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Editorial

Addressing Workplace Incivility: A Call for Action in Healthcare Settings

Uzma Ahsan

Workplace incivility, a prevailing issue in various professional environments, has gained particular significance within the context of healthcare settings. In the complex working environment of healthcare, workplace incivility surfaces as a demanding concern, subtly threatening the underpinning of patient care. The working environment in healthcare settings is not insusceptible to the destructive effects of discourteous conduct, sarcastic remarks, and trivializing attitudes among coworkers and associates. Typically, it is described as an un-courteous and impolite behavior which reflects a disregard for people in a working environment. It is a behavior which exhibits inter-relational misconduct and characteristically, has three components: desecration of standards and esteem in a working environment, uncertain attempt to maltreatment, and indirect forms of impolite conduct towards assistants or coworkers.[1] Communicating arrogantly, exhibiting inattention during talks, and taking no notice of others while they speak, are all illustrations of workplace incivility. People exposed to incivility, either as targets or witnesses, are traumatized and shocked, experiencing several negative effects on their mental and physical health. Moreover, intimidating and discourteous conduct frequently leads to mistakes in management, decline in patient satisfaction, and intensification of the cost of care. In the current era of enhanced accountability in the health care system, such apprehensions have become even more critical to address.[2]

A recent study emphasizes the pervasive nature of workplace incivility in medical and dental practices, highlighting its detrimental influence on employee well-being, job satisfaction, and overall organizational climate.[3] Incivility not only causes the deterioration of teamwork and communication within the faculty but also compromises the quality of patient care. The healthcare industry, often characterized by high-stakes decision-making and stressful environments, demands a collaborative and respectful workplace culture. A study by Smith et al. emphasizes the association between workplace civility and improved patient safety, emphasizing the need for interventions to curtail incivility in healthcare settings.[4]

Acknowledging the implication of dealing with this matter, we concede its potential impact on both healthcare professionals and patient outcomes. This editorial argues that in the jurisdiction of healthcare, where teamwork and unbroken communique are vital, the consequences of workplace incivility are particularly deep. The gradual destruction of teamwork and a deterioration in morale not only affect the well being of healthcare professionals but also dispose a noticeable risk to patient outcomes.[5]

We emphasize the need to create and promote awareness, implement pre-emptive strategies, and create training activities to avoid and appraise workplace incivility. Accentuating the significance of interpersonal skills, conflict resolution, and emotional intelligence becomes fundamental in nurturing a cooperative and compassionate healthcare environment. Management within healthcare establishments plays a crucial part in dealing with incivility. The conduct and professional behavior of healthcare leaders set the standard and directly inspire the entire team. Identifying this, it becomes essential for healthcare organizations to establish a workplace culture that is based on admiration, responsiveness, and open communique while admitting its bearing on the mental health of the healthcare professionals and the patient outcomes.[6] Furthermore, establishing a system for confidential reporting and creating neutral investigative processes can ensure the prevention of incivility among professionals to a certain extent. This permits the employees to report uncivil behavior in isolation, promoting clarity without threatening their own well being. This not only dejects the uncivil behavior but also validates to the healthcare professionals that their apprehensions are taken seriously. New professional platforms to voice concerns are needed without the fear of punishment, along with promoting a culture of accountability for those involved in rude behavior.

In conclusion, we urge the healthcare community to

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recognize and combat workplace incivility, promoting a culture of civility that enhances both professional satisfaction and patient care. By fostering a culture of mutual respect, understanding, and open communication, healthcare organizations can build resilient teams that can deliver optimal care in an environment free from the shadows of incivility. By addressing this issue, we can strive for a healthier and more productive healthcare environment.

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Original Article

Correlation between Mean Serum Uric Acid Level and Left Ventricular Diastolic Dysfunction in Patients with Chronic Kidney Disease

Muhammad Ahmad, Irfan Rasool, Madiha Rauf, Muhammad Shahbaz, Muhammad Imran, Waleed Tariq

ABSTRACT

Objective: To assess the correlation of mean serum uric acid (UA) level as a predicting tool for left ventricular diastolic dysfunction (LVDD) in patients with chronic kidney disease (CKD).

Methodology: A cross-sectional, analytical study was conducted at the Nephrology Department, Allied Hospital, Faisalabad from March to October 2021, using non-probability consecutive sampling method. The patients aged between 20-50 years having grade 2 to 5 CKD and left ventricular ejection fraction >50% were included in this research. The blood sample was withdrawn from each participant and serum UA level was measured through the Uricostat enzimatico method by a mono-reagent technique using a Selectra ProXL device. Pulsed wave tissue Doppler echocardiography was performed using an Esaote SpA device with a 2.5-3.5 MHz transducer to assess the LVDD.

Results: A total of 40 cases were included with a mean age of 42.48±6.96 years. Twenty one (52.5%) were males and 19(47.5%) were females. The mean serum UA level and mean peak early diastolic velocity (EmLV) were 6.49±0.56 mg/dL and 6.45±2.85 cm/sec, respectively. The LVDD was recorded in 31(77.5%) patients. A significant negative correlation was found between mean serum UA level and LVDD in patients with CKD (r-value=-0.846, p-value=0.0001). Pearson's correlation between mean serum UA levels and LVDD in the higher age group (36-50 years) was negative (r-value=-0.8476, p-value=0.001). Similarly, the female gender had a negative correlation between mean serum UA levels and LVDD (r-value=-0.9029, p-value=0.001).

Conclusion: The left ventricular diastolic dysfunction in CKD patients can be predicted by elevated serum UA levels. So, uric acid can be used as a screening tool for LVDD in CKD patients.

Keywords: *Chronic kidney disease. Ventricular dysfunction. Uric acid.*

INTRODUCTION

Chronic kidney disease is a significant and rapidly growing health problem with an estimated prevalence of 13.4%, globally.[1] The progression of CKD has been associated with several complications as hypertension, hyperlipidemia, anemia, hyperuricemia, hyperkalemia, mineral bone disorder, and cardiovascular disease (CVD). End-stage renal disease reduces the quality of life and has a very high mortality rate. Cardiovascular disease is the major cause of death in CKD patients. The mortality rate in CKD patients is twice the rate of the general population and more than 50% CKD patients have CVD.[2] Chronic kidney disease has a negative effect on cardiac activity and usually leads to structural and functional changes of the left ventricle (LV). The common cardiac structure abnormalities in CKD patients are decreased diastolic distensibility, impaired relaxation of LV being the characteristics of LV diastolic dysfunction, and have an independent association with increased morbidity and mortality. The LV function deterioration in CKD patients progresses predictably, with diastolic dysfunction usually preceding systolic dysfunction indicating that maintenance of diastolic function of LV is critical for prevention of cardiac failure. Diastolic dysfunction is an important pathophysiological step in the development of heart failure and is a significant focus for CVD prevention.[3] Echocardiography being a non-invasive imaging technique has been useful to assess diastolic dysfunction.[4]

Hyperuricemia is a potentially harmful medical condition occurring as a consequence of CKD and has an association with hypertension, metabolic syndrome, and CVD, making it an effective therapeutic target for CVD prevention. Uric acid is produced mainly by the liver and intestine as an end product of purine nucleotide metabolism. Hyperuricemia has a significant role as an independent predictor of poor outcome in chronic diseases such as hypertension, coronary artery disease, chronic heart failure, and CKD. However, the pathophysiology of hyperuricemia on the function of the cardiac muscles is not fully explained. The inflammation, activation of the renin-angiotensin-aldosterone system, damage to endothelial cells, and inhibition of nitric oxide secretion are some of the proposed mechanisms for the effect of hyperuricemia on the heart.[5] Uric acid can reduce nitric

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oxide (NO) production and accelerate NO degradation by the endothelial cells. Furthermore, UA and NO undergo irreversible reactions to create 6-aminouracil, further depleting the levels of NO. The negative impact of UA on cardiovascular and renal diseases could be attributed to its direct effect on inflammation, dysfunctioning of the endothelium, impaired metabolism of nitric oxide, and the activation of the reticuloendothelial system.[6]

Xanthine oxidase is an enzyme involved in the reaction of hypoxanthine and xanthine to uric acid. The increased activity of xanthine oxidase causes the release of free radicals and increases oxidative stress, having adverse effects on the activity of cardiomyocytes. The role of xanthine oxidase reductase (XOR) in the pathology of CVD has also been proposed. Excessive levels of XOR products promote inflammatory response and lead to plaque development, promoting the process of atherosclerosis and contributing to the risk of CVD.[7] Chronic kidney disease is a growing health problem and is associated with complications such as cardiovascular diseases. Hyperuricemia has been linked to poor outcome in chronic diseases. Literature regarding the correlation of mean serum uric acid levels and left ventricular diastolic dysfunction among the Pakistani population is lacking. Furthermore, there is a gap in international literature from recent times on this correlation. So, this study was planned to evaluate the application of serum uric acid as a predictive tool for left ventricular diastolic dysfunction in CKD.

METHODOLOGY

A cross-sectional, analytical study was conducted using the non-probability consecutive sampling technique. The patients aged between 20-50 years having grade 2 to 5 CKD and left ventricular ejection fraction >50% were included in this research. The patients with cardiac anomalies such as non-sinus rhythm, LV regional or global dysfunction, history of myocardial infarction, valvular heart disease, pericardial effusion, and uncontrolled hypertension were excluded from the study. The study was conducted from March to October 2021 at the Department of Nephrology, Allied Hospital, Faisalabad, Pakistan. The sample size of 40 was calculated by using the WHO sample size calculator with 95% confidence interval, type I error as 5%, type II error as 10% and r=0.471. Each of the participants was thoroughly explained about the purpose and procedure of the study. An informed consent was acquired from each of the participants. The participants could withdraw from the study at any moment. The institutional ethical review board of Punjab Medical College, Faisalabad, Pakistan approved the study.

The participants fulfilling the criteria of participation were included after the detailed clinical history and a thorough examination. The serum sample was sent to the Pathology Department, Allied Hospital, Faisalabad for the measurement of serum UA levels. The pathologist measured the serum uric acid level by the Uricostat enzimatico method by the mono-reagent technique using a Selectra ProXL device. The normal reference range of serum uric acid level is 3.5-6 mg/dL. The serum UA levels more than 6 mg/dL were taken as high serum UA levels. Later on, participants were sent to the Cardiology Department, Allied Hospital, Faisalabad for echocardiography to assess LVDD. As per operational definition, LVDD is defined as mean peak early diastolic velocity <8 cm/sec.[8] Pulsed wave tissue Doppler echocardiography was performed using an Esaote SpA device with a 2.5-3.5 MHz transducer. The echocardiography was evaluated by the consultant cardiologist. .

STATISTICAL ANALYSIS

The data analysis was done using the Statistical Package for the Social Sciences (SPSS) version 23. Quantitative variables were analyzed and presented as mean and standard deviation. Frequency and percentage were calculated for all qualitative variables. Pearson's correlation was utilized to find the relation between serum UA level and LV diastolic dysfunction. The effect of modifiers such as age and gender were nullified by stratification. A p-value ≤ 0.05 was considered statistically significant.

RESULTS

Forty patients with CKD were included in the study with the age distribution of the patients as 7(17.5%) between 20-35 years of age and 33(82.5%) between 36-50 years of age, with the mean age as 42.48±6.96 years. Twenty one (52.5%) were males and 19(47.5%) were females. The mean serum UA level was 6.49±0.56 mg/dL. The mean EmLV was 6.45±2.85 cm/sec. The left ventricular diastolic dysfunction was reported in 31(77.5%), while 9(22.5%) had normal findings of left ventricular diastolic function (Table 1).

A significant negative correlation was found between mean serum UA level and LVDD in patients with CKD (r-value=-0.846, p-value=0.0001).

Pearson's correlation between mean serum UA levels and LVDD in the higher age group (36-50 years) was negative (r-value=-0.8476, p-value=0.001). Similarly, the female gender had a negative correlation between mean serum UA levels and LVDD (r-value=-0.9029, p-value=0.001) (Table 2).

Table 1: Study Variables of Patients Included in the Study

Study Variables		Descriptive Statistics
Age (Years)	**Mean±SD**	42.48±6.96
	20-35	7(17.5%)
	36-50	33(82.5%)
Gender	**Male**	21(52.5%)
	Female	19(47.5%)
Serum Uric Acid Level (mg/dL)	**Mean±SD**	6.49±0.56
	Maximum	7.4
	Minimum	5.4
Mean Peak Early Diastolic Velocity (EmLV) (cm/sec)	**Mean±SD**	6.45±2.85
	Maximum	13
	Minimum	3
Left Ventricular Diastolic Dysfunction (LVDD)	**Yes**	31(77.5%)
	No	9(22.5%)

Table 2: Stratification for Mean Serum Uric Acid Level and EmLV with regards to Age and Gender

Variables		Mean Serum Uric Acid (mg/dL)	Mean EmLV (cm/sec)	r**	p-value
Age (Years)	**20-35**	6.43±0.64	6.14±2.48	0.8791	0.0001*
	36-50	6.52±0.57	6.35±2.91	-0.8476	0.001*
Gender	**Male**	6.47±0.60	6.48±2.84	0.8063	0.001*
	Female	6.53±0.53	6.42±2.95	-0.9029	0.001*

**Significant p-value*
***Pearson's Correlation*

DISCUSSION

Chronic kidney disease is a highly prevalent disease with a high mortality rate. It is an independent as well as an important risk factor for CVD. Multiple risk factors contribute to CVD in CKD leading to endothelial dysfunction, inflammation, insulin resistance, endoplasmic reticulum & oxidative stress, and a modifiable factor that leads to this is elevated serum UA level.[9] This study was conducted to evaluate UA levels for predicting LVDD and thus helping to reduce the morbidity and mortality associated with elevated serum UA levels.

The correlation between the mean serum UA levels and LVDD indicated an inverse relationship between these two variables (r=-0.846, p-value=0.0001). The higher the serum UA levels, the lower was LV function and vice versa. Welnicki et al. reported that serum UA levels had a significant negative correlation with ejection fraction (r=-0.15).[10] Comparable results were found in other studies.[7] Furthermore, Chiu et al. reported a significant association of high serum UA levels with low left ventricular ejection fraction (p=0.001), high left ventricular mass (p <0.001), and high left atrial diameter (p <0.001).[11] The elevated levels of serum UA have been considered as an important indicator of reduced renal function and have a causative role in the development of hypertension and CVD.[12] Hyperuricemia affects the prognosis of disease in patients with congestive heart failure. The higher serum UA level has a strong association with the higher degrees of heart failure (p=0.039) and a negative Pearson's correlation with the ejection fraction (r=-0.21) (p=0.039).[13]

We found that the higher age group had a negative correlation (r=-0.8476) between serum UA levels and LVDD than the lower age groups. Yang et al. reported an independent association of serum UA with cardiovascular mortality in older population with increasing risk at extreme levels of serum UA.[14] Another study reported that the higher levels of serum UA had a strong association with CKD in the elderly being independent of other risk factors such as higher levels of blood glucose & triglycerides, hypertension, and high body mass index.[15]

In this study, a negative correlation was found between serum UA levels and LVDD in female participants as compared to males. Sun et al. found that hyperuricemia remained an independent risk factor for coronary artery disease in females of all ages (p=0.029).[16] The serum

UA had an association with metabolic syndrome. An increase in serum UA concentration by 1 mg/dL increases the risk of metabolic syndrome by 41% and 62% in males and females, respectively, ultimately increasing the prevalence of diabetes mellitus type II and CVD.[17] Huang et al. found that high serum UA levels had an association with the clustering of CVD in elderly women (odds ratio=3.850) and women are three times more likely to develop CVD than males.[18] Many epidemiological studies have reported that increased uric acid level is a risk factor for hypertension, atherosclerosis, and cardiovascular disease.[19,20]

CONCLUSION

The elevated serum UA levels had a significant negative correlation with the LV diastolic function in CKD. Female gender and higher age group also has a negative association with serum UA levels and LVDD. The left ventricular diastolic dysfunction in CKD patients can be predicted by elevated serum UA levels. So, uric acid can be used as a screening tool for LVDD in CKD patients.

LIMITATIONS & RECOMMENDATIONS

Our study had a few limitations. It was a single-centered study with a small sample size. Large-scale randomized controlled trials should be conducted to find an absolute relation between the serum UA levels with CVD in CKD patients. Furthermore, clinical practice should be promoted to assess and manage the serum UA levels in patients suffering from chronic diseases to further reduce the morbidity and mortality associated with it. Awareness and screening for hyperuricemia are important in reducing adverse cardiovascular events in CKD patients.

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Original Article

Exploring the Educational Environment in an Online Certificate Program

Tayyaba Azhar, Kainat Javed, Kinza Aslam, Maimoona Nasreen, Syeda Tehseen Fatima

ABSTRACT

Objective: To explore the perceptions of postgraduate students regarding the e-learning educational environment of Certificate in Health Professions Education (CHPE).

Methodology: This descriptive cross-sectional study was carried out at the University College of Medicine & Dentistry, Lahore. A total of 250 students were included in this study. Out of 250 students, 209 students filled out the questionnaire. Non-randomized purposive sampling was used. A pre-validated 'e-learning educational atmosphere measure' (EEAM) questionnaire was used. A Google form link for the questionnaire was shared in the WhatsApp groups of CHPE students. Data was analyzed using Statistical Package for the Social Sciences (SPSS) version 23.

Results: Out of 209 participants, 88(42.1%) were males and 121(57.9%) were females. The results indicated positive perceptions across various factors assessed by the EEAM questionnaire. The majority of the participants (86.2%) found the programme effective and 84.8% were satisfied with the teaching quality. Students responded positively to the questions regarding ethics & professionalism (88.1%), learner support (64.1%), and safety & convenience (82.7%).

Conclusion: Students have positive perceptions regarding programme effectiveness, teaching quality, ethics & professionalism, learner support, and safety & convenience. Furthermore, the EEAM is a comprehensive tool that captures various aspects of the e-learning environment and provides a holistic view of the educational atmosphere.

Keywords: *Online learning. COVID-19. Students.*

INTRODUCTION

Online learning has drawn a lot of attention, especially in computer-assisted learning, where learning materials are digitally transmitted through various software and learning management systems (LMS).[1] Because of the flexibility offered by e-learning, students can attend classes at their convenience, regardless of their location.[2] Moreover, it has been recognized for its potential to foster creativity, critical thinking, and independence among higher education students.[2,3] E-learning also facilitates effective communication between teachers and students, as well as among students, encouraging open sharing of ideas without fear of judgement.[4]

Given the documented benefits of e-learning in various contexts, the University College of Medicine & Dentistry decided to shift its Certificate in Health Professions Education program online in 2020 due to the impact of the COVID-19 pandemic.[5] Moodle, a learning management system, was used to organize study materials as part of the e-learning implementation for CHPE. Additionally, WhatsApp groups were created to facilitate better communication. Zoom video communication was used for online classes. The evaluation of virtual learning environments has also been a subject of interest. Al-Fraihat et al. examined the virtual learning environments of Jordanian universities in 2020 using an extended Technology Acceptance Model. Their study identified the factors influencing student satisfaction and highlighted the significance of user experience and technology acceptance in creating successful e-learning environments.[6] However, it is important to note that e-learning in Pakistan is still an evolving area of education, requiring a distinct approach and skill set to ensure success.[7]

Recognizing that students are the primary consumers of education, understanding their perceptions of the e-learning educational atmosphere becomes crucial. Such feedback can enable program developers and facilitators to enhance the quality of e-learning programs. This study aimed to explore the perceptions of postgraduate students regarding the e-learning educational environment of CHPE, shedding light on their experiences, satisfaction, and areas of improvement. The current study was focused on the essential aspects relevant to understanding the significance of exploring students' perceptions in the context of e-learning.

METHODOLOGY

This study was carried out at the University College of Medicine & Dentistry, Lahore. It was a descriptive

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cross-sectional study in which non-randomized purposive sampling was done. The study was conducted from February to April 2023. The study was approved by the ethical committee of the institution. Informed written consent was taken from all participants. A pre-validated EEAM questionnaire was distributed to the students of the certificate in health professions education. A total of 250 students were included in this study. Out of 250 students, 209 students filled out the questionnaire. The purpose of the study was explained to the students. A Google form link for the questionnaire was shared in the WhatsApp groups. The questionnaire is comprised of items that assess five key factors: programme effectiveness, teaching quality, ethics & professionalism, learner support, and safety & convenience. Responses of students were calculated using the Likert scale, 1 & 2 were taken as agree, 3 was considered neutral, and 4 & 5 were taken as disagree.

STATISTICAL ANALYSIS

Data was entered and analyzed in Statistical Package of the Social Sciences (SPSS) version 23. Gender and students' perception regarding the e-learning educational atmosphere were presented as frequency and percentage. Mean±SD was also calculated for all factors of the questionnaire.

RESULTS

Out of 209 participants, 88(42.1%) were males and 121(57.9%) were females. The questionnaire assessed five factors: programme effectiveness, teaching quality, ethics & professionalism, learner support, and safety & convenience. The majority of the participants (86.2%) found the programme effective and 84.8% were satisfied with the teaching quality. Students responded positively to the questions regarding ethics & professionalism (88.1%), learner support (64.1%), and safety & convenience (82.7%). One hundred and eighty seven (89.5%) of them were satisfied with studying in this virtual program and 201(96.2%) were satisfied with the online teaching skills of the facilitators. A majority of the participants agreed that the facilitators were responsive and enhanced student's motivation to learn and 189(90.5%) said they felt safe to ask questions during the course. The study results, as summarized in Table 1, indicate positive perceptions across various factors assessed by the EEAM questionnaire. These findings demonstrate the overall satisfaction and positive experiences of participants in the e-learning environment.

DISCUSSION

This study aimed to measure students' perceptions of the e-learning educational environment at CHPE. This study provided valuable insights into five crucial factors: programme effectiveness, teaching quality, ethics & professionalism, learner support, and safety & convenience. According to the study's findings, postgraduate students enrolled in the CHPE program have a positive perception of the e-learning environment. In this study, 86.2% of the participants were agreed with the programme effectiveness. According to the results, the CHPE program is effective as it enables students to understand the subject matter and attain targeted learning outcomes. Alzahrani also commented on the use of technology to enhance learning and the level of support provided to students. According to him, one of the most fundamental advantages of technology in education is its capacity to assist students with physical learning.[5] Badger also emphasized that factors of the EEAM questionnaire play a crucial role in the effectiveness of the e-learning program, as they can help to create a sense of community, engagement, and motivation among students.[3]

Our results showed that 84.8% of participants were satisfied with teaching quality in terms of e-teaching skills [201(96.2%)], resources [174(83.2%)], feedback [122(58.3%)], and group activities & environment [205(98.1%)]. The positive remarks concerning the quality of the teaching in this study underline the importance of the teachers' e-teaching abilities and their capacity to engage students using a variety of techniques are also in line with the results of a study by Castro-Bedrinana et al. The focus on proper feedback, scheduling of course delivery, and use of educational resources all support the idea that the teachers are crucial in fostering a productive and enjoyable learning environment.[4] Al-Fraihat et al. also suggested that teaching quality is very important for assessing the level of engagement and collaboration between students and instructors in an online setting.[6]

The responses in this study depict that 88.1% of participants were positive about ethics & professionalism and indicated that the CHPE program's instructors fostered a helpful and encouraging learning environment. The respect for copyright & intellectual property rights along with the consideration of cultural & socio-economic issues show the importance of ethical behavior in the context of online learning. Similar results were observed by Ahsan et al. and Pierszalowski et al. who discussed the importance of responsiveness and availability of teachers, and being concerned about students' learning as key items for the professional and ethical behavior of teachers. These elements are considered important for creating a positive and supportive educational environment in e-learning.[7,8] Another study also recommended that these elements help students

Table 1: Participants Responses to all EEAM Factors

Factors	Agree	Neutral	Disagree
Programme Effectiveness	**86.2%**	**10.4%**	**3.4%**
Courses' resources and contents are intriguing and motivational for learning.	188(90%)	17(8.1%)	4(1.9%)
The possibility of learning academic meta-skills (such as writing a proposal, working with academic software, etc.) is provided for me.	156(74.7%)	45(21.5%)	8(3.8%)
Courses' contents and activities are understandable and tangible.	193(92.3%)	11(5.3%)	5(2.4%)
Teachers assess the students pretty well in various courses.	170(81.3%)	28(13.4%)	11(5.3%)
It's easy for me to study and do my assignments and activities.	167(79.9%)	27(12.9%)	15(7.2%)
During this program, my ability to interact with others in virtual space has increased.	194(92.9%)	9(4.3%)	6(2.8%)
I have learned what I needed to learn in this program.	189(90.4%)	18(8.6%)	2(1%)
This program will prepare me for my future job.	178(85.2%)	23(11%)	8(3.8%)
I am satisfied with studying in this virtual program.	187(89.5%)	18(8.6%)	4(1.9%)
Teaching Quality	**84.8%**	**10.7%**	**4.5%**
Teachers of this program have e-teaching skills.	201(96.2%)	6(2.8%)	2(1%)
Teachers of this program give timely feedback on my assignments, activities, and messages.	122(58.3%)	52(24.9%)	35(16.8%)
The timing of delivering courses' resources and activities during the semester is appropriate for me.	174(83.2%)	25(12%)	10(4.8%)
Teachers of this program care about students' views on how to present their courses and activities.	169(80.7%)	29(14%)	11(5.3%)
Teachers of this program cover the teaching process within LMS.	180(86.1%)	25(12%)	4(1.9%)
Teachers of this program benefit properly from available educational facilities for better e-teaching.	190(90.9%)	16(7.7%)	3(1.4%)
Teachers of this program use different methods (such as chat rooms, group assignments, etc.) to encourage group activities and engage students in virtual environment.	205(98.1%)	3(1.4%)	1(0.5%)
Ethics & Professionalism	**88.1%**	**9.8%**	**2.1%**
Teachers of this program help raise my motivation for learning	190(90.9%)	17(8.1%)	2(1%)
Teachers of this program have good and up-to-date academic ability.	196(93.7%)	10(4.8%)	3(1.4%)
Copyright and intellectual property of scientific resources and contents are respected.	192(91.8%)	15(7.2%)	2(1%)
Teachers of this program are responsive and available.	167(79.9%)	32(15.3%)	10(4.8%)
Teachers of this program try to make sure about my learning.	161(77%)	42(20.2%)	6(2.8%)
Cultural issues and social etiquette are observed in the educational environment.	187(89.5%)	16(7.7%)	6(2.8%)
Relationships governing the educational environment are with respect and courtesy.	196(93.7%)	11(5.3%)	2(1%)
Learner Support	**64.1%**	**26.5%**	**9.4%**
Administrative educational staff and authorities are well responsive to me.	162(77.5%)	34(16.3%)	13(6.2%)
Technical support staff and authorities are well responsive to me.	159(76.1%)	38(18.2%)	12(5.7%)
I have access to a decent digital library.	73(34.9%)	85(40.7%)	51(24.4%)
If necessary, I have access to an academic adviser.	114(54.5%)	65(31.1%)	30(14.4%)
There is good support for top students.	105(50.2%)	81(38.8%)	23(11%)
There are good supports for weak students.	109(52.1%)	80(38.3%)	20(9.6%)
Course plans are clear and available.	171(81.8%)	30(14.4%)	8(3.8%)
Given the virtual feature of the program, there is sufficient flexibility in administrative processes (e.g. number of units per semester, maximum permitted duration of the program, etc.)	153(73.2%)	47(22.5%)	9(4.3%)
Students' views on the program delivery and educational services are considered important.	160(76.5%)	38(18.2%)	11(5.3%)
Safety & Convenience	**82.7%**	**13.7%**	**3.6%**
I feel comfortable to ask my questions.	189(90.5%)	17(8.1%)	3(1.4%)
Content types and activities match my learning style.	175(83.6%)	29(14%)	5(2.4%)
I can easily work with LMS.	160(76.5%)	40(19.2%)	9(4.3%)
I do not feel lonely in my learning environment.	187(89.5%)	18(8.6%)	4(1.9%)
There is a good place for e-learning in my society.	173(82.8%)	24(11.5%)	12(5.7%)
I have become aware of educational regulations and administrative processes.	172(82.2%)	30(14.4%)	7(3.4%)
There are clear guidelines and style sheets for using educational and research facilities and systems.	153(73.2%)	43(20.6%)	13(6.2%)

successfully navigate the course, have access to relevant materials, and get the support they need to advance in their learning.[9]

According to our results, 162(77.5%) learners agreed that education staff & authorities were well responsive to them. Moreover, other studies also focus on the importance of "learner support" and "programme effectiveness" factors in technology-enhanced educational settings.[10,11]

Javed et al. also mentioned in their research that lack of support from the instructor could be a major challenge for students in an online learning environment. Without clear guidance and support, students may feel lost and unsure of how to proceed with their coursework.[12] Additionally, without regular interaction with their instructor, students may feel isolated and unmotivated to continue with their studies. This is why providing support and creating a sense of community is important to help students stay motivated and engaged in their online learning experience as discussed in other studies.[13]

The participants showed positive feedback on safety & convenience (82.7%) which indicates that efforts were made to create an engaging and interesting learning environment, where students feel comfortable asking questions and are given user-friendly tools and platforms. A similar study by Al Rawashdeh et al. has emphasized that e-learning increases the possibility of contact between students among themselves and between the students and the teacher, thus creating a positive learning environment.[14]

Overall, the study's findings show that postgraduate students had favorable perceptions of the CHPE program's e-learning environment. Another study also supported that the e-learning environment is suitable for postgraduate students and showed positive responses from candidates.[15]

CONCLUSION

Students have positive perceptions regarding programme effectiveness, teaching quality, ethics & professionalism, learner support, and safety & convenience. They are satisfied with taking the online program certificate course. Furthermore, the EEAM is a comprehensive tool that captures various aspects of the e-learning environment and provides a holistic view of the educational atmosphere. It can be used in interactive e-learning courses to enhance the students' learning.

LIMITATIONS & RECOMMENDATIONS

In this study, the survey was conducted only on students of postgraduate programs, which limits its generalizability to other educational settings, such as undergraduate programs. Therefore, further research is needed to assess the suitability of the EEAM for undergraduate students. The results of such studies can be used to modify or adjust the online model to better reflect the experiences of undergraduate students. Additionally, it would be beneficial to compare the results of the undergraduate studies to those obtained in the original postgraduate study to identify any differences in the factors that influence students' perceptions of the online learning environment.

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Original Article

Study of Morphological Changes and Nitrotyrosine Expression Induced by Aspartame in Albino Wistar Rat Ovaries

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ABSTRACT

Objective: To observe the dose dependent effect of aspartame on the histological architecture of ovary and nitrotyrosine expression by immunohistochemistry.

Methodology: This experimental study was performed at the University of Health Sciences, Lahore. In this study, twenty four adult female albino Wistar rats of age 6-8 weeks with a weight range of 150-180 grams were acquired from the animal house of the university and divided into four equal groups (A, B, C, and D). Aspartame was given at doses of 250 mg/kg, 500 mg/kg, and 1000 mg/kg daily for 30 days to three experimental groups (B, C, and D), while the control group (A) was given distilled water. Animals were sacrificed at the estrus phase and ovaries were dissected. Initial and final body weights, weight of ovaries, ovarian follicular parameters on hematoxylin and eosin (H & E) stained sections, and nitrotyrosine expression on immunohistochemistry were evaluated. Data was analyzed on Statistical Package for the Social Sciences (SPSS) and p-value ≤0.05 was considered significant.

Results: A significant difference was observed in the final body weight of rats of experimental groups ($p < 0.001$). Aspartame administration caused a significant decrease in the number of primordial ($p=0.001$) and primary ($p=0.01$) follicles, while a significant decrease in the diameter of primary ($p=0.01$) and secondary ($p=0.001$) follicles in rats of experimental groups was observed with a maximum decrease in group D. Nitrotyrosine expression was significantly increased in the aspartame administered groups ($p=0.005$).

Conclusion: The use of aspartame causes ovarian changes that may lead to infertility mainly due to oxidative stress.

Keywords: *Aspartame. Oxidative stress. Ovaries.*

INTRODUCTION

Artificial sweeteners are commonly used to overcome the usage of added sugars in many conditions where weight reduction is the main focus besides treating diseases like diabetes mellitus, polycystic ovarian disease or cardiovascular diseases.[1] Food and Drug Authority approves five artificial sweeteners which are aspartame, saccharine, sucralose, acesulfame, and neotame. Amongst the marketed sweeteners aspartame (ASP) is most commonly used. It is estimated that almost 200 million people are using this sweetener in their daily routine and this number is increasing very rapidly.[2]

When taken orally, ASP is absorbed completely in the intestine and broken down into its components like phenylalanine, aspartic acid, and methanol. Two out of three end products, phenylalanine and aspartic acid, are excitatory to neurotransmitters and adversely affect brain activity.[3] Phenylalanine affects the hypothalamic-pituitary axis by disturbing the release of gonadotropin-releasing hormone which leads to miscarriage and infertility.[4]

Outside the brain it can also directly affect the testes where it adversely influences the Leydig cells and impairs the process of spermatogenesis. Reproductive changes were also observed in male rats when aspartame was taken for a long time. It affected biochemical markers malondialdehyde (MDA), an increased level of which showed oxidative stress, hormones (testosterone), body weight, and reproductive disorders. Similar effects can be expected on the female reproductive system as many oxidative stress markers like catalase, MDA, and nitrotyrosine are also present in ovarian tissue and might cause oxidative damage at the structural or molecular level due to the liberation of free radicals.[5]

Some studies have reported disturbances in the female reproductive system due to saccharine, another artificial sweetener.[6] Since aspartame is the most widely used artificial sweetener and its effects on ovarian tissue have not been studied so far, the present study aimed to elucidate this area. This study will help to create awareness regarding the possible harmful effects of artificial sweeteners like aspartame on the structure of the ovary that might lead to infertility.

METHODOLOGY

This experimental study was performed at the University of Health Sciences, Lahore from July 2019

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to May 2020 after approval from the ethical committee of the institute. Twenty four adult healthy non-pregnant female albino Wistar rats of age 6-8 weeks with a weight range of 150-180 grams were acquired from the animal house of college. They were acclimatized in their allotted cages for one week before the commencement of this experimental study. The rats were maintained in the animal house under a controlled environment and fed on standard rat diet and water. Ailing rats were excluded from the experiment when discovered during the experimental period.

The rats were divided by convenience sampling followed by random allocation into four equal groups (A, B, C, and D), comprising six animals in each group. Animals were properly labeled and tagged. The dose was given orally for 30 days once daily by nasogastric tube. Group A served as control and was given 5 mL distilled water, while group B was given 250 mg/kg aspartame dissolved in 5 mL distilled water, group C was given 500 mg/kg aspartame dissolved in 5 mL distilled water, and group D was given 1000 mg/kg aspartame dissolved in 5 mL distilled water.[7] The animals in the estrus phase were identified and sacrificed accordingly.

The ovaries of each animal were placed in separate jars filled with 10% formalin for 48 hours for fixation. Vernier caliper was used to determine the size of each ovary. The weight of each ovary was taken by using a digital weighing machine. The color of each ovary was observed by the naked eye.

Tissue sections of 5 µm were obtained for hematoxylin and eosin & Masson's trichrome to observe the histological features. The number and size of follicles were measured by stage micrometer (two sections of all 24 animals were observed).

Immunohistochemical expression of nitrotyrosine, an oxidative stress marker, was also done on 3 µm formalin-fixed sections. Anti-nitrotyrosine antibody (Abbexa, abx 100841) was used as primary antibody. Cells with nitrotyrosine expression were counted with stage micrometer (two sections of all 24 animals were observed) and frequency was calculated. In the end, slides were washed, dried, and mounted with dibutylphthalate polystyrene xylene.[8]

STATISTICAL ANALYSIS

The data was entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 23.0. Results were expressed as mean±SD. One-way analysis of variance (ANOVA) & Kruskal Wallis tests were applied for comparison among the groups. A p-value ≤ 0.05 was considered as statistically significant.

RESULTS

Dose dependent response was seen in the mean body weight of experimental groups ($p < 0.001$), which was seen to be increased with increasing doses (maximum weight gain was observed in group D). On gross examination, no significant change in color, size, and weight of ovaries was observed in any experimental group.

Histological examination showed cuboidal epithelium with tunica albuginea. Cortical and medullary regions were clearly visible with follicles at different stages. Fibrosis was identified as blue stained fibers with dark brown to black flattened nuclei on Masson's trichrome staining only in group D (Figure 1).

Primordial follicles were identified by a single layer of squamous cells, primary follicles were identified by a single layer of cuboidal cells, and secondary follicles by multiple granulosa cells with cavities. Graafian follicles were identified by large antrum with oocyte surrounded by corona radiata. Many blood vessels were seen in the central medullary region (Figure 2).

Number of primordial & primary follicles were seen to be decreased in dose dependent order in experimental groups with a maximum decrease seen in group D ($p=0.001$ & $p=0.01$, respectively) (Figure 1, 2 & 3), while a decreasing trend was seen in the number of secondary & Graafian follicles in all experimental groups (maximum decrease in group D).

One-way ANOVA showed a significant decrease in the diameter of primary and secondary follicles of groups B, C, and D with maximum decrease in group D ($p=0.01$ & $p=0.001$, respectively) (Table 1) (Figure 4).

Positive cells for nitrotyrosine (dark brown stained cells) were counted and graded (Figure 5). Expression was found to be increased in dose dependent manner in all experimental groups ($p=0.005$) (Table 2).

DISCUSSION

The use of artificial sweeteners and their effects on different organs is the most challenging task for researchers. Long-term use of these sweeteners affects brain activity and induces oxidative stress by their metabolites.[9,10] The present study aimed to show its effects on the female reproductive system.

The current study showed that the body weight of the animals taking aspartame significantly increased, while the number and size of follicles significantly decreased in the experimental groups. Immunohistochemical expression of nitrotyrosine was also seen to be increased in experimental groups. In this study, increased body weight of animals was observed in dose dependent manner. Maximum weight gain was observed in group D, where 1000 mg/kg ASP was given. This significant increase in the body weight of

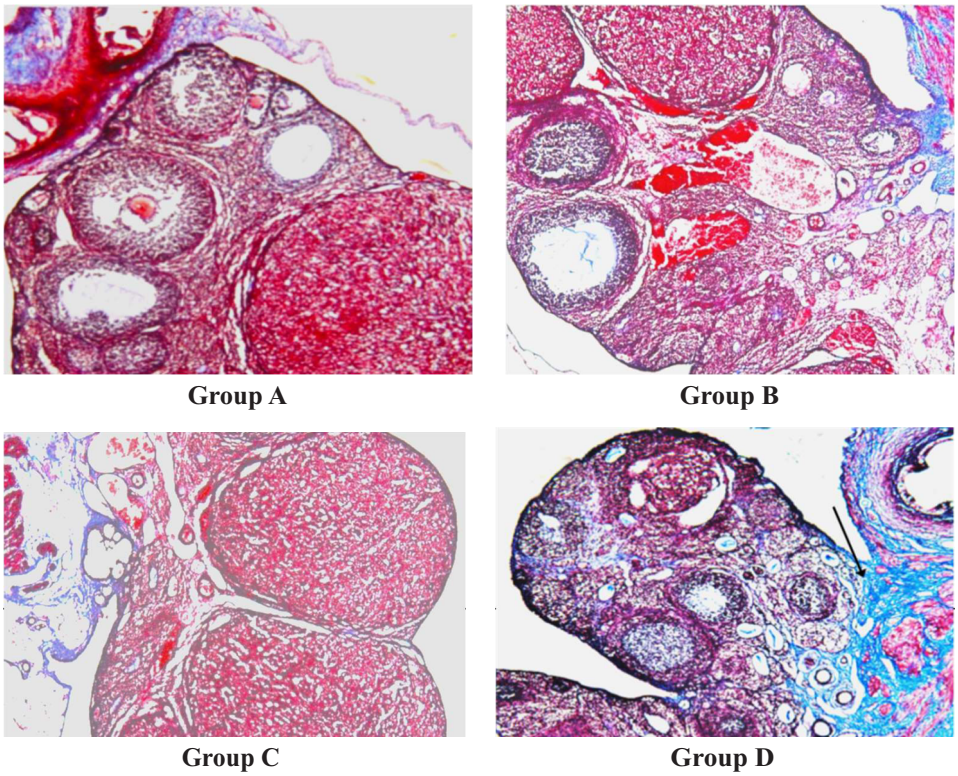


Figure 1: Masson's Trichrome Stained Section of Ovary Showing Fibrotic Tissue in Group D (Black Arrow) (5x magnification)

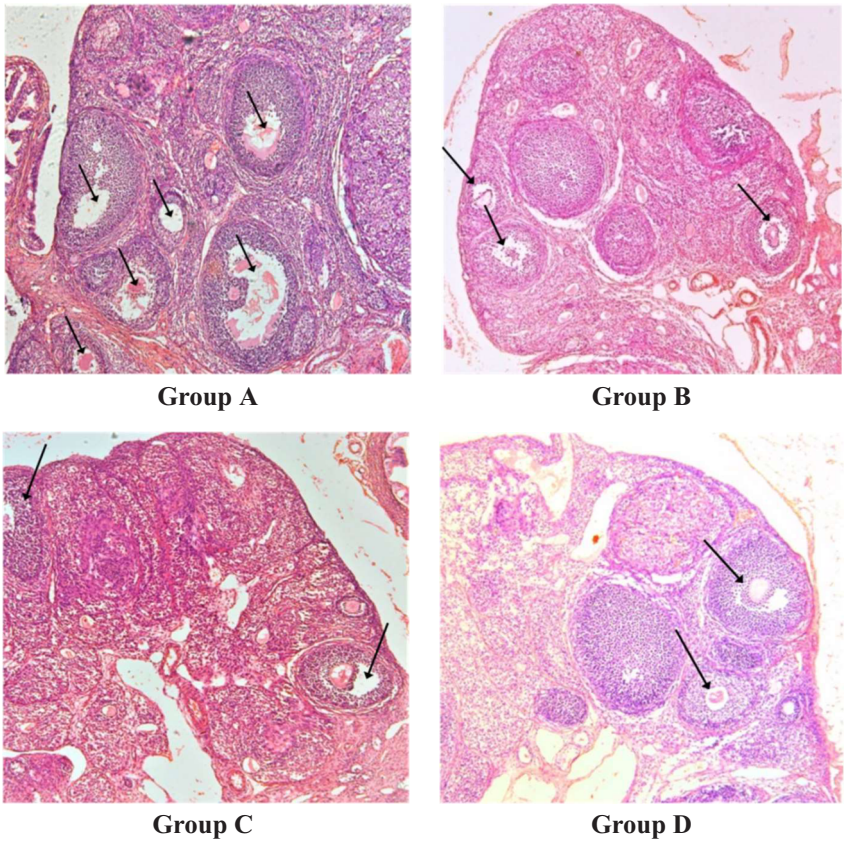


Figure 2: Number and Diameter of Follicles in Study Groups (H & E stain, 5x magnification)

Table 1: Comparison of the Number and Diameter of Primary & Secondary Follicles in Study Groups

Parameters	Group A	Group B	Group C	Group D	p-value
	Mean±SD				
Mean No. of Primary Follicles	2.75±1.25	0.95±0.9	0.83±0.56	0.79±0.51	0.01*
Mean No. of Secondary Follicles	0.93±0.77	0.41±0.25	0.58±0.3	0.45±0.53	0.36
Mean Diameter of Primary Follicles (mm)	176.5±11	142.5±27	80.5±54.23	52.83±42.4	0.01*
Mean Diameter of Secondary Follicles (mm)	357.31±91.36	119.38±93.88	82.16±70.82	47.33±42.64	0.001*

**p-value is generated by one-way ANOVA & its value ≤0.05 is considered significant*

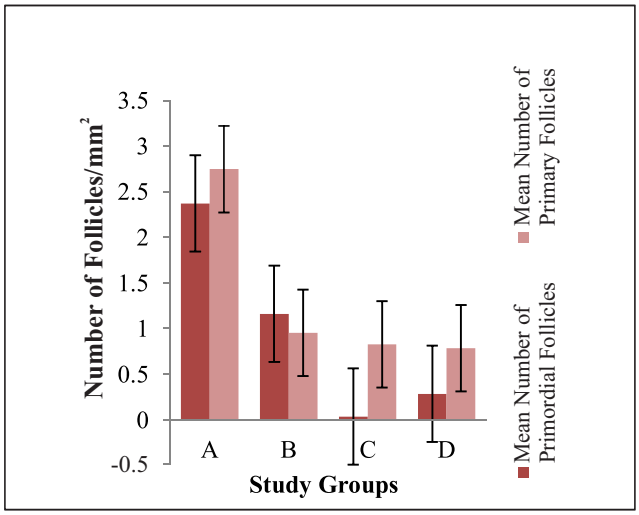


Figure 3: Comparison of Primordial and Primary Follicles in Study Groups

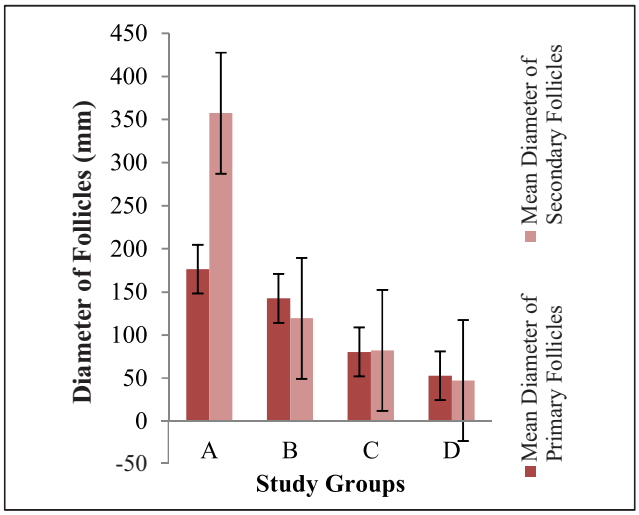
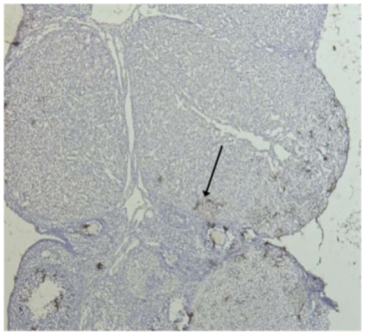
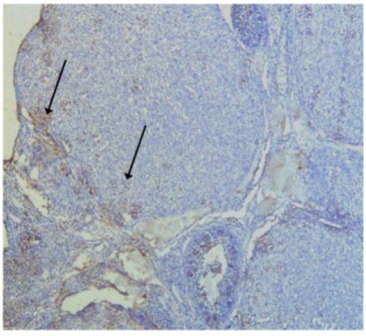


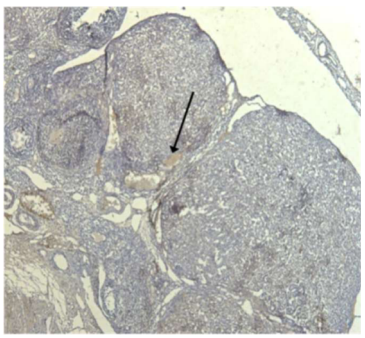
Figure 4: Mean Diameter of Primary & Secondary Follicles in Study Groups



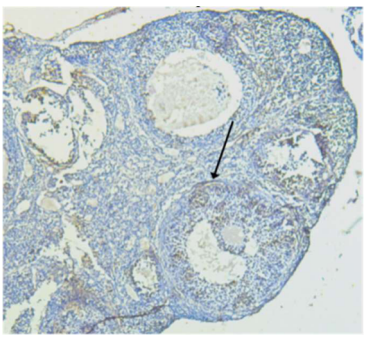
Group A



Group B



Group C



Group D

Figure 5: Immunohistochemcial Stained Slides of Study Groups (5x magnification)

Table 2: Comparison of Nitrotyrosine Expression between Control and Experimental Groups

Parameters	Grading	Group A	Group B	Group C	Group D	p-value
		Frequency & Percentage				
Nitrotyrosine Expression	<5% Positive Cells (0)	36(75%)	16(33.3%)	0(0%)	0(0%)	0.005*
	5-25% Positive Cells (1)	12(25%)	24(50%)	8(16.7%)	8(16.7%)	
	25-50% Positive Cells (2)	0(0%)	8(16.7%)	16(33.3%)	24(50%)	
	50-75% Positive Cells (3)	0(0%)	0(0%)	24(50%)	16(33.3%)	
	75-100% Positive Cells (4)	0(0%)	0(0%)	0(0%)	0(0%)	
Nitrotyrosine Strength	Absent (0)	0(0%)	8(16.7%)	0(0%)	8(16.7%)	0.626
	Weak (1+)	0(0%)	0(0%)	0(0%)	0(0%)	
	Medium (2+)	48(100%)	40(83.3%)	48(100%)	40(83.3%)	
	Strong (3+)	0(0%)	0(0%)	0(0%)	0(0%)	

**p-value is generated by Kruskal Wallis test & its value ≤0.05 is considered significant*

the experimental groups coincides with the findings of Ragi et al., where rats gained weight with time after consumption of aspartame.[11] This increased body weight due to the consumption of artificial sweeteners might be due to their effects on gut microbiota. These sweeteners decrease the concentration of gut microbiome, which leads to increased body weight and calorie consumption. Another study showed that ASP increases hunger by activation of receptors for sweet taste, which might be the reason for increased body weight.[12]

Microscopic results of the present study showed a decrease in the number and size of developing follicles in groups B, C, and D. These findings are comparable with previous reports on female reproductive organs, where a decreased number of mature and immature follicles as well as degenerative changes in corona radiata was observed in dose dependent manner when ASP was given for 30 days.[13] Another study conducted on male reproductive organs showed a decreased number of seminiferous tubules and sperm count in dose dependent manner when ASP was given for 90 days.[5]

The decreased number and size of follicles might be due to the toxic effects of methanol. It is a by-product of aspartame which liberates free radicals that affect the pituitary thyroid axis. A previous study showed thyroid stimulating hormone was disturbed after administration of aspartame. As thyroid receptors are also present in the ovarian tissue, any deficiency in thyroid hormone may indirectly affect the female reproductive system and may produce anovulatory cycles, one of the causes of infertility.[14] Furthermore, thyroid hormone receptors alpha1 and beta1 are present on the surface epithelium of ovarian tissue and also present on granulosa cells of mature follicles. The presence of these receptors on ovarian tissue indicates the role of thyroid stimulating hormone and thyroid hormone on structural and functional changes in ovarian tissue. Also, decreased thyroid hormones decrease the number and size of mature and immature follicles, which ultimately leads to anovulation.[15] In our study, the decreased number and size of follicles might be due to the effects of disturbance in the pituitary thyroid axis and decreased thyroid hormones.

The significant increased expression of nitrotyrosine among the experimental groups explains the dose dependent effect of aspartame on the histological changes in the ovarian tissue. This increased nitrotyrosine expression is due to protein oxidation and production of free radicals and limited antioxidant activity. These results coincide with the study done in 2022 where increased oxidative stress marker malondialdehyde was observed in polycystic ovarian syndrome, which in turn may cause ovarian aging by decreasing the number and size of mature follicles.[5] Similar findings of increased MDA levels were also observed by Ungurianu et al. According to them, increased MDA levels lead to increased stress and anxiety in rats which ultimately affect their hormones.[16] The increased oxidative stress in the current study might be the reason for histological changes in the ovary of aspartame administered groups.

CONCLUSION

The findings of decreased number and size of follicles and excessive oxidative stress indicated by the raised nitrotyrosine expression in dose dependent manner are highly suggestive that aspartame can deleteriously affect the microstructure of the ovary that can lead to infertility.

LIMITATIONS & RECOMMENDATIONS

Due to inherent time constraints, the duration of aspartame administration could not be prolonged more than 30 days to see the effects of long-term usage but this limitation was minimized by taking three different doses of aspartame from low to maximum tolerated dose and significant findings were achieved.

This experiment recommends that long-term studies with increased duration can explore this area further. Adding more parameters like levels of oxidative stress in serum and correlating it with tissue stress can be worth investigating.

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Original Article

Comparison of Lightweight and Heavyweight Prosthetic Mesh for Lichtenstein Repair of Inguinal Hernia

Rehana Raza, Zahra Raza, Fatima Batool, Manal Muzammil, Ahmad Bilal, Almas Kiran

ABSTRACT

Objective: To compare outcomes of lightweight mesh (LWM) versus heavyweight mesh (HWM) in inguinal hernia repair.

Methodology: It was a quasi-experimental study done at the General Surgery Department of Federal Government Polyclinic Hospital, Islamabad after ethical approval. One hundred and fifty six patients were enrolled using convenience sampling technique. Informed written consent was taken from the patients and they were divided into two groups, I and II. All patients had a Lichtenstein tension-free mesh repair. Patients in group I received HWM, whereas, those in group II received LWM. Then patients were followed-up on 1st day, 2nd week, 1st, 3rd, and 6th month post-surgery.

Results: Patients with LWM had significantly shorter operative and mesh fixation times than those with HWM. The postoperative pain and time to return to routine activity were also statistically reduced in patients with LWM (p-value <0.001). The mean hospital stay was not significantly different between the HWM and LWM groups (p-value=0.67). The postoperative complications were not linked to the mesh type except for foreign body sensation (p-value=0.02).

Conclusion: In the Lichtenstein method of inguinal hernia repair, the use of the lightweight mesh is better than the heavyweight mesh. It is associated with shorter operating time, less postoperative pain & foreign body sensation, and early recovery of the patients.

Keywords: *Inguinal hernia. Surgical mesh. Postoperative pain.*

INTRODUCTION

The inguinal hernia is a commonly encountered pathology in General Surgery. It affects 220 million individuals across the world and its frequency ranges from 1-31%.[1] It is responsible for 40,000 deaths and 3500,000 disability-adjusted life years.[2] Globally, more than 20 million inguinal hernia procedures are done each year.[1] Males have a 27.2% chance of acquiring inguinal hernia, while females have a risk of 2.6%.[3] Other predisposing factors of the disease are old age, low body mass index, abdominal wall weakness, high intra-abdominal pressure, smoking, jumping, coughing, and heavy weight lifting.[4]

The hernia repair has adopted various changes in recent years. Nowadays, the preferred technique is tension-free mesh repair, which is quickly replacing traditional suture repair (TSR). This is explained by numerous studies showing that mesh repair has lower recurrence rates than TSR. The surgical mesh provides firm reinforcement to the weakened area and facilitates collagen deposition.[5] A variety of meshes are available in the market. There are three types of mesh; light, medium, and heavyweight. Lightweight mesh has less weight and large pores. In contrast, heavyweight mesh has more weight and small pores. Controversy exists regarding the use of a mesh with the best results and lesser complications.[6] The complications of mesh repair include shrinkage, fistula, pain, infection, foreign body sensation, and recurrence. The most frequent issue following inguinal hernia repair is acute and long-lasting inguinal pain.[7] Around 10% of the individuals present with increased pain after surgery. This is attributed to poor quality of life interfering with the patient's work and social life. The majority of these complications occur with HWM.[8] Heavyweight prosthetic mesh induces a strong inflammatory response in the body, leading to pain and discomfort. Nowadays, lightweight proline mesh has been introduced which is inert, less dense, more flexible, partially absorbable, and has improved mechanical strength. It is associated with better tissue incorporation and less postoperative pain or discomfort.[9]

Our study was designed to compare the outcomes of LWM versus HWM in inguinal hernia repair and its effectiveness in improving the quality of life of patients after surgery. Literature has revealed that LWM is related to early pain relief and recovery of patients. The studies observing all surgical outcomes conducted in Pakistan are inadequate. Our study determined not only pain score but also other parameters such as operative time, mesh fixation time, hospital stay, return to routine activity, and postoperative complications. This study will contribute to improve the long-term goals of patient care, well-being, and health in surgical cases of inguinal hernia.

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METHODOLOGY

It was a quasi-experimental study done at the General Surgery Department of Federal Government Polyclinic Hospital, Islamabad. After taking ethical approval, the study was conducted from January to June 2020. One hundred and fifty six patients were enrolled using convenience sampling technique. Male patients with age ≥18 years having a primary and reducible inguinal hernia were included. The exclusion criteria were females, patients with strangulated or recurring hernia, chronic ailment, or concurrent infections. Informed written consent was taken from the patients and they were divided into two groups, I and II with 78 patients in each group. All patients had a Lichtenstein tension-free mesh repair. Patients in group I received HWM, whereas those in group II received LWM.

The heavyweight mesh used was non-soluble, monofilament with smaller apertures, and weighing 80-85 g/m^2. Lightweight mesh was a monocryl, captivated within 90-120 days due to hydrolysis leaving a mesh with a pore size of 3-4 mm and weighing 28 g/m^2. Demographic data was recorded on predesigned proforma. Patients were then operated in spinal anesthesia on the available elective list and a sufficient overlap was achieved using a 6x11 cm mesh. Patients were followed-up on 1st day, 2nd week, 1st, 3rd, and 6th month post-surgery. The outcomes assessed were operative time, mesh fixation time, duration of hospital stay, postoperative pain (both acute and chronic), and return to routine activity. Pain that lasts for 3 months is taken as acute and pain that persists for >3 months is labeled as chronic. The pain was assessed by visual analog score. It has a total of 10 points ranging from 0 ("painless") to 10 ("excruciating pain"). The incidence of postoperative complications was also noted in both groups.

STATISTICAL ANALYSIS

The entire patient information was recorded and analyzed in the Statistical Package for the Social Sciences (SPSS) version 25. The mean with standard deviation (SD) was estimated for numeric parameters such as age and pain scores. For categorical parameters, frequency and percentages were shown. The outcomes were compared between the two groups. An independent sample t-test was used for numeric data and a Chi-square test was applied for categorical data. For comparing postoperative pain between study groups at different time intervals, repeat measure ANOVA was used. A p-value of ≤0.05 was considered significant.

RESULTS

The average age of the patients was 46.21±17.07 years, with the youngest patient being 18 years old and the oldest patient being 90 years old. All the study participants were males. Group I had a mean age of 48.91±18.58 years, while group II had a mean age of 45.51±15.05 years (p-value=0.21). The right inguinal hernia was noted in 90(57.7%) patients followed by a left inguinal hernia in 58(37.2%) patients and bilateral inguinal hernia in 8(5.1%) patients.

Patients with LWM had significantly shorter operative and mesh fixation times than those with HWM. The mean hospital stay was not significantly different between the HWM and LWM groups (p-value=0.67). The postoperative pain was statistically reduced in patients with LWM at all the follow-ups (p-value=0.001). Similarly, the patients with LWM returned to routine activity earlier than those with HWM (p-value <0.001) (Table 1). Postoperative pain in study groups is shown in Figure 1.

The postoperative complications were not linked to the mesh type except for foreign body sensation (p-value=0.02). Foreign body sensation was reported in 5 patients and all of them were in group I. Recurrence was absent in both groups (Table 2).

DISCUSSION

Mesh repair, particularly the Lichtenstein technique, is the recommended treatment option for inguinal hernia. However, it is linked with the complications of chronic pain, wound infection, foreign body sensation, and recurrence.[10] To overcome this issue, different types of mesh have been synthesized. Literature has reported that LWM is associated with less complication than HWM.[11] This may be due to the large quantity of foreign material in HWM leading to an excessive inflammatory response. In contrast, the large pores of LWM promote collagen deposition and mesh integration into the abdominal wall with less inflammation.[12]

In our study, patients with HWM had a mean age of 48.91±18.58 years, whereas the mean age in patients with LWM was 45.51±15.05 years. In another study, the mean age was 38±24 years and 37.5±22.5 years in the HWM and LWM groups, respectively.[13] In a study by Lee et al., the mean age was 64 years in both groups.[14] In another study, the mean age was 45.26±14.4 years in the LWM group and 45.55±17.7 years in the HWM group.[15] Our results showed that most of the patients had a right inguinal hernia [90(57.7%)], followed by a left inguinal hernia [58(37.2%)] and bilateral inguinal hernia [8(5.1%)]. Similarly, Lata et al. reported right inguinal hernia in 57.1%, left inguinal hernia in 32.1%, and bilateral inguinal hernia in 10.7% of the patients.[15]

According to our results, the mean operative time and mesh fixation time were statistically less in patients with lightweight mesh. Regarding the average hospital stay, it was between 1-4 days, with an average stay of

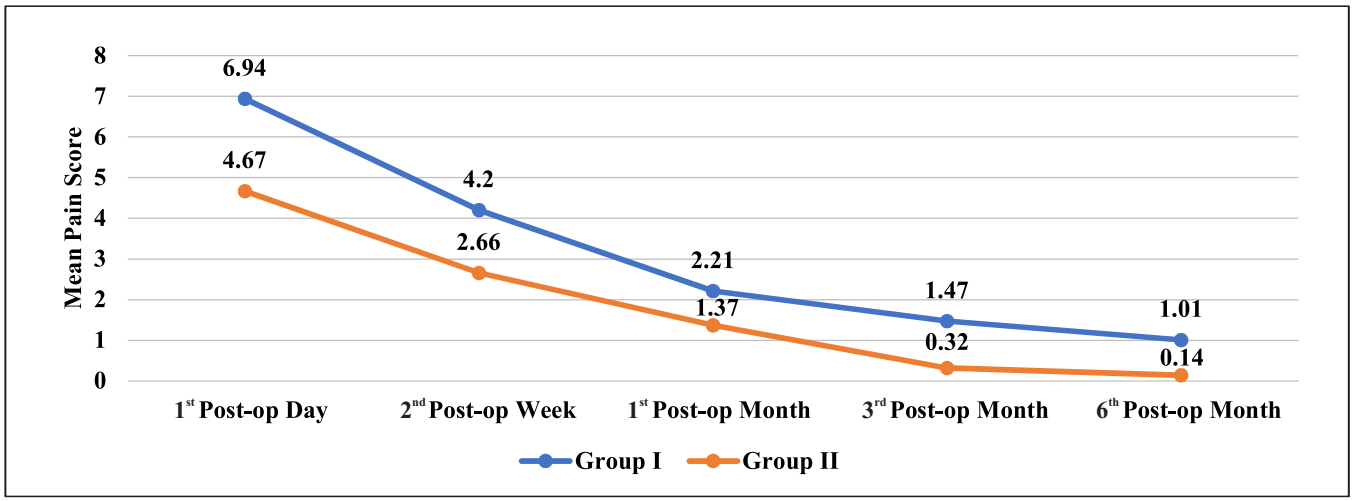

Figure 1: Comparison of Postoperative Pain in Study Groups

Table 1: Comparison of Outcomes between the Study Groups

Outcomes		Group I	Group II	p-value
		Mean±SD		
Operative Time (min)		61.3±12.55	53.5±13.05	0.0002*
Mesh Fixation Time (min)		14.25±3.65	13.05±3.9	0.04*
Hospital Stay (Days)		1.34±0.62	1.3±0.58	0.67
Postoperative Pain	**1st Day**	6.94±0.82	4.67±0.84	0.001*
	2nd Week	4.2±0.91	2.66±0.57	
	1st Month	2.21±0.41	1.37±0.66	
	3rd Month	1.47±0.59	0.32±0.54	
	6th Month	1.01±0.44	0.14 ± 0.35	
Time to Return to Routine Activity (Weeks)		2.88±1.25	1.82±0.54	<0.001*

**Significant p-value*

Table 2: Comparison of Postoperative Complications between the Study Groups

Postoperative Complications	Group I	Group II	p-value
	Frequency & Percentage		
Seroma	3(3.84%)	1(1.28%)	0.31
Hematoma	2(2.56%)	1(1.28%)	0.56
Wound Infection	1(1.28%)	1(1.28%)	1
Epididymo-Orchitis	1(1.28%)	0(0%)	0.31
Scrotal Edema	4(5.13%)	1(1.28%)	0.17
Foreign Body Sensation	5(6.41%)	0(0%)	0.02*

**Significant p-value*

1.34±0.62 days in patients with HWM and 1.3±0.58 days in LWM. This was not statistically significant. Similarly, the mean hospital stay did not statistically differ between the two groups in two other studies. They also found less operative & mesh fixation time in patients with lightweight mesh in their studies.[13,16] In a study by Verma et al., the mean length of stay was 8.6 days for patients with HWM and 5.6 days for patients with LWM.[17]

Our study showed a progressive decline in pain with time in both groups, whereas the reduction in pain was significantly more in group II, with an earlier return to normal activity. A study done at the Services Institute of Medical Sciences, Lahore supports our findings.[18] Other studies also found that patients with LWM had significantly less pain after surgery.[14,17] Sidharta et al. and Rutegard et al. also reported a statistical reduction in postoperative pain with LWM.[19,20]

A study showed no distinction in the pain scores between the two groups on initial follow-ups. However, at three months, patients with LWM had a significantly lower pain score than those with HWM.[16] In contrast, the pain score did not vary significantly between the two groups in a study.[21] A meta-analysis demonstrated a statistical reduction in pain after surgery with LWM than HWM.[22] Another study reported that patients in the lightweight mesh group returned to routine activities in less time as compared to patients in the HWM group.[13]

In our study, the postoperative complications were not linked to the mesh type except for foreign body sensation. Foreign body sensation was reported only in the patients of the HWM group. Lee et al. and Lata et al. revealed a significant difference in only foreign body sensation between the two groups, with a greater incidence in patients with heavyweight mesh.[14,15] Another study reported foreign body sensation in 15% of the patients with HWM and 10% of the patients with LWM.[17] According to a meta-analysis, light mesh is associated with a significant decrease in foreign body sensation.[22] In another study, the postoperative complications of seroma/hematoma formation, wound infection, recurrence, and foreign body sensation had no relation with the type of mesh. However, the incidence of epididymo-orchitis and scrotal edema was more in the HWM group, with statistical significance.[13] The results of another study revealed that seroma, wound infection, and recurrence rates were the same in both HWM and LWM groups.[19]

CONCLUSION

In the Lichtenstein method of inguinal hernia repair, the use of the lightweight mesh is better than the heavyweight mesh. It is associated with shorter operating time, less postoperative pain & foreign body sensation, and early recovery of the patients. So, LWM is a safe modality for Lichtenstein repair of inguinal hernia.

LIMITATIONS & RECOMMENDATIONS

It was a single-centered quasi-experimental study. A further multi-centered randomized controlled trial is recommended.

Conflict of Interest: None.
Source of Funding: None.

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Original Article

Comparison of Hydration Therapy and Amino Acid Infusion in Oligohydramnios and its Effect on Prolongation of Pregnancy and Amniotic Fluid Index

Shazia Tazion, Maimoona Hafeez, Shazia Rasul, Nishat Akram, Rukhsana Zafar, Rehana Kanwal

ABSTRACT

Objective: To compare intravenous hydration therapy (ringer lactate) with amino acid infusion in increasing amniotic fluid index (AFI) and its effect on prolongation of pregnancy.

Methodology: This quasi-experimental study was done in the Department of Gynaecology & Obstetrics, Sharif Medical City Hospital, Lahore from June 2021 to November 2022. Eighty patients were recruited from outpatient department (OPD), indoor, and emergency with idiopathic oligohydramnios fulfilling the inclusion criteria by convenience sampling technique. Informed consent was taken from the patients. Patients were divided into 2 groups; amino acid infusion group and ringer lactate therapy group. Patients were kept admitted for treatment and AFI was calculated at admission, 3rd day, and 7th day. All the information was collected on a proforma. Data was collected and statistical analysis was done on Statistical Package for the Social Sciences (SPSS) version 23.

Results: The mean gestational age in the ringer lactate group was 32.87±1.18 weeks, while in the amino acid infusion group it was 32.16±1.53 weeks. An increase in AFI on 3rd day was significant in the group which received ringer lactate as compared to the group which received amino acid infusion. Still, on the 7th day, this difference was not seen and the results were comparable. No difference in prolongation of pregnancy was seen in both groups.

Conclusion: Amniotic fluid index increase was seen with both the treatment modalities but significant change was seen on 3rd day with ringer lactate. On 7th day posttreatment, AFI increase was comparable between the two groups. Both treatment interventions led to pregnancy prolongation but no statistical difference was seen between the two groups.

Keywords: *Oligohydramnios. Amniotic fluid. Prolonged pregnancy.*

INTRODUCTION

Amniotic fluid is a cushion for fetus and it protects it from pressure, concussion, and also provides a medium for adequate fetal development and supply of nutrients. Amniotic fluid has bacteriostatic properties and it protects the fetus from infection.[1] Amniotic fluid production is initially regulated by flow across amnion and fetal vessels during early fetal life. Afterwards, amniotic fluid is produced by fetal skin up to 22-25 weeks of gestation, fetal lung secretions, and fetal urine after the second trimester. Fetal swallowing also plays a role in maintaining a balance.[2] There is a strong correlation between maternal plasma volume and amniotic fluid volume. Sonographic estimation of amniotic fluid volume was done for the first time in 1987. The deepest vertical pocket of liquor volume in four quadrants of the uterus and amniotic fluid index is calculated by summating all four measurements. Amniotic fluid volume increases gradually during pregnancy until 32 weeks of gestation. Amniotic fluid volume remains constant between 32-39 weeks. It decreases at the rate of 8% per week measuring 400 mL at 42 weeks.[3]

Oligohydramnios is defined as a single vertical pocket of 2 cm, or with an AFI of less than 5 cm. In many centers, AFI of 5-8 cm is considered as borderline AFI.[4] Idiopathic oligohydramnios is decrease in amniotic fluid volume in the absence of growth restriction with normal umbilical artery Doppler and in the absence of any underlying pathology. Moderate oligohydramnios is liquor volume 5-7 cm and less than 5 cm is considered severe oligohydramnios.[5] Oligohydramnios is associated with perinatal morbidity and mortality. It can lead to chronic placental insufficiency, cord compression, which in turn can lead to fetal hypoxia, poor lung development, intrauterine growth restriction, abnormal fetal heart patterns during labor, meconium aspiration syndrome, low Apgar score, neonatal intensive care unit admission, and stillbirth. Treatment options for oligohydramnios are hospitalization, bed rest, oral & intravenous (IV) hydration.[6]

Amino acid infusion is indicated for parenteral nutrition in patients with hypoproteinemia, malnutrition, and decreased intake. It increases AFI & fetal weight. So, it is beneficial for both mother & fetus in patients of oligohydramnios. Ringer lactate is a saline infusion which contains water and minerals. Idiopathic oligohydramnios is a common clinical

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presentation in Obstetrics. It can cause limb contractures, growth restriction, and delayed lung maturation.[5] Most of the previous literature explored the efficacy of one treatment modality or its comparison with healthy control. The comparative data between amino acid infusion and ringer lactate was not available. Based upon this observation, this study was done to find out a better treatment for idiopathic oligohydramnios cases.

METHODOLOGY

It was a quasi-experimental study done from June 2021 to November 2022 in the Department of Gynaecology & Obstetrics, Sharif Medical City Hospital, Lahore. Eighty patients were taken and divided into 2 groups (40 in each group). Patients with singleton pregnancy, gestational age between 28-34 weeks, AFI <8 cm (idiopathic oligohydramnios), patient not in labor with intact membrane at the time of selection, and non-anomalous fetus were included.

Patients having congenital anomalies of fetus, intrauterine death, multiple pregnancies, postdate pregnancy, preterm premature rupture of membranes, and pregnancy with medical disorders like pregnancy induced hypertension & diabetes, intake of diuretics, and non-steroidal anti-inflammatory drugs were excluded. Ethical approval was taken from the institutional ethical board. Patients were recruited from OPD, indoor, and emergency after fulfilling the inclusion & exclusion criteria. Detailed history and examination were done. The previous obstetrical record was reviewed. Any medical illness related to pregnancy was recorded. Obstetrical ultrasound was done to assess the liquor volume. Informed consent was taken from the patient before starting treatment. Ultrasonographic evidence of oligohydramnios was obtained. The amniotic fluid index was measured in all four quadrants of the uterus by sonologist. Single operator was selected to reduce the operator bias. Amniotic fluid index of less than 8 cm was taken as oligohydramnios. Patients were enrolled by convenience sampling technique. The amino acid group received amino acid infusion 500 mL and ringer lactate group received ringer lactate 1000 mL daily for one week. Liquor volume was assessed on day 3 and 7. After one week patient was discharged with further follow-up in OPD. Time from intervention till delivery & mode of delivery were recorded. Duration of prolongation of pregnancy (weeks) was also noted. All data obtained was entered on a predesigned proforma.

STATISTICAL ANALYSIS

Data was entered on Statistical Package for the Social Sciences (SPSS) version 23. Results were recorded and tabulated. Descriptive variables e.g., age & gravidity were presented as numerical data. Gestational age was expressed as frequency with percentage. Inferential statistics like independent student t-test was applied for categorical variables like AFI at the time of admission, 3rd & 7th day of treatment, and prolongation of pregnancy. A p-value of less than or equal to 0.05 was taken as significant.

RESULTS

Gestational age in the ringer lactate group was between 29-35 weeks with a mean of 32.87±1.18 weeks. In the amino acid group, it was 28-35 weeks with a mean of 32.16±1.53 weeks. Maternal age, gravidity, and duration of treatment in patients receiving ringer lactate and amino acid infusion are shown in Table 1.

The difference in AFI of the two groups was significant on 3rd day of treatment in the ringer lactate group, whereas the difference was not significant between the two groups at 7th day of treatment (Table 2). Regarding the prolongation of pregnancy, statistical comparison between the two groups was not significant (p-value=0.586). The gestational age of the patients at the time of delivery was also compared in both groups and no significant difference was found (p-value=0.067) (Table 3).

DISCUSSION

Oligohydramnios during 3rd trimester is associated with premature delivery and adverse neonatal outcome.[7] The treatment of idiopathic oligohydramnios is controversial in literature.[8] Oral amino acid and its infusion was given for the treatment of idiopathic oligohydramnios to increase the liquor volume. It increases maternal nutrition and has effect on fetal growth.[9] Maternal hydration by oral and intravenous route in different regimen is also linked with increased liquor volume.[10]

In this study, the age range of patients was between 20-36 years in both groups. This finding is comparable to a study by Vasanthamani et al.[1] Regarding gravidity, most of the patients in both groups were between 1st & 2nd gravida comparable to the finding of a study in which most of the patients were primigravida.[1] On contrary, another study reported that patients were 1st or 5th gravid.[11] Mean gestational age was 32 weeks in both groups in our study. These findings were comparable to a study done in Pakistan where the mean gestational age was 31.4±2 weeks.[7] The findings are different from the study done in India in which the mean age was 30 weeks in the study and control group.[1] The reason for this disparity could be the difference in inclusion criteria as we recruited patients from 28-34 weeks and they recruited patients from 24-34 weeks of gestation.

Regarding mode of delivery, most common mode of delivery in both groups was emergency lower segment

Table 1: Maternal Age, Gestational Age at Admission, Gravidity, and Duration of Treatment of Study Subjects

Study Variables	Ringer Lactate Group		Amino Acid Infusion Group	
	Range	Mean±SD	Range	Mean±SD
Maternal Age (Years)	20-35	27.6±4.56	20-36	28.3±3.73
Gestational Age at Admission (Weeks)	29-35	32.87±1.18	28-35	32.16±1.53
Gravidity	1-6	2.7±1.4	1-7	2.6±1.76
Duration of Treatment (Days)	3-38	22.53±8.78	2-40	21.33±10.77

Table 2: Mode of Delivery & AFI in Study Groups

Study Variables		Ringer Lactate Group	Amino Acid Infusion Group
Mode of Delivery	**Spontaneous Vaginal Delivery**	16(40%)	9(22.5%)
	Elective Lower Segment Caesarean Section	7(17.5%)	4(10%)
	Emergency Lower Segment Caesarean Section	17(42.5%)	27(67.5%)
AFI at Admission (cm)	**4-5**	25(62.5%)	27(67.5%)
	6-8	15(37.5%)	13(32.5%)
AFI at 3rd Day (cm)	**2-4**	1(2.5%)	7(17.5%)
	5-6	20(50%)	23(57.5%)
	7-8	19(47.5%)	9(22.5%)
	9-10	0(0%)	1(2.5%)
AFI at 7th Day (cm)	**2-4**	1(2.5%)	3(7.5%)
	5-6	4(10%)	5(12.5%)
	7-8	18(45%)	16(40%)
	9-10	17(42.5%)	16(40%)

Table 3: Comparison of AFI, Duration of Treatment, Gestational Age at Delivery, and Prolongation of Pregnancy in Study Groups

Study Variables	Groups	t-test for Equality of Means				
		Mean	t	p-value (Sig. 2-tailed)	95% Confidence Interval of the Difference	
					Lower	Upper
AFI at Admission (cm)	**Ringer Lactate**	1.63	-0.464	0.644	-0.265	0.165
	Amino Acid	1.68				
AFI at 3rd Day (cm)	**Ringer Lactate**	40	2.507	0.014*	0.149	1.301
	Amino Acid	40				
AFI at 7th Day (cm)	**Ringer Lactate**	40	1.258	0.212	-0.269	1.192
	Amino Acid	40				
Gestational Age at Delivery (Weeks)	**Ringer Lactate**	32.87	1.857	0.067	-0.0595	1.7145
	Amino Acid	32.16				
Prolongation of Pregnancy (Weeks)	**Ringer Lactate**	22.53	0.546	0.586	-3.173	5.573
	Amino Acid	21.33				

caesarean section (LSCS) and the rate of caesarean section was higher in the group receiving the amino acid infusion. This difference can be due to socioeconomic class and nutritional status of the female, which can affect the fetal condition leading to differences in the mode of delivery. These findings were supported by other studies in which study groups had rates of LSCS of 65% & 80%, respectively.[1,2] It differs from the finding of a study conducted in Ethiopia in which the rate of emergency LSCS in the intervention group was 14.7% as compared to the non-intervention group, which was 42.6%.[12] Our results showed that an increase in AFI on 3rd day was significant in the group which received ringer lactate as compared to the group which received amino acid infusion, but on 7th day this difference was not significant and the results were comparable. Regarding the prolongation of pregnancy, no significant statistical difference was seen between the two groups. Comparable results were found in another study in which normal saline and IV amino acid infusion showed similar results after 6 days of therapy.[2] Intravenous and oral hydration were compared in a study & they found IV ringer lactate is better than oral hydration in increasing the AFI.[9]

A study conducted in India included 52 pregnant females. These patients were divided into two groups. Intravenous amino acid infusion was given to group A patients on alternate days, whereas IV hydration was given to pregnant females included in group B. The mean AFI at the time of admission was 4.93±2.03 cm in the IV amino acid group and 4.22±2.00 cm in the IV hydration group. On the 14th day of therapy, mean AFI was increased in the IV amino acid group with a statistically significant difference (p-value <0.001).[13]

A single-blinded randomized controlled trial was conducted to compare the efficacy of IV amino acid and hydration therapy in patients of oligohydramnios. They reported significantly higher mean AFI in the amino acid group as compared to the IV hydration group (p-value <0.001).[14] Another study was conducted to evaluate the efficacy of IV hydration on AFI in patients of oligohydramnios. The study concluded that IV hydration therapy significantly increases AFI in pregnant females with oligohydramnios.[15]

In a comparative study, oral and intravenous amino acid therapy was compared. The study found more increase in amniotic fluid in the IV amino acid group as compared to oral therapy.[16] Another study was conducted by Shinde et al. to evaluate the effect of amino acid infusion and IV hydration. They reported a significant difference (p <0.001) in the mean AFI of both groups. In the amino acid group, the mean AFI was 7.52±2.04 cm and 5.89±2.20 cm in the IV hydration group.[13] A randomized clinical trial was conducted in Iran to compare the efficacy of hydration therapy in oligohydramnios. After 48 hours, a statistically significant difference was observed in the mean AFI of the intervention group & control group.[10]

CONCLUSION

Amniotic fluid index increase was seen with both the treatment modalities but a significant change was seen on 3rd day with ringer lactate. On 7th day posttreatment, AFI increase was comparable between the two groups. Both treatment interventions led to pregnancy prolongation but no statistical difference was seen between the two groups. So, both treatment options can be considered for the treatment of idiopathic oligohydramnios.

LIMITATIONS & RECOMMENDATIONS

Small sample was a limitation of this study. Further studies with a larger sample size and randomized controlled trials are recommended to support this finding.

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Original Article

Depression among Women using Different Contraceptive Methods

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ABSTRACT

Objective: To determine the frequency of depression among women using different contraceptive methods.

Methodology: It was a cross-sectional study conducted at the Department of Gynaecology, Jinnah Hospital, Lahore. Women of age between 20-45 years using contraception (oral contraceptive pill, condom, and intrauterine device) for 6 months were included in this study. A total of 196 women were enrolled after informed consent by non-probability convenience sampling technique. The participants were assessed for depression using Beck's depression inventory-II (BDI-II). The data was obtained by using a self-devised proforma. The women scoring 14 and above were classified to have depression.

Results: The mean age of women was 32.5±7.8 years. Out of 196 women, 112(57.1%) were between 31-45 years of age, while 84(42.9%) were between 20-30 years of age. Ninety four (48%) women had been using contraceptives for <1 year, while 39(19.9%) and 63(32.1%) reported using contraception for 1-2 years and >2 years, respectively. Sixty two (31.6%) women using contraception for at least 6 months had depression. Females with age more than 30 years and prolonged use of different contraceptive methods were found to have a significant association with depression.

Conclusion: The frequency of depression is high among women using different contraceptive methods.

Keywords: *Depression. Contraception. Intrauterine device.*

INTRODUCTION

Contraception is a way to prevent pregnancy. It gives couples the control to choose, when and how many children they want to have, so that they can provide better care for their children and invest in their future. For developing countries, contraception can also help control overpopulation, and benefit their environment, economy, and education.[1] Therefore, The Universal Declaration of Human Rights has included contraception as a basic human right.[2]

Globally, nearly 100 million women use various contraception methods.[1] There are two major types of contraception methods, hormonal and non-hormonal. Hormonal methods include oral contraceptive pills (OCPs), hormonal intrauterine devices (IUD), patches, implants, and injections. Barriers (male and female condoms), mechanical methods (like copper IUD), and surgical methods (i.e. male or female sterilization) are included in the non-hormonal methods group.[1]

Factors like spousal communication, combined decision-making, knowledge about using different contraception methods and their side effects, etc. play an important role in contraceptive use. Based on research, the side effects of contraceptives are the major reason of discontinuation of contraception; the fear of side effects and misconceptions about contraceptive methods are the main factors contributing to their underutilization.[3]

None of the available contraceptive methods is without side effects.[1] Two most common side effects that lead women to stop using contraceptives are mood swings and sadness.[4] Hormonal changes during reproductive years, along with mood swings are significant contributors to depression in women.[5]

Depression is one of the most disabling conditions worldwide, characterized by persistent feelings of sadness, loss of interest, emptiness & irritability, accompanied by physical and psychological changes that can significantly disturb daily functioning and can lead to suicide.[6] Women using hormonal contraceptives report a higher prevalence of depression, use of antidepressants, and even suicidal attempts.[1]

The objective of this study was to determine the frequency of depression among Pakistani women using different contraceptives. This is important because there is no previous research on this topic in the local population. The findings of this study can help women who are considering using contraception to understand the risks and benefits of different methods and make informed decisions about their reproductive and mental health. The study will also help healthcare providers to identify women who are at risk for depression and suggest suitable contraception methods accordingly.

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METHODOLOGY

It was a cross-sectional study conducted at the Department of Gynaecology, Jinnah Hospital, Lahore from January to July, 2022. Using non-probability convenience sampling technique, a total of 196 women fulfilling inclusion criteria were enrolled after informed consent. The inclusion criteria were females of age between 15-45 years and using any contraceptive method i.e. OCP, condom, and IUD for at least 6 months. The exclusion criteria were females with a history of depressive illness, infertility issues, in-vitro fertilization, and currently pregnant. The calculated sample size was 196 with a 7% margin of error and 95% confidence level taking an expected percentage of depression among women using different contraceptive methods as 47.8%.[7]

Depression was measured by the BDI-II questionnaire. It is a reliable and valid questionnaire with 21 item self-report inventory that identifies symptoms and attitudes of depression. Each item is evaluated on a severity scale ranging from 0-3 with a total score range from 0-63. A score of 14 or above was considered as depression.[8] All those females reporting depression were referred to psychiatry OPD as per standard hospital procedure.

STATISTICAL ANALYSIS

The data was entered and analyzed with Statistical Package for the Social Sciences (SPSS) version 25.0. Statistics for quantitative variables such as age, duration of contraception used, and BDI-II score were shown as Mean±SD. Qualitative data like contraceptive methods and depression were provided as frequencies and percentages. Data was stratified according to age, contraceptive technique, and contraceptive duration to account for potential impact modifiers and Chi-square test was performed to determine this association. A p-value of ≤0.05 was taken as significant.

RESULTS

A total of 196 females using different contraceptive methods for at least 6 months were included. The age range in this study was from 20 to 45 years with mean age of 32.5±7.8 years. Most of the females [112(57.1%)] were in the 31-45 years age group, while 84(42.9%) were in the 20-30 years age group.

Most of the females [107(54.6%)] were condom users, while 24(12.2%) and 65(33.2%) were IUD and OCP users, respectively. Majority of the females [94(48%)] were using contraceptives for <1 year, while 39(19.9%) and 63(32.1%) were using contraceptives for 1-2 years and >2 years, respectively. Out of 196 females, 62(31.6%) reported depression, whereas 134(68.4%) had no depression (Figure 1). It was found that age >30 years (p=0.001) and longer use of contraception was associated with depression (p=0.001) (Table 1).

DISCUSSION

This study found that depression is more common among females aged 31-45 years [52(46.4%)] than those aged 20-30 years [10(11.9%)]. Among contraceptive users, IUD users have the highest rate of depression [11(45.8%)], followed by OCP users [22(33.8%)] and condom users [29(27.1%)]. Additionally, the longer the duration of contraceptive use, the higher is risk of depression (p-value=0.001). Overall, depression was reported by women using contraception for 6 months and longer [62(31.6%)]. There was no statistically significant difference found in the prevalence of depression among users of OCP, condom, and IUD (p-value=0.183). However, a higher prevalence of depression was noted among women who were older than 30 years (p-value=0.001). These findings may suggest a link between the older age of women and the longer use of contraceptives with the increased risk of depression.

Alfaifi et al. reported that the prevalence of clinical depression among Saudi women using hormonal contraception was 43.3%, which is similar to those reported in Norwegian (24%) and Australian women (30%).[9] However, it is still unclear whether OCPs, IUDs, or condoms directly cause or exacerbate depression.

A study was conducted at King Fahad University Hospital to determine the prevalence of depression in women taking hormonal & non-hormonal contraception. They reported that 29% of females had depression. The rate of depression was higher in women using hormonal contraception as compared to non-hormonal contraception. They concluded that due to the use of hormonal contraceptive methods, the risk of depression increased by 1.267 times as compared to non-hormonal methods.[10] Another study reported that hormonal contraception is strongly linked to depression & mood changes.[11] A placebo-controlled randomized trial was conducted to determine the effect of combined oral contraception on mental health. At the end of the trial, they found no association of oral contraception with impaired cognition. The mental health impact of contraceptive interventions seems to be more closely linked to the users' psychological experiences & anxiety rather than to the therapeutic properties of the methods themselves.[12] Another study was conducted by de Wit et al. to evaluate the association between the use of oral contraceptives and depression. They reported that symptoms of depression were more prevalent in the young age group (16 years).[13]

You et al. found lower scores of sadness and suicidal ideation in non-condom users as compared to condom users. This may be attributed to the release of endorphins and dopamine during unprotected sexual

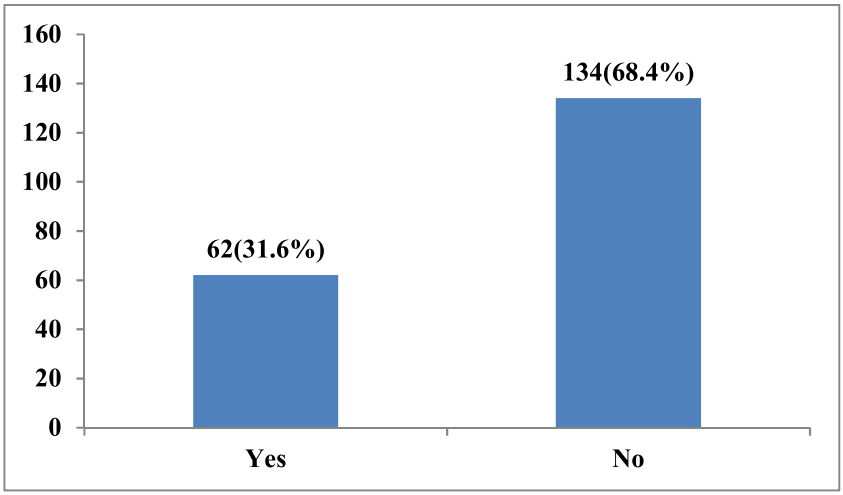

Figure 1: Frequency Distribution of Depression

Table 1: Association of Depression with Age and Contraceptive Use

Variables		Depression		Total	p-value
		Yes	No		
Age (Years)	**20-30**	10(11.9%)	74(88.1%)	84(100%)	0.001*
	31-45	52(46.4%)	60(53.6%)	112(100%)	
Contraceptive Methods	**OCP**	22(33.8%)	43(66.2%)	65(100%)	0.183
	Condom	29(27.1%)	78(72.9%)	107(100%)	
	IUD	11(45.8%)	13(54.2%)	24(100%)	
Duration of Contraceptive Use (Years)	**<1**	8(8.5%)	86(91.5%)	94(100%)	0.001*
	1-2	9(23.1%)	30(76.9%)	39(100%)	
	>2	45(71.4%)	18(28.6%)	63(100%)	

**Significant p-value*

activity, reducing depression scores and improving the mood of women.[14] A population based cohort study conducted in the UK suggested that the risk of depression increases during the first 2 years of use of contraceptive pills.[15]

Another study was conducted to evaluate the association between hormonal contraception and adverse mood changes. They concluded that women with a history of or ongoing mental health problems, as well as those who begin hormonal contraception at a younger age, are more likely to experience adverse mood symptoms caused by hormonal contraception. It emphasizes the importance of addressing both past and present mental health concerns during contraceptive counseling, emphasizing the need for appropriate treatment of ongoing mental health disorders.[16]

CONCLUSION

The frequency of depression among women using different contraceptive methods is high. The relationship between using different contraceptive methods and mental health is complex and determined by the interplay of biological, psychological, and social factors. Healthcare professionals can reduce the risk of depression among women using contraception by regularly screening for depression.

LIMITATIONS & RECOMMENDATIONS

It was a cross-sectional study and conducted in a single setting, so the results may not be generalizable to other populations. Further controlled trials in multiple settings are recommended to increase the generalizability of the findings.

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Source of Funding: None.

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Original Article

Increase in Nutritional Supplementation for Prevention of COVID-19 in General Population of Lahore

Mehreen Nasir, Aneeqa Mumtaz Joya, Iram Manzoor, Ayesha Younis

ABSTRACT

Objective: To evaluate the rise in supplement intake and their associated factors during COVID-19.

Methodology: This analytical cross-sectional study was conducted at the Department of Community Medicine, Akhtar Saeed Medical & Dental College, Lahore on the general population of Lahore. A pretested questionnaire containing information regarding socio-demographic data and supplement utilization before and during the pandemic was used to collect data through online Google forms. The sample size was 257 people selected with a 95% confidence level and 5% margin of error. The sample was collected with convenience sampling technique. The data was entered and analyzed in Statistical Package for the Social Sciences (SSPP) version 23. McNemar's test was used to test an increase in supplement intake. Chi-square test and multinomial logistic regression were used to analyze the factors associated with the increase in supplements.

Results: A statistically significant increase in supplement intake was observed during COVID-19 (p-value <0.0001). The most commonly used supplement was multivitamins. Female gender and age 26 to 50 years had high odds of supplement use. The most common perceived side effects of supplements were stomach pain, rapid heart rate, and constipation.

Conclusion: The usage of supplements for the prevention of COVID-19 increased by 21.4% during the pandemic. Females of age 26 to 50 years were more commonly found to use supplements.

Keywords: *Supplements. Pandemic. COVID-19.*

INTRODUCTION

The COVID-19 is widely recognized as a major global health catastrophe of the century and the greatest threat to world stability since World War II. This view is supported by the fact that the coronavirus has already infected more than one hundred countries.[1] On January 7, 2020, the World Health Organization (WHO) announced that a novel coronavirus discovered in a throat swab of one of the patients was the virus that caused the outbreak, and they named it "SARS-COV-2".[2]

The bioavailable forms of levels that are comparable to high dosages of vitamins and minerals are known as supplements. We refer to the nutrients in our diet that have a demonstrated nutritional or physiological effect as supplements. Data indicates that certain supplements can be helpful both for the prevention and therapy of SARS-COV-2.[3]

Due to a lack of an effective remedy during the epidemic, almost every country implemented a statewide lockdown, which had a disastrous impact on enterprises worldwide. However, the supplement industry saw a reversal of fortunes as the USD 101.38 billion worldwide dietary supplement market doubled in size by the year 2020 (about USD 220.3 billion).[4] Beginning in March 2020, sales of dietary supplements in the United Kingdom increased by 19.5%, with sales of vitamin C jumping by 110% and sales of multivitamin supplements increasing by 93%. In the first week of March 2020, zinc supplement sales in the United States had an increase that was 415 times higher than the comparable sales from the same week in the previous year.[5] Multivitamin supplementation boosts immunity.[6]

The findings of the first wave of the COVID-19 online trial by Google trends showed that 4.4% of the 2296 participants started using all supplements, while 9.3% started taking some supplements. According to the findings of the second wave of the COVID-19 study, 25% of participants were using at least one kind of supplement, and 9.3% were utilizing all types of supplements.[7] Another study conducted by the University of Chicago Medicine reported that the risk of obtaining a positive COVID-19 test increases in those who have low levels of vitamin D (less than 20 mg/mL). In addition to this, it was discovered that patients had a decreased risk of getting acute respiratory tract infections with supplement usage.[8] According to a study carried out in Karachi, Pakistan, the anti-inflammatory characteristics of vitamin C were beneficial in the treatment process, which led to a discernible improvement in clinical symptoms in COVID-19 patients.[9]

People may take dietary supplements without first consulting a physician during outbreaks of infectious

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diseases. Despite the fact that only people with a prescription from a physician or those who are nutritionally deficient (malnourished) should use dietary supplements because of the risk of adverse effects, the general public may increase their consumption of dietary supplements during pandemic times.[3] The goal of this study was to establish whether the increased consumption of dietary supplements by the general public during the pandemic was helpful or not. The study will also help in understanding the effects of daily consumption of dietary supplements on individuals who are concerned about COVID-19 in the local population.

METHODOLOGY

After receiving approval from the institutional review board, this analytical cross-sectional study was conducted at the Department of Community Medicine, Akhtar Saeed Medical & Dental College, Lahore. The study was carried out on the general population of Lahore from April to September 2021 through online Google forms. The sample size was calculated to be 257 at a 95% confidence interval and 5% margin of error using the anticipated frequency of supplement use to be 20%.[10] The sample was collected with convenience sampling from the general population of Lahore. All individuals above 18 years and both genders were included in the study. A self-structured questionnaire was used to collect the data. The questionnaire was developed after an in-depth literature search and was validated by a pilot study of 20 participants. Changes were incorporated in the final questionnaire. The questionnaire contained demographic variables of participants, questions regarding the use of supplements before and during the pandemic, and the factors associated with them. Participants who had already been diagnosed with COVID-19 were excluded from the study. The study was conducted after obtaining informed consent from respondents who were assured about data confidentiality.

STATISTICAL ANALYSIS

The data was entered and analyzed by Statistical Package for the Social Sciences (SPSS) version 23. McNemar's test was used to test an increase in supplement intake. We used the Chi-square test and binomial logistic regression to analyze the increase in supplement use and demographic variables (age, gender, marital status, educational status, residence) and perceptions. Significant factors ($p \leq 0.05$) on bivariate analysis were incorporated into the binary logistic regression, which resulted in the reporting of an adjusted odds ratio and 95% confidence intervals. A p-value less than 0.05 was taken as significant.

RESULTS

Out of the total 257 study participants, the mean age was 28.22±9.7 years. A total of 136(52.9%) were in age group 18-25years, 106(41.3%) were in age group 26-50 years, and 15(5.8%) were in age group above 50 years. There were 157(61.1%) males and 100(38.9%) females in the study. Ninety three (36.2%) participants were married and 164(63.8%) were unmarried. In our study, 217(84.4%) belonged to urban areas and 40(15.6%) belonged to rural areas. The educational status of participants showed that 6(2.3%) were illiterate, 3(1.2%) got primary education, 7(2.7%) did matriculation, 63(24.5%) got intermediate education, 143(55.7%) were graduated, and 35(13.6%) did postgraduation. Among study participants, 75(29.2%) had monthly income below 25000, 64(24.9%) had monthly income 25001-50000, 45(17.5%) had monthly income of more than 50001-75000, 16(6.2%) had monthly income more than 75001-100000, and 57(22.2%) had monthly income more than 100,000.

The use of supplement intake increased during the pandemic period. Out of 257 participants, 100(38.9%) of participants were taking supplements before the pandemic, whereas during the pandemic this number increased to 155(60.3%). McNemar's test was used to find out the statistical significance (<0.001) with the rise in supplement use (Table 1).

Perceived side effects of supplements were: 67(26.1%) had stomach pain, 64(24.9%) had rapid heart rate, 64(24.9%) had constipation, 61(23.7%) had nausea, 39(15.2%) had dizziness, 20(7.7%) had vomiting, and 1(0.4%) had diarrhea after taking supplements. Out of 257 total respondents, 98(38.1%) were taking supplements regularly and 159(61.9%) were not taking supplements regularly. Some respondents used more than 1 type of supplement. Out of total respondents, 169(65.8%) were taking multivitamins, 111(43.2%) were taking vitamin C, 100(38.9%) were taking calcium, 69(26.8%) were taking vitamin D, 62(24.1%) were taking zinc, and 1(0.4%) was taking folic acid. Out of 257 respondents, 121(47.1%) were taking supplements for less than 3 months and 136(52.9%) were taking supplements for more than 3 months.

The Chi-square test was used to find out supplement use with socio-demographic variables and perceptions about supplement intake (Table 2).

Gender was found significant subjected to binomial logistic regression as shown in Table 3. The results showed that the adjusted odds ratio for supplement intake by females is 1.966 with a 95% confidence interval (1.138 to 3.399).

DISCUSSION

This study was conducted to find out how the pandemic affected the population's consumption of and reliance

Table 1: McNemar's Test to Check the Rise in Supplement Intake during the Pandemic

Rise in Supplement Intake		Taking Supplements during Pandemic		p-value
		Yes	No	
Taking Supplements before the Pandemic	Yes	74	26	<0.0001*
	No	81	76	

**Significant p-value*

Table 2: Bivariate Analysis of Variables Associated with the Use of Supplements during the Pandemic

Variables		Supplement Intake during the Pandemic		Chi-Square	p-value
		Yes (n=155)	No (n=102)		
Gender	Females	71(46%)	29(18%)	7.81	0.005*
	Males	84(54%)	73(82%)		
Age (Years)	18-25	75(48.4%)	61(59.8%)	5.94	0.052
	26-50	73(47.1%)	33(32.4%)		
	Above 50	7(4.5%)	8(7.8%)		
Marital Status	Married	60(38.7%)	33(32.4%)	1.076	0.299
	Unmarried	95(61.3%)	69(67.6%)		
Educational Status	Illiterate	2(1.3%)	4(3.9%)	10.05	0.050
	Primary	3(1.9%)	0(0%)		
	Secondary	4(2.6%)	3(2.9%)		
	Intermediate	39(25.2%)	24(23.5%)		
	Graduate	79(51%)	64(62.8%)		
	Postgraduate	28(18%)	7(6.9%)		
Residential Area	Rural	20(12.9%)	20(19.6%)	2.636	0.142
	Urban	135(87.1%)	82(80.4%)		
Taking Supplements can Reduce the Risk of Getting COVID-19	Yes	136(87.7%)	54(52.9%)	38.656	<0.0001*
	No	19(12.3%)	48(47.1%)		
Advised to Take the Supplements	Yes	109(70.3%)	58(56.9%)	4.8	0.027*
	No	46(29.7%)	44(43.1%)		
Advised to use Supplements for COVID-19 by	Doctors	78(50.3%)	28(27.5%)	15.4	0.004*
	Friends	19(12.3%)	20(19.6%)		
	Social Media	10(6.5%)	10(9.8%)		
	Others	48(30.9%)	44(43.1%)		

**Significant p-value*

Table 3: Binary Logistic Regression Model Identifying Factors Associated with the Use of Supplements during the Pandemic Period

Variables		Beta	Significance	Using Supplements during Pandemic Adjusted Odds Ratio	95% CI of Supplement use during the Pandemic	p-value
Gender	Females	0.672	0.016	1.966	1.138 to 3.399	0.015*
	Males			Reference	Reference	

**Significant p-value*

on dietary supplements, as well as their perspectives on the use of supplements during COVID-19 and the type of supplements used. There has been a general increase in the consumption of dietary supplements and an accompanying rise in reliance among people of all ages and genders around the globe. There are a variety of factors contributing to this, including social and pharmacological factors, as well as an overall heightened awareness of the importance of one's health. This indicates that a rising number of people are consuming supplements in the modern day. One possible explanation is that people are becoming more health-conscious, but at the same time, they are falling prey to aggressive marketing campaigns in the media.[11]

This study revealed that there is a 21.4 percent increase in the uptake of supplements during the pandemic period which is statistically significant (p-value=0.00). This shows that approximately 60.3% population is taking supplements. This finding is similar to other studies which show that 50 to 70 percent of the population is using supplements during the pandemic period.[5] In our study, 73.9% of participants considered that they could avoid contracting COVID-19 with supplement use. This perception is supported by other studies that recommend supplements for boosting immunity.[12] It is important that other measures such as masks and safe distancing should not be ignored. Another study showed that 26.8% felt an improvement in their symptoms if they used supplements during COVID-19.[5]

Our study showed that the use of supplements was advised by doctors [106(41.3%)], friends [39(15.2%)], and social media [20(7.7%)]. Using supplements that are not recommended can lead to adverse effects and drug interactions in those people who are consuming other drugs or have conditions like liver or kidney disease. Social media is influencing the behavior of people in hand washing practices and even supplement or vitamin intake.[13] The most common side effects of supplements observed in our study were stomach pain, rapid heart rate, constipation, nausea, dizziness, vomiting, and diarrhea. These are similar to a previous study done in Saudi Arabia.[14] Further analysis revealed that most of the respondents [169(66%)] used multivitamins as a dietary supplement. Similarly, a study reported that 68% of the study population took multivitamins, thus making it the most frequently used dietary supplement.[15]

Our study showed that 155(60.3%) participants taking supplements felt that there was a reduced risk of COVID-19 with supplement intake. A study has shown that there is a decrease in the severity of disease with vitamin intake.[15] This may be due to a boost in immunity with vitamin intake. Another community survey in the UK showed that taking vitamins, probiotics, and omega-3 fatty acids reduce the likelihood of getting a positive COVID-19 polymerase chain reaction by 14%.[16]

The results of this study showed that the females have an increased likelihood of using supplements [adjusted odds ratio of 1.966 (95% CI: 1.138 to 3.399)]. Another study has shown that females used 1.3 times more vitamin C supplements during the COVID-19 pandemic than males.[17] Other studies show that female athletes and soldiers use more supplements and multivitamins than males.[18,19] This may be due to the fact that females are more inclined towards health and fitness. Our results indicated that age group between 26 to 50 years have an increased likelihood (adjusted odds ratio 2.523) of taking supplements than those aged below 25 years. Similar results were reported in another study. According to them, middle aged people take more supplements than the younger age group.[17]

CONCLUSION

The rise in nutritional supplement intake for the prevention of COVID-19 increased by 21.4% during the pandemic and the use was significantly higher in females of age 26 to 50 years. The increase in supplement use can be attributed to doctors, friends, and social media.

LIMITATIONS & RECOMMENDATIONS

The limitation of this study is that it didn't include the dose of supplement intake and the data was self-reported. It was a cross-sectional survey, hence causality cannot be established.

Multivitamins intake boosts immunity but they should be used with the recommendation of health care professionals. Multivitamins sold should be approved by the Drug Regulatory Authority of Pakistan, so that the recommended doses are followed by the companies.

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Original Article

Diagnostic Accuracy of Serum Uric Acid in First Trimester of Pregnancy for the Diagnosis of Gestational Diabetes Mellitus

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ABSTRACT

Objective: To assess the diagnostic accuracy of elevated uric acid in the first trimester of pregnancy for the diagnosis of gestational diabetes mellitus (GDM) keeping the oral glucose tolerance test as the gold standard.

Methodology: This cross-sectional study was done at the Department of Gynaecology & Obstetrics, Islamabad Medical Complex, NESCOM, Islamabad after ethical approval. A total of 455 booked pregnant females presenting within the first trimester were enrolled using non-probability convenience sampling technique. All participants were included after taking informed consent. Their blood sample was taken for uric acid analysis. Females were labeled as having normal (≤3.4 mg/dL) and high uric acid (>3.4 mg/dL). During 22-24 weeks of pregnancy, an oral glucose tolerance test (OGTT) was performed for diagnosing GDM. Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.

Results: In our study, 198(43.5%) pregnant females had GDM. Among the patients with GDM, 147(74.2%) of them had high uric acid level, with a significant association (p-value=0.00001). Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (LR+), negative likelihood ratio (LR-), and diagnostic accuracy of first trimester high uric acid keeping OGTT as the gold standard were 74.24%, 87.94%, 82.58%, 81.59%, 6.2, 0.29, and 81.98%, respectively.

Conclusion: The high uric acid level in the first trimester is a significant predictor of gestational diabetes mellitus with a diagnostic accuracy of 81.98%.

Keywords: *Gestational diabetes mellitus. Uric acid. Oral glucose tolerance test.*

INTRODUCTION

Gestational diabetes mellitus (GDM) has gained utmost importance owing to its adverse effects on maternal and child health. It is a condition of glucose intolerance that occurs in pregnancy when insulin is insufficient to combat the diabetes-inducing effects of various pregnancy hormones.[1] Most of the pregnancies are complicated by GDM, affecting approximately 14% of the females.[2] The chances of gestational hypertension and pre-eclampsia increase in pregnant females with GDM and the majority of them are delivered through caesarean section.[3] Both the mother and child are affected by GDM with a predisposition to coronary artery disease and type 2 diabetes mellitus. It is also a leading cause of financial constraints particularly in developing countries.[4]

Pathogenesis of GDM is still not clear. Genetic, environmental, and metabolic factors are involved in the disease pathogenesis.[5] Insulin resistance, induced by various placental hormones, is the key factor in the causation of disease. In addition, decreased secretion of insulin to meet the body's requirements also plays a role in causing the disease.[6] The pregnant females are screened for GDM after 20 weeks using oral glucose tolerance test (OGTT). Those having GDM are treated with dietary modification, physical activity, and drug therapy.[7]

Hyperuricemia is a predisposing factor for metabolic syndrome and GDM. High levels of uric acid damage endothelial cells, hence reducing their generation of nitric oxide (NO). Nitric oxide promotes the uptake of glucose by body tissues mediated by insulin. The decreased production of NO disturbs this normal phenomenon, leading to insulin resistance. Hyperuricemia also induces inflammation and oxidative stress, which also attributes to GDM.[8] There is a considerable reduction in serum uric acid in the first trimester owing to an increase in glomerular filtration rate and a decrease in the reabsorption of uric acid. Hyperuricemia in the first trimester can recognize pregnant females that have a strong predisposition to develop metabolic syndrome like GDM.[9]

Our study was designed to determine the relation of high uric acid in the first trimester of pregnancy with gestational diabetes mellitus. Our study also evaluated the diagnostic accuracy of first trimester high uric acid, comparing it to the gold standard oral glucose tolerance test for diagnosing GDM in our population. An oral glucose tolerance test is done between 22 to 24 weeks of gestation to diagnose GDM. High levels of uric acid in early pregnancy can be used for screening for GDM. Pregnant women with first trimester hyperuricemia can be considered a high-risk group for GDM and target groups for early prevention & treatment.

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METHODOLOGY

This cross-sectional study was done at the Department of Gynaecology & Obstetrics, Islamabad Medical Complex, NESCOM, Islamabad from 30th November 2021 to 29th May 2022 after ethical approval. After obtaining informed consent, 455 pregnant females were enrolled using non-probability convenience sampling technique. Booked cases of pregnant females with the age range of 18-40 years presenting within 12 weeks of gestation were included. Pregnant females with a history of diabetes mellitus, hyperlipidemia, coronary artery disease, hypertension or underlying chronic inflammatory conditions were excluded.

Demographic details like name, age, contact details, parity, and gestational history were taken. Their gestational age was confirmed on antenatal ultrasound and a blood sample was taken for uric acid analysis. Females were labeled as having normal (≤3.4 mg/dL) and high uric acid (>3.4 mg/dL). The patients were followed till 22-24 weeks of gestation. During 22-24 weeks of gestation, OGTT was done with 75 g of glucose for diagnosing GDM. Gestational diabetes mellitus was labeled based on the National Institute for Health and Care Excellence (NICE) criteria. Pregnant females with a fasting glucose level ≥5.6 mmol/L and 2-hour postprandial glucose level ≥7.8 mmol/L on OGTT with 75 g of glucose were diagnosed as having GDM.[10]

STATISTICAL ANALYSIS

The data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Mean and standard deviation (SD) were applied for quantitative data. Frequency and percentage were used for qualitative data. Chi-square test was applied to determine the relation between high uric acid & GDM and comparison of high uric acid with OGTT based on demographic variables. A p-value of ≤0.05 was considered statistically significant. A 2x2 table was made to estimate the measures of diagnostic accuracy taking OGTT as a gold standard. The measures of diagnostic accuracy were also stratified for age and parity.

RESULTS

The age of the pregnant females ranged from 18-40 years with a mean of 30.12±5.3 years. Most of them [232(50.99%)] were between 31 to 40 years of age. The mean gestational age was 9.24±1.8 weeks. Most of the patients had a parity of 3-5(54.51%) (Table 1). In our study, 198(43.5%) pregnant females had GDM. The mean level of serum uric acid was 6.21±1.54 mg/dL. Serum uric acid levels were high in 178(39.1%) females. Among the patients with GDM, 147(74.2%) had high uric acid level. Out of 455 females, 178(39.1%) had high serum uric acid and 277(60.9%) had serum uric acid within the normal range. Among 178 females with high serum uric acid, 147[True Positive (TP)] had GDM and 31[False Positive (FP)] had no GDM on OGTT. Among 277 females with normal serum uric acid, 51[False Negative (FN)] had GDM on OGTT, whereas 226[True Negative (TN)] had no GDM on OGTT. The association of high uric acid with GDM was statistically significant, with a p-value of 0.00001 (Table 2). This association was significant (p-value <0.00001) in pregnant females of all age groups and parity. Table 3 shows the comparison of high uric acid with GDM based on demographic variables of pregnant females. Overall sensitivity, specificity, PPV, NPV, LR+, LR-, and diagnostic accuracy of high uric acid in the first trimester keeping the actual OGTT as a gold standard were 74.24%, 87.94%, 82.58%, 81.59%, 6.2, 0.29, and 81.98%, respectively. Poststratified measures of diagnostic accuracy were also calculated for age and parity. The diagnostic accuracy of high uric acid was good in all age groups. The diagnostic accuracy was high in females with a parity of 1-2(90.82%). These results are shown in Table 4.

DISCUSSION

The frequency of gestational diabetes mellitus is increasing continuously on a global scale because of various epidemiological factors such as maternal obesity and increased age. Greater than 90% of cases of GDM are reported in developing countries.[11] It is of

Table 1: Study Variables of the Pregnant Females

Variables		Descriptive Statistics
Age (Years)	**Mean±SD**	30.12±5.3
	18-30	223(49.01%)
	31-40	232(50.99%)
Parity (Frequency & Percentage)	**1-2**	207(45.49%)
	3-5	248(54.51%)
Gestational Diabetes (Frequency & Percentage)	**Present**	198(43.5%)
	Absent	257(56.5%)
Serum Uric Acid (Frequency & Percentage)	**High**	178(39.1%)
	Normal	277(60.9%)

Table 2: Relation of High Uric Acid in the First Trimester with GDM

Uric Acid	GDM (Oral Glucose Tolerance Test)		Total	Chi-Square Statistic	p-value
	Positive	Negative			
High	147(TP)	31(FP)	178	188.55	0.00001*
Normal	51(FN)	226(TN)	277		
Total	198	257	455		

**Significant p-value*

Table 3: Comparison of High Uric Acid with OGTT Based on Demographic Variables

Study Variables		Level of Uric Acid	GDM		Chi-Square Statistic	p-value
			Positive	Negative		
Age Groups (Years)	**18-30**	**High**	62(TP)	18(FP)	93.96	<0.00001*
		Normal	18(FN)	125(TN)		
	31-40	**High**	85(TP)	13(FP)	87.36	<0.00001*
		Normal	33(FN)	101(TN)		
Parity	**1-2**	**High**	83(TP)	08(FP)	137.39	<0.00001*
		Normal	11(FN)	105(TN)		
	3-5	**High**	64(TP)	23(FP)	55.05	<0.00001*
		Normal	40(FN)	121(TN)		

**Significant p-value*

Table 4: Diagnostic Accuracy of First Trimester High Uric Acid Stratified on Demographic Variables

Study Variables		Sensitivity	Specificity	PPV	NPV	LR+	LR-	Diagnostic Accuracy
Age Groups (Years)	**18-30**	87.41%	77.50%	87.41%	77.50%	3.76	0.16	83.86%
	31-40	75.37%	86.73%	88.60%	72.03%	5.68	0.28	80.17%
Parity	**1-2**	88.30%	92.92%	91.21%	90.52%	12.47	0.13	90.82%
	3-5	61.54%	84.03%	73.56%	75.16%	3.85	0.46	74.60%

utmost significance to determine the risk factors and predictors of gestational diabetes to scale up its prevention at an early stage.[12]

In our study, pregnant females had a mean age of 30.12±5.3 years. The study participants had a mean age of 26.70±5.21 years in a study by Rehman et al. and 26.4±4.9 years according to Palaniappan et al.[13,14] Majority of the females (50.99%) were above 30 years of age in our study. Another study reported that most of the women (46.2%) were in the 26-30 years age group.[15] The average gestational age was 9.24±1.8 weeks in our study and 9.96±.37 weeks in another study.[13]

Our results revealed that the mean level of first trimester uric acid was 6.21±1.54 mg/dL. The mean uric acid level was 4.43±3.61 mg/dL in a study.[13] A study reported a mean uric acid of 2.9±0.9 mg/dL in the first trimester.[14] In our study, 43.5% females had GDM and among them, 74.2% had high uric acid. In another study, 39.6% of pregnant females had high uric acid in the first trimester and 19% of them developed gestational diabetes. On the other hand, only 4.7% of the women with normal uric acid had GDM.[15] A study demonstrated that 50-51% of pregnant females with high uric acid levels developed gestational diabetes.[16] A meta-analysis revealed a significant relation between high uric acid and GDM.[17] Another study reported that the chances of GDM increase with high uric acid in pregnancy particularly in the first trimester.[18] A study conducted in China found that a higher level of uric acid in early pregnancy is linked with greater chances of developing gestational diabetes, premature delivery birth, and low birth weight.[19]

A retrospective cohort study was conducted to determine the association between serum uric acid and the risk of GDM. They observed adverse pregnancy outcomes like GDM with preeclampsia, GDM requiring pharmacotherapy, large for gestational age infant, and preterm delivery. The study concluded that a high uric acid level before 24 weeks of gestation is strongly associated with the subsequent development of GDM. Increased uric acid has also a similar association with GDM requiring pharmacotherapy,

GDM with preeclampsia, and preterm delivery. They recommended that the best time for screening of serum uric acid is before 18 weeks of gestation.[20] Our results showed that the sensitivity, specificity, PPV, NPV, and diagnostic accuracy of first trimester high uric acid keeping the OGTT as a gold standard were 74.24%, 87.94%, 82.58%, 81.59%, and 81.98%, respectively. A study conducted in India reported that the sensitivity of serum uric acid in the diagnosis of GDM was 50% and its specificity was 67%.[21] Palaniappan et al. observed 100% sensitivity and 84.2% specificity of high uric acid levels.[14] Another study reported that hyperuricemia has a sensitivity of 77.8% and a specificity of 66.5%.[22]

CONCLUSION

The high uric acid level in the first trimester is a significant predictor of gestational diabetes mellitus with a diagnostic accuracy of 81.98%. It can be used as a screening tool for early diagnosis of GDM to reduce the morbidity & mortality of both mother & fetus.

LIMITATIONS & RECOMMENDATIONS

This study recommends that serum uric acid is simple, non-invasive, economical, and easily available investigation. So, it should be used as a screening tool for early prediction and management of gestational diabetes. The study determined the diagnostic accuracy of high uric acid to diagnose GDM at a cutoff of 3.4 mg/dL. Further studies should be conducted that measure the diagnostic accuracy at two or more cutoff values and construct a receiver operating curve (ROC) which can accurately select the optimal cut-off value.

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Original Article

Frequency and Antibiotic Susceptibility Pattern of *Klebsiella* Species in Blood Culture of Paediatric Population

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ABSTRACT

Objective: To isolate *Klebsiella* species in the blood culture of pediatric patients, evaluate its antimicrobial susceptibility, and determine the frequency of extended spectrum beta-lactamase (ESBL) among *Klebsiella* species.

Methodology: It was a descriptive cross-sectional study conducted at the Department of Microbiology, Children Hospital & Institute of Child Health, Lahore. A total of 2000 blood samples were enrolled in the study by convenience sampling technique. The blood samples received from various wards of the hospital were immediately processed in the laboratory by a semi-quantitative method as per standard protocol after the ethical approval of the committee. After the isolation & identification of the organisms, all the bacterial isolates were subjected to antimicrobial susceptibility testing by the Kirby-Bauer disc diffusion method.

Results: Out of 2000 study samples, 193 yielded *Klebsiella* species. Among *Klebsiella* species, *Klebsiella pneumoniae* (*K. pneumoniae*) caused more common bloodstream infections (BSIs) (87.6%) than *Klebsiella oxytoca* (*K. oxytoca*) (12.4%). Antimicrobial susceptibility testing revealed that *K. pneumoniae* and *K. oxytoca* were susceptible to chloramphenicol.

Conclusion: The *Klebsiella* species are among the significant pathogens for bloodstream infections in pediatric patients. The isolated *Klebsiella* species include *Klebsiella pneumonia*e and *K. oxytoca* with a predominance of *K. pneumoiae.* A significant antibiotic resistance (>70%) is exhibited by the isolated *Klebsiella* species against tested cephalosporin, fluoroquinolones, and aminoglycosides.

Keywords: *Klebsiella pneumoniae. Blood culture. Multidrug resistance.*

INTRODUCTION

Klebsiella are gram-negative bacilli commonly found in the environment and human microbiota. They can cause a broad range of infections, including bloodstream infections. It is associated with high morbidity and mortality rates. Blood culture is an essential diagnostic tool for identifying and isolating bacteria or fungi causing bloodstream infections.[1] By analyzing blood cultures, healthcare providers can determine the causative organisms and their antibiotic susceptibility, enabling targeted treatment strategies. Isolating *Klebsiella* species in blood cultures and identifying the susceptibility patterns provide valuable insights into these pathogens' prevalence, distribution, and antibiotic resistance patterns. The emergence of antibiotic resistance among *Klebsiella* species has become a global concern.[2] The ability of these bacteria to acquire and transfer resistance genes is leading to the development of multidrug resistance strains. This poses significant challenges in managing *Klebsiella* bloodstream infections as treatment options become limited and the risk of treatment failure increases.[3]

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Unfortunately, *Klebsiella pneumoniae* is an emerging microorganism among members of *Enterobacteriaceae* which produces AmpC β-lactamases. The increased incidence of antibiotic resistance among bacteria in resource-poor settings is due to the empirical use of antibiotics. To counter the antimicrobial properties of antibiotics, bacteria are equipped with effective mechanisms. Extended spectrum beta-lactamase is plasmid-mediated and confers broad resistance against penicillin, cephalosporin, and monobactam, except carbapenems.[4] Extended spectrum beta-lactamase producing *Klebsiella pneumoniae* can resist the third generation cephalosporin like cefotaxime, ceftriaxone, and ceftazidime. This is the predominant cause of childhood infections and presents notable challenges such as adverse outcomes, treatment failure, and high mortality and morbidity. Detection of ESBL is important because there are extremely limited antibiotic options for treating ESBL-producing organisms.[5] In several parts of the world, the prevalence of ESBL-producing *Klebsiella pneumoniae* strains ranges from 5-25% in hospitals. *Klebsiella* species are opportunistic pathogens and commonly cause nosocomial infections in immunocompromised patients.[6] There is no sufficient data about this bacterial infection in children of Pakistan. *Klebsiella* species frequency determination and their antibiotic susceptibility pattern in blood cultures is crucial for guiding appropriate antibiotic therapy and infection control measures. This study was designed to assess the prevalence and current antibiotic resistance pattern of the *Klebsiella* species in pediatric patients with bloodstream infections.

METHODOLOGY

It was a descriptive cross-sectional study conducted at the Department of Microbiology, Children Hospital & Institute of Child Health, Lahore. All blood samples collected from patients suspected to have bloodstream infections with age less than 10 years were included. The study was conducted from January to May 2021. Informed consent was taken from all the patients. The study was approved by the institutional review board of the institution. Convenience sampling technique was used. The unlabelled or mislabelled samples were excluded from the study. Three milliliters of venous blood were drawn and collected into the conventional blood culture bottles using the proper aseptic technique to prevent contamination. Samples were processed in the laboratory for culture, identification of organisms, and antibiotic sensitivity patterns. Samples were incubated at 37°C aerobically at room temperature for 18 to 24 hours. The bottle with signs of hemolysis, turbidity, production of gas, and pellicle formation was cultured on blood and MacConkey agar. The *Klebsiella* species on blood agar appear as small translucent, mucoid, raised, and non-hemolytic. It is lactose-fermenter and produces pink mucoid colonies on MacConkey agar. Biochemical tests i.e. citrate utilization test, triple sugar iron test, urease test, and indole test were used for further identification. Antimicrobial susceptibility was performed by the modified Kirby-Bauer disc diffusion method and interpreted according to Clinical & Laboratory Standards Institute (CLSI) guidelines 2020. A zone of inhibition or clear zone was observed. Extended spectrum beta-lactamase screening was performed using the clavulanate inhibition test method.

STATISTICAL ANALYSIS

Statistical Package for the Social Sciences (SPSS) version 24 was used to analyze the collected data. Categorical variables were expressed in frequency and percentage.

RESULTS

Out of a total of 2000 samples, 193 had positive bacterial growth (*Klebsiella* species) and 1807 either exhibited no growth or yielded growth of bacteria other than *Klebsiella*. The majority of positive blood cultures were of male patients [106(54.9%)]. Out of 106, 90(53.25%) were *Klebsiella pneumoniae* and 16(66.67%) were *Klebsiella oxytoca*. Eighty seven (45.1%) female patients showed positive growth in blood culture, from which 79(46.75%) were *Klebsiella pneumoniae* and 8(33.33%) were *Klebsiella oxytoca*. Out of 193 *Klebsiella* isolates, 169(87.6%) were *Klebsiella pneumoniae* and 24(12.4%) were *Klebsiella oxytoca* based on the indole test. The *Klebsiella oxytoca* was indole positive, whereas *Klebsiella pneumoniae* was indole negative. From 193 *Klebsiella* isolates, 71(36.7%) isolates of *Klebsiella pneumoniae* and 15(7.7%) isolates of *Klebsiella oxytoca* were ESBL positive (Table 1). Frequency of *Klebsiella* species isolated among paitents of different age groups is shown in Figure 1. The antibiotic susceptibility pattern of *Klebsiella* species showed the highest sensitivity towards chloramphenicol (Table 2).

DISCUSSION

Bloodstream infection is characterized by positive blood cultures and systemic signs of infection. It may either be primary or secondary to a documented source. *Klebsiella pneumoniae* accounts for more than 70% of all catheter associated bloodstream infections.[7] In this study, the susceptibility pattern and frequency of *Klebsiella* species causing bloodstream infections were evaluated.

Our results showed that 193 blood cultures yielded *Klebsiella* species. Out of 193, *Klebsiella pneumoniae* was 169(87.6%) and *Klebsiella oxytoca* was 24(12.4%). These results were comparable to the study conducted by Ali et al., which reported 84 isolates of *Klebsiella pneumoniae* and 4 isolates of *Klebsiella oxytoca* from 300 different clinical specimens.[8] Another study reported that 151 episodes of BSIs were identified per 100,000 population per year, the incidence of *Klebsiella pneumoniae* was 9.1, and *Klebsiella oxytoca* was 2.9.[9]

The study demonstrates that most of the positive cases were obtained from males, 106(54.9%) followed by female patients 87(45.1%). The study findings are in accordance with the study conducted at the Armed Forces Institute of Pathology, Rawalpindi, Pakistan where most positive cultures were from males 102(60%) followed by females 70(40%).[10]

Antibiotic-resistant strains are the most common cause of infection. The resistance is due to the prolonged use of antibiotics or the use of inappropriate antibiotics. The resistance of *Klebsiella* to the most commonly used antibiotics is due to ESBL production. Treatment approaches for these antibiotic-resistant organisms are limited because these organisms possess multidrug resistance phenotype.[11] In this study, 193 positive samples were collected from different wards and outpatient department patients. Seventy one (36.7%) isolates of *Klebsiella pneumoniae* and 15(7.7%) isolates of *Klebsiella oxytoca* were ESBL positive. Similar results were found in another study which showed that 28.2% (29/103) *Escherichia coli* and *Klebsiella* isolates were confirmed as ESBL producers by combination disc diffusion method out of 103 samples. Production of ESBL was 33.3% in *Klebsiella pneumonia*, 27.4% in *Escherichia coli,* and 16.7% in

Table 1: Frequency Distribution of the *Klebsiella* Species

Organisms	Frequency & Percentage	Male	Female	ESBL
Klebsiella pneumoniae	169(87.6%)	90(53.25%)	79(46.75%)	71(36.7%)
Klebsiella oxytoca	24(12.4%)	16(66.67%)	8(33.33%)	15(7.7%)

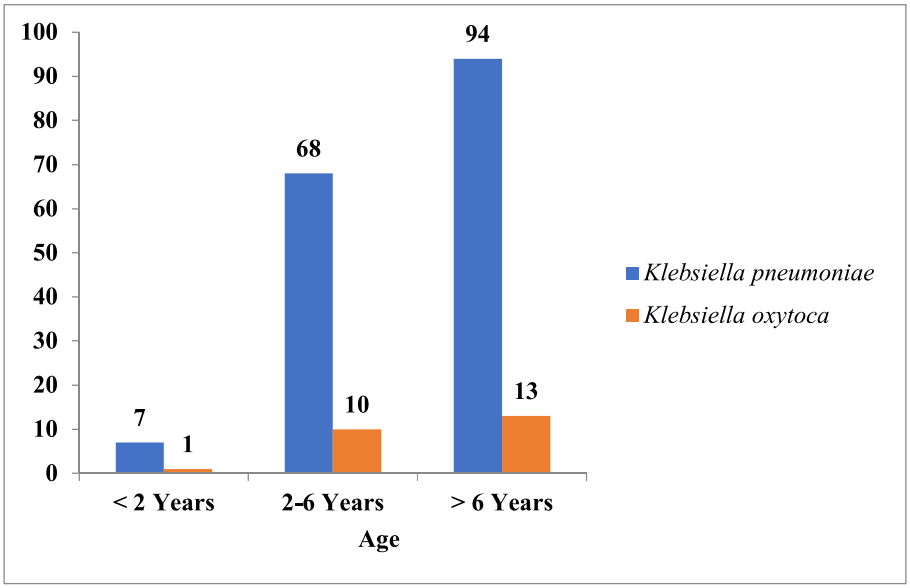

Figure 1: *Klebsiella* Species among Different Age Groups of Study Participants

Table 2: Antibiotic Susceptibility Pattern of *Klebsiella* Species

Antibiotics	Organisms			
	Klebsiella pneumoniae (n=169)		*Klebsiella oxytoca (n=24)*	
	Sensitive	Resistant	Sensitive	Resistant
Amikacin	41(24%)	128(76%)	4(17%)	20(83%)
Co-amoxiclav	19(11%)	150(89%)	4(17%)	20(83%)
Cefuroxime	5(3%)	164(97%)	4(17%)	20(83%)
Cefixime	5(3%)	164(97%)	3(13%)	21(87%)
Cefotaxime	22(13%)	147(87%)	4(17%)	20(83%)
Ceftazidime	15(9%)	154(91%)	4(17%)	20(83%)
Ceftriaxone	9(5%)	160(95%)	4(17%)	20(83%)
Cefepime	17(10%)	152(90%)	4(17%)	20(83%)
Ciprofloxacin	44(26%)	125(74%)	6(25%)	18(75%)
Levofloxacin	66(39%)	103(61%)	11(46%)	13(54%)
Moxifloxacin	54(32%)	115(68%)	7(29%)	17(71%)
Meropenem	39(23%)	130(77%)	4(17%)	20(83%)
Tobramycin	22(13%)	147(87%)	3(12%)	21(88%)
Co-trimoxazole	42(25%)	127(75%)	7(29%)	17(71%)
Chloramphenicol	81(48%)	88(52%)	13(54%)	11(46%)

Klebsiella oxytoca.[12] A study done by Dehshiri et al. showed that 62(31.3%) *Klebsiella pneumoniae* isolates have the gene phenotype of broad spectrum β-lactamase enzymes.[13]

Muller-Schulte and his colleagues conducted a study on clinical samples from a teaching hospital in Bouake. A total of 107 isolates were included and among all *K. pneumoniae* isolates, 90(84%) were ESBL producers.[14] A study was conducted in Iran to determine the antibiotic resistance pattern of *Klebsiella.* They

reported resistance to cephalexin, ceftriaxone, trimethoprim-sulfamethoxazole, and cefixime.[15] In the present study, *K. pneumoniae* and *K. oxytoca* demonstrated different susceptibility patterns to different antibiotics. Our data showed that 97% *of K. pneumoniae* showed resistance to cefuroxime and cefixime. Grundmann and his colleagues conducted a study on *Klebsiella pneumoniae* in a European Hospital where they studied 2703 clinical isolates, out of which 850(37%) *K. pneumoniae* were carbapenamase producing organisms.[16] In the current study, 54% *K. oxytoca* and 48% *K. pneumoniae* were sensitive to chloramphenicol. Regarding fluoroquinolones, *Klebsiella pneumoniae* showed 39% and 32% sensitivity to levofloxacin and moxifloxacin, respectively. *K. oxytoca* also showed significant resistance to tobramycin, cefixime, ceftriaxone, ciprofloxacin, co-trimoxazole, amikacin, and meropenem. *Klebsiella pneumoniae* is more prevalent than *K. oxytoca*. Multidrug resistance in *Enterobacteriaceae* is often the result of the acquisition of resistance genes by horizontal transfer. In addition, a large number of resistance genes are present on integrons carried by plasmids and transposons.[17]

CONCLUSION

The *Klebsiella* species are among the significant pathogens for bloodstream infections in pediatric patients. The isolated *Klebsiella* species includes *Klebsiella pneumonia*e and *K. oxytoca* with a predominance of *K. pneumoniae*. A significant antibiotic resistance (>70%) is exhibited by the isolated *Klebsiella* species against tested cephalosporins, fluoroquinolones, and aminoglycosides.

LIMITATIONS & RECOMMENDATIONS

The study was conducted on pediatric patients of a single tertiary care hospital. The sample size was relatively smaller as compared to the population of Pakistan. Furthermore, the study did not isolate strict anaerobic bacteria and fungi. Further multi-centered studies with large sample size are required to generalize the results.

The study recommends that all personnel handling blood samples should be taught the principles and practices of the aseptic technique. Good communication between the infection control unit and the hospital authority should exist. Patients with nosocomial infections should be separated from other patients to avoid cross-infection. Regular clinical meetings should be organized to discuss and review methods of handling clinical specimens. It is important to reduce the chances of infection in patients by cautious use of ventilators and intravenous catheters and prompt removal when they are not required.

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Original Article

Challenges of Mentoring Program: Perceived by the Stakeholders

Khadijah Mukhtar, Javeria Usman, Khizar Ansar Malik, Muhammad Ammar Qasim, Mahnoor Mukhtar, Uzma Shahid

ABSTRACT

Objective: To identify challenges faced by stakeholders of the mentoring program, i.e. mentors, mentees, and mentoring committee in the University College of Medicine & Dentistry, The University of Lahore.

Methodology: This qualitative exploratory study was conducted at the University College of Medicine & Dentistry (UCMD), Lahore. Six focus group discussions were conducted with 18 mentees, 12 mentors, and 6 members of mentoring committee. Two focus group discussions were conducted with mentors, three with mentees, and one with mentoring committee. Thematic analysis was performed after transcribing the recorded data.

Results: The major challenges faced by mentors are lack of a faculty development program, no incentives, mentees considered it a complaint box, lack of students' seriousness, and lack of authority. Major challenges faced by mentees are non-availability of mentors, non-confidentiality, untrained mentors, and improper scheduling. Major challenges faced by the mentoring committee are lack of committee training, lack of proper job descriptions, and improper channeling.

Conclusion: This study concludes that the issues faced by mentors, mentees, and the mentoring committee are serious and must be addressed for the smooth running of the mentoring program.

Keywords: *Qualitative research. Job description. Mentors.*

INTRODUCTION

Mentoring involves a long-term relationship where a senior person (mentor) guides and supports a junior person (mentee) throughout the period of education and training.[1] Mentoring to the students can have positive effects on mentees, mentors, and concerned educational institute.[2] Mentees experience supportive infrastructure, educational career advancement, and increased confidence in the college.[3] Mentors experience personal satisfaction, collegiality, networking, and career enhancement. College sees improved productivity in terms of future healthcare providers, and enhanced faculty skills.[2]

Mentoring has also been found to increase the academic success of students. Affective skills such as empathy, caring, altruism, and compassion are attributes in medical students. All too often, they are underdeveloped because of an exhaustive curriculum with minimal time for relaxation, high parental expectations, fear of ragging (in case of the first year), occasional humiliating behavior of teachers, loneliness, and other factors that make medical study difficult for most students. Mentoring program has been advocated to lessen the burden of this stress.[4]

Keeping in view of all this a "Mentoring Program" was initiated in the University College of Medicine & Dentistry, Lahore in 2014 for the new entrants of that year. The goal of the program was to provide the students with an immediate support network that can help students to reach their full potential, provide a supportive environment, and reassurance. A total of 750 students of all classes 1st, 2nd, 3rd, 4th, and final year MBBS were provided with a total of 60 mentors for group mentoring. Mentoring session was conducted once a month for 1 hour duration and incorporated in the timetable of the respective class.

A range of studies have highlighted the challenges of mentoring programs from the perspectives of different stakeholders. Mentors and mentees in undergraduate programs have differing views on the benefits and challenges, with role modeling and psychological support being particularly important.[5] Mentors have been seen to be often overburdened with heavy teaching loads or disproportionate administrative duties, resulting in inadequate time for research, professional development, and mentoring.[6] In an Eastern Ethiopian University, it was seen that about 75% of mentors and mentees had negative attitudes and only 25% responded positively towards the mentoring process.[7] Upon exploration of issues affecting the mentoring process, it has also been found that mentoring faces challenges such as limited time, teachers' negative attitudes, lack of motivation, and poor relationship between teachers and administrators.[8]

In teacher development programs, mentors have emphasized the need for more interaction, systematic

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observation, and mentor training.[9] These studies collectively underscore the need for tailored and well-structured mentoring programs that address the specific needs and challenges of different stakeholders. The rationale of our study was to highlight the main challenges daring stakeholders of the mentoring program, that is mentors, mentees, and mentoring committee in UCMD, UOL and how these challenges are hindering the growth and successful conduction of the formal mentoring program.

METHODOLOGY

This was a qualitative exploratory study conducted at the University College of Medicine & Dentistry, Lahore from August to December 2022. Ethical approval was provided by the ethical review board of the college. Six focus group discussions were conducted with 18 mentees, 12 mentors, and 6 members of mentoring committee. Two focus group discussions (FGDs) were conducted from the mentors (6 mentors in each group) of UCMD who had an experience of at least 2 years of mentorship. Similarly, three FGDs were conducted from the mentees of 1st, 2nd, 3rd, 4th, and final year MBBS students. Each group included 6 mentees. The last focus group had 6 members from the mentoring committee with 2 years of experience. In order to avoid selection bias, inclusion and exclusion criteria were identified through which participants were selected for interview purpose. Mentees and mentors who had attended at least 6 mentoring sessions were included in the study. Mentees and mentors who did not respond to two reminders for the FGD and who did not give consent to participate in the study were excluded.

Interview questions were prepared by the detailed literature search which were then validated by 2 expert medical educationists. Focus group discussions were conducted to identify challenges daring stakeholders of the mentoring program that is mentors, mentees, and the mentoring committee of UCMD. A total of five interview questions were designed based on the steps of the mentoring cycle. Participants were provided with a participant information sheet including a consent form. Data were obtained by conducting 6 focus group discussions with mentors, mentees, and the members of the mentoring committee at UCMD.

DATA ANALYSIS

The recorded data was transcribed by using Otter.ai which was then analyzed. After recording the interview, each interview was transcribed and sent to individual student and teacher for review purpose and confirmation in order to reduce observer bias. Atlas.ti qualitative data analysis tool was used for thematic analysis of the transcribed data. Themes and codes were carved out of the transcribed data. Detailed methodology and results were imprinted throughout to ensure transferability.

INTERVIEW QUESTIONS

1. What is your perception of your mentoring program? Is it good or bad, how and why?
2. Do you have any poor mentoring experience/bad interaction?
3. What challenges/difficulties have you faced in your mentoring program? (probe for not fulfilling time commitments, undue/over expectations, unfair manipulations, non-matching/ineffective mentors and mentees)
4. Do you want to change your mentor/mentees? If yes, why?
5. How can these difficulties be overcome?

RESULTS

This study focused on the challenges faced by the mentors, mentees, and mentoring committee. Participants chosen for this study are shown in Table 1. Table 2 shows the respective challenges faced by the stakeholders of the mentoring program i.e., mentors, mentees, and mentoring committee.

DISCUSSION

A regulated and official relationship between a doctor/teacher with more experience (the mentor) and a student (mentee) with less experience is referred to as a mentorship program in medical school. This program's objective was to offer the mentee opportunities for professional development in their medical career as well as mentoring and assistance. Mentorship has been highlighted as a vital aspect of the professional growth of medical students and residents.[10] According to a study, faculty, residents, and medical students can all benefit greatly from mentoring in terms of their professional development and general well being.[11] Our study showed that the lack of faculty development program, no incentive, complaint box, lack of students' seriousness, and lack of authority were the major challenges faced by mentors.

Another study was conducted to explore the difficulties

Table 1: Participants' Information

Gender	Mentors (n=12)	Mentees (n=18)	Mentoring Committee (n=6)
Male	5	6	1
Female	7	12	5

Table 2: Challenges Faced by Mentors, Mentees, and Mentoring Committee

Themes	Representative Quotations
Challenges Faced by Mentors	
Lack of Faculty Development Program	*"Only one workshop was conducted in an entire year which is not sufficient."*
No Incentive	*"At the start, mentors were given little bit of incentive at annual dinner, but now, no one appreciates our work and there is not even a single certificate of appreciation."* *"It seems like a burden to us."*
Complaint Box	*"Students always complaint only about hostel & transport issues, etc."*
Lack of Student's Seriousness	*"Attendance of the students is the issue. According to them, it's a waste of time and effort".*
Lack of Authority	*"Students don't want to share anything with us because they now know that we will not be able to approach the higher ups and will not be able to solve their issues and problems".*
Challenges Faced by Mentees	
Non-Availability	*"Most of the time, when we reach out to our mentor, office is empty. When I ask the staff, they say doctor sb is in OT".* *"In my and my peers' experience, usually it is really difficult to schedule time with a mentor from clinical side."*
Non-Confidentiality	*"In a group of this many people, I am not able to open up in front of our mentor."* *"My mentors used to discuss my issue in front of my class fellows."*
Un-Trained Mentors	*"My mentor doesn't even know how to talk to us".*
Improper Scheduling	*"For me, mentoring sessions themselves are so spaced out that sometimes it's really difficult to have good interaction to highlight the complaints"*
Challenges Faced by Mentoring Committee	
Improper Challenging Tasks	*"Student's results have not been shared with us by assessment cell and administration is also not supporting us regarding attendance of students. It is not an easy task for us to send attendance and results to the mentors."*
Lack of Committee Training	*"For us there is no training program. Since I joined this committee, till now, there is no training for us as a committee."*
Lack of Proper Job Description	*"When I joined this committee I didn't even know what to do. With some experience, now I am able to do some of the tasks which are insufficient."*

& challenges of residents during the mentoring program. They found similar concerns raised by mentors.[12]

Our study reported that mentors may find it challenging to assist a diverse range of students with various backgrounds, learning preferences, and professional aspirations. It can be time-consuming and difficult for mentors to continuously refresh their knowledge and abilities in order to keep up with medical breakthroughs.[13] Dealing with burnout and stress in learners, mentors may find it difficult to support learners which can have a detrimental effect on their health and learning.[14]

Our results showed that no incentives for the faculty member were highlighted by mentors. Similarly, in another study, it was reported that medical college mentors commonly face the challenge of no specific incentive which should be a part of the mentorship program. This demotivates mentors, as an incentive helps to increase job satisfaction and motivation.[15]

Moreover, mentees' engagement with mentoring program can also pose a problem with several studies reporting low student participation. Due to a lack of mentee engagement, mentees may not participate fully in the mentoring process or may find it difficult to build a solid rapport with their mentor.[16] Similarly, a study at King AbdulAziz University Faculty of Medicine, Saudi Arabia, reported that group meetings and one-on-one meetings were attended by only 60% and 49% of all students, respectively. The authors concluded that

sustained mentor and administration staff motivation is a prerequisite for a successful mentoring program.[17]

Non-availability of mentors, non-confidentiality, untrained mentors, and improper scheduling were the key issues reported by mentees in our study. Another study found that due to insufficient time commitment from mentors, many mentees struggle with mentors who are unable to commit enough time to the mentorship relationship.[14] It can also be challenging for some mentees to have a mentor who does not share their interests or goals for their career.[18] Finding a balance between teaching and clinical responsibilities is difficult. Mentors frequently have busy schedules, which makes it difficult for them to devote enough time to mentoring.[19] Resistance to feedback or criticism was highlighted by mentees in our study. This was also supported by a study indicating that certain mentees may find it difficult to take constructive criticism or feedback from their mentors, which might inhibit their professional development.[20] According to a study published in the Journal of Medical Education and Training, miscommunication and misunderstandings between a mentor and mentee might be detrimental to the mentorship relationship.[21] Mentors may not be sufficiently prepared for their responsibilities, which makes it difficult for them to effectively mentor their mentees.[22]

Our results showed that lack of mentoring committee training & proper job description and improper challenging tasks were the main issues reported by the mentoring committee. Due to inadequate evaluation and feedback, mentoring committees may find it challenging to accurately assess the mentoring process and offer feedback, which makes it difficult to maintain and expand the program. Mentoring committees may have trouble connecting mentors and mentees according to their needs and aspirations, which could make the mentoring connection less effective.[23] It was also observed that mentoring committees may encounter difficulties in providing adequate resources such as training programs or support networks to mentors and mentees.[14] Another study indicated that because of their other obligations, mentors and mentees may find it difficult to set aside adequate time for their mentoring activities.[16] A study of final year medical student and junior doctor mentorship programs at Great Western Hospital, Swinton found that despite 96% of students recommending the scheme, not all students felt that they needed a mentor, and 20% of students chose not to have any contact with their mentor. Nevertheless, students also faced challenges in finding a mentor. Only 44% of students were able to find a suitable research mentor with ease.[1]

CONCLUSION

Major challenges identified by mentors are less incentives, lack of authority, lack of mentor development plan, and non-seriousness of students. Improper scheduling, non-availability of mentors, untrained mentors, and breach of confidentiality are the main issues identified by the students. The mentoring committee also faces challenges such as a lack of job description and untrained mentors. So, these issues need to be addressed as soon as possible to improve the quality of the mentoring program.

LIMITATIONS & RECOMMENDATIONS

The study was only conducted in the University College of Medicine & Dentistry, Lahore. There are very few institutes with proper formal mentoring programs, so the sample size is small. Further research to collect data from multiple institutes with proper mentoring program is advised. The study recommends that mentees and mentors should be matched in a way that encourages their relationship to succeed. This may be through a validated matching process or mentees choosing their own mentor. Mentors should receive training in the requirements of the role and in delivering effective feedback. Incentives should be offered, for example, recognition of mentoring for promotion. Likewise, mentees should be made aware of what is expected of them.

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