## CONCLUSION

In our population, for pregnancies within normal range of fetal weight Hadlock's, Shepard's, Aoki's and Schild fetal weight formulae, all showed low values of mean errors and mean percentage errors within acceptable range.

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

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# Portal Vein Diameter in the Diagnosis of Portal Hypertension Confirmed on Serum-Ascites Albumin Concentration Gradient in Patients with Decompensated Chronic Liver Disease

1. Shaista Ahmed 2. AttiyaSabeenRahman 3. JawahirLal 4. Aisha Javed 5. Laeeq Ahmed

1. Asst. Prof. Medicine, Karachi Medical and Dental College. 2. Assoc. Prof. Medicine, Karachi Medical and Dental College. 3. Senior Registrar, Medicine, Karachi Medical and Dental College. 4. Senior Registrar, Medicine, Karachi Medical and Dental College. 5. Prof. of Medicine, Karachi Medical and Dental College.

## ABSTRACT

**Objective:** In patients with chronic liver disease, determine the accuracy of portal vein diameter in the diagnosis of portal hypertension confirmed on Serum-Ascites Albumin Concentration Gradient.

**Study Design:** Cross sectional study.

**Place and Duration of Study:** This study was conducted in the Department of Medicine at AbbasiShaheed Hospital, Karachi for a period of six months from January to June 2012.

**Materials and Methods:** Seventy patients with decompensated CLD were included in this study. The routine testing of ascitic fluid was included total protein, albumin and cell count. All patients underwent ultrasonography of abdomen.

**Results:** The average age of the patients was  $48.97 \pm 7.52$  years. 47(67.1%) were male and 23(32.9%) were female. In the diagnosis of portal hypertension confirmed by serum ascites albumin or decompensated chronic liver disease 95.7% positive accuracy of portal vein diameter was found.

**Conclusion:** Our study of small predominantly male sample found a very high positive accuracy of portal vein diameter in determining portal hypertension. The results are similar to previous researches that have also shown a higher accuracy rates but slightly lower than our study.

**Key Words:** Ascites, portal hypertension, portal vein diameter

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## INTRODUCTION

One of the major complications of liver cirrhosis and portal hypertension is ascites. More than 50% of patients develop ascites within ten years of the diagnosis of cirrhosis.<sup>1,2</sup> Ascites is a poor prognostic factor with a mortality of 15% at one year and 44% at five year followup respectively.<sup>1</sup> Excess fluid within the peritoneal cavity, which is pathologic, is called ascites. It has important diagnostic prognostic and therapeutic implications.<sup>3</sup> Ascites has a diverse etiology, so the primary physician needs to have a systematic approach to seek the underlying cause. Cirrhosis with ascites has been found in approximately 85% of patients and a non-hepatic cause of fluid retention in 15% of patients.<sup>3,4</sup> It is important to do paracentesis in every patient to determine the cause and complications of ascites and target the management.<sup>3</sup>

The commonest cause of portal hypertension is secondary to chronic liver disease which accounts for 78% of patients with ascites.<sup>3,5</sup> To reduce morbidity and

mortality early detection of portal hypertension before development of complications is important. Ascites is either exudative or transudative based on the estimation of ascitic fluid total protein concentration<sup>6</sup> or ascitic fluid to serum ratio of total protein or lactic dehydrogenase (LDH).<sup>6</sup> Unfortunately, none of these parameters has been found to be entirely conclusive.

The serum ascites albumin concentration gradient (SAAG) in the discrimination of ascitic fluid compared with the exudate transudate concept has found to be superior with a validity rate of 90% or more in determining the ascites due to portal hypertension has been estimated. The SAAG is found to be highly precise yet minimally invasive method which allows to classify ascitic fluid according to the absence and presence of portal hypertension.<sup>7</sup> SAAG based on oncotic hydrostatic balance, it is an index of the serum ascites oncotic pressure difference correlates directly with the pressure gradient between portal capillaries and the peritoneal cavity.<sup>8</sup> Subtracting the albumin concentration of ascitic fluid from the serum albumin obtained at the same time calculates SAAG.<sup>9</sup> SAAG of 1.1 g/dl or more suggests portal hypertension, if  $< 1.1$  g/dl then other causes should be considered and

**Correspondence:** Dr. Shaista Ahmed

Asst. Prof. Medicine, Karachi Medical and Dental College

Contact No.: 0333-3179504

E-mail: shaistaahmed.dr@gmail.com

excluded. The accuracy of such determination is 97%.<sup>4,6,8,9</sup>

Ultrasonography, a non-invasive tool to measure portal vein diameter (larger than 1.3 cm) helps in the diagnosis of portal hypertension.<sup>10</sup> The relative change in size of the portal vein with respiration is more sensitive, than the absolute size of the portal vein. An increase of less than 20% in the diameter of the portal vein with deep inspiration indicated portal hypertension with a sensitivity and specificity of 80% and 100% respectively.<sup>11,12,13</sup>

The rational of this study is to determine the accuracy of portal vein diameter (>1.3cm) on ultrasound confirmed by SAAG ratio as a marker of portal hypertension, so that noninvasive modality in diagnosing portal hypertension.

## MATERIALS AND METHODS

It is a cross sectional study conducted in the department of medicine at Abbasi Shaheed Hospital Karachi for a period of six months (January to June 2012). A total of 70 patients were enrolled in the study. All patients, above 18 years of age, presenting with decompensated CLD, confirmed on ultrasonography, to the department during the six month period were included in the study. Non probability purposive sampling.

**Inclusion criteria:** All patients were above 18 years of age with decompensated CLD with a duration of symptoms 1- 2 months were included in the study. Patients in child's class A & B were included.

**Exclusion criteria:** Patients having ascites other than decompensated chronic liver disease or having comorbidities like congestive cardiac failure, chronic renal failure etc. were excluded. Patients who refused to give consent were also excluded.

Data was collected from patients with ascites meeting the inclusion criteria. Informed consent was taken from the patient. After thorough history and physical exam ascitic fluid was collected by paracentesis done under sterile condition using 21gauge cannula. The routine testing of ascitic fluid was included total protein, albumin and cell count. Blood was drawn from antecubital vein under sterile technique for serum protein, albumin, A/G ratio, P.T and INR and liver function tests, blood sample drawn at the same time of abdominal paracentesis and with these results SAAG was calculated. All patients underwent ultrasonography of abdomen, presence of portal vein diameter of >1.3cm or above and SAAG >1.1g/dl were taken as an evidence of portal hypertension along with coarse echotexture of liver, splenomegaly and presence of ascites.

**Statistical Analysis:** Data was entered and analyzed by statistical software package SPSS version 15.0. Statistical analysis was expressed as frequencies and percentages for gender and accuracy. Mean and standard deviation were calculated for the age of patient and duration of disease. Stratification was done with

regards to age, gender and duration of disease to see the effect of these on the outcome.

## RESULTS

A total of 70 patients with decompensated chronic liver disease were included in this study. The mean age of the patients was  $48.97 \pm 7.52$  years (95%CI: 47.18 to 50.76) similarly the average duration of disease was  $4.73 \pm 2.56$  months (95%CI: 4.12 to 5.34), figure 1 and table 1.

Out of 70 patients, 47(67.1%) were male (figure 2). Duration of disease of the 24(34.3%) patients was 1 to 3 months, 17(24.3%) was 4 to 5 months, 24(33.4%) was 6 to 8 months and 5(7.1%) patients duration of disease was 8 to 12 months (figure 3 and table 1).

It has been found that 95.7% positive accuracy of portal vein diameter in the diagnosis of portal hypertension is confirmed by serum ascites albumin of decompensated chronic liver disease. Similarly positive accuracy was 90% to 100% in all age groups, gender and 80-100% duration of disease as presented in table 2, 3 and 4 respectively.

**Table No.1: Descriptive statistics of the characteristics of the patients**

Variable	Mean $\pm$ SD	95%CI	Median (IQR)	Max-Min
Age (Year)	$48.97 \pm 7.52$	47.18 to 50.76	48(13)	60-32
Duration of disease (months)	$4.73 \pm 2.56$	4.12 to 5.34	4(3)	12-1

**Table No.2: Accuracy of portal vein diameter in the diagnosis of portal hypertension with respect to age groups**

Age Groups	n	Accuracy Positive	Percentage
31 to 40 Years	15	14	93.3%
41 to 50 Years	26	26	100%
51 to 60 Years	29	27	93.1%

**Table No.3: Accuracy of portal vein diameter in the diagnosis of portal hypertension with respect to gender**

Gender	n	Accuracy Positive	Percentage
Male	47	46	97.9%
Female	23	21	91.3%

**Table No.4: Accuracy of portal vein diameter in the diagnosis of portal hypertension with respect to duration of disease**

Duration of disease	n	Accuracy Positive	Percentage
1 to 3 months	24	24	100%
4 to 5 months	17	14	82.4%
6 to 8 months	24	24	100%
>8 months	5	5	100%

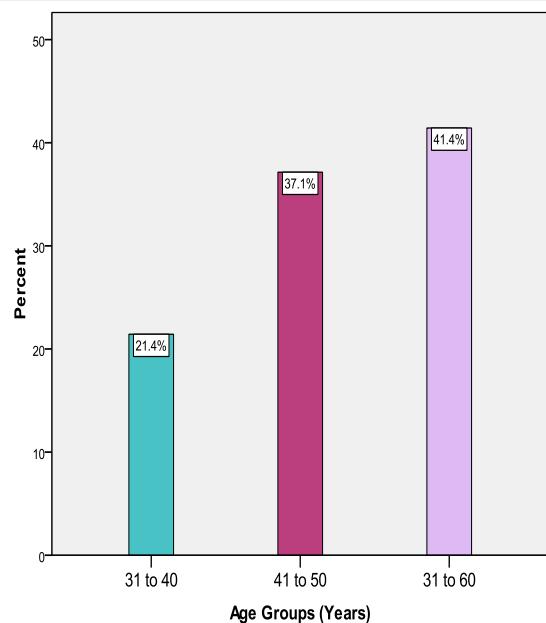


Figure No.1: Age distribution of the patients n=70

Male  
Female

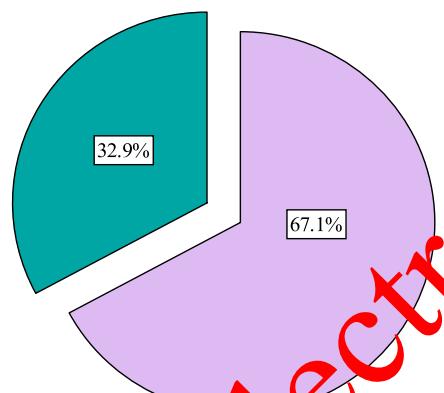


Figure No.2: Gender distribution of the patients n=70

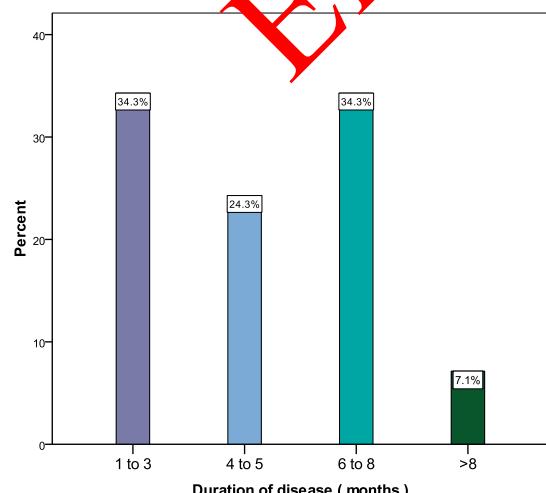


Figure No.3: Duration of disease

## DISCUSSION

Chronic liver disease is a common medical problem.<sup>4,14</sup> Portal hypertension and its complications not only cause significant morbidity in patients with chronic liver disorders but also a cause of mortality due to serious consequences like variceal bleeding and hepatic encephalopathy etc.<sup>14,15</sup> SAAG is a reliable marker in detecting portal hypertension. A high SAAG (more than 1.1 gm/dl) reflects abnormally high hydrostatic pressure gradient between portal bed and ascitic compartment where as low SAAG (< 1.1 gm/dl) excludes portal hypertension with a diagnostic accuracy and sensitivity of 97%. It distinguishes ascites related to portal hypertension from other causes regardless of presence of bacterial infection within the peritoneal cavity.<sup>14</sup> It is rapid, cheap and effective method to detect portal hypertension.<sup>4,14</sup>

We conducted a study of 70 patients with decompensated CLD with average age 48.97 years, average duration of disease 4.73±2.56 months, 47(67.1%) were male showed 95.7% positive accuracy of portal vein diameter in the diagnosis of portal hypertension confirmed by serum ascites albumin of decompensated chronic liver disease. It was interesting to note that positive accuracy was 90% to 100% in all age groups, gender and all duration of disease. While a cross sectional study conducted in Karachi showed less accuracy of detecting portal hypertension by portal vein diameter in which only 70% of the patients were correctly identified.<sup>3</sup>

Jaffri et al. evaluated portal vein diameter accuracy in detecting portal hypertension on 140 patients, 100 (71%) were males. The study found that at the cut off value of PV diameter 13 mm, 70% patients had evidence of portal hypertension and esophageal varices.<sup>3</sup> Similarly our study showed similar male to female proportion and found a very high positive accuracy of portal vein diameter in detecting portal hypertension in about 95% of cases.

Rizwan et al. found the sensitivity and specificity of SAAG were 100% and 87.8% respectively and they concluded that serum ascites albumin gradient is a reliable marker to see that ascites is due to portal hypertension or not which was similar to our study.<sup>14</sup>

The differences of higher positive accuracy of detecting portal hypertension by portal vein diameter observed in our study as compared to the above studies conducted within same geographical location may be attributed to differences in severity of cirrhosis the gold standard or other standard criteria selected to which portal vein diameter is compared and may also be attributed to the cut off value for portal vein diameter selected.

**Limitations:** Like most studies our study has also few limitations the cross sectional study design lacks biological plausibility and inferences regarding temporal relationships and causative associations,

though certainly provide an account of relationships. The selection of non-probability purposive sampling limits generalizability of the study results and findings. Although study sample size was scientifically calculated, the selection of an epidemiological study warrants a large sample size to provide true estimation of frequency and prevalence. Another main limitation of the study was not establishing the sensitivity, specificity, positive predictive and negative predictive values that is not identifying in terms of true positive, false positive, true negative and false negative cases.

## CONCLUSION

Our study of small predominantly male sample found a very high positive accuracy of portal vein diameter in determining portal hypertension. We recommend further future studies with large multiple settings and sample and detecting of sensitivity, specificity, PPV and NPV to reach a firm conclusion.

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

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# Cardiovascular Risk Reduction

## Comparison of Felodipine and Propranolol in Patients of Essential Hypertension

1. Noor ul Huda Ansari 2. Nehal Naseer 3. Vardah Noor 4. Abira Nazir 5. Mushtaq Ahmed

1. Asstt. Prof. of Pharmacology, QAMC, Bahawalpur 2. MBBS 3. D.Pharm 4. Prof. of Pharmacology, NMC, Multan. 5. Assoc. Prof. of Pharmacology, QAMC, Bahawalpur

### ABSTRACT

**Objective:** To compare the efficacy of felodipine versus propranolol in patients of essential hypertension for Serum cholesterol, LDL cholesterol and HDL cholesterol.

**Study Design:** Randomized controlled study.

**Place and Duration of Study:** This study was conducted at the Accident and Emergency Department, Bahawal Victoria Hospital, Bahawalpur and Ansari Private Clinic Model Town B Bahawalpur from 1<sup>st</sup> July 2015 to 30<sup>th</sup> September 2015.

**Materials and Methods:** Total 90 patients with essential hypertension having age range from 30 to 50 years were enrolled in this study for three months. Patient were randomly divided into three groups I, II and III, each group comprising 30 patients. Group I patients were treated with felodipine, Group II patients were treated with propranolol and group III patients were treated with placebo. Effects of these drugs on Lipid profile(Serum cholesterol, HDL cholesterol and LDL cholesterol)were compared.

**Result:** Felodipine, treated patients exhibited markedly significant fall in the serum cholesterol ( $P<0.01$ ), highly significant fall at the level of LDL cholesterol ( $P<0.001$ ) and non significant effect in HDL cholesterol. Whereas propranolol treated patients showed highly significant increase of serum cholesterol ( $P<0.001$ ), markedly significant increase in LDL cholesterol ( $P<0.01$ ) and markedly significant decreased in HDL cholesterol ( $P<0.01$ ). Whereas comparison of two drugs Felodipine and Propranolol displayed a highly increased ( $P<0.001$ ) serum cholesterol, LDL cholesterol and markedly increased ( $P<0.01$ ) HDL cholesterol.

**Conclusion:** Result of this study showing that comparing the two drugs felodipine had significantly decreased Serum cholesterol and LDL Cholesterol, whereas propranolol increased the Serum cholesterol, LDL cholesterol and decreased HDL cholesterol. So felodipine prove its better over propranolol.

**Key Words:** Cardiovascular Risk, Felodipine and Propranolol, Hypertension

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### INTRODUCTION

Hypercholesterolemia, hypertension and cigarette smoking are three major risk factors responsible for ischemic heart disease.<sup>1</sup> Whereas obesity, physical inactivity, diabetes, personality-type, excessive alcohol intake, hypertriglyceridemia and hyperuricemia have been categorized as minor cause, because they are either relatively less powerful determinants of risk or less prevalent within the population<sup>2</sup>. It was also noticed that 50% of all Coronary Heart Disease (CHD) deaths were associated with raised Serum cholesterol concentration; whereas 50% of these excess deaths were linked in cholesterol level above 85<sup>th</sup> percentile<sup>3</sup>. The treatment of hypertension has failed to show a definite preventive effect on the incidence of coronary heart disease which has aroused interest in lipid

metabolism in hypertension therapy<sup>4</sup>. In 1983 Cutler<sup>5</sup> reported that dietary lipids are absorbed through the small intestine and reach the blood mainly in the form of chylomicron. Other lipid fractions are synthesized within the liver and gut from the primitive metabolites such as acetate. High density lipoprotein (HDL) and very low density lipoproteins (VLDL) are both synthesized in the liver. LDL is a lipoprotein which carries most of the serum cholesterol borne by the blood stream. The cholesterol rich LDL fraction from the liver apparently enters the coronary artery wall and deposits its cholesterol load in the intima where as it may initiate or perpetuate the process of atherosclerotic plaque formation. HDL fraction is also carried by the blood stream, when reaches the arterial wall, seems to play a protective role against the formation or progression of atherosclerosis by removing the cholesterol deposited by LDL. Levy<sup>6</sup> reported that a definite correlation existed between the increased serum LDL cholesterol concentrations and prevalence of CHD. Miller cited by Cutler<sup>5</sup> noted an inverse

**Correspondence:** Noor Ul Huda Ansari

Asstt. Prof. of Pharmacology, QAMC, Bahawalpur

Contact No.: 0300-9681788

E-mail: noorulhuda56@gmail.com

correlation between HDL cholesterol and coronary heart disease prevalence.

Among other antihypertensive drugs beta blockers and calcium channel antagonists are widely used in cases of essential hypertension. Propranolol, a non-selective beta blocker, is a standard drug to which other beta blockers are compared<sup>7</sup>. The beta blockers are known to produce unwanted metabolic effects such as dyslipidemia<sup>8</sup> and reduction in HDL-cholesterol level<sup>9,10</sup>. Propranolol is reported to have little effect on serum cholesterol and LDL-cholesterol<sup>11, 12, 13, 7</sup> but produces a significant rise in serum cholesterol and LDL-cholesterol in an investigation carried out in smokers<sup>14</sup>. Beta blockers are said to inhibit adenylate cyclase activity, leading to a reduced activity of lipoprotein lipase (LPL) through beta 2-receptor antagonism which would retard VLDL catabolism. Propranolol and other beta blockers increase catecholamine levels, thereby increasing hepatic cholesterol production and decreasing lecithin- cholesterol-acyltransferase (LCAT) activity, thus suppressing the HDL-LCAT cycle and ultimately decreasing HDL cholesterol<sup>15, 14</sup>.

Felodipine is the member of second generation of dihydropyridine class of calcium antagonists and is insoluble in water<sup>16, 17</sup>. Calcium antagonists have little or beneficial effect on lipid profile<sup>18, 19, 13</sup>. In a study on hypertensive patients receiving calcium antagonists there was 10% reduction in total cholesterol. This decline resulted from LDL cholesterol fraction<sup>20</sup>. This is due to the fact that catecholamines suppress LDL receptor activity whereas calcium antagonists antagonise the catecholamine action, thereby increasing LDL receptor activity resulting in a decrease in LDL level<sup>21</sup> and non-significant effect on HDL cholesterol<sup>22</sup>.

## MATERIALS AND METHODS

This study was conducted at Accident and Emergency Department, Bahawal Victoria Hospital, Bahawalpur and Ansari Private Clinic, Model Town B, Bahawalpur from 1<sup>st</sup> July 2015 to 30<sup>th</sup> September 2015. One hundred and thirty two patients of mild to moderate essential hypertension were initially registered in this study some of them were excluded because of noncompliance or other reasons and ninety patients were followed up for the full course of three months. The patients were divided randomly into three groups, each comprising of 30 patients. Group I was given felodipine tablets 5mg once daily, Group II was given propranolol tablets 40mg twice daily and group III was given placebo tablets once daily. All the patients were withheld from any anti-hypertensive medication for at least two weeks prior to their inclusion in the study. The fasting blood samples from all the patients were analyzed for serum cholesterol, LDL-cholesterol and HDL-cholesterol on the day of registration (day0) and repeated every month.

**Methodology:** Serum cholesterol and HDL-cholesterol were estimated by their respective enzymatic method using kit supplied by B.M whereas LDL-cholesterol was calculated according to the formula of Freidwald<sup>23</sup>.

**Statistics:** SPSS Statistic Software (Version 22.0) was applied for analysis of acquired data. Values are given as mean  $\pm$  SEM. group comparison was done by applying students t-test, and values within the same group at different time intervals were compared by paired t-test.

## RESULTS

The felodipine, propranolol and placebo treated groups are I, II and III respectively. The levels of serum cholesterol, LDL-cholesterol and HDL-cholesterol for the patient treated with felodipine, propranolol and placebo were observed at day 0, 30, 60 and 90. The differences (as mean $\pm$ SEM) in the level of serum cholesterol, LDL-cholesterol and HDL-cholesterol at different time intervals as affected by felodipine, propranolol and placebo were calculated.

**Serum cholesterol:** Felodipine treated patients exhibit a fall in the level of serum cholesterol, which was non-significant from day 0 to 30, day 0 to 60 and markedly significant ( $P<0.01$ ) between day 0 to 90. In contrast, propranolol increased the level of serum cholesterol, this increase was significant ( $P<0.05$ ) between day 0 to 30 and highly significant ( $P<0.001$ ) between day 0 to 60 and day 0 to 90 (table 2). When the mean values of the corresponding difference in the felodipine and propranolol groups were compared (table3) it showed a markedly significant difference for day 0 to 30 and day 0 to 60 ( $P<0.01$ ), however the difference became highly significant ( $P<0.001$ ) between day 0 to 90.

**LDL cholesterol:** Felodipine treated patients exhibit a fall in the level of LDL cholesterol, which was non-significant between day 0 to 30, day 0 to 60 and highly significant ( $P<0.001$ ) between day 0 to 90, whereas propranolol produced an increase in LDL cholesterol. This increase was non-significant between day 0 to 30, day 0 to 60 and became markedly significant ( $P<0.01$ ) from day 0 to 90 (table 2).

When the mean values of corresponding differences in felodipine and propranolol groups were compared (table 3). This difference assumed non-significance between day 0 to 30, significance ( $P<0.05$ ) between day 0 to 60 and high significance ( $P<0.001$ ) between day 0 to 90.

**HDL – cholesterol:** In present study a non-significant change was noticed in the level of HDL cholesterol throughout the study with felodipine therapy (table2). The level of HDL cholesterol decreased along with the treatment in propranolol group; the decrease was non-significant between day 0 to 30 but became significant ( $P<0.05$ ) between day 0 to 60 and markedly significant ( $P<0.01$ ) from day 0 to 90 (table 2).

When the mean values of the corresponding differences in the felodipine and propranolol groups were compared it showed a non-significant difference between day 0 to 30 which became significant ( $P<0.05$ ) between the 0 to 60 and markedly significant ( $P<0.01$ ) between day0 to 90 (table 3).

**Table No.1: Change in Level of Serum Cholesterol, LDL-Cholesterol and HDL-Cholesterol Before and During Treatment (Mean  $\pm$  S.E.M)**

Drugs	Serum Cholesterol level in mg/dl				LDL-Cholesterol in mg/dl			HDL-Cholesterol in mg/dl				
	Before treatment	During treatment			Before treatment	During treatment			Before treatment	During treatment		
		Day 0	Day 30	Day 60		Day 0	Day 30	Day 60		Day 0	Day 30	Day 60
Felodipine (n=30)	187.13 $\pm$ 6.29	182.83 $\pm$ 6.32	180.40 $\pm$ 5.98	171.76 $\pm$ 4.86	124.40 $\pm$ 5.75	121.83 $\pm$ 6.19	116.90 $\pm$ 5.71	105.70 $\pm$ 3.87	37.33 $\pm$ 1.30	36.83 $\pm$ 1.51	38.53 $\pm$ 1.89	39.53 $\pm$ 1.46
Propranolol (n=30)	160.10 $\pm$ 8.21	172.06 $\pm$ 7.39	184.10 $\pm$ 8.15	195.60 $\pm$ 8.77	89.90 $\pm$ 7.20	93.70 $\pm$ 6.77	102.56 $\pm$ 7.28	109.70 $\pm$ 8.38	39.83 $\pm$ 2.20	38.23 $\pm$ 1.63	35.46 $\pm$ 1.41	32.66 $\pm$ 1.34
Placebo (n=30)	169.16 $\pm$ 6.58	174.36 $\pm$ 6.95	174.80 $\pm$ 6.90	176.70 $\pm$ 7.15	108.46 $\pm$ 6.85	112.56 $\pm$ 7.08	113.80 $\pm$ 6.46	111.43 $\pm$ 7.02	34.43 $\pm$ 1.61	36.16 $\pm$ 1.43	36.33 $\pm$ 1.22	36.33 $\pm$ 2.54
S.E.M:= Standard Error of Mean				n: =number of patients								

**Table No.2: Effect of on serum cholesterol, LDL-Cholesterol and HDL-Cholesterol at different time intervals (d $\pm$ S.E.M)**

Drugs	Significance of Serum Cholesterol			Significance of LDL-Cholesterol			Significance of HDL-Cholesterol		
	Day 0-30	Day 0-60	Day 0-90	Day 0-30	Day 0-60	Day 0-90	Day 0-30	Day 0-60	Day 0-90
Felodipine vs Propranolol	P<0.01	P<0.01	P<0.001	N.S	P<0.05	P<0.001	N.S	P<0.05	P<0.01
Propranolol vs Placebo	P<0.05	P<0.05	P<0.001	N.S	P<0.05	P<0.01	N.S	N.S	N.S
Felodipine vs Placebo	N.S	P<0.05	P<0.001	N.S	N.S	P<0.05	N.S	P<0.05	P<0.05

N.S:= Non-significant

**Table No.3: Levels of significance of serum cholesterol, LDL-Cholesterol and HDL-Cholesterol on conversion of drugs at different time intervals**

Drugs	Significance of Serum Cholesterol			Significance of LDL-Cholesterol			Significance of HDL-Cholesterol		
	Day 0-30	Day 0-60	Day 0-90	Day 0-30	Day 0-60	Day 0-90	Day 0-30	Day 0-60	Day 0-90
Felodipine vs Propranolol	P<0.01	P<0.01	P<0.001	N.S	P<0.05	P<0.001	N.S	P<0.05	P<0.01
Propranolol vs Placebo	P<0.05	P<0.05	P<0.001	N.S	P<0.05	P<0.01	N.S	N.S	N.S
Felodipine vs Placebo	N.S	P<0.05	P<0.001	N.S	N.S	P<0.05	N.S	P<0.05	P<0.05

N.S:= Non-significant

## DISCUSSION

In the present study felodipine reduced the level of serum cholesterol; though non-significant initially, this effect became markedly significant ( $P<0.01$ ) by the end of three month time. On the other hand, propranolol increased the level of serum cholesterol which was highly significant ( $P<0.001$ ) by the end of therapy. The action of felodipine and propranolol on comparison exhibited highly significant risk reduction with felodipine but not with propranolol. The rise in serum cholesterol by propranolol in the present study contradicts the report of Day<sup>11</sup> and Shanks<sup>7</sup>, it is however, in consensus with the observation of Vyssoulis<sup>14</sup> hence upholding the statement of Lardinois<sup>24</sup> and Vyssoulis<sup>14</sup> that beta blockers increase the hepatic production of cholesterol.

The present study revealed that during felodipine therapy there was a non-significant reduction in the level of LDL cholesterol initially ,i.e. day 0 to 30 and

day 0 to 60 but a highly significant reduction in LDL cholesterol level at the end of therapy i.e. day 0 to 90 ( $P<0.001$ ). On the other hand propranolol increased its level, which assumed marked significance after the third month of therapy ( $P<0.01$ ).The results of felodipine agree with those reported by Walldius cited by Scheon<sup>20</sup>. However, the results of propranolol in this study disagree with the finding of Day<sup>11</sup> and Shanks<sup>7</sup>and agree with the observations of Vyssoulis<sup>14</sup> who observed a significant rise in LDL cholesterol with propranolol therapy.

It is reported that propranolol significantly decreased HDL cholesterol<sup>13, 14, 15, 18</sup>. A similar decrease was also observed in the present study ( $P<0.01$ ).On the other hand, felodipine raises the level of HDL cholesterol but not to the level of significance matching the findings of Capewell and Maninder Kaur<sup>22</sup>.

Comparing the two drugs, felodipine versus propranolol, effect on serum cholesterol was markedly significant ( $P<0.01$ ) between day0-30, day0-60 and

highly significant ( $P<0.001$ ) between day0-90. Comparative effect on LDL cholesterol were non-significant between day0-30, significant ( $P<0.05$ ) between day 0-60 and markedly significant ( $P<0.001$ ) between day0-90. Comparative effect on HDL cholesterol was non-significant between day0-30, significant ( $P<0.05$ ) between day 0-60 and markedly significant ( $P<0.01$ ) between day 0-90. Thus it can be concluded from the present investigation that felodipine reduces the cardiovascular risk factor, in comparison to propranolol and has a beneficial effect on serum cholesterol, LDL-cholesterol and HDL-cholesterol thus proving its merit over propranolol.

## CONCLUSION

Comparing the two drugs, felodipine had significantly reduced the various cardiovascular risk factors, as assessed in this study. Thus felodipine has proved its merits over propranolol not only causing beneficial effects on lipid profile i.e. serum cholesterol, LDL-cholesterol and HDL-cholesterol but reducing the cardiovascular risk factors in patients of essential hypertension.

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

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# To Assess the Correlation of Imaging Studies X-ray and CT-Scan of Para Nasal Sinuses in Clinically Selected Sinusitis Patients from Outpatient Department of ENT at Civil Hospital Karachi

X-Ray & CT Scans in Sinusitis Patients

1. Asstt. Prof. of ENT, Islam Medical College Sialkot 2. Asstt. Prof. of ENT, Azra Naheed Medical College, Lahore  
3. Asstt. Prof. of ENT, Azra Naheed Medical College, Lahore

## ABSTRACT

**Objective:** Objective of this study is to assess the correlation of imaging studies X-ray and CT-Scan of Para nasal sinuses in clinically selected sinusitis patients from outpatient department of ENT at Civil Hospital Karachi.

**Study Design:** Observational study

**Place and Duration of Study:** This study was conducted in the department of ENT, Civil Hospital Karachi from 01 Aug 2009 to 31 July 2010.

**Materials and Methods:** After taking a informed consent sinusitis patients initially thoroughly clinically examined in ENT out patients department than referred to radiology department for imaging evaluation at Civil Hospital Karachi. This study comprises of 95 patients of both sexes who presented with acute and chronic sinusitis.

**Results:** In our study we assessed 95 patients of both sex with acute and chronic sinusitis, selected on clinical basis and finally correlated by radiologically. Out of 95 patients 43 patients who clinically suspected of having acute sinusitis sent to radiology department to correlate our finding both by X-ray PNS and CT-Scan. X-ray PNS showed imaging findings of acute sinusitis in 26(60%) patients while 17 patients were having normal X-ray PNS. When CT-Scan was performed to correlate the findings, it showed 30(90%) patients were having acute sinusitis while 13 patients had no imaging findings of acute sinusitis. When clinically suspected of chronic sinusitis of 52 patients were radiologically investigated, out of those, in whom X-ray PNS shows chronic sinusitis in 26(54%) patients and 22 patients are having normal X-ray PNS. But when CT-Scan performed in these patients it depicted 33(68%) patients were having chronic sinusitis and 15 patients were having normal imaging. Out of these 52 patients, 4 patients refused for any radiological investigation.

**Conclusion:** Previously X-ray of nose and Para nasal sinuses was considered mainstay to rule out of various pathologies but now have been replaced by high-resolution CT scan and MRI. Plain radiographs of various angles can be used as a useful tool for diagnosis of acute and chronic sinusitis patients which are difficult to rule out clinically where the CT- scan facility is not available whereas CT-Scan is the only modality of choice and considered as a "gold standard" imaging of nose and Para nasal sinuses in acute and chronic sinusitis and guides the surgeon with important information of the osteomeatal complex, sphenoid, ethmoid sinuses status and other normal anatomical landmark or any variations, preoperatively.

**Key Words:** CT- scan of nose and PNS, X-rays PNS, Para nasal sinuses, Sinusitis

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## INTRODUCTION

Imaging studies of nose and Para nasal sinuses play a vital role in management of various pathologies. Advance imaging studies like CT-Scan and MRI have further facilitated their role to deal with Para nasal sinus diseases more accurately than the conventional X-rays

of Para nasal sinuses (PNS). Advent of functional endoscopic sinus surgery in ENT is great hallmark. CT-Scan of nose and Para nasal sinuses guides surgeons for pertinent anatomical landmarks with its variations and extends of disease preoperatively.

Para nasal sinuses are air filled cavities, which plays very important role for resonance of voice and other physiological changes of inspired air to compatible of lower airway. Infective diseases like acute and chronic sinusitis basically diagnosed on history and physical examination but in difficult and complicated cases radiology of nose and Para nasal sinuses plays a

**Correspondence:** Dr. Adnan Ejaz

Asstt. Prof. of ENT, Azra Naheed Medical College, Lahore

**Contact No.:** 0323-4180527

**E-mail:** adnan\_ejaz24@yahoo.com

remarkable role in diagnoses of Para nasal sinus diseases. The most common diseases that affect the nose and Para nasal sinuses are inflammatory<sup>1</sup>, and advent of diagnostic and therapeutic role of nasal endoscopy has revolutionized the management of nose and Para nasal sinuses diseases. The advent of functional endoscopic sinus surgery has replaced the various types of conventional surgical procedures like Caldwell-Luc surgery of maxillary sinus and different types of nasal polypectomies and septoplasty. CT scan and MRI are more value able radiological modalities which help to rule out early nose and Para nasal sinuses infective diseases and accurate tumor staging. Plain radiographs are still be using as a diagnostic tool even being a limited role to highlight some important areas like osteomeatal complex, ethmoidal groups of sinuses in developing countries. Other confine role of conventional radiology includes difficulty in differentiating between infection, tumour<sup>2</sup> and polyp in an opaque sinus<sup>3</sup>. Advance radiology like CT-Scan provides much better information about normal anatomical landmarks and variations of nose and paranasal sinuses.<sup>4</sup> CT-Scan has very marvellous role to appreciate pathologies in difficult areas especially within ethmoid group and sphenoid sinuses.<sup>5,6</sup> Studies has revealed the radiological finding of X-ray PNS could be mucosal thickness, air fluid level in maxillary sinuses and partial or complete opacification<sup>7,8</sup>. Nevertheless mucosal thickening is observed in greater than 90% of sinusitis cases, it is a nonspecific finding<sup>9,10</sup>. Complete opacification and air fluid level are more specific finding of acute sinusitis of about 60% of cases<sup>9</sup>.there is also false negative results observed in interpretation of plain radiograph in different observer.<sup>3,11</sup>

Advance radiology like high resolution CT-Scan provides excellent detail of bone involvement<sup>12</sup>. CT-Scan highlights very nicely inflammatory diseases of paranasal sinuses. If facility of CT-Scan would be available should be performed before functional endoscopic sinus surgery.<sup>13,14</sup> Prior to surgery this also helps to notice involve sinuses by inflammatory disease and to assess important anatomic landmarks and their variations. CT-Scan is more sensitive than plain radiography for detecting sinus pathology, especially within the sphenoid and ethmoid sinuses. The fundamental role of CT-Scan besides diagnosis and management of sinusitis is also to define the anatomy of the sinuses prior to surgery<sup>15</sup>.

Complete study of CT-Scan of PNS is required in pathological conditions before surgical intervention. Coronal CT-Scan view is preferred. Axial view of CT-Scan should be obtained to supplement the coronal view for lesions involving the roof of the maxillary antrum and hard palate and for the detection of orbital and cranial invasion<sup>16</sup>. Bone window provides excellent information about bone involvement. The complete

study of the Para nasal sinuses and nasal fossae is obtained by a combination of axial and coronal studies of 3mm cuts.<sup>17</sup> Intravenous contrast in advance radiology is used to see enhancement of soft tissue masses.

## MATERIALS AND METHODS

The study was conducted in the ENT and Head and Neck Surgery department and radiology department of Civil Hospital Karachi, from 01 Aug 2009 to 31 July 2010. In this study 95 patients of both sexes who presented with symptoms of acute and chronic sinusitis were examined and referred to radiology department for X-rays PNS and CT-Scan PNS according to clinical findings to correlate radiologically.

In radiology department X-ray Para nasal sinuses were performed by Toshiba machine of 1000 mA. CT-Scan was also performed by Toshiba Asteon spiral scanner. Radiological finding of X-ray and CT-Scan were correlated in both acute and chronic sinusitis presented patients.

**Statistical Analysis:** Data was analyzed using SPSS version 10. The data from study was evaluated by correlating finding of X-ray and CT-Scan of Para nasal sinuses, considering CT-Scan as a gold standard. Percentages were used to describe the data. Sensitivity, specificity, positive & negative predictive values and accuracy of X-ray and CT-Scan of Para nasal sinuses evaluated.

## RESULTS

In this study, 95 patients were selected from 1<sup>st</sup> of August 2009 to 31<sup>st</sup> July 2010. Initially these patients were examined in outpatients department of ENT than referred to radiology department for X-ray and CT-Scan PNS to correlate their findings. Out of these Patients there were 56 males and 39 were females, with a mean age of 45 years (range, 20–60 years) (Graph 1). Out of 43 clinically suspected of having acute sinusitis patients, X-ray PNS findings of acute sinusitis were observed in 26 (60%) while 17 patients were notice with no radiological positive findings. Among these 27 patients of positive finding 6 patients noticed with mucosal thickening, 9 patients with haziness and 11 patients with partial or complete opaque of maxillary sinus. (Table 1) When CT-Scan was performed to correlate the findings in same 43 patients it showed 30(69%) patients were having acute sinusitis while 13 patients have no radiological findings of sinusitis, as shown in (Table 2). X-ray Para nasal sinuses were wrongly diagnoses in 8 patients among those two were false positive and 6 were false negatively diagnosed. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were calculated using SPSS and according to the formula in data analysis. X-ray PNS has low sensitivity (80%), specificity (84%) and accuracy (81%) for diagnosis of

acute sinusitis than CT-Scan (Graph 2). Among these 4 patients refused for their CT-Scan imaging.

Out of 48 patients clinically suspected of chronic sinusitis, sent for radiological evaluation. X-ray Para nasal sinuses depicted finding of chronic Sinusitis in 26(54%) patients while in 22 patients were having normal X-ray Para nasal sinuses. Among these 26 patients 13 patients noticed with mucosal thickening, 7 patients with haziness and 6 patients with complete or partial opacity (Table 1). When CT-scan was performed in similar 48 patients of clinically suspected chronic sinusitis, it showed 33(68%) patients were having chronic sinusitis while 15 patients have no imaging findings of chronic sinusitis (Table 2). X-ray Para nasal sinuses wrongly diagnosed 21 patients, 7 patients with false positive and 14patients with false negative results. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were calculated using SPSS and according to the formula in data analysis. X-ray Para nasal sinuses has low sensitivity 57%, specificity 53% and accuracy 56% for diagnosis of chronic sinusitis because of the inadequate evaluation of the sphenoid and ethmoid sinuses and their overlapping anatomic structures (Table 3). Most of false positive and false negative results were due to wrong diagnosis of chronic ethmoid and sphenoid sinusitis which were picked up and diagnosed on CT-Scan.

**Table No.1:** Showing X-ray abnormalities in acute and chronic sinusitis

x-ray PNS	Acute Sinusitis (60%)	Chronic Sinusitis (54%)
Normal	17	22
Mucosal thickness	6	13
Haziness	9	11
Opacity total/partial	11	6
Total	43	48

**Table No.2:** Statistical evaluation of imaging findings of acute sinusitis in X-ray & CT PNS (n=43)

Imaging findings of Acute Sinusitis in CT PNS				
X-Ray PNS		Present	Absent	Total
Present	True Positive 24	False Positive 2		26
Absent	False Negative 6	True Negative 11		17
	30	13		43

Key: TP= True positive cases, FP= False positive, FN= False negative, TN= True negative cases.

Sensitivity =  $a / (a + c) \times 100$  or  $TP / (TP + FN) \times 100 = 80\%$

Specificity =  $d / (d + b) \times 100$  or  $TN / (TN + FP) \times 100 = 84\%$

Positive Predictive value =  $a / (a+b) \times 100$  or  $TP / (TP + FP) \times 100 = 92\%$

Negative Predictive value =  $d / (d+c) \times 100$  or  $TN / (TN + FN) \times 100 = 64\%$

Accuracy = Total n - (FN + FP) / n = 81%

**Table No.3:** Statistical evaluation of imaging findings of chronic sinusitis in x-ray & CT PNS (n=48)

Imaging findings of Chronic Sinusitis in CT PNS				
X-Ray PNS		Present	Absent	Total
	Present	True Positive 19	False Positive 7	26
	Absent	False Negative 14	True Negative 8	22
		33	15	48

Sensitivity =  $a / (a + c) \times 100$  or  $TP / (TP + FN) \times 100 = 57\%$

Specificity =  $d / (d + b) \times 100$  or  $TN / (TN + FP) \times 100 = 53\%$

Positive Predictive value =  $a / (a+b) \times 100$  or  $TP / (TP + FP) \times 100 = 73\%$

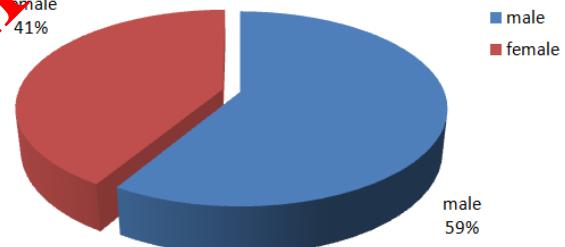
Negative Predictive value =  $d / (d+c) \times 100$  or  $TN / (TN + FN) \times 100 = 36\%$

Accuracy = Total n - (FN + FP) / n = 56%

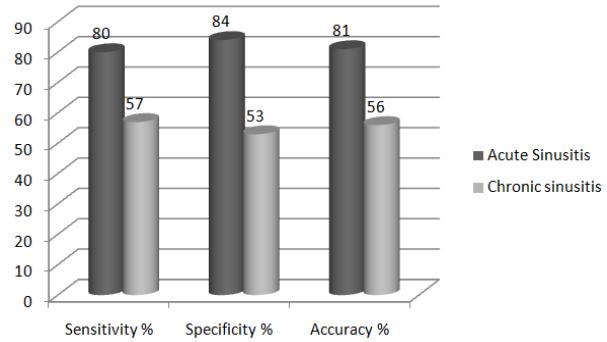
**Table No.3:** Sensitivity, specificity, positive predictive value, negative predictive value and accuracy of X-ray Para nasal sinuses for diagnosing Para nasal sinus diseases.

Diagnosis	Sensitivity %	Specificity %	Positive Predictive value %	Negative Predictive value %	Accuracy %
Acute Sinusitis	80	84	92	64	81
Chronic sinusitis	57	53	73	36	56

Gender ratio



**Graph No.1:** Male to female ratio for imaging findings in acute and chronic sinusitis.



**Graph No.2:** Diagnostic performance of X-ray PNS for predicting imaging findings in acute and chronic sinusitis

## DISCUSSION

Many anatomical variations of nose exist which may be missed clinically but recognize clearly by imaging especially like CT-Scan. These variations may narrow the some areas of nasal cavity which impair nasal airflow and drainage of Para nasal sinuses leads to sinusitis. Sinusitis can be subdivided into acute, subacute and chronic sinusitis depending on duration of mucous membranes inflammation. Acute sinusitis defined as diseased lasting less than one month, sub acute less than three months and chronic sinusitis disease lasts more than three months<sup>18</sup>. Acute sinusitis can be because of viral, bacterial or fungal infections. Chronic sinusitis can be because of recurrent episodes of acute sinusitis or other condition like asthma, immune disorders and structural abnormalities such as deviated nasal septum or polyps.

In our study we selected 95 patients of sinusitis in ENT outpatient department on clinical ground than correlated radiologically by X-ray and CT-Scan PNS.

In this study 56 are males and 39 are females. Our observation regarding the increase frequency in males due of excessive use of smoking, which may impair mucociliary mechanism leads to sinusitis. In contrast to our study an international study conducted in KSA showed predominantly female involvement about 57.7%.<sup>25</sup>

In this study we also observed various findings on X-ray PNS in both acute and chronic sinusitis patients like mucosal thickening, haziness and opacity of maxillary sinus. Mucosal thickening best seen in the lateral wall of maxillary sinus separates the air from bone wall in waters view. In contrast to our results a study reflects that mucosal thickening found more than 90% of cases in sinusitis, though a nonspecific finding<sup>9,10</sup> and also showed the air fluid level or complete opacification in 60% which is more specific finding.<sup>9</sup> These finding are also consistent with an international study by Varonen et al.<sup>19</sup>

Interpretation of plain radiograph can vary widely among different observers and there is high chances of false negative results.<sup>3,11</sup> Plain radiograph cannot distinguish between acute inflamed and chronic scarred mucosa. However contrast enhanced CT shows the mucosal enhancement in active inflammation. On plain radiographs the sphenoid sinus often appears normal even in presence of maxillary disease and 50% of sphenoid sinuses cases remains undetected.<sup>20</sup> However CT-Scan consistently detect these cases.

Out of 43 clinically suspected of acute sinusitis patients in our study shows positive X-ray PNS in 26 patients and normal X-ray PNS in 17 patients. When CT-Scan performed in these patients to correlate finding, 30 patients found positive and 13 patients negative radiologically. In our study X-ray PNS shows 80% sensitivity, 84% specificity and 81 % accuracy for

diagnosing acute sinusitis which is compatible with an international study by Thomas et al.

In our study patients presented with chronic sinusitis were having large number with mucosal thickening on X-ray PNS. Plain radiograph do not allow adequate exposure of osteomeatal complex, sphenoid and ethmoid sinuses because of overriding bone shadows. These findings are consistent with an international study by Brook et al.<sup>22</sup>

High resolution CT-Scan provides excellent bone detail and accurate soft tissue mapping.<sup>12</sup> We observed by our study that CT-Scan modality is modality of choice for imaging of inflammatory disease of sinuses and osteomeatal complex. CT-Scan is used routinely before endoscopic sinus surgery nowadays<sup>13</sup> to evaluate extend of inflammatory diseases and to assess the important anatomical landmark and its variations. CT-Scan showed mucosal thickening, sinus opacification and sclerotic reactive sinus walls of maxillary sinuses. These findings are consistent with our study by Rosenfeld et al.<sup>23</sup>

In correlation of X-ray PNS and CT-Scan in chronic sinusitis patients in our study of 48 patient 26(54%) patients having positive finding of disease and 22 patients found negative on X-ray PNS while when performed CT-Scan in similar number of patients we noticed positive finding in 33(68%) patients and 15 patients negatively marked. So, in this study X-ray PNS shows 66% sensitivity, 50% specificity and 62% accuracy for diagnosis of chronic sinusitis which is favorably comparable with an international study by Steward et al.<sup>24</sup> Most of false positive and false negative cases were due to wrong diagnosis of chronic sinusitis which were picked by CT-Scan.

## CONCLUSION

We concluded that imaging studies have definite supportive role in the management of sinusitis patients along with clinical assessed patients despite of some extend of their false positive and false negative results. X-ray PNS though helpful in certain cases but could not be able to evaluate in high index of suspicious cases like chronic sinusitis, polyps, mucocele and fungal sinusitis. CT-Scan PNS is genuinely not only having supportive role in diagnosing sinusitis patients but also provide road map to follow the disease and provide excellent information about normal anatomy and variations of various structures in surgical cases preoperatively.

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

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