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EDITORIAL

Medical Professionalism but Where Are the Role Models?

Khalid Faroq Danish

The knowledge boom is at its peak. Under this influence the healthcare profession is undergoing rapid transformation. This transformation has brought along positive changes in professional progress but is accompanied by challenges to many aspects of professional practices.

Doctors now face distracting financial incentives, commercial pressures, loyalty challenges from corporate employers and compulsive financial targets by organizations.[1] There are challenges of the modern world, the evolving ecology of the profession, and the public awareness of the healthcare dynamics, with ever rising expectations from the healthcare providers.[2,3] All these pose threats to medical professionalism.

In rural areas of Pakistan, the healthcare workers still face adverse reaction from the public especially affecting the vaccination groups and preventive initiatives.[4] Mass initiatives for health are viewed with doubt by the people and social media becomes flooded with antagonistic views by the public.

Patients eagerly seek second opinions about doctors' decisions considering that the decision may have been made only to enhance financial gains by the doctor. Doctors are frequently accused of receiving money from other services where they refer their patients for different treatments. Their recreational tours of foreign countries are allegedly sponsored by the pharmaceutical companies against prescription favors. These and many other allegations and accusations plague the social media and public talk to create a general atmosphere of lack of trust in doctors as a professional community.

An additional challenge was faced by the medical profession in the form of COVID-19 pandemic a few years back. This pandemic unraveled many limitations in the healthcare profession, including the trust that the public had in health care providers.[5] The pandemic unveiled a wide trust deficit between the public that the doctors serve, and the doctors themselves.

During covid 19 pandemic, a large segment of the society did not get themselves vaccinated.[6,7] This segment included many doctors. They simply did not trust the advisability and efficacy of vaccines. It rejuvenated the initiative to promote medical professionalism.

Medical professionalism stands out as the signpost of professional prestige for the community of healthcare professionals. The professions serve to promote and protect values in addition to providing professional services to the community. Whereas the term, medical professionalism still evades a consensus for its definition, there is consensus about the fact that medical professionalism is intimately related to all the humane characteristics of healthcare providers.

The term provides umbrella to all the humane beliefs, values and behaviors that underlie the trust that the public has in doctors. These beliefs and behaviors are deeply embedded amid the sacred space between the patient and the doctors. But in addition to that, there is the intrinsic imperative for the doctors to do their best on their part to provide compassionate care to their patients. The medical profession owes its nobility to the humane characteristics of compassion, empathy, and humility of healthcare professionals. Upholding this nobility calls for protecting and promoting the values of the profession and is a shared responsibility of all the members of the professional community.

This is one area which is vulnerable to the transformative effect of all the influences of the modern world.

The imperative was well perceived in the historic Hippocratic oath; the earliest expression of medical ethics, establishing principles of medical professionalism. Since that time the profession is trusted for its commitment to all the humane characteristics that are the hallmarks of a physician's behavior.

Unfortunately, most physicians and especially young doctors are poorly equipped and trained to face the

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challenges in an amicable manner.[5] This has resulted in a widening trust deficit between the service providers and the served. The situation calls for urgent and effective corrective measures that may have a long-lasting impact on the current healthcare landscape. External regulation of doctors and legislative measures for protection of doctors may save formidable situations but can have a negative impact on the trust-based relationship between doctors and their patients.

Regulatory and accreditation bodies have responded to this challenge in the form of emphasis on medical professionalism as an essential component of medical curriculum.[8 9] Medical academia has been increasingly sensitized about the essentiality of training in medical professionalism. However, there is a problem of formal ownership of the training program focused on professionalism. At individual level, all the members of academia and faculties appreciate the ethical and value-based training, yet no one is particularly motivated to assume legitimate ownership of the training program. The most conducive environment for the training of undergraduate medical students is available during their clinical clerkships where they are under direct supervision of highly skilled and experienced consultants. Most of the time, however, they do not assume deliberate responsibility for formal training of medical students in this area. During clinical clerkships the students face the most challenging environment where lapses in professionalism are likely to occur in real-life situations. Lacking the required mindfulness and under pressures of academic performance these lapses go unnoticed. In this way precious feedback and training opportunities are lost. Not only this, but these lapses, when uncorrected, stay as habits in future professional life.

The scarcity of effective and robust assessment methods related to medical professionalism is a problem that lets the non-professional attitudes grow unnoticed. [10]

The expanding bulk of curricular content for trainee doctors at all levels keeps them engaged in activities that leave less space for value-based activities and learning.

The professional environment is losing its positive impact in promoting the values so characteristic of the profession and its legacy. Institutional cultures have imperceptibly melted into corporate cultures in response to the sustainability pressures on healthcare system as a whole. commodification of healthcare services has changed the focus from patient care to profit maximization and cost-cutting measures. Inequality in service provision to less privileged segment of society has served to undermine the professional nobility, once so widely recognized. The professionals also face pressures of meeting financial targets of corporate employers and government agencies and find it difficult to prioritize patient care at the top position.

Job stress of varied nature has been affecting the performance of clinicians leading to a rising incidence of burnout in healthcare professionals.[11] Values of medical professionalism are victims of the burnout in doctors.

Self-accountability and self-regulation of the profession has gradually faded and provided space for external regulation that has aggravated the situation in terms of eroding the trust-based relationship of doctors with their patients.

The situation calls for urgent, effective, and sustained corrective measures. Responding to this situation is the shared responsibility of the whole professional community supported by civil society at large. Teaching institutions have greater responsibility in this respect because they are the ones who can exert deeper and heavier impact. Since they provide training to budding professionals, their impact may be longer lasting. They also possess legitimate power to exert influence over the students and trainees.

The professional community must pronounce explicitly their self-commitment to the values of the profession. Gaining the support of the civil society is important to re-build the trust relationship between the service provider and the served. The imperative cannot succeed without the awareness, involvement, and support of civil society. The voice of the professional community must be made audible to all. Societal expectations from the professions must be re-explored to correctly develop the problem-solving approach. This can be done through a broad-based dialogue with all segments of society with a view to developing a strong political will to institute a positive change in the situation. This effort should generate physicians' advocacy for patients

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and their health.

Teaching institutions must integrate medical professionalism in their curricula. But to make this curriculum effective and progressive, development of professionalism departments is essential. This will generate ownership and ensure dynamic curricular progression through departmental efforts. Dedicated departments will serve to promote research in the area and work to train faculty and master trainers in the field.

Structured faculty training with regular follow up should also be instituted to ensure conducive institutional culture that fosters value-based activities of learning and training. Emphasis on ethical practice and moral self-accountability can nurture such an institutional culture.

Exit from teaching institutions and entry into clinical practice is a crucial time in the life of young doctors. And here they are exposed to a learning interaction with experienced and seasoned clinicians and practitioners, who act as role models for them. Their adherence to ethical practice, respect for patients, dedication to patient's good and upholding professional values possesses a strong impact on the shaping of moral behaviors of young doctors.

Senior clinicians have a responsibility to embody the excellence of professional practice for their trainees and mentees. They must act as powerful role models for others to follow. Whereas the foundational impact can be affected by the institutional effort but its maturation to a solid professional identity is the job of a role model. Where, in our professional environment, do these role models flourish? Where do they even exist? How can this widening lacuna be filled; is the most important question to be answered.

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CONFLICT OF INTEREST

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ORIGINAL ARTICLE

Evaluation of Apolipoprotein B / Apolipoprotein A Ratio as an Alternate of Lipid Profile for Cardiovascular Risk Assessment in a Tertiary Care Hospital

Aqsa Mushtaq[1], Muhammad Younas[2], Zujaja Hina Haroon[3], Muhammad Usman Munir[4], Sayed Tanveer Abbas Gilani[5], Muhammad Anwar[6]

ABSTRACT

Objective: To compare the predictive utility of serum Apo B/Apo A ratio with serum lipid profile in evaluation of cardiovascular disease (CVD) risk assessment**.**

Study Design: Cross sectional study.

Place and Duration of Study: Research was done at Department of Chemical Pathology & Endocrinology, Armed Forces Institute of Pathology (AFIP), Rawalpindi from 1st January 2021 to 31st March 2022.

Materials and Methods: A total of 204 patients were enrolled from a tertiary care hospital admitted for recent cardiac events and were compared with 96 healthy individuals. A serum sample was taken from all the members of both groups. Their lipid profile, Apo A, and Apo B were analyzed. Apo B/ Apo A ratio was calculated. The data was analyzed using SPSS version 21.

Results: Means of patient group for total cholesterol, LDL-cholesterol, HDL-cholesterol, VLDL-cholesterol, triglycerides, and Apo B/Apo A ratio were 4.18±1.21, 2.52±1.06, 0.83±0.34, 0.71±0.31, 1.66±0.86, 0.96±0.60 respectively, whereas means for control group were 3.99±0.54, 2.31±0.56, 1.00±0.31, 0.59±0.15, 1.22±0.33 and 0.70±0.18 respectively. Independent t-test was applied to compare means between two groups, which showed statistically significant difference between Apo B/Apo A ratio, HDL, and TG (*p* value <0.001). Chi-square test was applied for comparison of two groups which was statistically significant (*p* value <0.001).

Conclusion: Apo B/Apo A ratio is a better indicator for evaluation of cardiovascular disease as compared to lipid profile suggesting it to be a new and robust marker for CVD risk evaluation in our population.

Key Words: *Apo A, Apo B, Apo B/Apo A Ratio, Cardiovascular Disease, Lipid Profile.*

Introduction

Cardiovascular disease (CVD) is a foremost risk to the health globally, which attributed to approximately 30% of the appraised 20.5 million demises worldwide every year.[1] World Health Organization (WHO) has reported that CVD is second most significant cause of death in Pakistan accounting to approximately 29%. Whereas, a local study done in Pakistan showed prevalence of CVD of approximately 17.5%.[2]

Dyslipidemia has been one of the fundamental perpetrators for atherosclerosis leading to cardiovascular related diseases.[3] People with inactive lifestyles, positive family and medical history or obesity need to be carefully evaluated for early identification of ischemic heart disease (IHD). The elevating concentration of LDL-C is by and large acknowledged as being the most central risk factors for atherosclerosis in CVD.[4]

Atherosclerosis is a protracted inflammatory process which leads to atheroma plaques development resulting in thrombus formation. However, with advancement in diagnostics, many smaller lipoproteins and apolipoproteins have emerged as causes of atherosclerosis. Of these, Apolipoprotein A (Apo A) is supplemented with cardioprotective HDL-C while Apolipoprotein B (Apo B) is allied with atherogenic LDL-C.[5] The Main instigator in the atherogenic process is the excessive number of Apo B-containing particles, because the ApoB molecule in these particles is the trail blazer to trap the atherogenic lipoproteins in the arterial wall. Contrasting to Apo B, Apo A is a foremost apolipoprotein of cardioprotective lipid that helps

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the conveyance of cholesterol from peripheral cells to liver, thus dropping the risk of growth of inflammatory plaques.[6]

Several studies have shown that in people with CVD, changes in serum Apo A and Apo B levels are similar to those for HDL and LDL, respectively.[7] Apo B values increase and Apo A values decrease in people with CVD compared with those without CVD.[8] Furthermore, these two apolipoproteins have shown better correlation with the coronary stenosis than LDL and HDL.[9]

The Apo B/Apo A ratio denotes the equilibrium between atherogenic particles, containing Apo B, and the antiatherogenic ones, rich in Apo A. Thus, in spite of the lipids, lipoproteins and lipid ratios Apo B/ Apo A ratio is displayed to be a superior consideration for CVD risk assessment.[10] Epidemiological studies have indicated that the higher the Apo B/Apo A ratio, the greater is the CVD risk, and ≥0.9 and ≥0.8 cut-off value of ApoB/Apo A ratio have been suggested to express a high CVD risk for gender specified as males and females, respectively.[11]

For ages lipid profile is being used for evaluation of CVD risk which has now become obsolete in most of the world due to its low specificity as deranged lipid profile can occur due to various other medical health conditions and may appear at a much-delayed time when it is not that significant in assessment of CVD risk. In this study, we aimed on the utilization of Apo B/Apo A ratio for CVD risk assessment in population of Pakistan. As previously no study was done to assess its significance and relation to CVD. So, there is a need for a marker which can specifically be used for CVD risk and can help in its diagnosis at a time way earlier than the development of symptoms, making it easier for clinicians as well as patients to make lifestyle modifications at an earlier time to avoid the risk of a cardiovascular event.

In our study, our aim was to evaluate the Apo B/Apo A ratio in comparison with lipid profile in patients with recent cardiac events and compare it with the normal healthy individual.

Materials and Methods

A cross-sectional study was carried out in the Chemical Pathology & Endocrinology Department, AFIP Rawalpindi from 1st January 2021 to 31st March 2022 after getting ethical approval from the Institute with *IRB # FC-CHP-26/READ-IRB/21/658*. Sample size calculation was performed using a World Health Organization sample size calculator, with confidence interval of 95%, margin of error 5% and *p* value at less than 0.05 considered to be significant, and our sample size came out to be 300. Participants were selected through non-probability convenient sampling and divided into two Groups; Group I comprised of patients and Group II comprised of age matching healthy individuals. Patients were taken from the AFIC with the positive Trop-I results and healthy individuals coming for routine checkup at AFIP were selected. Informed consent was taken from both groups.

In group I (n=204), patients with recent history of myocardial infarction having serum Trop-I values > 0.06nmol/l were included. For group II (n =96), healthy individuals with no previous history of any cardiac, renal or any other chronic disease were selected. 5 ml venous blood was withdrawn by aseptic technique in clot activator gel tubes. Serum was immediately separated by centrifugation at 3500 revolutions per minute (RPM) for 5 minutes and analyzed.

Lipid Profile was analyzed on Advia 1800 using photometric technique, Apo A and Apo B were analyzed on Roche Cobas c501 using turbidimetric technique.[12] Statistical Package for Social Sciences (SPSS) program version 21.0 was used for data analysis. Results were articulated as mean ± SD. Descriptive statistics, independent-sample student t-test and chi-square test used to compare mean of lipid profile and Apo B/Apo A ratio between both groups. Apo B/ Apo A ratio of >0.7 was considered as significant for development of CVD while value <0.7 was considered as healthy.[13]

Results

Mean age for group I was 57±9 years whereas, mean age of group II was 52±11 years. In Group I, 60% (122) of patients were males while 40% (82) was female. However, gender percentages in Group II were 70% (66) for males and 30% (28) for females. For statistical analysis, SPSS 21 software was used. The Shapiro-Wilk test used to check distribution of data and found to be Gaussian. Means of patient group for total cholesterol, LDL-cholesterol, HDL-cholesterol, VLDL-cholesterol, triglycerides and Apo B/Apo A ratio were 4.18±1.21 (<5.2 mmol/l),

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2.52±1.06 (<3.2mmol/l), 0.83±0.34 (>1.04mmol/l), 0.71±0.31 (<0.78mmol/l), 1.66±0.86 mmol/l (0.4-1.6mmol/l), 0.96±0.60 (<0.70) respectively, whereas, means for control group were 3.99±0.54 (<5.2mmol/l), 2.31±0.56 (<3.2mmol/l), 1.00±0.31 (>1.04mmol/l), 0.59±0.15 (<0.78mmol/l), 1.22±0.33 (0.4-1.6mmol/l) and 0.70±0.18 (<0.70) respectively (Fig.1).

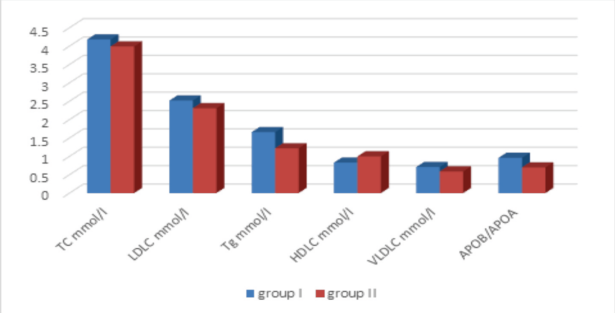

Fig. 1: Results of participants Group wise (n=300)

Independent t-test was applied for comparison of means between Group I & II, which showed significant difference between Apo B/Apo A ratio, HDL, VLDL, and TG, whereas total cholesterol and LDL-cholesterol, did not indicate any noteworthy difference between the two groups, shown in Table 1. For comparison of the difference between the two groups, a Chi-square test was performed, while taking cutoff of 0.7 as significant for Apo B/Apo A ratio in patients and control group, as shown in Table 2. The *p* value <0.05 was considered as significant for the comparison of the two groups.

Table I Comparison of means between Case Group I and Control Group II.

Variable	Group I	Group II	*p*-value
Total cholesterol (<5.2mmol/l)	4.18±1.21	3.99±0.54	0.12
LDL-C (<3.2mmol/l)	2.52±1.06	2.31±0.56	0.06
HDL-C (>1.04mmol/l)	0.83±0.34	1.00±0.31	0.001***
VLDL-C (<0.78mmol/l)	0.71±0.31	0.59±0.15	0.001***
Triglyceride (0.4-1.6mmol/l)	1.66±0.86	1.22±0.33	0.001***
Apo B/Apo A	0.96±0.60	0.70±0.18	0.001***

Asterisk (*) added for the significant *p* value i.e. less than 0.05.

Asterisk (**) added for the significant *p* value i.e. less than 0.01.

Asterisk (***) added for the significant *p* value i.e. less than 0.001.

Table II: Comparison of Apo B/ Apo A ratio between Group I and Group II (Chi-Square)

		Ratio group		Total	*p* value
		< 0.7	> 0.7		
	case	81	123	204	0.01*
	control	68	28	96	0.01*
Total		149	151	300	

Asterisk (*) added for the significant *p* value i.e. less than 0.05.

Discussion

Present study (n=300) has revealed that Apo B/A has been proven a better marker in workup of estimation of CVD risk. Apo B/Apo A ratio for Group I was 0.96±0.60 while for Group II ratio was 0.70±0.18 *p*-value (0.01) which has shown a significant difference.

DengF. *et al.,*[14] done a similar study with atherosclerotic CVD going through percutaneous coronary intervention with coronary syndrome and divided them into acute or chronic group. The data showed similar results that Apo B/Apo A ratio was considerably high in ACS patients than that in CCS patients ($p<0.001$) and was greater in cases having plaques compared to without plaques. Thus, showing Apo B/ Apo A is more significant in acute disease which supports present study.

Similarly, LiuY. *et al.,*[15] used ApoB/Apo A ratio to assess coronary heart disease in diabetics. In their study, 2563 patients having ACS previously diagnosed as diabetics were counted in. It was observed that with higher incidents of acute myocardial infarction (AMI), the Apo B/Apo A was notably increased. They concluded that the Apo B/apo A ratio in patients with diabetes alongwith ACS is an autonomous predictor for complex lesions and impending AMI. This study also supports present study.

In another study,WangX. *et al*.,[16] evaluated the use of Apo B/Apo A ratio along with SYNTAX system, an angiographic technique to grade coronary artery lesions' complexity, for acute coronary syndrome. They concluded that the combining of Apo B/Apo A with SYNTAX scoring system should be the emphasis of clinician for early treatment and long-standing follow-up observation in medium and high-risk group. Thus, showing the impact of Apo B/Apo A ratio.

Similarly, significant differences between HDL, VLDL

and TG between Group I and II was found in present study which is in accordance with earlier studies. Whereas, total cholesterol and LDL-cholesterol, does not display any momentous difference between the two groups which are considered as hall-mark of atherogenesis which is in agreement with earlier studies.[17] Thus, giving us confidence in the significance of Apo B/Apo A ratio in our population.

Results of present study clearly shows that lipid profile does not significantly change in presence of CVD, while Apo B/Apo A ratio is suggestively greater in MI patients showing that this ratio should be used at earlier time to assess the risk of myocardial infarction. Thus, it can be assumed that Apo B/Apo A ratio can be utilized to assess cardiac risk in people with family history and/or people with higher chance of having an AMI.

According to extensive literature research to this day, no study is published to rule out the significance of Apo B/ Apo A ratio in comparison to lipid profile. Thus, it can be positively said that Apo B/ Apo A ratio proves to be better cardiac disease risk predictor than the conventionally used lipid profile.

Much research for utilization of this marker for other diseases which eventually lead to CVD is also being done. A study for evaluation of diabetes risk was done which showed ApoB/Apo A as an efficient marker.[18] Another study was done to determine ApoB/Apo A ratio significance in children and young adults with Type 1 diabetes mellitus for evaluation of metabolic risk and microvascular complications which showed that this ratio can be used for determine of metabolic risk and insulin resistance. Thus, depicting its role in other conditions which can ultimately raise the CVD risk.[19]

Conclusion

Our study showed that Apo B/Apo A ratio foresee the peril towards atherosclerosis beforehand the lipid profile. Lipid profile can sometimes be misleading to the impending cardiac risk. But Apo B/ Apo A ratio indicates the risk very early and is not affected by other related factors. Thus, concluding it to be more beneficial than the routine lipid profile.

Limitation of Study

In our study, single-center data was present and was done only in patients with cardiac events already recorded. In future, study in patients even before any cardiac event and only at risk can be added to understand its variability. Furthermore, multi-center data and cohort study can be done to improve the better prediction using this marker.

Recommendation

Longitudinal study should be done to evaluate the Apo B/Apo A levels in individuals at risk of ischemic heart disease to assess its response with the progress of disease.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Awareness of Folic Acid Intake Before and During Early Pregnancy at A Primary Health Polyclinic in Saudi Arabia

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ABSTRACT

Objective: To assess awareness and attitudes towards folic acid intake before and during early pregnancy.

Study Design: A cross-sectional study.

Place and Duration of Study: The study was conducted in a primary health polyclinic of King Faisal University in Al Ahsa, Saudi Arabia from 18th December 2022 to 30th March 2023.

Materials and Methods: The study employed a 22-item self-constructed questionnaire, developed after a thorough literature review. It encompassed six socio-demographic, two obstetric, four awareness, six knowledge, and three attitudes items. A sample of 385 females participated through systematic randomized sampling. SPSS software version 26.0 was used for data analysis.

Results: About 40% (157) of participants were 36-45 years old and the mean age was 33.24 years with an 8.68 SD. While 89.4% (344) were married, 76.4% (294) were Saudi nationals, 51.7% (199) had a monthly income of 5000-10000 riyals, 41.8 % (161) were employed, 62.4% (241) held bachelor's degrees, 58.4% (211) were pregnant, 75.6% (291) had children, 42.9% (165) had heard of NTD and 3.1% (12) had neural tube defects affected children. A good knowledge score was achieved by 72.4% of participants, age 18-25 years, married status, students, and low income showed statistically significant association with knowledge level (p<0.05). Participants' affirmative attitude showed statistical significance (p<0.05) with their good knowledge.

Conclusion: Participants reflected good knowledge scores and a positive attitude about folic acid intake but had low awareness of neural tube defects and less knowledge regarding folic acid dose in a low-risk pregnancy.

Key Words: *Awareness, Folic acid, Neural tube defects, Health practitioners Pregnancy, Saudi Arabia*

Introduction

Folic acid is acknowledged as a crucial supplement during the initial four weeks of embryonic development.[1] The failure of the neural tube to fully close within the first month of pregnancy is associated with neural tube defects (NTDs). Insufficient folic acid intake (less than 400 micrograms per day in low-risk and less than 5 mg in high-risk pregnancy) during this period can lead to deficiencies with potential consequences on the development of the fetal brain and spinal cord.[2]

The prevalence of neural tube defects is less than 10 per 10,000 births in countries with folic acid fortification policies.[3] Neural tube defects are documented worldwide in literature. A study in Saudi Arabia reported spina bifida as the most prevalent NTD.[4] Neural tube structural defects vary in extent and severity, and newborns with anencephaly are unable to live after birth while spinal cord defects are corrected surgically.[1,8] A hospital-based NTD registry study observed the majority of pregnant women whose fetuses encountered NTDs had not taken folic acid in the initial post-conception weeks (4 weeks from conception) of pregnancy and one-third did not take it in the pre-conception period.[5] Therefore, all pregnant women need to follow a folic acid-rich diet like spinach, lettuce, broccoli, and folic acid-fortified foods but the recommended daily intake is not up to the mark with diet alone in pregnancy.[6] Taking folic acid before pregnancy and continuing in the early post-conception period for a minimum of four weeks can prevent 50% of neural tube defects.[7] Therefore, it is recommended to take preconception daily supplementation of 400 micrograms of folic acid at least one month before pregnancy and continue for three months until the

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first 12 weeks of pregnancy while those who had NTD-affected pregnancies before or using antiepileptic drugs should take 4milligrams folic acid three months before pregnancy and continue till the first 12 weeks.[8] A meta-analysis and systematic review demonstrated a 21% decrease in congenital heart disorders in women taking folic acid supplementation in the pre and early post-conception period.[9]

Following WHO recommendations, oral supplements frequently combine folic acid with iron to prevent deficiencies in both nutrients, mitigating the risk of anemias associated with these nutritional shortcomings.[10] Studies in western and northern regions of Saudi Arabia have assessed awareness of folic acid and its role in preventing NTDs with varied findings and gaps in awareness.[11,12] Gaps in awareness and delayed initiation of folic acid supplementation missing the critical period of neural tube development in the early embryonic weeks of pregnancy, can be improved with educational sessions.[13]

The current study aims to assess females of Al Ahsa City in eastern Saudi Arabia for preconception and early pregnancy folic acid use. Due to variations in the population across eastern, western, and northern regions, this necessitates a dedicated study in the eastern region as well to add a body of evidence regarding folic acid usage awareness from eastern Saudi Arabia. The objectives include: i) To assess awareness and determine knowledge of Al-Ahsa females about folic acid intake, and its deficiency outcomes primarily on neural tube structural defects level, ii) To evaluate their attitudes toward folic acid use in pregnancy and to find the percentage of NTD affected pregnancies.

Materials and Methods

A Cross-sectional study using a self-constructed questionnaire was conducted in the Polyclinic of King Faisal University (KFU), Al-Ahsa Eastern Province of Saudi Arabia from December 2022 to March 2023. Research Ethical approval was obtained from King Faisal University Research Deanship (KFU-REC-2022-OCT-ETHICS273). The Polyclinic was chosen because it deals with a representative population of Al Ahsa residents. It serves as an important health care center as consultation services are led by the specialists and consultants of Medicine College in addition to general physicians. A total of 385 participants from Al-Ahsa City needed to be recruited in the study and the sample size was calculated by the Raosoft sample size calculator to achieve a confidence level of 95%, and a margin of error of 5%. It involved Saudi and non-Saudi pregnant and non-pregnant females between 18-50 years of age. Females who were younger than 18 or older than 50 years and belonging to medical and paramedical fields were excluded from the study. An English questionnaire was designed by the researchers after going through published studies and literature in depth.[14-18] Afterward, it was translated into the Arabic language by Arabic experts for Saudi nationals who cannot understand English. The questionnaire had 22 items: The first section addressed six socio-demographic, two obstetric characteristics, and four awareness items. The second part had six items for multiple-choice knowledge questions. The third had three statements for attitude with close-ended options of yes & no and one statement for any misconception about folic acid. For the knowledge assessment score, all six multiple choice questions with correct answers were allocated 1 score and wrong 0, therefore making a total of 6 scores. A score of 4 and above is considered adequate/good whereas 3 and less is low knowledge. Before initiating data collection, both (Arabic and English) questionnaires' validity was tested in a pilot study of 20 patients (Cronbach alpha > 0.70 for all items). Participants' consent to respond to the questionnaire was taken verbally. It was distributed to every third female client with a systematic random technique after randomly choosing the first female from the clinics' computer appointment lists on the working days of the week by the leading researchers and a data collector nurse. After completion and submission of the questionnaire, the participant was informed about folic acid usefulness, its deficiency outcomes mainly NTDs, and dosage in low-risk pregnancy by the data collectors and researchers. Initially, the awareness of the participants was assessed whether they had a piece of understanding or idea about NTDs in pregnancy, and then their true deep knowledge about folic acid and NTDs with six questions was assessed.

The data was analyzed in SPSS version 26. Descriptive

statistics were utilized as frequencies, means, and standard deviations. Associations with the independent and dependent variables were assessed with the Chi-square test for knowledge scores and attitudes. Multiple linear regression was applied to analyze predictors for good knowledge scores of participants. The *p* value < 0.05 was considered statistically significant.

Results

Among three hundred and eighty-five females the mean age was 33.24 years (SD± 8.68), and 40% of participants were 36-45 years of age which is twofold more than other age ranges. About 89.4% (344) were married, 76.4% (294) were Saudi nationals, 51.7% (199) had monthly income of 5000-1000 riyals, 41.8 % (161) were employed, 62.4% (241) held bachelor's degrees, 58.4% (211) females were pregnant, 75.6% (291) had children, 42.9% (165) have heard of NTD and 3.1% (12) had NTDs affected. children, displayed in Table I.

Knowledge items with correct answers are depicted in Table II where a good score was achieved by 72.4% (278) of participants.

Table I: Demographic Characteristics and Awareness of Neural Tube Defects.

Variables	Category	Frequency, n	Percentage, %
Age	18-25	108	28.1
	26-35	111	28.8
	36-45	157	40.8
	46-50	9	2.3
Marital status	Single	15	3.9
	Married	344	89.4
	Divorced	18	4.7
	Widowed	8	2.1
Nationality	Saudis	294	76.4
	Non-Saudis	91	23.6
Monthly income in SAR	<5000	73	19.0
	5000-10000	199	51.7
	>10000	113	29.4
Occupation of participants	Student	120	31.2
	employed	161	41.8
	Not working / housewife	104	27.0
Education of participants	illiterate	17	4.4
	< high school	13	3.4
	High school education	83	21.6
	Bachelor’s Degree	241	62.6
	Master and Advance	31	8.1
Are you pregnant	No	174	45.2
	yes	211	54.8
Do you have children	No	94	24.4
	yes	291	75.6
Have you heard of spina bifida or neural tube defects?	No	220	57.1
	yes	165	42.9
From where heard?	GP	326	84.7
	Neighbor,relative,friend	43	11.2
	Newspaper	8	2.1
	Social media	8	2.1
Have u taken Folic acid before/during pregnancy	No	62	16.1
	Yes	323	83.9
Do you have any child with NTDs	No	373	96.9
	Yes	12	3.1

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Table II: Knowledge Questions and Participants' Scores About Folic Acid

Questions	Answer Options	Frequency, n	Percentage, %
What is folic acid?	Vitamin [a]	236	61.3
	Mineral	62	16.1
	Do not know	87	22.6
How many times folic acid should be taken?	once a day [a]	297	77.1
	once a week	7	1.8
	Do not know	81	21.0
Sources of Folic acid	Natural[a]	208	54
	Supplements/ daily tablet[a]	102	26.4
	Don't know	75	19.5
	selected both correct answers	2	0.5
Deficiency of Folic acid can cause:	Spina bifida, ancephaly. [a]	162	42.1
	Folic acid deficiency anemia [a]	134	34.8
	Don't know	89	23.1
When should folic acid be used to reduce congenital malformations	Before conception and during the first 3 months of pregnancy [a]	181	47.0
	In the first 3 months of pregnancy	146	37.9
	Do not know	28	7.3
	Two correct answers	30	7.8
What is the normal recommended dose of folic acid in low-risk pregnancy	400 micrograms [a]	93	24.2
	400mg	125	32.5
	Do not know	167	43.4
Total Knowledge Score: 6	Low (less and equal to 3)	107	27.8
	Good (4 and above)	278	72.2
	Total	385	100.0

[a] Correct answer

Figure I showed that 60% (231) of the participants preferred taking folic acid from natural sources, 97.4% (375) would take it during pregnancy, 98.2% (378) would advise others to use it while no one had any misconception about folic acid use.

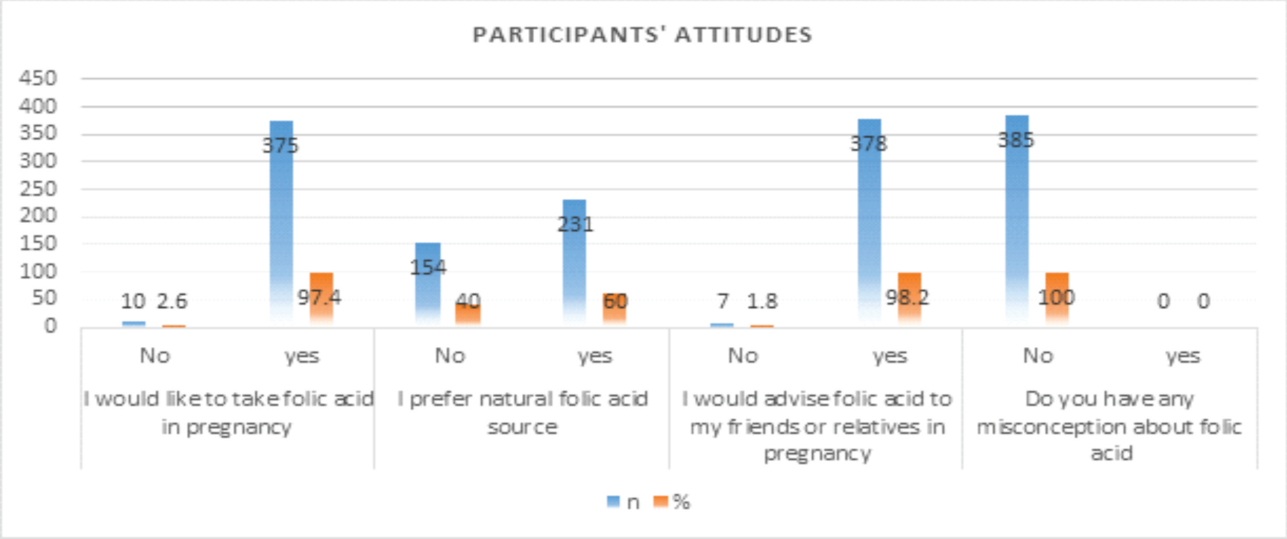

Figure 1: Participants' Attitudes Toward Folic Acid Use

In Table III good knowledge scores showed statistical significance ($p \leq 0.05$) with age 18-25 years, married status, being a student, having a bachelor's degree, monthly income less than 5000 riyals, and those who have heard of NTDs. Participants' attitudes association with good knowledge and other study variables are also displayed in it.

Based on Table V of multiple linear regression analysis, hearing about folic acid was found related to adequate knowledge with a positive relationship (3.243) while hearing from GP depicted a negative relationship with a knowledge score (-0.381). Furthermore, hearing about spina bifida or NTDs was related to knowledge with a positive relationship (0.803).

Table III: Association of Demographic and Other Study Variables with Good Knowledge and Attitudes

Variables		Frequency, n (percentage, %)	Chi-square	*p* value
Age * good knowledge	18-25	89(82.4%)	11.33	0.010
Marital status * good knowledge	Married	260(75.6%)	22.25	0.001***
Monthly income in SAR* good knowledge	<5000SAR	63(86.3%)	12.43	0.002
Occupation of participants* good knowledge	Student	103(85.8%)	20.36	0.001***
Education of participants* knowledge score	Bachelor's degree	187(77.6%)	34.64	0.001***
Have you heard of spina bifida or neural tube defects	Yes	149(90.3%)	47.11	0.001***
I would like to take folic acid in pregnancy* good knowledge	yes	278(74.1%)	26.67	0.001***
I would advise folic acid to my friends or relatives in pregnancy* good knowledge.	yes	278(73.5%)	18.52	0.001***
Age* I prefer natural folic acid source	26-35yr	83(74.8%)	16.13	0.001***
Age* I would advise folic acid to my friends or relatives in pregnancy	46-50yr	9(100%)	17.59	0.001***
Monthly income in SAR* I would like to take folic acid in pregnancy & advise my relatives in pregnancy.	5000-10000	199(100%)	14.29	0.001***
Occupation of participants* I would like to take folic acid in pregnancy	Housewife	104(100%)	8.76	0.034
Occupation of participants* I would advise folic acid to my friends or relatives in pregnancy.	Student	120(100%)	9.92	0.007
Education* I would advise folic acid to my friends or relatives in pregnancy	Master and higher	31(100%)	154.34	0.001***
Have children* I would like to take folic acid in pregnancy & advise others	Yes	289(99.3%)	17.186	0.001***
Have you heard about Folic acid* I would like to take folic acid in pregnancy & advise others.	Yes	371(99.2%)	166.76	0.001***
From where heard * I would like to take folic acid in pregnancy	magazine/ newspaper	8(100%)	17.54	0.001***
Have u taken Folic acid before/during pregnancy* I would like to take folic acid in pregnancy & advise others in pregnancy?	yes	321(99.4%)	31.02	0.001***
Have you heard of spina bifida or neural tube defects* I would advise folic acid to my friends or relatives in pregnancy	yes	165(100%)	5.35	0.021

Discussion

The prime significance of folic acid lies in its crucial role in preventing NTDs in the developing fetus and supporting overall maternal and fetal health.[13] In the current study, overall, a large proportion of females exhibited good knowledge scores and positive

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Table V: Multiple linear regression analysis

Coefficients								
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**95.0% Confidence Interval for B**	
		B	**Std. Error**	**Beta**			**Lower Bound**	**Upper Bound**
1	(Constant)	0.996	0.560		1.779	0.076	-0.105	2.096
	Age	0.154	0.084	0.102	1.845	0.066	-0.010	0.319
	Marital status	-0.330	0.176	-0.103	-1.879	0.061	-0.676	0.015
	Nationality	0.123	0.147	0.040	0.834	0.405	-0.167	0.413
	Monthly income in SAR	-0.130	0.089	-0.068	-1.465	0.144	-0.305	0.045
	Occupation of participants	0.118	0.072	0.104	1.633	0.103	-0.024	0.260
	Education of participants	-0.006	0.102	-0.004	-0.061	0.952	-0.207	0.195
	Are you pregnant	0.113	0.112	0.043	1.007	0.315	-0.108	0.334
	have children	-0.016	0.195	-0.005	-0.083	0.934	-0.400	0.368
	Have you heard about Folic acid	3.243	0.434	0.412	7.465	**0.001*****	2.389	4.097
	From where heard	-0.381	0.103	-0.168	-3.699	**0.001*****	-0.584	-0.179
	Have u taken Folic acid before/during pregnancy	0.208	0.170	0.058	1.219	0.224	-0.127	0.543
	Have you heard of spina bifida or neural tube defects	0.803	0.126	0.303	6.380	**0.001*****	0.556	1.051
	Do u have any child with NTDs	0.557	0.460	0.074	1.212	0.226	-0.347	1.461

attitudes. Medical practitioners were the primary source of information, less than half had awareness and knowledge of NTDs. Predictors of good knowledge included familiarity with folic acid and awareness of NTDs. Hearing about folic acid from a medical practitioner correlated negatively with knowledge scores. Young age, marriage, lower income, student status, and awareness of NTDs were associated with statistically significant good knowledge.

Alreshidi et al[14] in Riyadh revealed high awareness, the majority knew the role of folic acid in preventing neural tube defects primarily through health care professionals which is opposite to our results as less participants knew the role of folic acid. They reported six percent of NTD-affected children while we had 3 percent. Likewise, a study in Riyadh by AlDuraibi et al.[15] also showed many women knew about folic acid and its deficiency outcomes on fetal neural tube closure. The high awareness in these two studies was due to good information disseminated by doctors and nurses, while in the current study hearing about folic acid from a medical practitioner displayed a negative relation with participants' knowledge.

Al-Mohaithef et al.,[16] in Jeddah showed similar findings with the current where a majority heard of folic acid, but a smaller number of females knew about neural tube defects, while a bachelor's degree and married status were associated with better knowledge.

Raad et al.,[17] reported low knowledge among Saudi women, regarding sources of folic acid and its generic name which differs from our findings but like

the recommended folic acid dosage. They found older age and irregular intake of folic acid as predictors of low awareness while in our study hearing from practitioners was a low predictor of awareness. Higher education was a good predictor of awareness whereas having heard about folic acid and NTD was a good predictor of awareness in the current study. Samar et al.,[18] found an association between better awareness and young age and higher education which matches our findings. Similarly, AlOdan et al.,[19] conducted a study on pregnant women which revealed high awareness of young age and education. The current study differs from AlOdan et al.,[19] by involving all women, irrespective of pregnancy, in the awareness assessment. This was done to disseminate knowledge to females at both the household and community levels.

A study in Hail by Khan et al.,[20] showed lower awareness which differs while good awareness with higher education matches with the current study. Li et al.,[21] in China showed a lack of awareness for preconception use of folic acid, with less education which differs from ours where most participants were literate and therefore reflected better awareness.

A Canadian study by Mida et al.,[22] assessed physicians' knowledge, attitude, and practice for preconception folic acid in low-risk women where only half of the physicians were aware of the correct recommended dose. This supports our findings, which indicated that low knowledge scores were associated with receiving information from physicians. Therefore, the practitioner's knowledge needs to be updated. According to Kim et al.,[23] a Korean study a minority of women reported preconception folic acid supplementation, despite a notable proportion being aware of the preconception use of folic acid. In contrast, most of the participants in our study were aware of preconception usage.

The results of the present study underscore the necessity for healthcare practitioners to accentuate and elucidate the significance of folic acid in pregnancy and its role in preventing NTD. The study implies that real-time information provided by healthcare professionals can establish a positive relationship between heightened knowledge and healthy fetal outcomes. Our results are not consistent with the studies that are conducted in the Western province of Saudi Arabia, especially in Riyadh city concerning high insight into NTD awareness and folic acid dosage, and slightly differ from international ones on participants' selection.

The key strength of this study lies in its implementation of a probability sampling technique, ensuring a more unbiased selection of female participants regardless of their pregnancy status. Additionally, the inclusion of older females is noteworthy, as they can play a crucial role in propagating awareness to younger females within their families and extended networks. The dissemination of this knowledge has the potential to have a lasting impact, benefiting numerous future females of reproductive age by encouraging the utilization of folic acid.

Conclusion

The study demonstrated an overall good knowledge concerning folic acid, endorsing favorable attitudes, but the knowledge regarding the dose of folic acid in low-risk pregnancies was comparatively lower. Interestingly, obtaining information from medical practitioners correlated with lower knowledge scores among women.

The practical implications of these findings suggest the need for healthcare professionals to elucidate the benefits and dosage of folic acid in low-risk pregnancies, during consultations with those aspiring to conceive or currently pregnant.

Limitation of Study

The study's limitation resides in its study design and the results cannot be generalized to all primary health care facilities in Saudi Arabia.

Recommendation

Further research be conducted in this regard in all Saudi primary health care facilities to deduce a large and authentic body of evidence.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Psychological Impact of Sexual Assault on Males: An Open Secret in Our Society

Asif Azeem[1], Sikandar Ali[2], Tashfeen Bin Nazir[3], Zawar Shah[4]

ABSTRACT

Objective: To determine the psychological impact of sexual assaults among males during their childhood.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: Combined Military Hospital Okara from 2nd August 2022 to 20th March 2023.

Materials and Methods: We consecutively sampled 204 subjects who were given proforma to record demographic data including age, socioeconomic status, ethnicity, being victim of sexual assault, relationship to the assailant, numbers of sexual assault, and mode of sexual assault. Post-traumatic stress disorder (PTSD) check list and Trauma symptom check (TSC) list was applied on participants reporting sexual assault and SPSS 23 used for data analysis.

Results: Out of 204 study participants 33 (16.1%) males experienced sexual assault while 27 (81.8%) victims experienced PTSD with trauma symptoms of sleep disturbance in 18 (54.5%), sexual dysfunction experienced by 6 (18.1%), anxiety felt by 13 (39.3%), depression presented in 5 (15.1%), while 2 (6.0%) individuals experienced dissociation. Victims of sexual assault, assailant and number of sexual assaults were highly correlated with mode of sexual assault, trauma symptoms (except dissociation), and PTSD ($p < 0.001$)

Conclusion: Sexual assault on males during their childhood is strongly associated with significant psychological distress.

Key Words*: Male, Post-Traumatic Stress Disorder, Sexual, Trauma.*

Introduction

Sexual assault is a traumatic experience that can have lasting psychological effects on victim irrespective of being male or female.[1] Females are considered vulnerable and predisposed to sexual assault therefore societal attitudes and sympathies are more focused towards female survivors of sexual assault,[2] while males are perceived as strong, aggressive less predisposed to sexual assault as result male victims of sexual assault remain relatively invisible and unsupported.[3] In general female victims of sexual assault are supported and encouraged to raise their voice and cry for help, whereas on the other hand male survivors of sexual assault find it difficult to voice their agony due to shame, discrimination and stigma attached to the incident therefore it is no surprise that incidents of sexual assault on males are under reported.[4] A survey conducted in United States by the National Intimate Partner and Sexual Violence Survey (NISVS) noted that approximately 1 in 26 men experience sexual violence in their lifetime.[5] This survey has also suggested that these statistics are likely to be an underestimate, because many male survivors of sexual assault do not report their traumatic experiences to law enforcement agencies and neither seeks medical or mental health care.[5]

Similar to female gender sexual assault on males can lead to a range of psychological consequences such as depression, anxiety, sexual dysfunction, dissociation, disturbed sleep, post-traumatic stress disorder (PTSD), and substance abuse.[6,7] Acknowledgement of the impact of sexual assault on male survivors, understanding and empathic attitude and sound awareness about their experiences and unique needs is vital and of prime importance in making these victims confidant enough to come up and seek assistance.[8] This study intends to explore the frequency and psychological impact of sexual assault on males in our society which is otherwise male oriented and there is taboo

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for males in admitting being victim of sexual assault as observed by Imtiaz[9] in his study with emphasis that further research is needed to explore the experiences of sexual assault on males. Hence, there is need to establish facilities like support services, counseling for male survivors to heal and recover to improve mental health and wellbeing.

It is important to highlight the fact that even in developed countries like United States it is very difficult for male survivors of sexual assault to come up and report as the sheer concept of male being victim of sexual assault is clouded with taboo and stigma.[5] Therefore, it is not hard to understand that in under developed and conservative country like Pakistan how hard it would be for males to report a sexual assault. Unfortunately, there is scarcity of local literature on the subject. Therefore, we aim to ascertain the frequency of sexual assault on males in our society and establish its relationship with psychological impact in a local Pakistani sample for better management and planning.

Materials and Methods

This cross-sectional study was conducted after approval of Ethical Review Committee vide cert Ser No 01-1-22 at Combined Military Hospital Okara between October 2022 to Mach 2023. A total sample size of 204 was obtained by using OpenEpi sample size calculator based on the results of study conducted by Avais and Narijo[10] where anticipated population proportion was 17% with odds ratio 4. We consecutively sampled 204 subjects using convenience nonprobability sampling technique. All newly reporting patients at general medical reception of male gender aged 18-50 years were included. Patients with past or present psychiatric history, patients with chronic medical conditions and patients having history of substance abuse were excluded. Participants after informed consent were given a proforma to fill that recorded demographic details of age, economic status, ethnicity, victim of sexual assault (yes/no, those who answered yes were asked to proceed further with questions), sexual assault committed by (stranger/someone known), number of sexual assault (once/more than once), anal penetration (yes/no), oral sexual assault (yes/no), sexual touching (yes/no), attempted anal penetration (yes/no).

Post-traumatic stress disorder check list-DSM5 (PCL-5) was used to assess PTSD.[11] It has two parts. The first part contains a check list of stressful and scary events with possible yes/no reply. Those individuals who replied yes to any stressful or scary event out of list of fifteen were moved to second part of checklist. The second part contains a checklist for PTSD with possible replies (not at all, a little bit, moderately, quite a lot and extremely). A score of thirty-three is taken as clinical PTSD.

To assess trauma related problems, the trauma symptom check list – 40 (TSC-40) was used.[12] It contains forty questions with four-point frequency scale ranging from 0 to 3 (never too often). It has subscales (dissociation, anxiety, depression, sleep disturbance and sexual problem). The score for each subscale is the sum of the relevant items identified in the check list. The total TSC score is from one to forty.

Software SPSS 23 was used for analysis. Economic status, area of dwelling, ethnicity, being victims of sexual assault, assailant, method adopted by assailant and number of sexual assaults were depicted as frequencies and percentages. PTSD check list and TSC-40 scores were also shown as frequencies and percentages. To find correlation between variable Chi squared test was applied to assess statistical significance which was taken as 5% ($p \leq 0.05$).

Results

The mean age of participants in this study was 22.8 ± 4.4 while 68 (33.3%) belonged to lower socio-economic class, 115 (56.4%) middle class and 21 (10.3%) participants were of upper socio-economic class. Participants from urban areas were 68 (33.3%) and 136 (66.7%) were from rural areas. Participants of Punjabi ethnicity was 147 (72.1%), 5 (2.5%) were Sindhis and 52 (25.5%) were Pathans. Participants who experienced sexual assault were 33 (16.1%) while 171 (83.8%) did not experience any sexual assault. In 9 (27.2%) sexual assault was committed by a stranger but 28 (84.8%) were victims of sexual assault by someone known. Sexual assault was committed by taking advantage of position in 21 (63.6%), 5 (15.1%) of assailant used physical force, 8 (24.2%) exploited emotionally, while 1 (3.0%) threatened physical harm to commit sexual assault. Sixteen (16) (48.4%) victims experienced sexual assault once and 21 (63.6%) suffered sexual assault more than once. With regards to nature of sexual

assault 30 (90.0%) victims suffered sexual touching, 29 (87.8%) suffered attempted anal penetration, 24 (72.7%) recalled oral sex while 28 (84.8%) of victims suffered anal penetration (Table-I).

PTSD was experienced by 27 (81.8%) of victims. Trauma symptoms among victims of sexual assault were sleep disturbance in 18 (54.5%), sexual dysfunction in 6 (18.1%), anxiety felt by 13 (39.3%), depression experienced by 5 (15.1%) while 2 (6.0%) individuals experienced dissociation (Table –II).

For analysis of mode of sexual assault, trauma symptoms and PTSD data was stratified for age, economic status, area of dwelling, ethnicity, victims of sexual assault, assailant, and number of sexual assaults. No correlation was found between mode of sexual assault, trauma symptoms (except anxiety which was correlated with ethnicity) and PTSD when assessed with age, economic status, area of dwelling and ethnicity ($p > 0.05$). Victims of sexual assault, assailant and number of sexual assaults were highly correlated with mode of sexual assault, trauma symptoms (except dissociation), and PTSD ($p < 0.05$) (Table-III).

Table I: List of Demographic and Study Variables.

S.No	Category	Frequency, n (percentage, %)
1.	**Age** (n=204)	
	Mean ± SD	22.8 ± 4.4
2.	**Economic Status** (n=204)	
	Lower class	68 (33.3%)
	Middle class	115 (56.4%)
	Upper class	21 (10.3%)
3.	**Area of dwelling** (n=204)	
	Urban	68 (33.3%)
	Rural	136 (66.7%)
4.	**Ethnicity** (n=204)	
	Punjabi	147 (72.1%)
	Sindhi	5 (2.5%)
	Pathan	52 (25.5%)
	Others	0 (0)
5.	**Victims of sexual assault** (n=204)	33 (16.1%)
	Yes	171 (83.8%)
	No	
6.	**Sexual assault committed by**	
	(n = 33)	9 (27.2%)
	Stranger	28 (84.8%)
	Someone known	
7.	**Method of sexual assault** (n = 33)	
	Emotional exploitation	8 (24.2%)
	Threatened physical harm.	1 (3.0%)
	Took advantage of position	21 (63.6%)
	Used physical force.	5 (15.1%)
	Combination of methods	2 (6.0%)
8.	**Number of sexual assault** (n = 33)	
	Once	16 (48.4%)
	More than once	21 (63.6%)
9.	**Attempted anal penetration.** (n = 33)	29 (87.8%)
10.	**Anal penetration** (n = 33)	28 (84.8%)
11.	**Oral sex** (n = 33)	24 (72.7%)
12.	**Sexual touching** (n = 33)	30 (90.9%)

Table II: Frequency of Trauma Symptoms and PTSD among Males after Sexual Assault

S.No	Category	Frequency, n (percentages, %) n=33
1.	**Symptoms of trauma**	
	Depression	5 (15.1%)
	Anxiety	13 (39.3%)
	Sexual dysfunction	6 (18.1%)
	Dissociation	2 (6.0%)
	Sleep disturbance	18 (54.5%)
2.	Post-traumatic stress disorder	27 (81.8%)

Discussion

Sexual abuse in males is a less appreciated reality in Pakistan therefore it has been less explored.[13] In Pakistan people feel uncomfortable to discuss the issue of male sexual abuse, as a result problem has always been pushed under the carpet. Like other societies Pakistani society is also attuned to the misconception that males are less vulnerable and less likely to be the victims of sexual abuse.[3]

It has been observed that sexual abuse in either gender can lead to long term consequences especially penetration of some kind in males is associated with greater psychological impact. Gravity of consequences caused by sexual abuse is not dependent on the gender of assailant, but the duration of abuse and identity of the abuser as observed by Scholte in his study.[14] This study has also

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Table III: Correlation between variables with trauma symptoms and PTSD

S.No	Category	Mode of Sexual Assault				Method of assault	Trauma symptoms					PTSD
		Attempted Anal penetration	Anal penetration	Oral	Touch		Dep	Anx	S: dys	Diss	Sleep	
1.	Age	0.772	0.703	0.642	0.816	0.999	0.903	0.423	0.909	0.904	0.424	0.787
2.	Economic status	0.740	0.830	0.261	0.296	0.772	0.738	0.402	0.511	0.823	0.199	0.636
3.	Area of dwelling	0.356	0.174	0.598	0.411	0.141	0.459	0.096	0.682	0.443	0.612	0.252
4.	Ethnicity	0.012	0.008	**0.001***	0.015	0.055	0.020	**0.001***	0.059	0.676	**0.001***	0.005
5.	Victim of assault	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	0.025	**0.001***	**0.001***
6.	Assailant	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***
7.	Number of sexual assaults	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	**0.001***	0.009	**0.001***	**0.001***

* *p value < 0.001* is considered statistically significant

dep (depression), Anx (Anxiety), S: dys (sexual dysfunction), Diss (Dissociation), PTSD (post-traumatic stress disorder)

noted that 21 (63.6%) out of 33 victims were sexually abused more than once by a known assailant.

In one study Avais[10] has quoted a survey of 2016 on Pakistani population that about 17% of children were survivors of sexual abuse in addition highlighting that the boys were more vulnerable as compared to the girls (1 in 7 girls and 1 in 5 boys). It was also important to note that in 80% of cases sexual abuse was committed by someone known.[12] Similar results were noted in this study where 33 (16.1%) out of 204 participants admitted having suffered sexual abuse and 28 (84.8%) out of 33 victims claimed to have been abused by someone known. A systematic review conducted by Dworkin[15] indicates that prevalence rate of sexual assault on male's rages from 0.3% to 55.5%.

Pakistani studies have highlighted that majority of cases of male sexual abuse take place in province of Punjab followed by Sindh and Khyber Pakhtoon Khwa.[16] Similarly in this study Punjabi victims were more as compared to other ethnicities in addition majority belonged to rural areas but it is important to mention that as this study was conducted in the city of Punjab therefore it is natural to have more Punjabi representation thereby inflating the numbers of Punjab ethnicity.

Results of this study show that 97% of male victims suffered from sexual touching, 87% experienced attempted anal penetration followed by anal penetration and oral sexual abuse. Research by Thomas[17] observed that 86% of male victims experienced unwanted touching, 38% experienced attempted anal penetration while 46% experienced anal penetration.

Assessment of psychological impact revealed that 27 out of 33 (81.8%) victims experienced post-traumatic stress disorder after sexual assault. After traumatic event of sexual assault 54% of individuals suffered from disturbed sleep. Anxiety was more frequent as compared to depression followed by sexual dysfunction or problems with sexual life. It is important to highlight that only two victims of sexual assault experienced dissociative symptoms. Khan[18] has also noted positive correlation of PTSD among males experiencing sexual assault.

Age of the victim, economic status, ethnicity, and area of dwelling had no correlation with mode of assault, method of assault, PTSD or trauma symptoms except that for unknown reasons there was correlation between ethnicity, presence of anxiety and sleep disturbance among victims of sexual assault. On the other hand, victims, identity of assailant and number of sexual assaults experienced were strongly correlated with mode of sexual assault, method of assault, PTSD, and symptoms of trauma except that dissociative symptom of trauma had no correlation. Similarly study by Kiss[19] also finds association between adverse mental impact with identity of the assailant and number of sexual assaults.

Conclusion

Sexual trauma in male especially during childhood is

associated with significant psychological distress. Being male or masculine do not guarantee or provide immunity against sexual abuse. More work needs to be done in Pakistan to create awareness and sensitizing the issue.

Limitations of Study

Authors acknowledge the limitations of this study being cross sectional design doesn't help in determining the reasons why and how ethnic background leads to disturbed sleep and anxiety and why after sexual assault symptom of dissociation is not that frequent. Furthermore, study cannot comment on why mode of sexual assault, method of sexual assault and symptoms of trauma were correlated with victims, identity of assailant and number of sexual assaults.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Prevalence of Malnutrition in Children Under 5 Years of Age in Batkhela Tehsil, KPK, Pakistan

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ABSTRACT

Objective: To find out the prevalence of malnutrition in children under five years of age in a local population.

Study Design: A descriptive cross-sectional study.

Place and Duration of Study: Department of Paediatrics, Tehsil Headquarter Hospital Dargai, Malakand District from 1st July 2022 to 31st Dec 2022.

Materials and Methods: A total of 156 children were included in the study. Demographic details like age, gender and weight were recorded. All children underwent malnutrition assessment as per operational definition using WHO Software. Data analysis was done using SPPS Version 24.

Results: A total of 156 children were included in this research survey. Mean age and weight were 4.1±0.69 years & 12.8±0.94 kg respectively. A total of 51.28% children were between 3months to 3 years of age and 48.71% belonged to 4-5 years age group. Amongst them, 71.15% were males and 28.84% were females. Approximately 72.3% of the children were from families with a lower socio-economic status, while 19.23% and 8.33% were associated to the middle class and well of categories, respectively. Literacy rate of fathers was 44.87%. Regarding mothers, 85.25% were housewives, and 14.75% were employed. As per frequencies and percentages for malnutrition, 57 (36.35%) patients were recorded with malnutrition.

Conclusion: Prevalence of child malnutrition is notably elevated among children below the age of five. This phenomenon is more commonly observed among children whose mothers are housewives, predominantly due to factors associated with limited educational attainment and constrained socioeconomic status.

Key Words: *Children, Malnutrition, Stunting, Underweight, Wasting.*

Introduction

Under five year malnutrition in paediatric population is global issue with dire consequences not only on survival of children but also has harmful effects on cognition & physical growth of children.[1,2] Globally 70% of undernourished paediatric population belongs to lower income regions like Asian subcontinent & African continent.[3] Malnutrition accounts for 45% of mortality in children younger than 5 years of age and contributes to more than 3 million deaths every year.[3,4,5]

According to United Nation report acute malnutrition affects 8% of children across the world. Almost one in twelve children are affected in the age group of one to five years.[1,6] More than 50% cases of childhood mortality results from acute malnutrition with resulting 3.5 million deaths annually in children below 5 year.[7] Wasting (moderate to severe) another predictor of under nutrition effects 52 million children below five years of age with an estimated 5% of children suffering from severe wasting.[8] Approximately two third & one third of all wasted children live in Asia & Africa respectively. South Asia having highest prevalence of wasting with weightage of 16%. Out of its India having highest number around 25 million children with moderate to severe wasting, which was approximately 16%.[9] Around one third of under five-year children's moralities are attributed to malnutrition. Cchildhood malnutrition is still prevalent in Asian & African continent with prevalence of stunting, wasting and underweight as 39%, 10 %, & 25 % respectively in children under 5 years of age.[10,11]

Malnutrition leads to greater risk of mortality & morbidity due to common paediatric infections like

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diarrhoeal illnesses, malaria, pneumonia, measles & human immunodeficiency virus. Malnutrition has both acute & long-term side effects. Its acute side effects include mortality and morbidity. In long term malnourished children don't achieve full developmental milestones and have poor cognition. Pakistan is among the developing countries having highest rates of child malnutrition. Improvement & progress in child health & nutrition remains slower in Pakistan than rest of South Asian countries due to economic instability, poor health policies & lack of state interest in such matters.[12]

There is limited data available about childhood malnutrition in our general population. Only two studies from Sindh & KPK province have been found so far and their results cannot be generalized on all Pakistani population due to difference of geographical location. [12,13] Rationale of study is not only to investigate the prevalence of malnutrition in children below five years of age but also to evaluate the risk factors associated with malnutrition in a rural setting. The result of this study will help in estimating the actual burden of malnutrition in our local paediatric population under 5 year of age. The study will serve as baseline indicator for finding magnitude & factors related to malnutrition & will help policy makers to make policies to address this issue in rural areas of KPK. It will help to make nutritional interventions for catch up growth for children under five years of age. So, a study was planned with an objective to find out the prevalence of malnutrition in children of the local population less than 5 years of age.

Materials and Methods

It was a descriptive cross-sectional study with non-probability consecutive sampling carried out at Department of pediatrics, Tehsil Headquarter Hospital Dargai from 01 July 2022 to 31st Dec 2022. A total of 156 children were included in the study. Sample size was calculated by the formula n = z2 pq/d^2 (p=35.5%. q= 1-p and d= 7.5% with confidence level of 95%**)** Approval was taken from ethical committee comprising of District Health officer Batkhela via letter No 3898-390 dated 06/2022. Children between three months to five years of age of both genders were included in the study. Children with tuberculosis on medical history, born either premature or small for gestational age on medical record, those having history of congenital anomalies of the kidney and urinary tract and anatomical abnormalities like hydronephrosis, vesicoureteric reflux or nephrolithiasis on medical record(History, Examination and Ultrasound findings) and parents' refusal for consent were excluded from study. Malnutrition was defined by WHO standard chart assessing both weight and height and plotting them on growth charts.[1] Stunting, Wasting and Underweight were defined as weight for age, height for age and weight for height with a Z score below two standard deviations respectively. Demographic data like age, gender and weight was noted. For children up to two-years of age tared weighing was done. All children underwent malnutrition assessment as per operational definition using WHO software.[1] Data was registered according to operational definitions & its analysis was done using SPSS version 24. Frequency and percentage were recorded for gender, father education level, economic status, mother occupation and malnutrition. Mean and standard deviation were noted for variables like age and weight. Effect modifiers like age, gender, father's education level, economic status, mother's occupation, and weight were controlled by stratification. Post stratification Chi square test was applied for data analysis. *p* value of equal or less 0.05 was considered statistically significant.

Results

A total of 156 children were included in the study. Mean age and weight were 4.1±0.69 years & 12.8±0.94 kg respectively.

Frequency and percentage of age, gender, father's educational status, family's economic status, mother occupation, malnutrition are shown in Table I. Study results revealed that 80 patients (51.28%) were within the 3 months to 3 years age group. Of the total 156, 111 patients (71.15%) were male, and 45 patients (28.84%) were female. Regarding parental education, 86 (55.12%) were not educated. In terms of economic status, 113 patients (72.43%) came from poor families. Moreover, 133 patients' mothers (85.25%) were housewives. Regarding malnutrition, the data revealed that 57 patients (36.35%) were diagnosed with malnutrition.

Post stratification chi square test was applied. Stratification of malnutrition with age, gender,

educational status, economic status, mother occupation, malnutrition is shown in Table II.

Table I: Frequency and Percentage of Age, Gender, Parents' Educational status and Economic Status, Mother Occupation, Malnutrition (N=156)

	Frequency	Percentage
Age Group		
3Year-3Months	80	51.28%
4-5 Years	76	48.71%
Gender		
Male	111	71.15%
Female	45	28.84%
Education Status		
Literate	70	44.87%
Illiterate	86	55.12%
Economic Status		
Poor	113	72.43%
Middle Class	30	19.23%
Rich	13	8.33%
Mother Occupation		
Housewife	133	85.25%
Employed	23	14.75%
Malnutrition		
Yes	57	36.35%
No	99	63.46%

Table II: Stratification of Malnutrition by Gender, Parents' Educational status and Economic Status, Mother Occupation, Malnutrition (N=156)

	Malnutrition	Frequency	Percentage	P Value
Gender Male	Yes	43	27.56%	0.370
	No	68	43.58%	
Female	Yes	14	8.97%	
	No	31	19.87%	
Father Education Status				
Literate	Yes	21	13.46%	0.156
	No	49	31.41%	
Illiterate	Yes	36	23.07%	
	No	50	32.05%	
Mother Occupation				
Housewife	Yes	49	31.41%	0.849
	No	84	53.84%	
Employed	Yes	08	5.12%	
	No	15	9.61%	
Economic Status				
Rich	Yes	01	0.64%	0.037
	No	13	8.33%	
Middle Class	Yes	14	8.97%	
	No	16	10.25%	
Poor	Yes	42	26.92%	
	No	70	44.87%	
Weight				
≤ 3 kg	Yes	34	21.79%	0.038
	No	42	29.92%	
> 3 kg	Yes	23	14.74%	
	No	57	36.53%	

Discussion

In our study, the mean age and weight of study participants were 4.1+0.69 years & 12.8+0.94 kg, respectively. 51.28% children were in the 3 months to 3 years age group while 48.71% were in 4-5 years age group. Male to female were 71.15% and 28.84% respectively. 44.87% of fathers were literate and 55.12% were illiterate. 72.43% belonged to low socioeconomic status. 19.23% of patients were from middle class families and 8.33% were from rich families. 85.25% mothers were housewives and 8.55% were employed. Frequencies and percentages for malnutrition showed that 36.35% children were recorded with malnutrition.

In their study, Khan GN et al in their study found that prevalence of stunting, underweight and wasting were 48.2%, 39.5% & 16.2% respectively with male predominance, (51 % being male, p=< 0.001).[12] It is consistent with our study findings. Namusoke M et al in their study found 52 % of children were below 1 year of age, 30% between 1 to 2 years of age & 12 % between 2 to 3 years of age and low socioeconomic status was considered the major factor contributing to malnutrition in below 5 years of age along with other factors like low parental education, chronic ailments, large family size, delayed introduction of weaning foods.[13] Pomati M et al, found out in their study that 48% of all children under 5 years of age experienced some form of malnutrition with prevalence of stunting, underweight & wasting 38%, 12% & 23% respectively in children below 5 years of age. All these finding is consistent with our study results. [13,14]

Modgadi p et al [11] stated that social & economic factors contributing to childhood malnutrition were

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maternal illiteracy, marriage at teen age with multiple pregnancies and no birth spacing. Mangahwar P et al [15] and Das JK et al [16] determined in their respective studies that poverty, illiteracy, overcrowding, and low income were major contributing factors in childhood malnutrition. Parental education, socioeconomic status and family size have a direct association with childhood malnutrition. All these are consistent with our study findings in terms of socioeconomic status, mother illiteracy and incidence of malnutrition.

Makanjana O et al & Asim M et al et al found in their studies that lack of education, breastfeeding practices, weaning practices and large family sizes were associated with child malnutrition.[17, 18] Lagahri ZA et al [19] pointed out that malnutrition association with family member with special needs & maternal literacy rate exists. Families with high illiteracy rate, low socioeconomic status, large family sizes are among the contributing factors in childhood malnutrition. All these study findings are consistent with our study results.

Kureishy S et al [20] found that lack of food, maternal education, large family, and insufficient knowledge of childcare practices lead to stunting in paediatric population. Ahsan S et al & Asim S et al [21, 22] in their studies concluded that lack of immunization, large family with lack of birth spacing & early marriages are major contributing factors leading to childhood malnutrition. According to a National survey, conducted in Pakistan [3] factors leading to stunting were poor socioeconomic status, lack of immunization practices, education and birth spacing with large families living in small rooms. All these observations were consistent with our study findings. Sheikh SA et al [22] identified lack of birth spacing with inter pregnancy interval of less than two years between two pregnancies was the contributing factor in stunting in children in District Dadu of Sindh province. All these observations are consistent with our study results. Study carried out by Kosaka s et al & Kalu RE et al showed similar incidence of malnutrition with same contributing factors as observed in our study in children under 5 years of age.[23,24]

Lack of both qualitative & mixed method studies on etiologies of Paediatric undernutrition exists in Pakistan. Frequency of all types of undernutrition in our country especially rural areas is higher than that of rest of neighboring regions. Children between six to twenty-four months of age are considered the most vulnerable but were entirely neglected in most of local studies.

Limitations of our study include limited time duration of study and smaller sample size. Children should have been followed up after nutritional management to assess the outcome. Locally devised assessment tools should be designed for development of assessment because tools used globally ain't suitable for our local population.

Conclusion

The prevalence of child malnutrition is notably elevated among children below the age of five. This phenomenon is more commonly observed among children whose mothers are housewives, predominantly due to factors associated with limited educational attainment and constrained socioeconomic status.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Frequency and Pattern of Gynecological Malignancies at Bolan Medical Complex Hospital Quetta

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ABSTRACT

Objective: To determine the pattern and relative frequencies of gynecological malignancies at Bolan Medical Complex Hospital Quetta.

Study Design: Retrospective observational study.

Place and Duration of Study: Department of Obstetrics and Gynecology Unit-2, Bolan Medical Complex Hospital, Quetta, from 1st January 2017 to 31st December 2021.

Materials and Methods: This retrospective study included review of clinical records of all patients presented with gynecological malignancies. The data was collected from ward admission registers, case sheets and operation theater registers. Simple descriptive statistics were used to obtain the results in terms of frequency and percentage.

Results: During the study period of five years**,** there were 154 cases of genital tract malignancies out of 1565 major gynecological operations, giving a frequency of 9.8%. Most common site of malignancy was ovarian (63%), followed by endometrial carcinoma (17.6%), and cervical cancer (12.4%) being on third most common. Ca vulva and choriocarcinoma were 3.2% both and there was only one case of fallopian tube carcinoma (0.6%). The majority of cancers (35.6%) were in 41 to 50 age group. Ovarian carcinoma was most common in nullipara and low parity while Ca endometrium and Ca cervix were more common among grand multiparas.

Conclusion: The most frequent gynecological cancer was ovarian cancer, which was followed by endometrial and cervical cancer. In most cases of cancer, late presentation with an advanced stage was observed. There is need for public awareness of about the symptoms of ovarian cancer and cervical screening by pap smear. So, early diagnosis can reduce the morbidity and mortality from gynecological cancers in females.

Key Words*: Cervical Cancer, Endometrial Cancer, Grand Multipara, Low Parity, Morbidity, Ovarian Cancer.*

Introduction

Gynecological malignancies comprise carcinomas of cervix, uterus, ovaries, vulva, vagina, and gestational trophoblastic diseases. All over the world, there is a significant contribution of gynecological malignancies to morbidity and mortality of female causing a major health problem.[1] Genital cancer prevalence varies in different regions. In North America, it is as low as 12.7% to 13.4%, whereas in sub-Saharan Africa, it is as high as 31.6% to 35%. and it is much higher in developing countries of Asia.[2] After the breast cancer (46.3%), carcinoma cervix (13.6%) is the second most common cancer in woman, while endometrial cancer (8.4%), ovarian cancer (6.6%) and ca vulva (0.9%) are less common .[2] The gynecological malignancies has different frequencies between countries due to various factors like socioeconomic background, life style and genetic tendency.[3]

The number of women seeking cancer treatment has been increased in past years, due to this it has become one of major public health issues.[4,5] The risk of death is higher in cancer patients who cannot afford the treatment. According to WHO, in majority of the countries, cancer ranks as the second most common cause of death for women under 70.[1]The incidence of cervical cancer has been increased in developing countries and 80% cases are now reported in these countries as they have no proper cervical cancer screening programs[6] Ovarian cancer is also diagnosed at very late stage III, or stage IV. Although the Gold standard test is histopathology but in the diagnosis of malignant ovarian neoplasm, the doppler ultrasound method is a trustworthy and

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dependable one. So, it can be used as screening of ovarian tumors. Due to lack of proper cancer registry, gynecological malignancies are under reported in Pakistan.[7] For estimation of the burden of disease there is need of a population-based data and a high-quality cancer registry.[8]

We reviewed the data of five years in Bolan medical complex hospital, Quetta to produce local data about the risk factors, frequency, and pattern of presentation of various female genital tract cancers. Bolan Medical Complex Hospital is a leading tertiary care hospital of Baluchistan and has a large number of patients suffering from various kinds of cancers from all over the province as well as from neighboring countries Afghanistan and Iran border. This is the first analysis of five years' worth of gynecological cancer data from our hospital. Thus, we anticipate that this data will be useful to us as we develop and implement comprehensive cancer prevention and treatment strategies. Additionally, it will support the development of policies for prompt management, early diagnosis, and program prioritization for cancer control.

Materials and Methods

A five-year retrospective study from 1st Jan 2017 to 31st Dec 2021 was conducted in gynae unit -2 of Bolan Medical Complex Hospital Quetta. The clinical record of patients admitted for genital tract malignancy were retrieved from ward admission registers, case sheets and operation theater record registers. All the patients operated for any gynecological malignancy was included in the study and patients operated for obstetrical reasons were excluded. Local ethical review committee approval was taken for the study, (Ref no: GD/30/23) dated 22/07/2023. Simple descriptive statistics were used to calculate the results in terms of percentage and frequency, and Microsoft Excel 13 was used for analysis.

Results

During the study period 1565 major gynecological operations were performed in which 154 cases were of genital tract cancers. Thus, 9.8% of total gynecological operations were due to malignancies. Commonest site of cancer was ovarian 63% (97/154) followed by endometrial carcinoma 17.6% (27/154) and cervical cancer 12.4% (19/154). Ca vulva and choriocarcinoma account for 3.2% each (5/154) while there was only one case of fallopian tube carcinoma giving the frequency of 0.6% as shown in table -1.

The majority of cancers (35.6%) were in the 41 to 50 age group. The ovarian cancer was commonest in all age groups being most common in 4th decade. Endometrium carcinoma was most common after 50 years of age. (table 2). No cases of cancer of vagina were seen during the study period. Table III shows that gynecological malignancies are more common in grand multiparas. Endometrial ca (85%) and cervical ca (89%) were more common in grand multiparas whereas ovarian cancer was seen mostly in nullipara and women with low parity (64%).

Table I: Site Distribution of Female Genital Tract Malignant Tumors

Site of tumor	No of cases	Percentage
Ovary	97	63%
Endometrium	27	17.6%
Choriocarcinoma	5	3.2%
Cervix	19	12.4%
Vulva	5	3.2%
Fallopian tubes	1	0.6%
Total	154	100%

Table II: Age Distribution of Carcinomas n=154

Age	Ovarian	Endometrial	Cervical	Vulva	Tube	Choriocarcinoma	No (%)
21-30	20	0	0	0	0	1	21(13.6%)
31-40	25	0	1	0	1	2	29(18.8%)
41-50	33	10	7	3	0	2	55(35.7%)
51-60	13	11	5	1	0	0	30(19.5%)
61-70	6	6	5	1	0	0	18(11.7%)
>70	0	0	1	0	0	0	1(0.6%)

Discussion

Gynecological cancer is increasing worldwide and especially in developing countries. Every year, about five million new cases of cancer are diagnosed. This increase is due to many factors, for example change in lifestyle, excessive radiation exposure and there is an increase in detection rate of cancers by different screening methods. The prevalence of gynecological

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Table III: Parity of Patients with Gynecological Malignancies. n =154

Parity	ovarian	endometrial	cervix	vulva	tubal	choriocarcinoma	No %
Nullipara	28	1	0	1	1	1	32(21%)
P1-2	14	0	0	0	0	0	14(9%)
P3-4	20	3	2	0	0	1	26(17%)
≥P5	35	23	17	4	0	3	82(53%)
Total	97	23	19	5	1	5	154(100%)

malignancies is 9.8% in our study while it is observed in Asian population, approximately 11% of cases that were admitted had gynecological issues. The prevalence is different worldwide ranging between 2.8% to 17% of the cases.[8] Ovarian carcinoma is the commonest malignancy in our study (63%) which is comparable with the studies from other parts of Pakistan. These study which were conducted in Lahore,[9] Quetta,[10] and Karachi[11] had 53.5%, 49.32% and 47% of ovarian cancers respectively. Ovarian cancer was most common in age of 41 to 50 years (35.7%) in our study while ovarian cancer's peak age was found to be between 50 and 59 years old in other studies.[12,13] Ovarian cancers was more common in nullipara and low parity women (64%) in our study. This shows that there has been a lifestyle change in developing countries like late conception, small families and lack of breast feeding. Change in dietary habits and reduced physical activity has contributed to weight gain which has increased the risk of poly cystic ovarian disease and ovarian cancer.[14] Due to non-significant symptoms, the diagnosis of ovarian ca is delayed, and patients seek treatment in very late stage. Early detection of gynecological cancers can be possible by creating various screening techniques, such as tumor markers like CA125, serial transvaginal scans, and risk factor stratification. But these screening test still have not evidenced to be helpful.[15,16]

Endometrial cancer was the second most common malignancy in our study, which was also observed in a study at Liaqat National Hospital Karachi[11]. According to Global Cancer Observatory[3], cancer of endometrium is second number after cervical cancer. Endometrial carcinomas were more common after 50 years. The characteristic feature of uterine cancer is abnormal bleeding and assessing this symptom as soon as possible can increase the chance of early detection and appropriate treatment within safe time limits.[17]

Ca cervix is the commonest cancer in the United States and Europe[10], and it is on third number in occurrence in our study (12.4%). Other local studies also found cervical cancer to be 3rd most common cancer in women.[11] In a Turkish study[18] the most common gynecological cancer was uterine cancer, which was followed by ovarian cancer and cancer of cervix. In the study of Shaukat et al[19]at Rahim Yar Khan, cervical cancer was on the top of all gynecological cancers with 53.2% which is an alarming situation. In our study cervical cancer was most common after 40 years of age and in grand multipara (89%) Which is comparable with other studies.[11,19] There is no structured screening program for cervical cancer in our country.[20] Even educated people do not know about Pap smear for screening of cervical cancers and human papilloma virus (HPV) vaccination availability. HPV infection is the main cause of ca cervix in our country, so due to lack of awareness about HPV vaccination, pap smear screening and follow up, the women present in late stage with high mortality rate.

In the UK, vulvar and vaginal cancer comprise 7% of gynecological cancers .[21] while we found ca vulva and choriocarcinoma 3.2% each. In our study, one case of cancer of fallopian tube was identified, which accounts for 0.1% to 1.8% of all genital malignancies and is an uncommon tumor of the female genital tract.[22]

Conclusion

Carcinoma of the ovary is the most common gynecological malignancy in our setup. The mortality is high due to late presentation with advanced stage of cancer. There is need of public awareness of about the symptoms of ovarian cancer and cervical screening by pap smear and vaccination for cervical cancer. So, early diagnosis can reduce the morbidity and mortality from gynecological cancers in females.

Limitations of Study

As this study is retrospective and conducted only in

one unit of tertiary care hospital, this is underestimation of the gynecological cancers in our province.

Recommendations

There should be public awareness programs about all gynecological cancers using social media, by conducting workshops at educational institutes. Cervical cancer screening should be mandatory in reproductive age of all women and vaccination for cervical cancer should be included in Government vaccination schedules for teen age girls.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Nasolabial Fold Dynamics in Orthodontic Treatment: Extraction versus Non-Extraction Perspectives

Sadia Naureen[1], Huma Ghazanfar Kiani[2], Bushra Amin[3]

ABSTRACT

Objective: This study compared the impact of extraction and non-extraction orthodontic therapy on nasolabial folds and provides valuable insights for treatment planning in borderline orthodontic cases.

Study Design: A cross-sectional observational study.

Place and Duration of Study: The study was conducted in the Orthodontic Department at Rawal Institute of Health Sciences Islamabad. The duration of the study was eleven months from 2nd August 2022 to 3rd July 2023.

Materials and Methods: The research comprised of 80 patients, divided into 40 cases involving extractions and 40 cases without extraction. Photographs were taken before and after orthodontic treatment and analyzed for the change in the depth of nasolabial folds using the modified Wrinkle Severity Rating Scale. Results were compared between the extraction and non-extraction groups by using the t-test. SPSS version 23 was used to perform statistical analysis.

Results: There was a statistically significant reduction in the nasolabial folds' prominence in the non-extraction group (p=.012), whereas the extraction group did not show a statistically significant difference. The pre-treatment shallow nasolabial folds changed to moderately deep nasolabial folds in the extraction group in 7.5% of the cases, while 5% of shallow and 5% of deep nasolabial folds converted to absent nasolabial folds in the non-extraction group.

Conclusion: Non-extraction orthodontic treatment positively impacted facial aesthetics by reducing the nasolabial folds' depth. Extraction cases did not show a significant effect on the nasolabial folds. The study emphasizes the importance of personalized treatment planning and comprehensive assessment of the patients regarding soft tissue response.

Key Words: *Aesthetics, Extraction, Non-Extraction, Nasolabial Folds, Orthodontic Treatment.*

Introduction

According to a recent study it has been observed that 80% of the cases seek orthodontic treatment for aesthetic improvement.[1] One pivotal aspect of orthodontic treatment planning is the choice between extraction or non-extraction modalities. Extracting teeth can impact the soft tissue profile.[2] Premolar extractions are clearly indicated in severe crowding and incisor proclination. However, in borderline cases like mild to moderate crowding, the decision relies on various factors including the upper and lower lip prominence in relation to the E-plane, lower lip prominence in relation to the true vertical line (TVL), upper lip thickness, nasolabial angle and interlabial gap.[3] There is a growing concern regarding soft tissue alterations in comparison to hard tissue changes, such as upper lip extension and facial flattening after orthodontic treatment. Almurtadha RH *et al.,*[4] proposed that the extraction therapy causes a significant retraction of the lips, thus increasing the nasolabial angle. Following the orthodontic retraction, noticeable changes occur in the perioral soft tissues, which also extend to the lower third of the face, affecting the nasolabial folds (NLFs).[5] Changes in the morphology and depth of the NLFs along with the elongation of lips are considered as the early signs of facial aging but, for the young adolescents, a heavy cheek fat pad may cause the NLFs to deepen as well.[6] Maxillary skeletal retrognathism and a reduction in dental vertical height also lead to deepening of the NLFs.[7] While it's well-documented that the upper lip lengthens and

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NLFs deepen with age,[8] but if these changes occur in young patients after orthodontic treatment, it can significantly impact their self-esteem and overall satisfaction with the treatment outcome.[9]

Lot of studies have explored the effect of extraction and non-extraction therapy on soft tissues of the lower face, but no definitive conclusions have been reached.[10] Angle advocated for non-extraction orthodontic therapy, while Calvin Case favored premolar extraction in orthodontic treatment planning.[10] However, a recent systematic review indicates that there is limited and low-quality evidence regarding the potential adverse aesthetic effects of extracting premolars in orthodontic patients.[11] In clinical practice, orthodontists occasionally observe heightened prominence or absence of the NLFs in some patients during orthodontic treatment. However, there is limited scientific evidence in the literature available on the changes in the morphology of the NLFs after orthodontic therapy.

This study aimed to contribute to a better understanding of how orthodontic interventions, specifically extraction and non-extraction modalities, influence the aesthetics of nasolabial folds, aiding clinicians in making more informed and personalized treatment decisions. The findings of this study would help orthodontists in the treatment planning of borderline orthodontic cases when the decision of extraction has to be critically analyzed.

Materials and Methods

It was a cross sectional comparative study. It was conducted in the Orthodontic Department of RIHS, Islamabad for eleven months from 2nd August 2022 to 3rd July 2023. The sample size was calculated using the WHO health calculator with the prevalence of 34.4% premolar extraction in 987 orthodontic cases.[12] Non-probability purposive sampling was done. This study was approved by the Ethical committee of Rawal Institute of Health Sciences (RIHS), Islamabad. The ERB number was RIHS/IRB/D/23/003. The inclusion criteria for extraction and non-extraction cases were vertically normal angle skeletal Class I malocclusion cases with moderate crowding not more than 7mm. Cases with bimaxillay proclination, skeletal deformity, highly placed canines and thick heavy cheek pads were excluded from the study. Patients having unequal depth of NLFs on both sides were also excluded from the study.

The treating orthodontist and a prosthodontist recruited 92 patients for this study from the available pretreatment photographic record. Eight patients not matching the criteria were excluded and the sample consisted of 80 patients divided into 40 extractions and 40 non-extraction cases in the Department of Orthodontics RIHS. The extraction group was labeled as G1 (n= 40, 14-18 years age) and non-extraction group as G2 (n=40, 14-18 years age).

The initial morphological type of the NLFs was defined by the modified Wrinkle Severity Rating Scale (WSRS), a standard scale for measuring the depth of facial folds.[13] Modified WSRS uses the following three-point scale:

1= Absent, NLF is invisible.

2 = Shallow, visible NLF with a slight indentation with minor facial features.

3= Moderately deep NLF with clear facial features visible at normal.

Post-treatment photographs were taken immediately after the completion of incisor retraction for the extraction (G1) group and after the alignment of the upper and lower arches for the non-extraction (G2) group. We did not wait for debonding in any case. All photographs were taken by Nikon D 5000 camera in 12.3 million pixels with a sensor size of 26.3 x 15.8 mm. Post-treatment photographs were analyzed in Photoshop software by the same team of two doctors. Photographs were clinically correlated with the patient and compared with the pretreatment photographs for better scoring of NLFs with WSRS.

For data analysis SPSS version 23 was used. Mean age and frequency of gender were calculated in both the extraction and non-extraction groups. Interrater reliability was measured as percent agreement among the photographic examiners. The agreement between raters was 80%. The difference between pre- and post-treatment NLF values was assessed by a paired sample t-test, and the comparison between inter-group NLF values was performed using an independent sample t-test. The p value ≤ 0.05 was considered statistically significant.

Results

According to descriptive statistics the mean age of participants in G1 was 13.93±1.269 years and in G2

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the age was 14.05± 0.959 years. Gender distribution showed 27 females (66%) and 13 males (34%) in G1 group. In G2 group there were 26 females (65%) and 14 males (35%) (Figure I). Comparing the percentage of nasolabial fold (NLF) types in G1 (Table I) it was found that there was no change in 5% (n=2) of patients in which pre-treatment NLFs were absent, however 7.5% (n=3) of shallow pre-treatment NLFs changed to moderately deep NLFs in G1(negative change). Similarly, 5% (n=2) shallow NLFs and 5% (n=2) of deep NLFs converted to absent NLFs in G2 (Table II) after orthodontic treatment. Paired sample t-test (Table III) was applied to compare the pre- and post-treatment pairs of G1 and G2. In G1, the difference between NLFs pre- and post-treatment was not statistically significant (p=.183). In G2, the difference was statistically significant (p = 0.012). Independent Sample t-test (Table IV) was applied for within group analysis, i.e. pre-treatment and post-treatment changes. Results were not significant for both groups, G1 and G2.

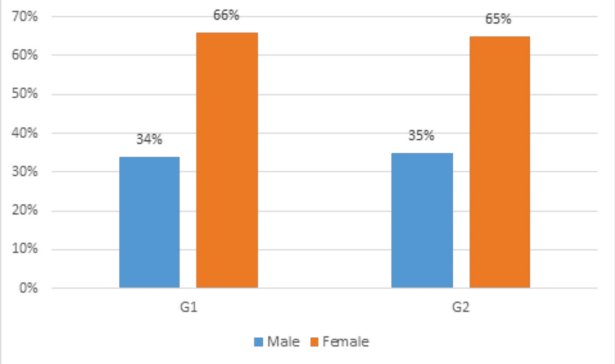

Figure I: Gender Distribution in the Groups, G1 and G2

Table I: Frequency of NLF in Extraction Group (G1)

	NLF pretreatment		NLF post-treatment	
Type of NLF	Frequency, n	Valid percentage	Frequency, n	Valid percentage
Absent	2	5%	2	5%
Shallow	32	80%	29	72.5%
Deep	6	15%	9	22.5%
Total	40	100%	40	100%

Table II: Frequency of NLF In Non-Extraction Group (G2)

	NLF pretreatment		NLF post treatment	
Type of NLF	Frequency, n	Valid percentage	Frequency, n	Valid percentage
Absent	4	10%	7	20%
Shallow	28	70%	28	65%
Deep	8	20%	5	15%
Total	40	100%	40	100%

Table III: Intra Group Paired Sample t-test between G1 and G2

	Paired Differences					t	df	Sig. (2 tailed)
	Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Lower			
Pair1: NLF 1pre-NLF 1post (Extraction group G1)	-.075	.350	.055	-.187	-.037	1.356	39	0.183
Pair2: NLF 2pre-NLF 2post (Non-Extraction group G2)	.15000	.36162	.05718	.03435	.26565	2.623	39	0.012**

*The p value ≤ 0.05 was considered statistically significant.

Table IV: Inter Group Independent Sample t-test between G1 and G2.

			Independent sample t-test						
	Levene's Test for Equality of Variances							Confidence Interval 95%	
	F	Sig.	T	df	Sig. (2-tailed)	Mean diff	Standard error difference	lower	Upper
NLF Pre-treatment Equal variances assumed	1.138	.289	.868	.78	.070	.212	.111	-.221	.221
Equal variances not assumed			.868	74.755	.070	.212	.111	-.221	.221
NLF post-treatment Equal variances Assumed.	.200	.656	1.909	.78	.060	.225	.118	-.010	.460
Equal variances not assumed			1.909	77.257	.060	.225	.118	-.010	.460

*The p value ≤ 0.05 was considered statistically significant.

Discussion

The study depicted the effects of orthodontic treatment on nasolabial folds in a sample of young adolescents, with the mean age of 13.93 and 14.05 years in the groups G1 and G2 respectively. These ages correspond to a critical phase of adolescent development when notable signs of aging, such as fine lip wrinkles, deep NLFs have not started.[14] That is why we included young adolescents in this study so that aging bias may not affect the results. Zhang[15] divided the nasolabial folds into five types, depending on the skin and fat type, however we used

the modified Wrinkle Severity Rating Scale[13] (WSRS) to classify the NLFs as absent, shallow, and deep, and 70 -80% of our patients had shallow pretreatment NLFs in both groups, G1 and G2.

Upon examining the pre- and post-treatment NLFs, minor disparities emerged between the groups G1 and G2. In the extraction group, the analysis indicated a minor increase in NLFs prominence, although this was not significant statistically (p = .183). Only three cases out of forty (7.5%) in the extraction group transitioned from shallow to moderately deep nasolabial folds. This observation may be attributed to the soft tissue adaptation due to dental retraction and dentoalveolar changes during extraction-based treatment.[16] It is worth noting that deep NLFs are undesirable, as they are indicative of aging. There is a limited low-quality evidence, that extraction of premolars can affect the orthodontic patients' face esthetics negatively.[11] Our study further authenticated these results and added that non-extraction therapy can change the depth of NLFs. Generally, dental, and skeletal changes occurring during orthodontic treatment do influence soft tissue structures, yet the extent of these changes may vary depending on the treatment plan and the elasticity of the soft tissues.[17] Conversely, in contrast to our findings, Soheilifar[18] discovered significant changes in the linear distance of upper lip to E-line in the extraction group, which could potentially affect NLFs. In our non-extraction group, there was a notable reduction in NLFs prominence following orthodontic alignment (p = 0.012). This indicates distinct positive soft tissue response to treatment approach that does not involve premolar extractions. Within our sample, 7.5% of shallow pre-treatment nasolabial folds changed to moderately deep nasolabial folds after extraction therapy while 5% of both shallow and deep nasolabial folds converted to absent nasolabial folds after non-extraction orthodontic treatment.

These results may depend on the unraveling of crowding which was up to 7mm in most of the border line cases. Previous research has also demonstrated that in borderline cases, both the lips and incisors became prominent in non-extraction groups, while they moved backward in extraction groups.[4,18] Therefore, it can be interpreted that dental changes do indeed impact soft tissue. Maaz M and Fida M[19] findings indicated that the dental and soft-tissue changes were highly significant and were found to be in the ideal range when treated with premolar extraction. In contrast, Zhoe Q et al.,[6] found that regardless of tooth extraction, NLFs displayed a retraction trend after orthodontic treatment. This could be attributed to reduced use of masticatory muscles during orthodontic treatment due to appliance wear.[20]

Inter-group analysis, conducted through independent sample t-tests, yielded insignificant results, indicating no significant difference in NLFs between the pre and post treatment G1 and G2 groups. A recent study in adult women under 30 years old demonstrated an improvement in NLFs after maximum retraction, despite greater posterior changes. This might be attributed to increased skin tone and soft tissue thickness, along with the good quality of subcutaneous adipose tissue.[21] A recent systematic review revealed that the face does become flatter, after extractions, however the effects of extractions are small and they do not alter perception of aesthetics by lay persons or orthodontists.[22] Additionally, long-term NLF changes because of aging are inevitable. Aging, sun damage, and smoking are the biggest reasons for deepening NLFs. The ultraviolet (UV) rays of sunlight break down the collagen and elastin fibers in our skin that keeps it smooth and supported. Smoking also breaks down these fibers.[23]

While this study provides valuable insights, it is not without limitations. Firstly, we used a qualitative method of assessing the NLFs, however according to the current evidence, Cone beam computed tomography with soft tissue image transfer methods can help in virtual analysis. Secondly the small sample size may influence the generalizability of the findings, and further research with larger cohorts is warranted.

Conclusion

In conclusion, the present study proved that the non-extraction orthodontic treatment can positively impact the face aesthetics by reducing the depth of NLFs significantly. Most of the extraction cases did not show any positive or negative effect on NLFs. These findings emphasize the importance of personalized treatment planning and underscore the need for comprehensive assessments encompassing

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both skeletal and soft tissue responses, keeping in mind the patients' preferences.

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CONFLICT OF INTEREST

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DATA SHARING STATMENT

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ORIGINAL ARTICLE

Estimation of Salivary Candida Count Among Pregnant and Non-Pregnant Women

Fareeha Aleem, Tehmina Munir, Afia Shafiq, Farhat Abbas Bhatti, Syeda Fatima Babar, Faizan Hamid

ABSTRACT

Objective: Comparison of *Candida* count in the saliva of pregnant and non-pregnant women to determine how much salivary *Candida* count increases in pregnancy as compared to non-pregnant women.

Study Design: Cross-sectional study.

Place and Duration of Study: Pathology Dental Department, HITEC-IMS Hospital Taxila Cantt from 2 December 2021-30 May 2022.

Materials and Methods: The study included 60 pregnant and 60 non-pregnant women of age group ranging from 18 to 40 years. The unstimulated whole saliva of the subjects was collected in sterile plastic containers. The sample was inoculated on Sabouraud dextrose agar. The grown colonies were counted after 48 to 72 hours. Gram staining was performed to confirm the presence of Gram-positive oval budding *Candida.*

Results: The *Candida* count from the saliva of pregnant women was two times greater in number than saliva of non-pregnant women. The mean value in pregnant women was 237.7 CFU/ml while in non-pregnant, it was 103 CFU/ml.

Conclusion: The changes during pregnancy make the oral cavity of pregnant women more vulnerable leading to increased growth of Candida and that increase is twice more than that of non-pregnant women.

Key Words: *Candida, Non-Pregnant Women, Oral Pathology, Pregnant Women, Saliva.*

Introduction

In an oral cavity, saliva plays a very important role in the conservation of the oral mucosa.[1]In saliva, many proteins are antimicrobial in nature that help the oral cavity in protection from infectious organisms.[2] Also, saliva helps in the diagnosis of various diseases not only related to the salivary gland but also many other oral and systemic pathologies.[3]

There are a variety of microorganisms inhabiting the oral cavity. Although *Streptococcus mutans* has shown the major involvement in the formation of dental caries, it's still not the only agent responsible for dental caries formation. Other frequently observed microorganisms involved in dental caries are Gram positive cocci and bacilli mainly the *non-mutans Streptococcus* and *Lactobacilli*. Consumption of sugar containing items facilitates the growth of cariogenic microorganisms.[4]

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Dental caries occurs mainly due to demineralization of enamel and dentine by the acids formed by these cariogenic bacteria. The cariogenic microorganisms produce acids by doing metabolism of dietary sugars.[5] These acids are responsible for the acidic oral environment which favors the further growth of cariogenic microorganisms contributing in the progress of dental caries formation.[6]

Also, along with bacterial components of oral flora, fungi also constitute normal flora. Among fungi, *Candida* speciesare the most dominantly distributed fungi observed in the oral cavity.[7] Caries formation involves a drop in pH, so when the dental plaque develops low pH, it gets prone to caries formation.[8] *Candida* have the ability to produce acids, these features allow the fungus to participate in the formation of dental caries.[9]

C.albicans interacts with *S.mutans* through various biochemical mechanisms to form biofilms which are highly cariogenic. This interaction between *C.albicans and S.mutans* enhances each other's role in the development and progress of dental caries.[10] This favors the evidence of *Candida* species association with dental caries, with special involvement in early childhood caries and root caries. *C.albicans* has been especially identified as a crucial root caries agent.[11]Studies showed that

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Candida, along with other bacteria, act as an indicator for dental caries activity and also may lead to transfer of infection from mother to fetus.[12] Apart from involvement in dental caries, *candida* has also been involved in oral candidiasis.[13]

During pregnancy, the female body goes through significant changes in hormonal, metabolic, and immunological systems, which also have an impact on the microbiological composition of the oral cavity.[14] These changes in the microbiological environment of the oral cavity during pregnancy, may favor the growth of *candida* species that are linked with the development of acidic oral environment.[15] This imbalanced environment of microflora in oral cavity may lead to overgrowth of bacteria and other opportunistic pathogens, causing oral diseases, such as dental caries and periodontal diseases.[16]

Keeping in view the involvement of both bacteria and fungi in caries formation, our study aimed on the number and count of *Candida albicans* in saliva of pregnant and non-pregnant women to estimate how much *candida* increases in number during pregnancy. In Pakistan, very few studies have been done to estimate the *candida* count in saliva during pregnancy. As a considerable association has been found between *Candida* and oral health diseases and their relationship with pregnancy,[7,10,11] our study aimed to estimate how much *Candida* count increases in saliva during pregnancy which may affect the overall oral health of pregnant women.

Materials and Methods

This cross-sectional study was conducted in Pathology Dental department HITEC-IMS Hospital Taxila Cantt for a duration of six months from 2nd December 2021-30th May 2022. The study was approved by the ethical review committee ERC/38 of HITEC-IMS Taxila Cantt. Sample size was calculated by WHO criteria.[17,20,23] The samples were collected from 60 outpatient pregnant women and 60 non-pregnant women. Inclusion criteria was healthy women from 18 to 40 years. Exclusion criteria include high-risk pregnancy, smoking, any drug addiction, associated debilitating disease, oral and/or systemic antifungal therapy within 2 months of the study. The consent from all the participants was taken before taking the sample.

The unstimulated whole saliva was collected from pregnant and non-pregnant women in graduated sterile plastic containers. About 1ml of saliva was collected from each participant. As a fresh sample was taken each time and incubated immediately, no storage of the sample was required. From each 1ml salivary sample, 0.2 ml of saliva was inoculated on Sabouraud dextrose agar (SDA) and incubated for 48 to 72 hours at 37°C.

After an incubation period, the creamy pasty colonies appeared on plates. The colony was then Gram stained. The presence of *Candida* was confirmed when Gram-positive budding ovoid yeast cells were seen under the microscope. The colonies of *Candida* were then counted in colony forming unit (CFU/ml). The number of colonies formed in the 0.2ml saliva sample was calculated in 1ml by dividing the number of colonies by 0.2. The serial dilution method was not employed as no dilution of the original sample was done.[18] Data was analyzed on excel sheets followed by descriptive statistics and percentages were calculated.

Results

As shown in Table-I, the mean value in pregnant women was 237.7 CFU/ml while in non-pregnant, it was 103 CFU/ml. The result showed *Candida* count in the saliva of pregnant women was two times greater than the saliva of non-pregnant women.

The results showed *Candida* colony growth potential is more in the saliva of pregnant women than in non-pregnant women.

Discussion

This study was conducted to determine the *Candida* count, the most common oral yeast, in saliva during

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Table I: Mean Values Of CFU/Ml in Pregnant and Non-Pregnant Women

Total number of participants	Number of pregnant women (60)	Number of non-pregnant women (60)
120	Mean CFU/ml	Mean CFU/ml
	237.7	103

Table-II: Percentage Values Of CFU/Ml in Pregnant and Non-Pregnant Women

Pregnant women		Non-pregnant women	
Samples with Positive growth of *candida*	Samples with Negative growth of *candida*	Samples with Positive growth of *candida*	Samples with Negative growth of *candida*
83%	17%	72%	28%

pregnancy. Our study gave 237.7 CFU/ml mean value of *Candida* in the saliva of pregnant women showing 83% of samples giving positive growth on agar. In one of the previous studies, the value of 270 CFU/ml was a threshold to distinguish oral Candidiasis from carriage state.[18] Another study showed the same 270 CFU/mL to be the threshold value when measured with the whole saliva sample to distinguish oral Candidiasis from carrier state. The threshold value is important for the diagnosis and prevention of diseases. By controlling contributory host factors, *Candida* counts can be maintained at levels lower than the threshold which might help in preventing *Candida* infections. So, by knowing the threshold amount of *Candida* species (>270 CFU/mL) helps to distinguish oral Candidiasis from oral carriage.[19]

Our mean value of 237.7 CFU/ml during pregnancy suggested that the increase is not significant enough to lead to oral Candidiasis, but it showed considerable number that it may be a contributory factor to the development of oral Candidiasis or dental caries during pregnancy. During pregnancy, the whole-body changes including the oral cavity making it vulnerable to the development of dental caries.[20]

Generally, pregnant women are considered at an increased risk for dental caries probably due to hormonal changes and their associated effects on the oral cavity. Also, during pregnancy, delay in treatment increases the risk.[21] Several studies showed an increase in *Candida* count in saliva during pregnancy.[16,22] So our study showed that how much increase in *Candida* count happens during pregnancy in saliva. Another study provides evidence favoring the point that pregnancy may promote oral yeast growth.[23] One study augmented the fact that in addition to the bacteria, *Candida* count also increased during the pregnancy especially during second and third trimesters of pregnancy.[24] So the increase in *Candida* count may augment the increasing chances of developing dental caries in pregnant women.

In another study, it has been mentioned that chances of yeast infection increase in pregnancy due to hormonal changes, and simple oral hygiene measures may sometimes become less effective in preventing *Candida* growth which renders employing more vigilant oral hygiene measures sometimes involving antifungal drugs. So pregnant women should employ professional tooth cleaning during pregnancy for maintaining a healthy oral environment and reducing oral and systemic problems during pregnancy. Also, there is reduction in *C. albicans* in saliva during pregnancy if proper oral hygiene measures are employed.[25] Meanwhile, the mean value of 103 CFU/ml in non-pregnant women suggests that *Candida* may not be much significant in saliva in healthy non-pregnant women.

As our study only determined salivary *Candida* count but not its clinical correlations, more research is needed in this field to correlate its significance with a clinical perspective. More studies are needed to find methods to imply these results for early detection and diagnosis to prevent future oral pathologies pertaining to salivary *candida*. Also, this emphasizes the importance of vigilant oral hygiene practices during pregnancy.

Conclusion

Our study concludes that salivary *Candida* count increases two times during pregnancy than non-pregnant women depicting their vulnerability towards dental caries and oral *candida* infections. This emphasizes the importance of effective and diligent oral hygiene measures during pregnancy to reduce the possibilities towards dental caries and oral candidiasis formation.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Patient Esthetics and Functional Satisfaction with Complete Denture Therapy

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ABSTRACT

Objective: To evaluate patient esthetics and functional satisfaction with complete denture therapy.

Study Design: Cross-sectional observational study.

Place and Duration of Study: The study was conducted at Lahore Medical and Dental College from 10th February 2023 to 10th August 2023.

Materials and Methods: Sixty-seven edentulous patients who have undergone complete denture therapy of tooth losses using complete denture for at least six months were enrolled. Patients' satisfaction was recorded having variables regarding socio demographic features and questions regarding esthetic and functional satisfaction of complete denture.

Results: Forty-four patients (65.7%) have satisfied esthetics whereas 23 (34.3%) patients have no esthetics satisfaction. Forty patients (59.7%) were functionally satisfied, and 27 patients (40.3%) were not functionally satisfied. 89.5% patients were between 6-12 months and 7 (10.4%) patients were between 13-20 months of duration of use of denture.

Conclusion: Patients appeared to be largely satisfied with their dentures, indicating that patient happiness is a key factor in the success of denture delivery.

Key Words: *Complete Denture, Edentulism, Esthetics, Functional Satisfaction, Patient Satisfaction*.

IntroductionEdentulism (is the state of being edentulous, or without natural teeth) has plagued individuals throughout the world for centuries and has been characterized as “The dental equivalent of mortality”. Severe caries or periodontal disease is often the predisposing factor.[1] Historically, edentulism has been declining as people have in general, taken better care of their teeth.[2,3]

The common treatment for edentulism worldwide is complete denture therapy.[4] It is mainly due to economic reasons, health, and psychological conditions of elderly edentulous patients.[5,6] Complete denture can restore some functions that were lost along with teeth. Important of them are esthetic and mastication.[4]

Edentulism is a major disease which remains world-wide especially in older adults is due to lack of knowledge about oral health.[7] Prevalence of edentulism is 16.3% in France, 58% in Canada, 21.7% in Mexico, 9% in China, 3% in Ghana while in urban and rural areas there were 48.6% and 51.4% of edentulism is present.[8] It is estimated that the number of older people increasing more rapidly than other age groups. The dental treatment involves attaining the patient's satisfaction while also restoring and enhancing oral health and functioning.[9] Losing teeth can have a negative impact on speech and appearance, therefore maintaining oral health required for replacing missing teeth with appropriate prosthetics. Teeth loss, whether from caries, trauma, diseases of the mouth, pathology, or other causes, not only affects the patients' psychological state but also interferes with their appearance, phonetics, and functional occlusion.[10,11] Knezović et al.,[12] discovered that a number of factors, including dental loss, esthetics, retention, phonetics, and oral hygiene practices, had an impact on the patient's level of satisfaction. For some patients, the esthetics and phonetics of their dentures were linked to their level of satisfaction, but for other patients, mastication was more crucial.[13]

Patients who plan to wear complete dentures are concerned about comfort and esthetics because

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they want to have a more youthful appearance.[6] A key component of complete dentures is denture esthetics, or the esthetic effects of a dental prosthesis that impact a person's desired beauty, attractiveness, character, and dignity. Completely edentulous patients typically have low self-esteem, widespread discomfort, and difficulties in efficiently chewing a variety of foods.[14]

A patient's self-esteem and self- worth can be improved with the use of complete denture to such a degree that these deprived people will feel much better about themselves and become a part of society, able to communicate easily.[15] Several authors have found evidence that esthetics is the predominant factor in complete denture success**.** The psychological importance of a pleasing dental appearance is clear and is often discussed regarding denture success.[16]

A study states that females and elderly edentulous patients were not satisfied with their esthetics (67%) and functional ability (58%) of their denture.[17] In second study, esthetic satisfaction (59% vs 62.9%) did not differ between sexes or with age.[2] While in one more study, females (88%) were more satisfied with esthetics and less satisfied with functional ability (63%) and older patients were more satisfied with esthetics (69%) and less satisfied with functional ability (61%).[18]

Most of the previous studies are done globally and a dearth of local study is present. The objective of this study was to evaluate patient esthetics and functional satisfaction with complete denture therapy.

Materials and Methods

A cross-sectional study was carried out at the department of Prosthodontics, Lahore medical and dental college for a period of 6 months from 10th February till 10th August 2023. A structured questionnaire was designed that captured the patient's details if the patient was satisfied with the function of prosthesis and the esthetics of prosthesis. The present research was conducted by following all ethical principles. Foremost, Ethical Committee Approval was sought, which works as an Institutional Review Board (IRB) LMDC/FB/2125/20. Informed consent was taken from the patients. The duration of the study was 6 months. Confidence interval being 95% absolute precision was required 5% using WHO calculator. An overall 67 patients were included.

Nonprobability convenient sampling technique was used. The inclusion criteria were edentulous patient, between ages of 50 – 80 years of either gender, complete denture therapy already done for at least 6 months. Exclusion criteria was patients with dementia, history of neurosis, local and systemic malignant neoplasia, bedridden and uncooperative patients' satisfaction was recorded in a pre-designed questionnaire having variables regarding socio-demographic features, questions regarding esthetic and functional satisfaction of complete denture.

The Statistical Package for the Social Sciences (SPSS) version 25.00 was used to analyze the data. Continuous variables such as duration of usage of denture were presented in the form of mean ± SD. The results were presented in frequencies and percentages for gender, esthetics satisfaction and functional satisfaction of complete dentures. Effect modifiers including gender and duration were controlled through stratification. The Post stratification Chi-square test was calculated with *p* value of ≤ 0.05 considered statistically significant.

Results

The total number of patients in this study was 67. The mean duration of use of denture was 8.99±3.08 months (Table I). Forty-four (65.7%) patients were satisfied with their esthetics and 23 (34.3%) patients were not satisfied with their esthetics (Table II). Forty patients (59.7%) were functionally satisfied and 27 (40.3%) were not functionally satisfied (Table III). According to duration of use of dentures, 60 (89.5%) patients were between 6-12 months and 7 (10.4%) patients were between 13-20 months. When the satisfaction was stratified according to duration of use of denture, it was statistically significant (*p* value= 0.043) (Table IV)

Table I: Stratification of Satisfaction According to Duration of Use of Denture (n=67)

Duration of use of denture (months)	Satisfaction		*p* Value
	YES	NO	
6-12	37(55.3%)	23(34.3%)	0.043
13-20	7(10.4%)	-	

Table II: Complete Denture Satisfaction According to Esthetics (n=67)

Esthetics Satisfaction	Number, n	Percentage (%)
Yes	44	65.7
No	23	34.3

Table III: Complete Denture Satisfaction According to Function Usage (n = 67)

Functional Satisfaction	Number, n	Percentage (%)
Yes	40	60
No	27	40

Table IV: Distribution of cases according to duration of use of Denture (n = 67)

Duration of use of denture (months)	Numbers of Patients	Percentage, (%)
6-12	60	89.6
13-20	7	10.4
Mean±SD	8.99±3.08	

Discussion

Rehabilitation of the edentulous patients has always been a challenge. The success of conventional complete denture therapy might be affected by several factors such as patients' age, personality, previous denture wearing experience, expectations, esthetics, residual ridge anatomy and form, denture quality, how it was made, the dentist's background, and the relationship between the dentist and the patient.[19]

In one study, it was found that the median age of the patients in 2017 was 58 years old, and 52% of them were female.[2] The satisfaction scores significantly outperformed the expectation scores, even though both were high (p<0.001). There were differences in age, gender, and expectancies throughout the studies (p<0.008); there were gender differences in age as well (p=0.004). Men's expectations were higher than women's after the study was adjusted (p =0.005); There was no difference in satisfaction levels by gender. It was discovered that the satisfaction and expectations were only positively correlated in men (r=0.300; p<0.001). Patients and dentists frequently evaluate complete denture treatment success in different ways.[20] In one study it was discovered that 10% of the participants were not pleased with their functionally sound removable dentures.[21] Patient satisfaction can therefore be used to evaluate the clinical success of denture treatment. Patient opinions and emotions regarding various aspects of prosthodontic treatment can be directly determined because of the ease of measuring satisfaction outcomes. It was discovered that health care in all aspects including oral health, standard of life is related, and satisfaction measures were positively correlated (Oral Health Related – Quality of Life, OHRQoL).[22,23]

A valuable means for comparing prosthodontic outcomes is the Oral Health Impact Profile (OHIP), a questionnaire on oral health-related quality of life. The original (49-item) OHIP was developed by Locker and Slade. Among its seven domains were handicap, physical and psychological difficulty, physical and psychological limitations, social disabilities, and functional limitations.[24]

In the current study the duration of use of dentures, 60 (89.5%) patients were between 6-12 months and 7 (10.4%) patients were between 13-20 months. The average time spent wearing the denture was 8.99±3.08 months (Table 3). The present study result showed that satisfaction of esthetic procedure was stratified according to duration of use of denture, it was statistically significant (p<0.05) difference (Table 4).

Future studies should compare long-term results with additional variables like the patient's age, both sexes and cost effectiveness, as well as operator experience.

Conclusion

After receiving denture therapy, patients were generally more aesthetically satisfied than they had anticipated; this satisfaction did not change with age or gender. Young patients are more functionally satisfied than older patients.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

ORIGINAL ARTICLE

Comparison Between Flipped Classroom and Traditional Classroom Strategies in Teaching Human Anatomy

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ABSTRACT

Objective: To compare the effect of flipped classroom versus traditional classroom on students' academic performance in teaching human anatomy. To assess the perceptions of medical students about flipped classroom and traditional classroom strategies.

Study Design: The present study followed quasi-experimental design, including pretest, posttest, and a questionnaire.

Place and Duration of Study: The study was carried out in the Department of Anatomy, at Wah Medical College, Pakistan from April 10th, 2023, to June 9th, 2023.

Materials and Methods: A total of 143 second year MBBS students were randomly divided into two groups; Group I (n=72) and Group II (n=71). Group I (Experimental group) was exposed to the flipped classroom while Group II (Control group) was taught through the traditional classroom. A Pretest and a posttest were taken at the start and end of the experiment. Perceptions of students regarding flipped classroom and traditional classroom strategies were recorded through a 5-point Likert scale questionnaire. The data was analyzed by SPSS version 23. The *p* value 0.05 was significant.

Results: The mean pretest score was not statistically significant between groups I and II ($p>0.05$). By the end of the study, the mean posttest score of each group significantly raised as compared to its pretest score ($p<0.001$). However, Group I achieved a significantly higher posttest score than Group II ($p<0.05$). Students perceived flipped classroom as more beneficial than traditional classroom ($p=0.001$) as it enhanced their understanding, memorization, integration, and application of subject knowledge. Moreover, flipped classrooms proved to be more valuable in engaging students and improving their ability to participate in problem-solving activities.

Conclusion: Flipped Classroom has proven to be a more effective strategy in teaching human anatomy to medical students compared to traditional classroom method.

Key Words: *Anatomy, Flipped Classroom, Student Performance, Teaching, Traditional Classroom.*

Introduction

Despite the advances in medical education, a large proportion of basic medical sciences curriculum is delivered to the students through teacher-centered lectures which are certainly considered to be the basic method of imparting knowledge. However, it has become increasingly difficult for the educators of generation X (born between 1965 and 1979) to maintain interest of learners of generation Z (born after 1995) on account of short attention spans of these 'digital natives' and their interests towards creativity, stimulating and entertaining activities. They prefer to listen lesson recordings in their own comfortable time instead of taking notes during the lectures.[1]

Anatomy, being the fundamental subject in medical sciences, has always been considered difficult to learn.[2,3] Medical students frequently report problems related to memorization of the facts of human anatomy and its application in preclinical and clinical subjects.[4,5] Although teachers practice a variety of pedagogical strategies, most of the classroom time is still utilized in listening to lectures in traditional classroom, and usually, students complete assignments at home.[6] In the context of global curricular reforms, existing anatomy training

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has become more challenging and needs to be shifted from passive to active learning mode.[7]

Flipped classroom has emerged as an innovative active learning strategy and has gained much attention for its strong contribution to improving self-directed learning, motivation, and retention of knowledge.[8,9] In flipped or inverted classroom approach, what is generally done during class time and what is typically completed as homework are reversed. Followed by pre-class preparatory work designed by the instructor, in-class time is effectively utilized in engaging the students in various learning activities which focus on peer discussions and develop problem-solving skills. Students take responsibility for their own learning while the teacher serves as a guide and resolves the queries of students. Learning retention is ensured by post-class activity in the form of reflections and practice.[10,11.]

Despite the reports of many researchers in favor of flipped classroom,[11,12] some studies have found insignificant differences between the beneficial effects of flipped versus traditional classroom.[13,14] Flipped classroom model is still in its early phase and traditional lecturing is yet preferred by a large group.[15] Moreover, available data in the discipline of Anatomy is very scarce. Keeping in view the current demand of evidence-based teaching and characteristics of generation Z students, the present study was designed to accomplish the following objectives:

- To compare the effect of flipped classroom versus traditional classroom on students' performance in teaching human anatomy.
- To assess the perceptions of medical students related to flipped classroom and traditional classroom strategies.

Materials and Methods

The present study followed quasi-experimental design, including pretest, posttest and a questionnaire.[12,16,17] The study was carried out in the department of Anatomy, at Wah Medical College, Pakistan from April 10th, 2023, to June 9th, 2023. The approval of study was taken from the Institutional Review Board (Letter No. WMC/ERC/IRB/035, Dated: April 5th, 2023).

The effectiveness of flipped classroom was investigated in a course of human anatomy (Development of gastrointestinal tract) in Year-II MBBS (NUMS Curriculum). Developmental Anatomy forms the compulsory part of curriculum. Generally, it is taught through the traditional lecture method.

A sample of 143 second year MBBS students was selected by non-probability convenience sampling technique. Students who have passed the first professional exam (in first attempt) were included in the study after their informed consent. Seven students were excluded from the study as they were irregular in classes, and they had to prepare for the supplementary exam. Similarly, students having attendance <75%, and those who were absent in pretest were also excluded from the study.

The second-year students (n=143, mean age= 20.46±0.91 years) were randomly divided into two groups; Group I (n=72, mean age=20.37±0.11 years) and Group II (n=71, mean age=20.55±0.11). Group-I (Experimental group) was exposed to flipped classroom (8 sessions, each of 1-hour duration) while Group II (serving as control group) was taught through traditional classroom (8 sessions, each of 1-hour duration). Both groups were taught by the same instructor/ facilitator on the same day of each week (Group I immediately after group II, in the subsequent hour). Moreover, topics and their learning outcomes were the same for both groups except for the teaching strategy. The details of study participants are given in Figure 1.

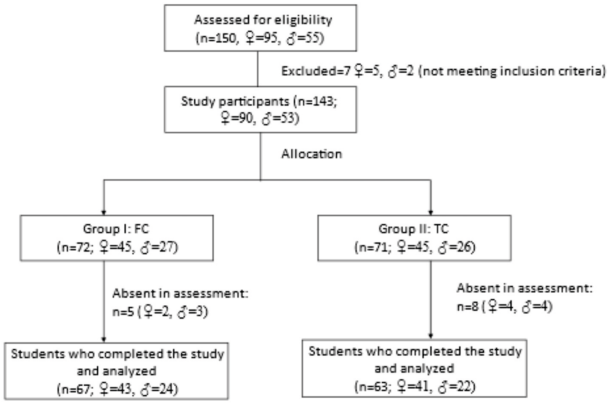

Figure 1: Showing Number of Study Participants in Group I: Flipped Classroom (FC) and Group II: Traditional Classroom (TC)

A Pretest (Comprising 10 MCQs and 2 SEQs based on clinical scenarios) was taken from both groups at the start of experiment. In each session of flipped classroom, three steps were followed: Step-I: pre-class; Step-II: in-class; Step-III: after-class. Step-I was

online. For this purpose, an on-line google classroom was created. The facilitator posted reading material in the form of lecture notes, ppt/pdf, and relevant videos at least 2 days prior to the scheduled face-to-face in-class session. In addition, the facilitator supervised the online discussions of students with their peers and encouraged them to come in class with questions. Step-II was face-to-face session (in-class session). The facilitator provided a quick review of already posted material. Class time was mainly utilized in student-centered activities designed by the facilitator. The in-class activities were selected in accordance with topic demand e.g. demonstration on models by the students, case-based discussions, presentations, and various problem-solving activities. Main theme was to engage students and to augment discussions with peers and teacher to resolve the queries of students. Throughout the session, the teacher served as a guide, however, she contributed to discussions where necessary, focusing on achievement of desired session learning outcomes. Step-III (after-class) was online in the form of writing reflection and reviewing the content. Similar content was taught to Group II by the same instructor but through traditional way (teacher-centered). There was no preparatory work assigned to the students. Although lectures were interactive but most of the class time was utilized by the students in listening didactic lecture. By the end of each lecture, a question-answer session was carried out and the students were given assignments. At the end of study, a posttest (Comprising 10 MCQs and 2 SEQs based on clinical scenarios) was taken from both groups.

Although most of students attended the sessions, some students were highly irregular and short of attendance (<75%) on account of various reasons and were absent on the day of posttest. Finally, 67 students of group-I and 63 students of group-II completed the study (Figure 1). Instruments used for data analysis were as follows:[12,16.]

1. Instrument 1: At the start of experiment, a pretest was taken from both groups to confirm the homogeneity of both groups, in terms of academic achievement.
2. Instrument 2: By the end of study, academic performance of both groups was assessed through a posttest assessing the development of digestive system.
3. Instrument 3: A 12-item questionnaire was adopted from Bansal et al[16] to assess the perceptions of students regarding flipped classroom and traditional classroom strategies. The questionnaire was reviewed by the Institutional Research Advisory Committee/ Institutional Review Board. Responses were based on a 5-point Likert scale: 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree.

The data was analyzed by SPSS version 23. For quantitative analysis, mean ± SD scores of each group were calculated for pretest & posttest. Descriptive statistics were applied for measuring frequencies, percentages, means and standard deviations. Mean pretest score was compared by independent samples t-test between control and experimental groups. Similarly, mean posttest score was also compared between both groups by independent samples t-test. Then a paired samples t-test was applied to compare mean difference in pretest and posttest score of each group (at the start and end of experiment). The *p* value 0.05 was significant. Scores obtained from Questionnaire were analyzed using independent samples t-test. A score ≥ 4 was considered satisfactory.[18]

Results

Out of 143 second year MBBS study participants, 130 students completed the study. Of the 130 analyzed students, 67 were from group I who participated in flipped classroom and 63 students were from group II which were taught through traditional classroom.

Pretest score (mean ± SD) was not statistically significant between the groups I & II ($p>0.05$), indicating that both groups were homogenous at the start of experiment (Table I).

After the experiment, posttest score of each group significantly raised as compared to its pretest score ($p<0.001$) (Table II). However, Posttest score of group I was significantly higher than group II (*p* 0.05) reflecting that flipped classroom outweighs the traditional classroom (Table I)

For each item in the questionnaire, the mean score for each teaching strategy is shown in Figure 2. Likert-scale analysis of questionnaire showed that students perceived flipped classroom as more beneficial than traditional classroom ($p<0.001$) as it enhanced their

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Table I: Showing Comparison of Pretest and Posttest Score Between Group I (n=67) and Group II (n=63)

	Group I (mean ± SD)	Group II (mean ± SD)	*p* value
Pretest Score	10.43 ± 3.15	10.49± 3.27	0.91
Posttest Score	13.73 ± 4.03	12.20 ± 4.10	0.03*
Independent samples t-test was applied. *Significant at *p* value ≤ 0.05			

Table II: Showing Comparison of Pretest and Posttest Score within Each Group

Groups	Pretest Score (mean ± SD)	Posttest Score (mean ± SD)	*p* value
Group I (n=67)	10.43 ± 3.15	13.73 ± 4.03	<0.001***
Group II (n=63)	10.49± 3.27	12.20 ± 4.10	<0.001***
Paired samples t-test was applied. ***Significant at P value < 0.001			

understanding, memorization, integration, and application of subject knowledge. Moreover, flipped classroom proved to be more valuable in engaging students and improving their ability to solve clinical scenarios (Table III)

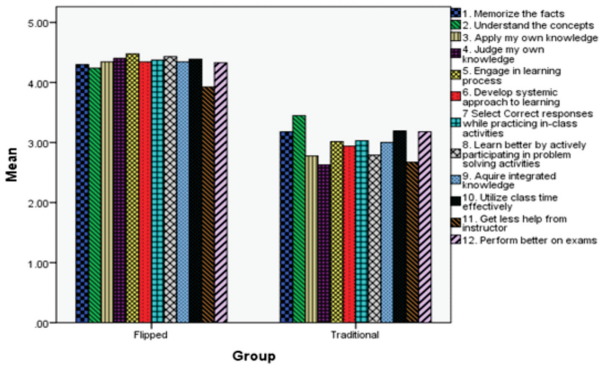

Figure2: Showing perceptions of students regarding beneficial effects of flipped classroom versus traditional classroom on a 5-point Likert scale: 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree.

Discussion

With an awareness of the challenges in learning human anatomy, we conducted a comparison of academic performance of students in flipped classroom versus traditional classroom in a course of human anatomy taught to second year MBBS students. The perceptions of students regarding both teaching strategies were also evaluated.

In our findings, we observed that academic performance of flipped classroom students was statistically significant (p<0.05) than students taught through traditional classroom. The considerable improvement in scores observed among students in the flipped classroom can be attributed to the features in which this teaching method has benefited

Table III: Showing Comparison of Mean Score of Perceptions of Students Regarding Flipped Classroom (FC) Versus Traditional Classroom (TC) Recorded on 5-Point Likert-Scale Questionnaire

S. No	The Course helped me to:	Teaching Strategy	Mean	SD	*p* Value
1.	Memorize the facts	FC	4.29	±0.79	<0.001***
		TC	3.17	±1.12	
2.	Understand the concepts	FC	4.23	±0.85	<0.001***
		TC	3.44	±1.01	
3.	Apply my own knowledge	FC	4.34	±0.76	<0.001***
		TC	2.77	±1.02	
4.	Judge my own knowledge	FC	4.40	±0.85	<0.001***
		TC	2.62	±1.05	
5.	Engage in the learning process	FC	4.47	±0.74	<0.001***
		TC	3.01	±1.02	
6.	Develop systemic approach to learning	FC	4.34	±0.74	<0.001***
		TC	2.94	±1.07	
7.	Select correct responses while practicing in-class activities	FC	4.37	±0.79	<0.001***
		TC	3.02	±1.08	
8.	Learn better by actively participating in problem-solving activities	FC	4.43	±0.83	<0.001***
		TC	2.79	±1.05	
9.	Acquire integrated knowledge	FC	4.34	±0.80	<0.001***
		TC	3.00	±1.10	
10.	Utilize class time effectively	FC	4.38	±0.79	<0.001***
		TC	3.19	±1.14	
11.	Get less help from instructor	FC	3.92	±1.09	<0.001***
		TC	2.67	±1.28	
12.	Perform better on exams	FC	4.32	±0.94	<0.001***
		TC	3.17	±1.16	
Independent samples t-test was applied. ***Significant at *p* Value < 0.001					

them (Table III, Figure 2). Moreover, students reported that the flipped classroom proved to be more effective in memorizing the subject than traditional classroom. Our findings are consistent with a previous study which demonstrated significantly higher retention levels of students in flipped classroom compared to their counterparts in the classical blended learning group, in a scientific research methods course.[12] However, some researchers did not find statistically significant difference between assessment score of students taught through flipped classroom and traditional classroom.[13]

Certainly, medical graduates must employ an ample understanding of anatomy for the practice of medicine safely.[5] To attain profound and extensive learning, students need to be able to apply and assess their own knowledge. Moreover, it is essential in this context to grasp concepts, acquire integrated knowledge, and cultivate a systemic approach to learning.[16] In accordance with previous researchers[18], students utilizing the flipped classroom in our study highly appreciated these specific benefits of the approach.

Students in the flipped classroom also expressed appreciation for the enhanced chance to engage in problem-solving activities, thereby making effective use of class time. They interacted with each other and got less help from the teacher. These findings of present study are concomitant with Angadi et al[11] who investigated the effectiveness of flipped classroom approach in a course of pharmacology. Flipped classroom improved the performance of students as compared to conventional classroom and 82% students favored it in terms of engaging and building their interests in the subject.

In a study conducted on 800 university students, flipped classroom mode was found to be very effective in improving self-regulated learning and social connectedness of students.[17] An interventional study was carried out at Agha Khan university to conduct online flipped classroom in a module of endocrine reproduction. The learner curve demonstrated substantial increase in the knowledge learned. The students praised this strategy and requested its continuation in future.[19] Amazingly, flipped classroom strategy proved to be exceptionally valuable for difficult topics, particularly for medical students with lower performance levels.[16]

Contrary to our findings, in an ophthalmology clerkship, fourth year medical students complained of increase in burden and pressure during preparatory work of flipped classroom.[20] Similarly, a randomized controlled trial was carried out in a university-level statistics and epidemiology course and assessment scores of flipped classroom versus traditional classroom were not statistically significant despite the preference of students for flipped classroom than traditional classroom.[21]

The discrepancy between the results of various studies can be ascribed to various factors including dissimilar study designs, selection of course, planning and implementing of pre-class and in-class learning activities. Considering the characteristics of generation Z students, certain points need to be emphasized. Firstly, every topic is not suitable for flipped classroom outcomes. Secondly, similar in-class activities for each topic don't work. Thirdly, inverting the classroom does not make the teacher a mere observer. Instead, their guidance in assisting students to attain their learning objectives remains of utmost importance.[22,23]

Conclusion

In conclusion, flipped classroom proves to be a more effective learning strategy for teaching human anatomy to medical students compared to traditional classroom approach. Students expressed high satisfaction with flipped classroom approach as it improved their understanding, memorization, integration, and application of the subject knowledge. The flipped classroom also demonstrated its value in engaging students, optimizing class time, and establishing itself as an active learning strategy.

Limitations of study

The study's limitations include its restriction to a single department and class, making it difficult to generalize the results to other institutions. Additionally, the focus on short term results points towards the need for long-term impacts of flipped classroom approach.

Future work should focus on exploring various models of flipped classroom and evaluating the correlation between different pre-class and in-class activities and students' performance.

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CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

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CASE REPORT

A Case of Diclofenac Induced Rhabdomyolysis with Complications

Iqra Ahmed, Ahmad Asim, Maham Qudoos Nizami, Abid Saeed Khan

ABSTRACT

In Rhabdomyolysis, muscle releases its contents into blood that can cause Acute Kidney Injury. We reported a very rare case of rhabdomyolysis after Diclofenac intramuscular injection with super added gluteal abscess formation, eventually led to acute kidney injury.

Key Words: *Acute Kidney Injury, Rhabdomyolysis, Diclofenac, Gluteal Abscess.*

Introduction

In rhabdomyolysis, muscle injury leads to release of muscle's intracellular contents into blood that can cause acute kidney injury, arrhythmias and death.1 There are numerous causes of rhabdomyolysis that include trauma, exertion, infections and drugs which commonly include statins, fibrates, recreational drugs. If treated early and aggressively, it has a good prognosis. 2 Acute kidney injury is the main complication that worsens the prognosis. 3 Irrespective of the cause, the mortality rate of rhabdomyolysis can be as high as 8%.4

Case

A 62-year-old male presented in Emergency Room of Capital Hospital, Islamabad with presenting complaints of pain and swelling in the left gluteal region. He also complained of nausea, vomiting, abdominal pain and high-grade fever for one week. He had a history of fall a few days back after which he visited a local clinic where he was administered intramuscular diclofenac, 75mg. He developed a gluteal abscess (as shown in the figure) due to intra gluteal injection and hence was admitted for incision and drainage of the abscess by the Surgery Department.

During this admission, he developed decreased urine output along with cold peripheries. On examination he had low blood pressure along with regular feeble pulse. He was jaundiced but rest of the examination was unremarkable. Investigations revealed TLC

21.14×10^3/µL, creatinine 4.8mg/dL, urea 231 mg/dL, Sodium ions 131 mmol/L, potassium ions 6.05 mmol/L, and chloride ions 92 mmol/L. Cardiac enzymes were advised which came out to be markedly elevated AST 858 U/L, CPK 50900 U/L, LDH 3238 U/L, and CK-MB 1160 U/L.

Patient was labeled as a case of Acute Kidney Injury secondary to rhabdomyolysis which was due to the diclofenac administration with superadded gluteal abscess formation. Patient underwent multiple sessions of dialysis after which his condition

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improved. On examination his conscious level improved along with improvement in his blood pressure and urine output. The creatinine levels improved to 0.7 mg/dL post multiple sessions of dialysis. The detailed laboratory findings during the disease course are given in the following table.

Laboratory Findings	At The Day of Admission	During Admission (After Sessions of Dialysis)	At The Day of Discharge	Reference Ranges
TLC	$21x10^3$/µl	$11x10^3$/µl	$10x10^3$/µl	4-$11x10^3$ /µl
HEMOGLOBIN	9.4g/dl	10.2g/dl	11.2g/dl	12.0-15.0 g/dl
PLATELETCOUNT	$146.4x10^3$/µl	$154x10^3$/µl	$155x10^3$/µl	150-$450x10^3$ /µl
CREATININE	4.8mg/dl	2.3mg/dl	0.7mg/dl	0.4-1.4 mg/dl
UREA	231mg/dl	116mg/dl	84mg/dl	10-50 mg/dl
SODIUM	131 mmol/l	130mmol/l	130mmol/l	130-135 mmol/l
POTASSIUM	6.05 mmol/l	5.5mmol/l	5.3mmol/l	3.5-5.5 mmol/l
AST	858 U/L	400U/L	22U/L	Up to 20 U/L
CPK	50900U/L	2000U/L	180U/L	20-190 U/L
LDH	3238U/L	2020U/L	445U/L	180-450 U/L
CK-MB	1160ng/ml	952ng/ml	25ng/ml	0-25 ng/ml
CRP	335mg/L	110mg/L	12.0mg/L	Negative is <10mg/L

AST: Aspartate aminotransferase
CPK: Creatine phosphokinase
LDH: Lactate dehydrogenase
CK-MB: Creatine kinase-MB
CRP: C-reactive protein

Discussion

Rhabdomyolysis leads to extreme breakdown of skeletal muscle tissues, muscle necrosis and release of muscle enzymes into the circulation. It is characterized by myalgias, myoglobinuria and increased muscle enzymes especially creatinine kinase. It is also associated with electrolyte imbalance and can cause acute kidney injury in 10-15% of the patients. All of its effects can lead to acute tubular necrosis which eventually causes acute kidney injury. Mortality rate is about 10% and even higher with patients presenting with acute kidney injury.2

Our case report adds to the growing evidence where a patient with history of diclofenac injection in the gluteal region presented with rhabdomyolysis leading to acute kidney injury for which he underwent multiple sessions of wound debridement and dialysis.

There are quite a few cases reported with patients developing rhabdomyolysis after being administered with diclofenac injection which eventually leads to acute kidney injury.[6,7] Similarly, another case was reported in which the patient developed rhabdomyolysis thirteen days after diclofenac injection administration. Patient had markedly raised creatinine phosphokinase levels and he eventually developed mild renal failure.[8] Another case was reported in which a 32 years old male received an intramuscular injection in his right thigh which eventually leads to acute rhabdomyolysis secondary to necrotizing fasciitis and eventually acute kidney injury. He went into septic shock and finally died after 5 days.[9]

There is scarcity of the literature available that confirms rhabdomyolysis as a side effect of diclofenac injection but some literature along with

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this one adds to the significance of diclofenac induced rhabdomyolysis as an adverse reaction. This is because inappropriate intramuscular administration can cause muscle injury and superadded infection which can get complicated with necrotizing fasciitis, rhabdomyolysis and acute kidney injury.–''5 So, diclofenac injections should be administered cautiously and a clinician should be aware of its one of the life-threatening side effects i.e., rhabdomyolysis. As, early intervention could be lifesaving.

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Authors declared no conflicts of Interest.

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DATA SHARING STATMENT

The data that support the findings of this study are available from the corresponding author upon request.

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- Articles under consideration that experiment on human subjects/animals in research are required to have *institutional review committee/board approval* in accordance with ethical standards set forth in the ICMJE- Uniform Requirements for Manuscripts Submitted to Biomedical Journals.

HUMAN RIGHTS POLICY

- JIIMC follows ICMJE Recommendations on Protection of Research Participants and World Medical Association (WMA) Declaration of Helsinki – ethical principles for medical research involving human subjects.
- When reporting experiments on human subjects, indicate whether the procedures were followed in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the latest version of Helsinki Declaration.
- In case of doubts, authors will explain the justification for their approach and exhibit that the institutional review committee approved the doubtful aspects of research.

Informed Consent and Confidentiality of Research Participants

- In case of research on human subjects, in addition to an ethical approval certificate an undertaking that “informed consent to participate” was taken from adult participants and/or from parents/guardians of participants

under 16 years of age will be submitted by the authors. This should also be mentioned in the material and methods section.

- Consent must be obtained for all Case Reports, Clinical Pictures, and Adverse Drug Reactions.
- Authors should avoid identifying patient information, including patients' names, initials, or hospital numbers, in written descriptions, photographs, and pedigrees unless the information is essential for scientific purposes and the patient (or parent/ guardian) gives written, informed consent for publication.
- Consents might be required by the editor on images from participants in the study. Consent form must be made available to Editors on request and will be treated confidentially.
- Informed consent should be obtained if there is any doubt that anonymity can be maintained, e.g., masking the eye region in photographs of patients is inadequate protection of anonymity."
- Masked Study Participants- If identifying characteristics are altered to protect anonymity, such as in genetic malformations, authors should provide written assurance to the editors that alterations do not distort scientific meaning.
- Authors are suggested to follow the CARE guidelines for case reports.

ANIMALS' RIGHTS POLICY

- Research conducted on animals is published in JIIMC. The research contributors are expected to strictly follow the national and international guidelines for the care and use of laboratory animal in research.
- Authors can take guidance on animal research ethics from WMA statement on animal use in biomedical research , International Association of Veterinary Editors' Consensus Author Guidelines on Animal Ethics and Welfare and Guide for the care and use of laboratory animals
- In addition to ICMJE recommendations, JIIMC also supports the principles of 3Rs (Replacement, Reduction and Refinement) for humans and animals' usage in research. These principles are as follows: *Replacement:* approaches which avoid or replace the use of animals *Reduction:* approaches which minimize the number of animals used per experiment *Refinement:* approaches which minimize animal suffering and improve welfare
- *To verify compliance with the above policies, the authors must fulfill the following requirements:*
- Ethical review committee/board's approval certificate indicating that the study protocol was in accordance with international, national, and/or institutional guidelines.
- Declare that the experiments on animals were conducted in accordance with local Ethical Committee laws and regulations as regards care and use of laboratory animals.
- A signed letter certifying that legal and ethical requirements were met with regards to the humane treatment of animals described in the study.
- Mention in the Methods (experimental procedures) section that appropriate measures were taken to minimize pain or discomfort, and details of the care provided to the animals.

INFORMED CONSENT: Authors are required to submit the undertaking that informed consent was taken from the client if they involved the client-owned animals.

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An addendum is decided on the significance of the addition to the interpretation of the original publication. Addenda do not contradict the original publication, but if the authors inadvertently omitted significant information available to them at the time of submission. This material will be published as an addendum after peer review.

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- It constitutes plagiarism.
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At times the article may occasionally be retracted for correction of errors in submission or publication and will be replaced with the corrected one.

Retraction Process

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1. An article requiring potential retraction will be brought to the attention of JIIMC editor.
2. Managing Editor will follow the step-by-step

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