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EDITORIAL

Health System Financing
Social Health Insurance vs Tax-Financed Health Systems

Muhammad Adnan Khan

Not Only Is A Healthy Society Possible; It Is Inevitable

All people are entitled to quality essential health services, without suffering financial hardship to pay for health expenses. This simple but powerful belief undergirds the growing movement towards universal health coverage (UHC), now a global commitment under the Sustainable Development Goals (SDGs).

The 17 Sustainable Development Goals (SDGs) adopted by the United Nations General Assembly (UNGA) consists of targets that primarily focus health.[1] Target 3.8 of SDG 3 - achieving universal health coverage (UHC), including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all – is the key to attaining the entire goal as well as the health-related targets of other SDGs.[2]

Strong, financially sustainable health systems create healthy citizens, who can then get the education and skills they need to thrive in a dynamic global economy. Health does indeed produce wealth (Figure 1).[3]

Figure 1: Health in SDG ERA[3]

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HEALTH SYSTEM FINANCING SPECTRUM

Traditionally, health care systems have been compared in terms of tax-financed Beveridge-type and contribution-financed Bismarck-type alternatives. The world is in the midst of a debate about the relative merits of social health insurance and tax-financed health systems. Most systems are hybrid of the two types and most have unique caveats embedded within.[4]

A ***tax-financed Beveridge-type,***[5] named after William Beveridge (1879-1963)[6] an economist and social reformer in the UK, detailed five "giant evils" in need of being addressed: want, disease, ignorance, squalor, and idleness. This model is funded by means of general taxation. Responsibility for the budget is in the hands of and under strong influence of the government. The organisation is often part of a pyramid shaped hierarchical bureaucracy with primary health care at the bottom and tertiary care teaching hospitals at the top and are geopolitically organised. Access to specialized care is dependent on a referral from a primary health care: the so-called gate-keeping system.[7]

A ***contribution-financed Bismarck-type,***[5] named in honour of Prussian Chancellor Otto von Bismarck, is funded by earmarked premiums, mainly from salaried population. The system is more loosely organised, with less state influence and more pluralistic, with a strong influence of health care providers and (social) insurers. There is often parallel access to primary and specialised care and no strict geographic distribution. Care is provided by profit/non-profit hospitals and individual practitioners.[8]

A ***National Health Insurance*** (NHI) system is a form of the Bismarck model and should be seen as a sub-category or variant of that group. While both NHI and Bismarck models are insurance-based, the main difference is that NHI models are single payer systems, as opposed to having multiple payers (insurance funds) like the pure Bismarck models.[5]

Most classifications of health systems do not discuss ***Out-of-Pocket (OOP)*** models as a separate category. However, since the majority of countries in the world are too poor and the governments too weak to institute a public health system of any kind, and as a result have OOP systems.[5] The comparison of different healthcare models are described in figure 2.[9]

No one system is entirely capable of delivering a comprehensive health coverage and most of the countries build their own models combining different aspects of each. Strictly speaking the Social Health Insurance and National Health Insurance frameworks do edge out the others in merits and demerits.[5]

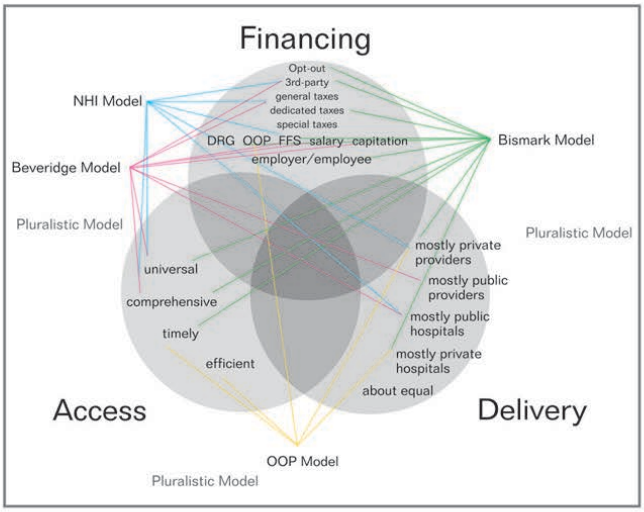

Figure 2: Comparison of Healthcare Models[9]

MERITS - DEMERITS

Contribution-Financed Bismarck-Type Financing Model

Healthcare insurance presents uncountable benefits. Numerous studies in developing and under developed countries have proven its potential. Health insurance reduces catastrophic health expenditures and out of pocket payments, it increases utilization of health services, and it improves health and well-being.[10]

It's a technically feasible and financially viable system providing equitable healthcare, stable financing, choice of services, and strong support of the population leading to infrastructure development. Health insurance has a way of mobilizing additional domestic resources for health, allowing organizational change for improved health system quality and efficiency which is easier to introduce through purchaser-provider splits and/or new provider payment mechanisms. It also extends financial risk protection to more people, or provide greater levels of protection to those already with coverage by replacing out-of-pocket spending with some form of prepayment and facilitates switching from private health insurance to social insurance. This additional financial protection is seen as a way of allowing more people to use needed services without incurring high out-of-pocket payments, effectively moving closer to universal coverage.[10]

Tax-Financed Beveridge-Type Financing Model

The establishment and performance of Tax-Based Systems depends on what politics makes possible in a particular country. Political instability and sensitivity to political pressures leads to irrational and inefficient decisions. People's expectations of the health service are unrealistic and underfunding due to small tax base and weaker institutional power effects the healthcare outcomes adversely.[11]

Tax-based systems are popularly known as "a poor system for poor people". Quality of care and efficiency is challenged with potential inefficiency in health care delivery. This primarily results from aging infrastructure, unresponsive staff, inability to downsize or reorient priorities, abuse of monopoly power, obsolete medical technology compared with the private sector, and waiting lists for nonemergency treatments. There's also varied access to medical care / health facilities because of geographical disparity.[12] Figure 3 showed the single-payer tornado as the single-payer healthcare which would force patients to wait for care, destroy million of jobs, hike taxes, ration prescription drugs and restrict research and development.[13]

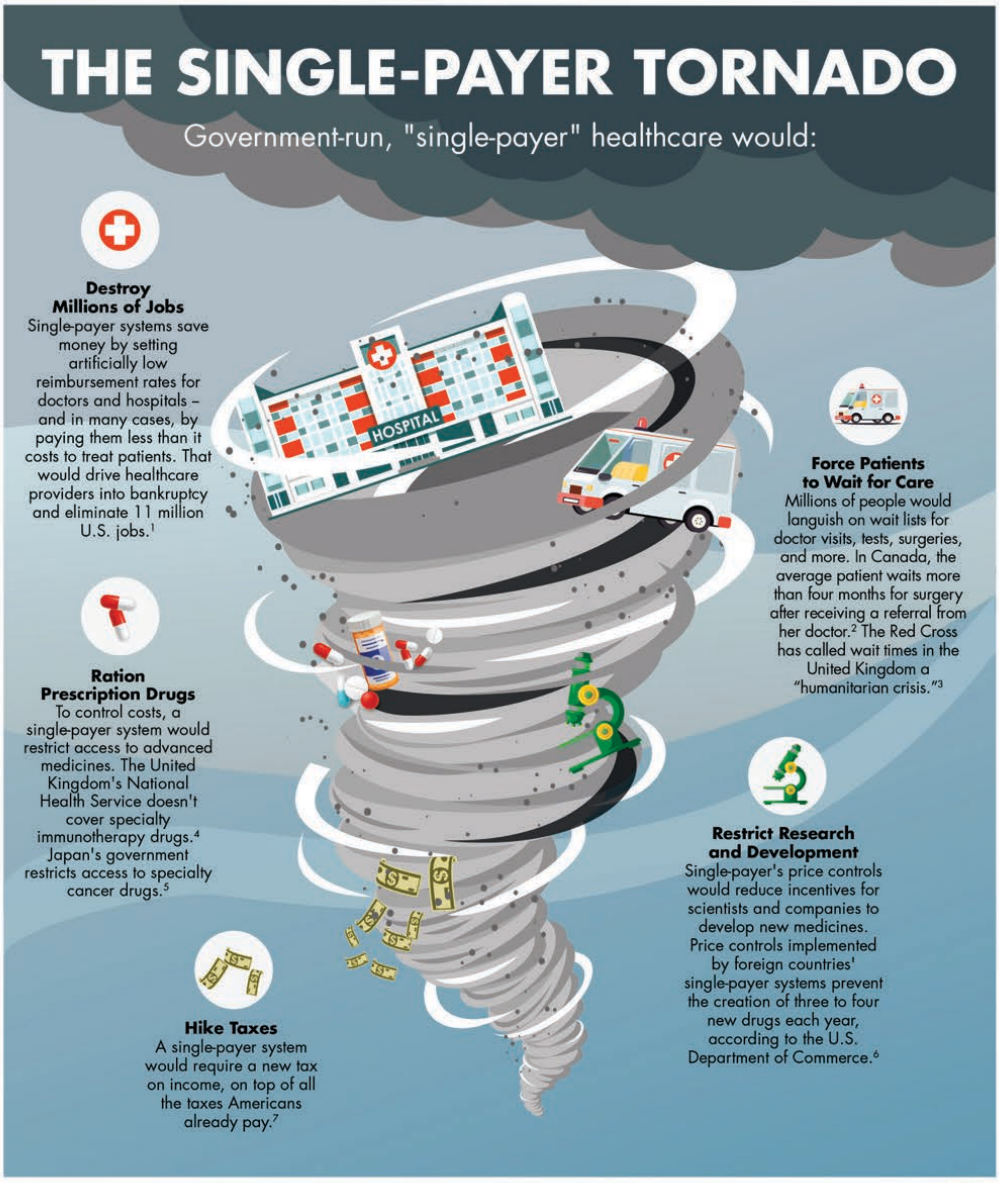

Figure 3: The Single Payer Tornado[13]

BISMARCK OR BEVERIDGE: A BEAUTY CONTEST BETWEEN DINOSAURS

Towards the Bev-Marck or Bis-Eridge Model?

The debate on 'which system is best', depending on health outcome indicators (*overall mortality rate, infant mortality rate & life expectancy*), healthcare expenditure indicators (*Health expenditure per capita, Health care expenditure as percentage of GDP)* and satisfaction with the healthcare system is challenging and widely points towards a hybrid system tailor made for a population. There are major differences for higher-income and middle or lower-income countries for an ideal setup to achieve universality.[14]

BISMARCK BEATS BEVERIDGE!

Bismarck systems dominate the top of EHCI ranking as reported in Euro Health Consumer Index 2016 (Figure 4).[15]

Beveridge systems offer conflicts between loyalty to citizens and loyalty to healthcare system/organisation. There's lack of business acumen in Beveridge systems; efficiency gains and cutbacks are mostly not differentiated.

Moreover, "Bismarck" systems do better than centrally planned "Beveridge" systems. Multiple professionals at multiple levels take better decisions and drive development better than central bodies where incentives driving quality and productivity are essential.[15]

EuroHealth Consumer Index 2016

Sub-discipline	Indicator	Albania	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	FYR Macedonia	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Lithuania	Luxembourg
1. Patient rights and information	1.1 Healthcare law based on Patients' Rights																					
	1.2 Patient organisations involved in decision making																					
	1.3 No-fault malpractice insurance																					
	1.4 Right to second opinion																					
	1.5 Access to own medical record																					
	1.6 Registry of *bona fide* doctors																					
	1.7 Web or 24/7 telephone HC info with interactivity																					
	1.8 Cross-border care seeking financed from home	n.ap.										n.a.	n.ap.							n.a.	n.a.	
	1.9 Provider catalogue with quality ranking																n.ap.					
	1.10 EPR penetration																					
	1.11 Patients' access to on-line booking of appointments?																					
	1.12 e-prescriptions																					
	Subdiscipline weighted score	73	108	104	66	108	73	87	111	108	108	90	118	104	63	73	115	80	83	87	97	101
2. Accessibility (waiting times for treatment)	2.1 Family doctor same day access																					
	2.2 Direct access to specialist																					
	2.3 Major elective surgery <90 days																					
	2.4 Cancer therapy < 21 days																					
	2.5 CT scan < 7days																					
	2.6 A&E waiting times																					
	Subdiscipline weighted score	163	200	225	150	175	125	213	150	163	150	188	225	188	125	125	163	100	138	113	175	200

Figure 4: Results of 2016 Euro Heath Consumer Index[15]

Healthcare is the cornerstone of the socialist state. It is the crown jewel of the welfare state.
Monica Crowley

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ORIGINAL ARTICLE

Frequency of OXA-48 Gene in the Enterobacteriaceae in a Tertiary Care Hospital in Lahore

Asma Yaqoob, Namra Yunus, Sameen Bint Ali, Hirra Ghaffar, Aqsa Aslam, Sadaf Nasir

ABSTRACT

Objective: The objective of this study was to determine the frequency of OXA-48 gene in the Enterobacteriaceae isolated from the clinical samples of hospitalized patients.

Methodology: This was a descriptive epidemiological study conducted at the Microbiology Department of Shaikh Zayed Hospital, Lahore. This study was approved by the ethical committee of the institution. The clinical specimens received in the Microbiology Laboratory for routine culture and sensitivity from the hospitalized patients were analyzed. Pure growths of 188 lactose fermenting Enterobacteriaceae were isolated from a diverse range of clinical samples from different clinical departments. The obtained bacterial growths were identified by their colony morphology and gram staining. After phenotypic identification by biochemical testing, these isolates were subjected to conventional PCR for confirming the presence of OXA-48 gene. The data was analyzed using SPSS version 24.

Results: Among 188 Enterobacteriaceae isolates, 60(31.9%) isolates were carrying OXA-48 gene. Most vulnerable age group harboring OXA-48 gene was 41-50 years (30%). There was a male preponderance of positive cases, as 51.7% of positive cases were recovered from male patients and 48.3% of female patients carried this gene. Majority of OXA-48 positive cases were isolated from urine samples (66.7%). Out of all the Enterobacteriaceae, *Klebsiella* species was the most common carrier (44%) of OXA-48 gene.

Conclusion: The global spread of antimicrobial resistance especially Carbapenem-resistant Enterobacteriaceae (CRE) in recent years has been exceptionally high. OXA-48, a member of carbapenem hydrolyzing enzymes of group-D is also emerging in Pakistan. Our study showed that the frequency of OXA-48 gene is high (31.9%) in Enterobacteriaceae.

Keywords: *OXA-48 gene. Carbapenemases. Enterobacteriaceae. Klebsiella.*

INTRODUCTION

Enterobacteriaceae is a major family of gram negative rods found primarily in the humans as a part of the normal flora of the colon.[1] The clinically important Enterobacteriaceae comprise 20-25 species. All the members of this class have a few characteristics in common.[2] These gram negative rods are facultative anaerobes, ferment glucose, oxidase negative and reduce nitrate to nitrite. Clinically, significant members are *Enterobacter, Escherichia, Klebsiella, Proteus, Salmonella, Serratia* and *Shigella.* This class is the commonest cause of many serious infections such as urinary tract infection (UTI), enteric fever, septicemia, pneumonia, peritonitis and meningitis etc.[3]

Although resistant strains among the gram-positive bacteria are emerging rapidly, the increasing incidence of antibiotic resistance among the gram negative bacteria is more worrisome.[4] Carbapenem-resistant Enterobacteriaceae (CRE) or carbapenemase-producing Enterobacteriaceae (CPE) is a group of gram negative bacteria, which are resistant to the carbapenem group of antibiotics. This group of antibiotics is usually considered as the drugs of last resort for complicated infections.[5] The resistance of these antibiotics can vary from moderate to severe. This class of bacteria can kill 50% of infected patients if unfortunately they get the septicemia. The excessive use of carbapenems is due to the worldwide increase of extended spectrum beta lactamases (ESBL) producing organisms in the past few decades, resulting in the emergence of carbapenem resistance.[6] Initially, this resistance appeared to be limited to bacterial species such as *Enterobacter cloacae*, *Citrobacter freundii*, *Serratia marcescens* and *Pseudomonas aeruginosa*, but after few years, the resistance also appeared in many other Enterobacteriaceae such as *Klebsiella pneumoniae, Salmonella species, Proteus mirabilis* and *Escherichia coli*.[7]

Carbapenems are a group of β-lactam drugs which include imipenem, meropenem, ertapenem and doripenem. Hospitals are found to be the primary cause of CRE-based infections. About 75% of hospital admissions which received the long-term care facilities caught such infections. Another major risk factor is being in such countries where easy availability of antibiotics and unregulated antibiotics distribution is very common. A study published in Japan reported that 6.4% of healthy adults are carriers of ESBL-producing strains as compared to 58% in Thailand, where antibiotics are usually available without a prescription.[8] Carbapenem resistance can be caused either by a decrease in porin expression along with the over-expression of cephalosporinases or by the

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carbapenemase itself.[9]

Nowadays, among the OXA-class, OXA-48 is spreading rapidly in various countries.[10,11] The first outbreak of OXA-48 producing *Klebsiella pneumoniae* was reported in 2003 in Turkey.[12] Now, OXA-48 resistance is found in Europe and in many countries along the Eastern and Southern part of the Mediterranean Sea.[13] It has also been reported in some Asian countries such as in Oman, Taiwan, Iran and Singapore. Although OXA-48 is the most prevalent carbapenemase in Europe and the Middle East, it is missed because its laboratory detection is difficult.[14]

The detailed genetic sequencing of *bla* OXA-48 is determined by the use of polymerase chain reaction (PCR). The gene is flanked by two copies of *IS1999,* located upstream and downstream of the *bla* OXA-48 gene in *Tr 1999*.[15] The spread of this resistance pattern is associated with a 62.5kbp plasmid (previous identification as a plasmid of 70kbp).[16]

Antibiotic resistance is posing many problems for clinicians as their treatment options are going to be limited. Some other important problematic factors are the wide-spread resistance, silent dissemination along with increased mortality.[17]

Active surveillance of at-risk patients should be a part of an infection control program so that early detection, isolation and sorting them can help us to control these infections to some extent.[18] Laboratories should determine the phenotypic methods for carbapenemase producing gram negative bacteria (GNB) screening because these are easy to perform and economical as well.[19] A comprehensive approach to combat antimicrobial stewardship should be taken both on the local and regional level.[20]

METHODOLOGY

A descriptive epidemiological study was conducted at the Microbiology Department of Shaikh Zayed Hospital, Lahore. This study was approved by the ethical committee of the institution. The clinical specimens received in the Microbiology Laboratory for routine culture and sensitivity from the hospitalized patients were analyzed. Pure growths of 188 lactose fermenting Enterobacteriaceae were isolated from a diverse range of clinical samples from different clinical departments. The obtained bacterial growths were identified by their gross morphology and gram staining. The routine biochemical tests including triple sugar iron (TSI), indole, motility, urease and citrate utilization tests were performed for growth confirmation. The confirmed bacterial growths were stored in glycerol broth at -80°C for PCR work-up. Conventional PCR was done on all 188 isolated Enterobacteriaceae after designing specific primers for OXA-48 genes.

STATISTICAL ANALYSIS

The data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 24. Data for age was described by using mean±SD. Data for gender and presence of OXA-48 gene was described by using frequency and percentages. Chi-square test was used to evaluate the significant p-value. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

Among the 188 clinical isolates of Enterobacteriaceae, 60(31.9%) isolates were the carrier of OXA-48 gene and the remaining 128(68.1%) isolates did not harbor this gene as shown in figure 1.

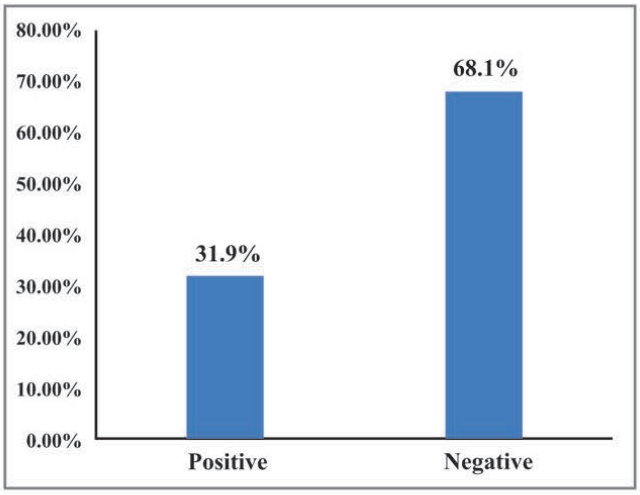

Figure 1: Frequency of OXA-48 Gene

All the age groups ranging from 1 day to 91 years were included in this study. This data shows that 41-50 years age group had the highest proportion (20.7%) of participants. Mean age of patients was 42±24.3 years. The most vulnerable age group harboring OXA-48 gene was 41-50 years as 30% of them were positive OXA-48 gene. The association of age with the presence of OXA-48 gene was found insignificant (p-value=0.117). Male preponderance was observed in this study. The percentage of male and female participants was 52.7% and 47.3% respectively. Out of 99, 31(51.7%) of male participants carried OXA-48 gene and out of 89 females, 29(48.3%) of female participants were the carrier of this gene (p-value=0.85) (Table 1).

Table 1: Association of OXA-48 Gene Status with the Demographic Characteristics

Demographic Variables	OXA-48 Gene				p-value significance
Age	Positive		Negative		
	n	%	n	%	
<1 year	11	18.3	20	15.6	0.117
1-10 years	1	1.7	2	1.6	
11-20 years	2	3.3	9	7	
21-30 years	4	6.7	6	4.7	
31-40 years	4	6.7	14	10.9	
41-50 years	18	30	21	16.4	
51-60 years	7	11.6	17	13.3	
61-70 years	11	18.3	13	10.2	
71-80 years	1	1.7	23	18	
>80 years	1	1.7	3	2.3	
Gender					
Male	31	51.7	68	53.1	0.85
Female	29	48.3	60	46.9	

The majority of the samples that were tested during the study period were urine specimens (70.2%) followed by pus samples (13.8%). Most of the OXA-48 positive isolates were recovered from urine samples (66.7%) followed by pus (20%). No significant association between OXA-48 gene and clinical specimens was observed as the p-value was calculated as 0.749 (Table 2).

Table 2: Association of OXA-48 Gene Status with the Clinical Samples

Types of Clinical Samples	OXA-48				p-value significance
	Positive		Negative		
	n	%	n	%	
Urine	40	66.7	92	71.9	0.749
Pus	12	20	14	10.9	
Sputum	4	6.7	6	4.7	
Body Fluids	2	3.3	7	5.5	
Endotracheal tubes	2	3.3	4	3.1	
Blood	0	0	5	3.9	
Total	60	31.9	128	68.1	

Among the isolated clinical samples, 58.5% were *E. coli*, 38.3% were *Klebsiella* species, 2.7% were *Enterobacter* species and only 1(0.5%) was *Citrobacter.* Out of all these Enterobacteriaceae, *Klebsiella* species was the most common (44%) carrier of OXA-48 gene. The significant relationship of OXA-48 gene with the isolated Enterobacteriaceae with p-value of 0.004 was detected. These results are shown in table 3.

Table 3: Frequency of Enterobacteriaceae Isolated from the Clinical Samples & their OXA-48 Gene Status

Enterobacteriaceae	Total Isolates	OXA-48 Gene		p-value significance
		Positive	Negative	
E. coli	110(58.5%)	27(25%)	83(75%)	0.004*
Klebsiella	72(38.3%)	32(44%)	40(56%)	
Enterobacter	5(2.7%)	1(20%)	4(80%)	
Citrobacter	1(0.5%)	0(0%)	1(100%)	
Total	188(100%)	60(31.9%)	128(68.1%)	

***Significant p-value ≤0.05**

DISCUSSION

Bacterial resistance to antibiotics has become a major public health issue worldwide. Although carbapenemases spread appears to be quite recent, the 'big players' which are New Delhi Metallo-β-lactamase (NDM), *Klebsiella pneumoniae* carbapenemase (KPC) and OXA-48 are now widely distributed. The Indian subcontinent actually acts as a reservoir for all three types of carbapenemases. OXA-48 has been identified only in Enterobacteriaceae species as compared to KPC and NDM which have been identified in unrelated gram negative species. The use of the rapid diagnostic technique is key to control disasters effect produced by these resistant strains[21].

According to a study by Hsu et al., carbapenem resistance had risen from 1% and 3% for clinical isolates of *E. coli* and *Klebsiella pneumoniae* respectively in 2009 to 5% and 18% respectively by 2014.[22] Snitkin et al. reported in their study that Enterobacteriaceae containing OXA-48 gene were initially isolated from Turkey and then rapidly spread all over the world. These class-D carbapenemases had been emerging as a superbug in many countries of the world. Many countries of the Middle East (Lebanon, Oman and Saudi-Arabia), Africa and Europe had recently reported the presences OXA-48 containing Enterobacteriaceae.[17]

As sufficient data was not available in Pakistan, the exact prevalence of OXA-48 gene is not known. Local data was collected from Aga Khan University but these statistics had no details about specific classes of carbapenemases.[22] In this current study, OXA-48 gene was detected from Enterobacteriaceae and later confirmed by conventional PCR. So to the best of our knowledge, this is the first report confirming the presence of *bla* OXA-48 harboring GNB from this region.

A study by Ma et al. identified the first cluster of OXA-48 carbapenem-resistant *Klebsiella pneumoniae* in Taiwan. Their study predicted that OXA-48 identification in Asia is still sporadic and quite unfortunately it will widely spread in the near future. Our study also concluded that OXA-48 containing Enterobacteriaceae were emerging in this region. The presence of OXA gene in GNB making the treatment options difficult as these would be the co-carrier of other resistant genes (ESBL) also.[23]

Our study demonstrated a high prevalence of OXA-48 gene among the Enterobacteriaceae. According to our study, 31.9% of Enterobacteriaceae were harbouring OXA-48 gene. In a study done in Riyadh, the frequency of OXA-48 gene was 58.1% among the 31 clinical isolates of *E. coli* and *Klebsiella pneumoniae*.[24] In contrast in a study conducted in Uganda, the prevalence of carbapenemase was 22.4% among Enterobacteriaceae family. Out of these 22.4% strains, 9.7% carried the OXA-48 gene.[25]

Our study showed that maximum numbers of isolates were recovered from the age group of 41-50 years with male predominance but such demographic association has not been reported in any other study so far. So, it can be stated that the presence of gene has no specific relationships with any age group or gender.

Our study statistics showed that OXA-48 gene was procured from different types of clinical specimens. The highest number of gene harbouring isolates were recovered from urine (40) followed by pus (12), sputum (4), ascitic fluid (2) and endotracheal tube aspirate (2). In contrary, a study conducted by Carrer et al. showed that the highest number of gene carrying isolates were from the samples of pus/wound (10), followed by blood (7), urine (5), endotracheal tube aspirates (4) and ascitic fluid (1).[1]

Kilic et al. concluded in their study that initially OXA-48 gene was confined to *Klebsiella pneumoniae* but with the passage of time it spread among other Enterobacteriaceae members like *E. coli* and *Citrobacter* species and *Enterobacter* species.[6] According to Dimou et al., OXA-48 carbapenemase is becoming prevalent in the United Kingdom, not only in *Klebsiella pneumoniae* but also in *E. coli* and *Enterobacter* species. This data highlighted that OXA-48 gene was invading the multiple strains of Enterobacteriaceae and difficult to detect as it is expressing multiple resistance pattern.[26] Our study also reported the presence of OXA-48 gene among different members of the Enterobacteriaceae family. This gene has a great potential to serve as a vehicle for the spread of hospital and community-acquired carbapenemases

According to our results, 44% of *Klebsiella pneumoniae* were the carrier of OXA-48 gene. Similar results were reported in a study conducted by Hammoudi et al. Among the OXA-48 carrying Enterobacteriaceae, the most common isolate was *Klebsiella pneumoniae* followed by *E. coli.*[27]

CONCLUSION

The global spread of antimicrobial resistance especially Carbapenem-resistant Enterobacteriaceae (CRE) in gram negative bacilli in recent years has been exceptionally high. OXA-48, a member of carbapenem hydrolyzing enzymes of group-D is also emerging in Pakistan. Our study showed that the frequency of OXA-48 gene is high (31.9%) in Enterobacteriaceae.

RECOMMENDATIONS

- There is an urgent need for a further workup to map out the epidemiology of class-D carbapenemases in our region.
- Coupled with vigilant clinical persons in educated public, greater efforts in antimicrobial stewardship and infection prevention may help in curbing the spread of MDR strains in hospital settings and communities.

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ORIGINAL ARTICLE

Undergraduate Students' Perception of Research Barriers: a Gender-Based Study

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ABSTRACT

Objective: To determine the gender-based differences in the perception of barriers to research among undergraduate medical students.

Methodology: This cross-sectional study was conducted in the King Edward Medical University, Lahore from June to September 2018. A total of 188 undergraduate students of both the genders were included after informed consent by non-probability convenient sampling. A 13-items Likert scale type questionnaire was used. Data was entered in SPSS 22, followed by application of chi-square test to see gender difference between responses.

Results: Out of total of 188 students, 112(59.5%) were female. Among the variables studied, there were statistically significant differences of opinion between the two genders regarding agreement about the inadequate experience in research, research methodology, statistical skills, delay in the approval of research synopsis from the ethical review board and societal neglect towards research development as barriers to research. Differences in responses towards barriers regarding areas of medicine needing further research, unfamiliarity with publication criteria, communication gap with senior researchers, the dearth of skilled librarian and diagnostic facilities, delay in supervisor's approval, stringent publishing criteria and time consuming peer review were insignificant.

Conclusion: The difference of opinion between the male and female undergraduate students was observed regarding their perception of inadequate experience in research, research methodology, statistical skills, delayed approval of synopsis from the ethical review board and underdeveloped research culture in society as barriers.

Keywords: *Undergraduate medical students. Research barriers. Perception.*

INTRODUCTION

For the improvement of our society, a basic and important step is research. Any scientific and logical movement is considered valid only if it is research-based. The present education system must train researchers. If this aspect is neglected, the research could never be incorporated as an integral and efficient activity in the educational system.[1] Research is a mandatory part of the core curriculum in the Bachelor of Medicine and Bachelor of Surgery (MBBS) & Bachelor of Dental Surgery (BDS) course of most of the medical institutes and students play a pivotal role in it. The social cognitive theory states that researchers are greatly influenced by environmental and personal factors.[2] One such personal factor is the gender of researcher. We want to identify how gender interplays with other factors to help or hinder research. This will help to improve communication between researchers and the beneficiaries of the research, thereby making research findings applicable practically and facilitating the problem solving process.[3,4]

Several studies have been carried out in many countries to evaluate the understanding of barriers toward scientific research among health professionals and medical students.[5,6] Evidence also showed that existence of barriers brings the gap between the theory of scientific research and practice of conducting it.[7] Furthermore, lack of skills training, infrastructure and facilities, mentorship and lack of time & motivation were cited as the major hurdles.[8-11] The possible reasons for the decline in research may also be less monetary benefits, family, gender disparity, practice philosophy and insufficient exposure to research prior to start a career.[12-14]

It is important to know whether both male and female students consider the above stated factors equally as barriers or they think it differently. The rationale of this study is the identification of gender-based barriers to research so that the gender disparity, if any, could be alleviated and both male and female could equally benefit medical research culture. Therefore, this study aims to determine the perception of gender-based differences in barriers of research among undergraduate medical students.

METHODOLOGY

This cross-sectional survey was conducted in the King Edward Medical University, Lahore from June to September 2018 and got ethical approval by the Institutional Review Board. A total of 188 undergraduate students (fourth and final year MBBS) of both the genders were included by non-probability convenient sampling. A 13-items Likert scale type questionnaire made by the author was used to collect data. The questionnaire was based on the findings obtained by other researchers regarding students' perspectives about research. Informed consent was

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taken. After briefing to the participants, they were requested to answer the questionnaire maintaining the anonymity. We excluded those students where we did not find a response to more than 10 variables.

STATISTICAL ANALYSIS

Data was entered in the Statistical Package for the Social Sciences (SPSS) version 22 followed by the application of the chi-square test to see the difference in responses between the two gender groups. The p-value of ≤ 0.05 was taken to be significant.

RESULTS

A total of 188 students responded, out of which 112(59.5%) students were female. Among barriers studied in both the genders, 68(89.3%) males compared to 87(77.7%) females, agreed that inadequate previous experience in research was a barrier. This difference of opinion was statistically significant (p-value 0.029). Similarly, we found statistically significant differences of opinion between males and females considering their agreement for lack of proficiency in research methodology (82.9% males; 67.8% females; p-value 0.004) and statistical skills (82.9% males; 70.6% females; p-value 0.002), delayed approval of research synopsis from ethical review board (76.3% males; 75% females; p-value 0.03), and underdeveloped research culture in society (84.2% male; 76.8% female p-value 0.013) as barriers to research. However, facing problem in identifying area of future research (81.6% males; 71.4% females; p-value 0.053), little understanding of publication criteria (82.9% males; 75.9% females; p-value 0.113), communication gap with senior researchers (79% males; 73.2% females; p-value 0.120), dearth of a skillful librarian (67.1% males; 71.4% female; p-value 0.383), unavailability of advanced diagnostic facilities (76.3% males; 66.1% females; p-value 0.114), delay in supervisor approval,

Table 1: Gender-Based Differences in Perception of Research Barriers (n=188)

Barrier	Gender	Disagree	Neutral	Agree	p-value
Undeveloped research culture in society	**Male**	5(6.6%)	7(9.2%)	64(84.2%)	0.013*
	Female	15(13.4%)	11(9.8%)	86(76.8%)	
Inability to recognize the area needing further research	**Male**	5(6.5%)	9(11.8%)	62(81.6%)	0.053
	Female	18(16.1%)	14(12.5%)	80(71.4%)	
Inadequate research experience	**Male**	3(3.9%)	5(6.6%)	68(89.3%)	0.029*
	Female	14(12.5%)	11(9.8%)	87(77.7%)	
Lack of proficiency in research Methodology	**Male**	7(9.2%)	6(7.9%)	63(82.9%)	0.004*
	Female	20(17.9%)	16(14.3%)	76(67.8%)	
Lack of statistical skills	**Male**	7(9.2%)	6(7.9%)	63(82.9%)	0.002*
	Female	19(17%)	14(12.5%)	79(70.6%)	
Dearth of skillful librarians	**Male**	8(10.5%)	17(22.4%)	51(67.1%)	0.383
	Female	13(11.6%)	19(17%)	80(71.4%)	
Unavailability of diagnostic Resources	**Male**	9(11.8%)	9(11.8%)	58(76.3%)	0.114
	Female	11(9.8%)	27(24.1%)	74(66.1%)	
Delay in synopsis approval by Supervisor	**Male**	7(9.2%)	11(14.5%)	58(76.3%)	0.082
	Female	14(12.5%)	16(14.3%)	82(73.2%)	
Delay in synopsis approval by IRB	**Male**	7(9.2%)	11(14.5%)	58(76.3%)	0.030*
	Female	15(13.4%)	13(11.6%)	84(75%)	
Communication gap with senior Researchers	**Male**	7(9.2%)	9(11.8%)	60(79%)	0.120
	Female	9(8%)	21(18.8%)	82(73.2%)	
Unfamiliarity with publication Criteria	**Male**	5(6.5%)	8(10.5%)	63(82.9%)	0.113
	Female	11(9.8%)	16(14.3%)	85(75.9%)	
Stringent rules of publication	**Male**	8(10.6%)	15(19.7%)	53(69.7%)	0.537
	Female	10(1.7%)	25(22.3%)	77(68.7%)	
Time consuming peer review process by journal	**Male**	8(10.5%)	13(17.1%)	55(72.4%)	0.357
	Female	10(8.9%)	24(21.4%)	78(69.6%)	

***p-value ≤0.05 Significant**

(76.3% males; 73.2% females; p-value 0.082), stringent publishing criteria (69.7% males; 68.7% females; p-value 0.537) and time consuming peer review by the journals (72.4% males; 69.6% females; p-value 0.357) were perceived as barriers but with insignificant differences of opinion between the genders.

DISCUSSION

Understanding of scientific methods becomes a crucial component of the medical profession. Although every health professional is not inspired to perform research to acquire new knowledge, he or she should be able to know the principles of scientific research. Researches have been conducted as to why students are not motivated for research. Moreover, perception of research barriers may be different for students and so, gender differences may play a role.[6] This study focuses on male and female medical students that how they perceive research barriers differently.

The findings from our study showed the difference of opinion between the two gender groups for some barriers (perception of lack of previous experience in research, research methodology, statistical skills, delayed approval of synopsis from the ethical review board and underdeveloped research culture in society). Studies from around the globe have found that gender effect is minimal on the perception of barriers. Soe et al. conducted a study to find the degree of knowledge, attitude and barriers to research in undergraduates and found no significant relationship between gender and perceived barriers toward research.[1] Similarly, findings from Ashrafi-rizi et al. related to the effect of gender showed that mean difference of research activities barriers is not significant in terms of gender.[3] Ejaz et al. from Karachi found that the institutional factors can inspire students to pursue research and show enthusiasm. Authors from this study observed the keen interest of the undergraduates and fresh graduates with 57(32%) final year students and 20(20%) interns who would like to publish. Their difference of opinion between genders was not found to be statistically significant factors related to a respondent's perception of barriers in research.[15] Baig et al. from Karachi did not find any difference of opinion between the genders. Authors reported that 88% of both genders stated that they intended to do research projects in their undergraduate years, 75% stated that their motivation was to improve their curriculum vitae to be more competitive for a residency abroad.[16] Amgad et al. observed that there was no apparent gender difference regarding the following outcomes: interest in a career in research; involvement in research during medical school; attitudes towards research; interest in or motivation towards performing research; research knowledge or skills. However, on average, males seem to be significantly more likely to publish the research (OR = 1.59, 1.26-2.01).[17]

The gender difference was again an insignificant factor in Pakistani study by Khan et al. where authors found that although gender was not a significant predictor of knowledge about health research, however, males had a significantly higher mean score on the attitude scale.[18] Meraj et al. from Shifa Medical College, Islamabad found that there was no statistically significant gender difference in response except one (p=0.01) where females considered research more helpful.[19] Osman from Sudan found that principle barriers to student research were lack of funding (75/72.1 %), insufficient time (71/68.3 %) and the demands of the curriculum (70/67.3 %). No significant differences were detected between gender and perceptions towards research.[20] Although our study also reported no difference in some barriers but finding significant differences in responses is not observed in previous studies. This difference in results may be due to the different population of medical undergraduates or unmatched female to male ratio. The reasons behind this gender difference may also be due to factors unrelated to research such as the overall academic environment or psychosocial factors.

This study has some limitations. This study used author made questionnaire which was not validated in our local setting. Only quantitative analysis was done on a smaller sample size due to which results from this study cannot be generalized. Considering these limitations, multicenter qualitative studies on a larger scale are needed.

CONCLUSION

The difference of opinion between the male and female undergraduate students was observed regarding their perception of inadequate experience in research, research methodology, statistical skills, delayed approval of synopsis from the ethical review board and underdeveloped research culture in society as barriers.

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ORIGINAL ARTICLE

Outcome of Non-Operative/Closed Management of Mandibular Condylar Fractures in Children

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ABSTRACT

Objective: To evaluate the outcome of non-surgical treatment of mandibular condylar fractures in growing children using maxillomandibular fixation (MMF) via arch bars, metal wires, elastics and gunning splint (where dentition did not provide support for MMF).

Methodology: This prospective study consisted of 67 children of condylar fractures collected at the Oral and Maxillofacial Surgery Departments of King Edward Medical University (KEMU)/Mayo Hospital, Lahore and Fatima Memorial Hospital, Lahore. Maxillomandibular fixation (MMF) with wires was used if there were severe occlusal disturbances. Mild occlusal disturbances were treated with elastic MMF. Mean follow-up period was 4.5 years (follow-ups every 3, 6, 12 & 24 months) and following variables were recorded, i.e. occlusion, mouth opening, degree of lower jaw deviation on rest/mouth opening, temporomandibular joint (TMJ) ankylosis etc. Data analysis was done using SPSS version 24.

Results: Fifty one (76.1%) patients showed normal occlusion with normal symmetrical mouth opening. Nine patients (13.5%) had normal occlusion with asymmetrical mouth opening on the affected side. Overall seven (10.4%) patients were diagnosed with TMJ ankylosis during the close follow-up period.

Conclusion: Non-operative/closed approach along with regular follow-up in children is a suitable, safe, reliable and non-traumatic treatment modality for growing children having mandibular condylar fractures.

Keywords: *Condylar fractures. Maxillomandibular fixation (MMF). Limited mouth opening. Temporomandibular joint ankylosis.*

INTRODUCTION

Condylar fracture of mandible constitutes 19-52% of overall mandibular fractures.[1] It is the second most common type of fracture of the mandible with female-male ratio 1:2.[2] These fractures are most commonly seen as pediatric mandibular fractures and present bilaterally in 20% of cases.[3]

Fracture of the condyle is either intracapsular (condylar head) or extracapsular (subcondylar) and displaced (dislocation of the articular head from mandibular ramus) or non-displaced.[4] Pediatric condylar fractures are mostly intracapsular in children less than 6 years old. Neck and subcondylar region is more frequently involved after this age.[5]

Untreated or unrecognized mandibular condylar fracture results in restriction of mandibular movement, muscle spasm, deviation, facial asymmetry, deranged occlusion, TMJ ankylosis, internal derangements of the temporomandibular joint, etc. In growing children, condylar trauma even leads to alteration in the condylar growth center or fusion of the fractured segments in a position other than that existing prior to the injury called as TMJ ankylosis.[6]

Debate continues regarding the optimal treatment of the condylar fracture. Although it has generated a lot of discussion and controversy in maxillofacial trauma, still pediatric cases are best treated conservatively.[7] The overall aim of the treatment is to achieve early mobilization of the mandible with normal occlusion.[8]

Treatment of pediatric mandibular condylar fractures differs from adults because of anatomical variation, early healing, patient cooperation and the potential for interference with mandibular growth.[9,10] During growth period condylar fractures in children should be treated non-surgically by maxillomandibular fixation (MMF) with close follow-up for a period of 15 years.[11,12] Jaw function is recommended to encourage growth owing to the high regenerative and remodeling capacity of mandibular condyle which is inherent in childhood.[13]

The objective of the study was to assess the outcome of non-surgical treatment of mandibular condylar fractures in growing children using MMF via arch bars, metal wires, elastics and gunning splint (where dentition did not provide support for MMF) along with gender & age distribution, etiology, site distribution for each type of condylar fracture and complications like occlusal derangement, deviation of the mandible, internal derangements of the temporomandibular joint (TMJ) and ankylosis of the joint.

METHODOLOGY

This prospective study was conducted at the Oral and Maxillofacial Surgery Department of KEMU/Mayo Hospital, Lahore from February 2011 to February 2012 and Fatima Memorial Hospital, Lahore from June 2012 to June 2016. The inclusion criteria was:

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- Condylar fractures in children with age range of 2-12 years who were assessed clinically via examination and radiographically (PA view, OPG, Lateral TMJ view right/left side).
- Those condylar fractures (isolated, associated) not needing surgical approach via open reduction and internal fixation technique and treated conservatively with MMF, elastics and gunning splint.
- Bilateral condylar fractures not causing reduced ramus height and an anterior open bite selected for MMF.

Condylar fractures along with complicated fractures of mandibular symphysis, body and angle or midfacial/ zygomatic bone fractures which needed surgical approach via open reduction and internal fixation (ORIF) were excluded from this study.

A total of 67 children who were satisfying the above criteria for treatment of condylar fractures were included after clinical and radiographic evaluation by consecutive sampling technique. Ethical approval was granted by the ethical committee of the institution. Informed consent was obtained along with relevant details on specially designed proforma. Maxillo-mandibular fixation (MMF) with wires was used if there were severe occlusal disturbances. Mild occlusal disturbances were treated with elastic MMF. Same proforma had follow-up section in which all patients were assessed again clinically and radiographically (via OPG, Lateral TMJ view both sides, PA view) focusing on fracture remodeling, the outcome of treatment, dental occlusion, the symmetry of mandible and mobility. Mean follow-up period was 4.5 years (follow-ups every 3, 6, 12 & 24 months) and following variables were examined, i.e. occlusion, mouth opening, degree of lower jaw deviation on rest/mouth opening, TMJ ankylosis etc.

STATISTICAL ANALYSIS

The Statistical Package for the Social Science (SPSS) version 24 was used for data analysis. The results were expressed using descriptive analysis (frequencies, percentages).

RESULTS

The male to female ratio was 2.5:1 with male predominance. The most common cause of fracture was road traffic accident (RTA) (n=25, 37.1%) although fall (n=24, 35.8%) was also found to be equally responsible in children of age above 2 years. The age range was 3.3-7.1 years. Forty two (62.7%) children had unilateral (right side n=30, 71.4% and left side n=12, 28.6%) and 25(37.3%) had bilateral condylar fractures based on clinical examination and radiographs (OPG and PA view of the face). Twenty nine (43.3%) patients also had associated fractures of mandibular symphysis, body or angle who were also candidates for closed reduction via MMF. Only 38(56.7%) children had isolated condylar fractures. Maxillomandibular fixation with wires was used in 39(58.2%) patients while the arch bar was used in 24(35.8%) patients with insufficient dentition. Only 4(6%) patients had gunning splint. Maxillomandibular fixation was kept in all patients for 10 to 14 days (Table1).

Fifty one (76.1%) patients showed normal occlusion with normal symmetrical mouth opening. Nine patients (13.5%) had normal occlusion with asymmetrical mouth opening on the affected side. Only 4(5.9%) patients had deviated lower jaw with limited mouth opening diagnosed with fibrous ankylosis of temporomandibular joint (TMJ). Three (4.5%) patients with bilateral condylar fractures developed limited mouth opening of <10mm with TMJ ankylosis. These results are illustrated in table 2.

Table 1: Methods Used for Management of Mandibular Condylar Fractures

Method used	Frequency (Percentage)
MMF with wires	39(58.2%)
Arch bar	24(35.8%)
Gunning splint	4(6%)
Total	67(100%)

Table 2: Outcome of Treatment in Children with Mandibular Condylar Fractures

Outcome	Frequency (Percentage)
Normal occlusion with symmetrical mouth opening	51(76.1%)
Normal occlusion with asymmetrical mouth opening	9(13.5%)
Deviated lower jaw with limited mouth opening	4(5.9%)
Limited mouth opening of <10mm	3(4.5%)
Total	67(100%)

DISCUSSION

According to this study both RTA and fall equally contributed to the fracture of the mandibular condyle in children above 2 years age group. Choi et al. stated that bicycle accident is one of the most common cause of condylar fracture in children.[1] Zachariades et al. also stated that the fracture of condyle occurred due to road traffic accidents at bicycle ridings.[13] The most common cause of condylar fractures was road traffic accidents (57.8%) reported by Sawazaki et al.[3] The difference in etiology varies with difference in lifestyles of different regions of the world.

In the current study, most of the condylar fractures were unilateral (62.7%). Sawazaki et al. reported 209 (65.9%) unilateral fractures out of 317.[3] Approximately 84% of fractures of condyle are unilateral and the most common causes are interpersonal violence, sports injury, falls and road traffic accidents according to Rutges and his colleagues.[14,15] Cole et al. stated that most of the pediatric condylar fractures are bilateral which is contradictory to the findings of our study.[16] This contradiction may arise due to the difference in etiology and socioeconomic factors of different regions of the world.

Anderson and his colleagues also worked on the distribution of unilateral condylar fractures. Their follow-up showed that 83% of patients had no problems in chewing and 91% of patients reported no impact of the fracture on daily activities.[17] This is in accordance with the results of our study which showed 76.1% of patients had normal occlusion.

Conservative treatment was advocated for all pediatric patients with close follow-up protocol in this study, although the different strategy was also discussed in studies of Montezam et al. and Ellis et al.[9,18] Luckily there is consensus in the worldwide literature with regard to the treatment of both intracapsular and extracapsular condylar fractures in children. The norm is to manage them with closed treatment as it is safer, reliable and non-traumatic.[13,19]

Nussbaum et al. published a critical analysis of the previous studies that have compared if closed or open treatment of condylar fractures produces the best results. The results were not conclusive regarding whether closed or open treatment should be used for the management of mandibular condylar fractures.[19]

According to our study 9(13.5%) patients had normal occlusion with asymmetrical mouth opening on the affected side. Only 4(5.9%) patients had deviated lower jaw with limited mouth opening diagnosed with fibrous ankylosis of temporomandibular joint (TMJ). The study of Marker et al. showed that 13% of patients with condylar fractures selected for closed treatment had minor functional problems such as limited mouth opening, deviation or dysfunction, 3% patients had pain in the joint and 2% patients had malocclusion which was related to dislocation of the condyle out of the glenoid fossa.[20]

Sawazaki et al. and Rutges et al. conducted studies in which they analyzed the frequency of complications governing closed reduction of the condyle.[3,14] Most of the patients presented with mild occlusal disturbance and deviation of mandible due to alteration in ramus length of the affected side. Most of the patients (89%) were symptom free while only 11% had severe symptoms.[14]

The above discussion confirms the fact that closed treatment option of mandibular condylar fracture in children will have few complications like occlusal disturbance or malocclusion, deviation of the mandible and TMJ ankylosis, etc.

CONCLUSION

Non-operative/closed approach along with regular follow-up in children is a suitable, safe, reliable and non-traumatic treatment modality for growing children having mandibular condylar fractures.

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ORIGINAL ARTICLE

Needlestick Injuries among Healthcare Workers

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ABSTRACT

Objective: To determine the frequency and contributory factors of needlestick injuries (NSI) among the healthcare workers (HCWs) in two tertiary healthcare centers of Punjab, Pakistan.

Methodology: This descriptive cross-sectional study was conducted in the Mayo Hospital, Lahore and Allama Iqbal Memorial Teaching Hospital, Sialkot from January to June 2018. Ethical approval was taken from the institutional review board of the institution. A total of 225 HCWs (doctors, charge nurses, nursing students and waste disposal workers) were included after taking their informed consent. A structured questionnaire for needlestick injury was used. The Statistical Package for the Social Sciences (SPSS) version 22 was used to analyze the data.

Results: Out of 225 HCWs, 90(40%) doctors, 83(36.9%) charge nurses, 17(7.6%) nursing students and 35(15.6%) waste disposal workers consented to participate in the study. Out of them, 112(49.8%) were trained for NSI prevention. However, 161(71.6%) had suffered from NSI which was statistically significant (p-value<0.001) in non-doctors, less experienced and less educated HCWs. Working in the operation theatre setting was a contributory factor in the majority (55%) of cases followed by maintaining intravenous line (29%) and drawing blood samples (27%).

Conclusion: The frequency of NSIs among HCWs was found to be high (71.6%). Maintaining intravenous line, drawing blood samples and working in the operation theatre setting were major contributory factors for NSIs among HCWs. Lack of awareness regarding immediate action following NSI was observed in 26% of HCWs.

Keywords: *Needlestick injury. Contributory factors. Healthcare workers.*

INTRODUCTION

Needlestick injuries (NSIs) carry notable danger for healthcare workers (HCWs).[1] Needlestick injury can cause transmission of around 20 types of pathogens leading to the potential risk of infection transmission.[2,3] The biggest danger from NSI is the risk of transmission of hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) which has been reported to be 30%, 3% and 0.3% respectively.[4,5]

As evident from the literature, nurses are more frequently prone to NSIs.[6] However, this varies from one locality to another. Various studies have reported the prevalence of NSIs to be 68% in Jordan, 74% in South Korea and 30% in Turkey.[7-9] There is a rise of NSIs due to lack of adherence to infection control precautions.[10] Recapping of needles, handling of body fluids, injection administration, drawing of blood samples and waste handling are few examples of contributory factors catching NSIs.[11,12]

Needlestick injury remains one of the radical measures for the spread of healthcare-associated infections. In our local circumstances, concrete knowledge about transmission of infection in healthcare facilities due to NSIs and their contributory factors varies from setting to setting and unsafe practices are common. Therefore, it is important to document the frequency of NSIs among hospital HCWs so that contributory factors leading to the hazards of NSIs must be addressed avidly and firmly. Therefore, the present study was designed to determine the frequency and contributory factors of NSIs among HCWs in two tertiary healthcare centers.

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METHODOLOGY

This descriptive cross-sectional survey was conducted from January to June 2018 in the Allama Iqbal Memorial Teaching Hospital, Sialkot and Mayo Hospital, Lahore. Ethical approval was taken from the institutional review board of the institution. On the basis of pilot study, it was found that 80% (8 out 10) of HCW's experienced NSI previously, so by taking percentage of NSI as 80% (pilot study), a sample of 246 cases was estimated in which the complete information was obtained from 225 cases, 8.53% gave no response. Therefore, a total of 225 HCWs, which included doctors and paramedics (charge nurses, nursing students and waste disposal workers) were enrolled by random sampling technique.

Needlestick injury contributory factors like drawing blood samples, maintaining IV line, recapping the needle, surgical procedure, waste disposal were recorded. Also the location (intensive care unit, ward, operation theatre, blood bank) where NSI occurred was recorded. Furthermore, immediate action to be performed by healthcare workers following NSI was also assessed by asking structured questions. Each study participant was briefed about protocol and was requested to be interviewed anonymously.

STATISTICAL ANALYSIS

The Statistical Package for the Social Sciences (SPSS) version 22 was used to analyze the data. Frequency and percentages were calculated for all categorical variables mentioned above. Chi-square test was applied and a p-value ≤ 0.05 was taken to be significant.

RESULTS

Out of 225 HCWs, 90(40%) doctors, 83(36.9%) charge nurses, 17(7.6%) nursing students and 35(15.6%) waste disposal workers consented to participate in the study. Out of them, 112(49.8%) were trained for NSI prevention. However, 161(71.6%) had suffered from NSI. Needlestick injury was statistically significant (p-value<0.001) in non-doctors, less experienced and less educated HCWs (Table 1). Maintaining the intravenous line (29%) and drawing blood samples (27%) were the major contributory factors for NSI. Working in an operation theatre setting was an additional contributory factor in the majority (55%) of cases (Table 2). Most of the healthcare workers (53%) did not know the disease of source patient. This was observed that among HCWs suffering from NSI, 26% were not aware about what action to be performed immediately following NSI (Table 3).

DISCUSSION

In the present study, among 225 HCWs, 112(49.8%) were trained for prevention from NSI. The results were different by Zafar et al. where authors found 88%

Table 1: Demography and Frequency of NSI (n=225)

Demographic Variables		Frequency of NSI					
		Never	Once	Twice	Multiple	Total	p-value
Status of Education	MBBS	62(27.5%)	0(0%)	11(4.8%)	17(7.5%)	90(40%)	<0.001
	Nursing diploma	02(0.9%)	01(0.4%)	06(2.7%)	91(40.4%)	100(44.4%)	
	≤ Intermediate	0(0%)	0(0%)	0(0%)	35(15.5%)	35(15.6%)	
Designation	Doctor	62(27.5%)	0(0%)	11(4.8%)	17(7.5%)	90(40%)	<0.001
	Charge nurse	0(0%)	0(0%)	01(0.4%)	82(36.4%)	83(36.9%)	
	Nursing student	02(0.9%)	01(0.4)	05(2.2%)	09(4%)	17(7.6%)	
	Waste disposal worker	0(0%)	0(0%)	0(0%)	35(15.5%)	35(15.6%)	
Work experience (years)	<2	0(0%)	0(0%)	0(0%)	60(26.6%)	60(26.7%)	<0.001
	2-5	51(22.6%)	01(0.4)	15(6.6%)	16(7%)	83(36.9%)	
	>5	13 (5.7%)	0(0%)	02 (0.9%)	67(29.7%)	82(36.4%)	
Training on safe injection practices	Yes	01(0.4%)	0(0%)	11(4.8%)	100(44.4%)	112(49.8%)	<0.001
	No	63(28%)	01(0.4)	06(2.7%)	43(19.1%)	113(50.2%)	
Ever experienced needlestick injury	Yes	0(0%)	01(0.4)	17(7.5%)	143(63.5%)	161(71.6%)	<0.001
	No	64(28.4%)	0(0%)	0(0%)	0(0%)	64(28.4%)	
Total		64(28.4%)	01(0.4%)	17(7.5%)	143(63.5%)	225(100%)	

Table 2: Frequency of Contributory Factors for NSI (n=161)

Procedure/Activity while having an NSI	Drawing blood samples	44(27%)
	Maintain IV line	46(29%)
	Recapping needle	29(18%)
	During a surgical procedure	13(8%)
	Waste disposal	29(18%)
Place of NSI	Intensive care unit	8(5%)
	Ward	42(26%)
	Operation theatre	89(55%)
	Blood bank	22(14%)

Table 3: Source of NSI & Action Performed Following NSI (n=161)

Source of index patient from where HCW contracted NSI	Hepatitis B	3(2%)
	Hepatitis C	8(5%)
	Patients admitted for surgery	65(40%)
	Don't know	85(53%)
Immediate action performed by HCW following an NSI	Squeeze blood	70(44%)
	Washed with water	21(13%)
	Washed with disinfectant	28(17%)
	Did nothing	42(26%)

trained HCWs in a private setting.[13] This difference in training emphasizes the need to strengthen training programs in our government hospitals.

In our study, 71.6% of HCWs suffered from NSI. This is higher than our neighboring country, India where Prasuna et al. and Ashat et al. reported the occurrence of NSIs as 39.76% and 68.2% respectively.[14,15] This is also higher from neighboring countries of Iran (42.5%), Turkey (30.1%) and Qatar (20.9%) but less than Jordan (91.8%).[9,16-18] Abebe et al. from Ethiopia reported an overall prevalence of NSI among staff nurses in Dessie Referral Hospital as 43%.[19] Needlestick injury have also been studied in dental HCWs with a high prevalence and a low rate of reporting of NSIs among dental HCWs in Pakistan.[20] The difference in frequencies may depend upon hospital conditions and adherence to standards, overcrowding of patients and skill of healthcare personnel.

We found that maintaining IV line (29%) and drawing blood samples (27%) were the largest contributory factors for NSIs in HCWs. This was followed by the occurrence of NSIs in an operation theatre setting (55%). The results from Manzoor et al. from Pakistan found recapping the needle as a major contributory factor.[21] Zafar et al. and Hussain et al. observed that drawing the blood samples or injecting intravenous drugs were the largest contributory factors in their study.[1,13] Abebe et al. in their study found that nurses who worked in the emergency department were 11 times more likely to experience NSIs compared with nurses who worked in outpatient department.[19]

Lack of awareness of immediate action following NSI was observed in 26% of cases. Manzoor et al. from private settings reported that only 8% of the HCWs did not know the immediate action following NSIs.[21] Lack of awareness regarding the source of diseases was observed in 53% HCWs in our study. Similar results have been reported from Aslam et al.[22]

The difference in private and government setting, as we mentioned earlier, necessitates the strengthening of awareness campaigns regarding prevention of NSIs. If HCWs have the least awareness about immediate action following NSIs or regarding the disease of the source inflicting NSIs, they can't remain safe from the untoward consequences of NSIs.

The results from our study may generate the attention of policymakers to fill the gaps regarding NSIs among HCWs.

CONCLUSION

The frequency of needlestick injury among HCWs was found to be high (71.6%). Maintaining intravenous line, drawing blood samples and working in operation theatre setting were major contributory factors for NSIs among HCWs. Lack of awareness regarding immediate action following NSI was observed in 26% of HCWs.

LIMITATIONS

The selection bias is one of the limitations of this study. The representation from two public hospitals may not represent the whole population; therefore, the results from this smaller sample size cannot be generalized. Further studies are needed in both public and private hospitals with stratification of HCWs to get the results generalized.

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ORIGINAL ARTICLE

Factors Influencing Academic Cheating in an Undergraduate Setting of Central Park Medical College, Lahore

Arooj Sattar, Asim Mumtaz, Amina Qayyum, Sarah Qadeer, Syed Imran Ali Shah

ABSTRACT

Objective: To study the different factors influencing academic cheating among the students during exams or during their academic life.

Methodology: A cross-sectional study was conducted using a 10 items structured questionnaire on different aspects of cheating in MBBS 5 year students of the Central Park Medical College, Lahore. There were 334 students in total who volunteered to participate in this study. A 10 items questionnaire was given to the participants after taking informed consent. Data analysis was done using SPSS version 23.

Results: The mean age of the students was 23.48±1.71 years. More female students 196(58.7%) participated as compared to the male students 138(41.3%). Two hundred and eighty five (85%) participants had witnessed anyone else involved in cheating and 15% of participants denied witnessing others doing cheating. Out of 334 students, 72.7% of students ignored the situation when they saw anyone involved in this act and 8% of students wanted to do the same. Most of the students (38.6%) were busy doing their own work when they witnessed someone involved in cheating. Lack of preparation was the major reason given by 30.5% of students followed by fear of not sending admission in 23% of students. The most common method of cheating was to ask from a friend and taking helping material with them by 60.18% and 12.28% students respectively. According to 35.3% of students, strict invigilation can stop students from cheating. However, 23.6% of students said that nothing could be done to stop this.

Conclusion: Present study concludes that three fourth of the students mostly females are involved in cheating. Factors for cheating include lack of exam preparation, admission issues and lenient invigilation. Strict invigilation and counseling can be adopted in order to minimize cheating.

Keywords: *Academic cheating. Undergraduate. Cheating factors.*

INTRODUCTION

Examinations are the most important tool for measuring learner's ability and effectiveness in delivering the content at different levels of education all over the world. Cheating in examinations is a worldwide problem.[1] Academic cheating is described as copying things from materials which are brought in the examination center. Students are not allowed to copy anything whether it's oral, written or by any other means.[2] Cheating is one of the main predictors that can lead to the wrong assessment and hence impose a false message on the detailed evaluation of students.[3] In spite of the fact, academic cheating in medical and health sectors should be strictly monitored because it has devastating consequences on human lives, socially as well as economically.[1]

There is enough evidence to suggest that academic dishonesty is an area of interest for academic as well as professional bodies'.[4] A number of studies have shown an alarming increase in academic misconduct in educational institutions. It has also been reported that students become desensitized to this attitude as they progress further and accept cheating as a normal phenomenon. It is suggested that students who are involved in cheating and misconduct may likely violate workplace ethics and are involved in dishonest practices with patients and organizations later in their lives.[5-7]

Academic cheating among students breaks the link between hard work and knowledge, resulting in the allocation of student's talent toward unnecessary and illegal practices. Moreover, cheating is not restricted to only college campuses; but also this misconduct is transferred to the workplace as the ethical issue of future professionals.[8] Students living in countries with massive corruption levels might be more prone to academic cheating whereas people who are habitual to cheating and evading the rule of law since their childhood are more likely to engage in such activities when they become adults. This situation provides strong reasons to carry out research on cheating as well as its causes and consequences.[9]

Cheating behavior in institutions not only affects the negative attitude on students but also it downregulates the institutions. This study is carried out to understand the factors influencing academic cheating among students.

METHODOLOGY

A cross-sectional study was conducted in the Central Park Medical College, Lahore after taking approval from the ethical committee. A total of 334 MBBS students of all the classes were included in this study. The purpose of the study was explained and informed consent was taken from all the participants. A 10 items questionnaire was given to the participants which

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included information regarding cheating practices, causes, methods of cheating and measures taken to control the cheating.

STATISTICAL ANALYSIS

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 23. Categorical variables were presented as numbers and percentages. For quantitative variables mean and the standard deviation was calculated.

RESULTS

The mean age was 23.48±1.71 years. One hundred and thirty eight (41.3%) male and 196(58.7%) female students participated in this study. The number of students of first year to final year MBBS participated in this study is shown in figure 1.

In response to the questionnaire, 256(76.6%) students involved in the cheating included 90(35.15%) male and 166(64.85%) female students. Seventy eight (23.3%) students were never involved in cheating. Main reasons for the cheating were lack of preparation (30.50%), admission issues (25%), confirmation of the answers (12.80%) and that everybody does the same (7.40%).

Two hundred and eighty five (85%) students had witnessed other students being involved in cheating during the examination, 243(72.7%) ignored the situation, 15(4.4%) students told the invigilator and 27(8%) wished to do the same. Main reasons of ignoring the situation were that they were busy in their own exam (38.6%), that students involved in cheating were their friends (17.5%), that they had no concern (27.5%) and that teachers were involved in cheating (1.2%). Different methods used for cheating by the respondents are tabulated in table 1.

Regarding cheating, 172(51.4%) students said it is done only in the exam, 64(19.1%) thought it involved copying the assignments from other students, 52(15.5%) students thought it marking proxy attendance for other students and 46(13.7%) had no idea about cheating. Table 2 shows various methods proposed by the students to prevent cheating.

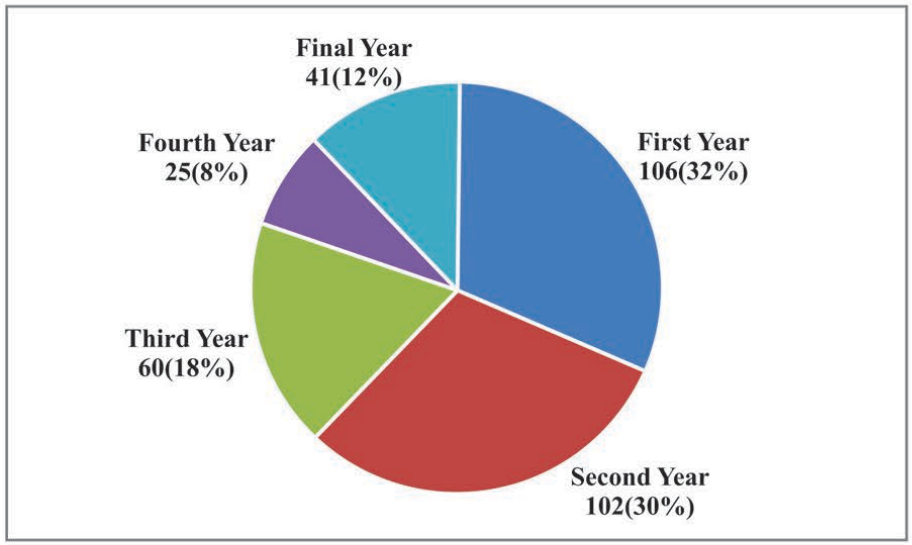

Figure 1: Distribution of Students According to the Class

Table 1: Frequency Distribution of Different Methods Used in Cheating by the Respondents

Methods of Cheating	Never Caught	Caught		Total	Percentage
		Once	Multiple Times		
Asking from a friend	124	27	50	201	60.18%
Helping material in the exam hall	7	28	6	41	12.28%
Cell phones	2	7	2	11	3.3%
Helping material in the washroom	1	2	0	3	0.9%
Total	134	64	58	256	76.67%

Table 2: Various Methods Proposed by Students in Order to Stop the Cheating

Methods	Percentage
Strict invigilation	35.3%
Counseling	14.3%
Minimizing syllabus	10.1%
Conceptual teaching	6.5%
Punishment	4.4%
Proper sitting arrangement	2%
Sufficient preparation time	1.4%

DISCUSSION

Our study revealed that out of 76.64% students that cheat during the exams, 64.85% were female students. A study by Hafeez et al. held in different medical colleges of Karachi also states that most of the students have cheated during an examination at least once and more females were involved in cheating.[10] Hrabek et al. reported that 94% of the students are involved in cheating.[11] Our results are also near to the one studied by Nyamwange et al. which state that more girls cheat during the exam than boys (52%).[1]

In our study lack of preparation (30.50%) was among the main reason for cheating. Other studies also reported poor preparation among the main reason for cheating.[11,12] A study conducted by Hammoudi revealed that the main factor which leads the students to cheat during an exam was that the students think examination method was just a test of memory rather than comprehension. Also the author stated that getting high grades has become the major focus of most of the students which lead them to use inappropriate resources in exams.[13]

According to our study, 12.8% of students cheat for confirmation of the answers. These results are similar to the study by Clariana et al. which states that student has a phobia during the examination and they lack the confidence.[14] In our study, 52.9% of the students have an opinion that cheating depends on the invigilator. These results comply with studies by Li et al. and Karluki et al. which state lenient invigilation is among the major reasons for cheating during exams.[15,16] Two hundred and forty (72%) students accepted that they help their friends in cheating during the examination. These results are similar to another study which state 83.9% of the students tend to copy answers of their classmates during exams.[17]

In our study, 85% of the students' witnessed that they have seen others cheating during the examination and 72.7% ignored the situation and never reported. Kruger reported that 88.4% of the students who witness cheating never reported the incident.[18] Schwartz et al. also reported cheating incidents among students of different school systems.[19]

Among the methods used to cheat, 60.18% were cheating by asking from a friend. A study conducted by Hafeez et al. reported that 83.6% of students are involved in cheating by this method.[10] In our study, 12.28% of the students used helping material in the exam hall and 3.3% used a cell phone for cheating. Other studies also reported the use of helping material in the examination hall.[1,21] Dogas et al. reported that 50% of the students are involved in cheating with the help of cell phones.[17]

In our study, 19.1% of the students are involved in copying the assignment of other students and 15.2% are involved in marking proxy attendance. Nyamwange et al. reported 10.25% of the students involved in forging the documents of other students.[1] Dogas et al. also discussed these factors of cheating in their studies and found that a large number of students are involved in this type of cheating.[17]

In order to stop or minimize cheating, a student proposed that strict invigilation (35.5%) and punishment (4.40%) can help. This complies with other studies which reported that punishment for example cancellation of paper and suspension of the student can help in minimizing cheating.[9,20] Remodeling syllabus (10.10%) and improving teaching methodology (6.50%) can also help. Nyamwange et al. suggested that enhancing exam taking skills and counseling of students can help a lot.[1] Margaret et al. also found counseling an effective technique in order to curb cheating. Proper sitting arrangement (2%) can also help in curbing cheating.[21] Similar results were found in a study by Ruto et al.[22]

There are certain limitations in this study. The study focused on the questions that the students face in examination halls. Relationship of the students' previous grades and certain habits, moral and cultural values with cheating were not discussed. Role of teachers in the preparation of examination and its effect on the transparency of exams was not discussed. These limitations can be addressed in future researches.

CONCLUSION

It has been concluded that three fourth of the medical students mostly female students do cheating in their exams. Factors for cheating include lack of exam preparation, lenient invigilator and admission issues. Certain methods that can be adopted in order to minimize cheating including strict invigilation, counseling of the students, improving syllabus and teaching methodology.

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ORIGINAL ARTICLE

Assessment of Oxidative Stress in Diabetic and Nondiabetic Patients of Acute Myocardial Infarction

Hassan Jamil, Hina Bashir, Saba Iqbal, Samina Kausar, Maham Younis, Qurat-ul-Ain

ABSTRACT

Objective: To assess the level of oxidative stress with malondialdehyde (MDA), catalase (CAT), glutathione (GSH) and superoxide dismutase (SOD) in diabetic and nondiabetic patients of acute myocardial infarction (AMI).

Methodology: It was a cross-sectional comparative study done at the Institute of Molecular Biology and Biotechnology, The University of Lahore. The study was conducted from June to September 2017. The research protocol was approved by the ethical committee before the conduction of study. Informed written consent was taken from all the patients. A total of 300 subjects attending the Punjab Institute of Cardiology and Services Hospital, Lahore including 138 diagnosed cases of AMI, 132 diagnosed cases of diabetes with AMI and 30 healthy subjects as a control group were enrolled in this study. Blood samples were collected, centrifuged and processed to estimate MDA, SOD, CAT and GSH. Data was statistically analyzed and presented by using the Graph Pad Prism 5 software.

Results: The results of our study indicate that SOD, CAT and GSH levels were significantly decreased in diabetic AMI patients as compared to AMI patients and control subjects. On the other hand, the MDA level was found increased in diabetic AMI patients when compared with AMI patients and normal control subjects.

Conclusion: Diabetic patients who also suffer from AMI are more prone towards the risk of oxidative damage as compared to patients who just have AMI because the oxidative stress markers damage cardiac cells and the prognosis in diabetic AMI patients is also poor. Diabetic patients must be careful towards their health and should make a check on their diet to avoid AMI.

Keywords: *Oxidative stress. Malondialdehyde. Catalase. Glutathione. Superoxide dismutase.*

INTRODUCTION

Oxidative stress is a process occurring in different cells while adapting to various noxious endogenous and exogenous stimuli. The imbalance between reactive oxygen species generation and antioxidant defense is the cause of oxidative stress.[1] It can be implicated in various lifestyle related diseases like diabetes mellitus and its microvascular complications including nephropathy, retinopathy and cardiovascular problems (atherosclerosis and ischemia), initiation or progression of myocardial infarction.[2]

Cardiovascular diseases (CVDs) develop due to oxidative stress. Acute myocardial infarction (AMI) is the critical cardiovascular disease which causes myocardial ischemia because of occlusion in coronary arteries. The mortality rate due to acute myocardial infarction is increasing worldwide especially in the population who also suffer from diabetes mellitus.[3,4]

Diabetes mellitus is a group of metabolic diseases in which defective insulin secretion and insulin action result in chronic hyperglycemia. Decreased level of insulin to attain adequate response or insulin resistance of target tissues mostly adipose tissue and to a lesser extent liver at the insulin receptor level is responsible for this metabolic abnormality.[5]

Reactive oxygen species (ROS) with the disturbance in the endogenous antioxidant mechanism play a vital role in the pathogenesis of acute myocardial infarction.[6-8] Reactive oxygen species level is maintained by intercellular antioxidants like catalase, glutathione and superoxide dismutase along with antioxidant vitamins. Excess of ROS affects the antioxidant stability in pathological conditions.[9] The ineffectiveness of antioxidant is more damaging in mitochondria which lack catalase with the increased production of hydrogen peroxide (H_2O_2). It affects DNA, lipid and protein which results in cell destruction and cell death by necrosis.[10,11] Malondialdehyde which is also the marker of oxidative stress is elevated in cardiac problems indicating a link between acute myocardial infarction and oxidative stress.[12] The analysis of various biomarkers can help in the diagnosis of acute myocardial infarction.[6]

Diabetes mellitus is regarded as a risk factor for cardiovascular diseases. Patients with diabetes have increased risk of AMI because the rate of progression of atherosclerosis is also increased and it affects blood cholesterol levels. The progression of atherosclerosis occurs in both insulin-dependent or noninsulin-dependent diabetes mellitus. Diabetes mellitus is a source of vascular dysfunction as it causes the formation of reactive oxygen species and increases oxidative stress. Hyperglycemia-induced oxidative stress has been reported to be involved in the pathophysiology of cardiovascular complications in

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diabetes.[12] Oxidative stress markers are raised and total antioxidant capacity is declined in diabetes and cardiovascular diseases.[13]

The main emphasis of this study is to highlight the imbalance of antioxidants and oxidative stress markers due to diabetes-induced oxidative stress in AMI as it can be used as an important parameter that can help in the diagnosis of cardiac damage due to diabetes.

METHODOLOGY

It was a cross-sectional comparative study conducted at the Institute of Molecular Biology and Biotechnology, The University of Lahore. The study was conducted from June to September 2017. A total 300 subjects both males and females were enrolled in this study including 138 diagnosed cases of AMI, 132 diagnosed cases of diabetes with AMI and 30 healthy subjects as a control group by consecutive sampling technique. Informed written consent was taken from all the patients. Blood samples were collected from the Punjab Institute of Cardiology and Services Hospital, Lahore. Complete medical history of all subjects was taken. The research protocol was approved by the ethical committee before the conduction of study.

A blood sample of 3 ml was withdrawn from the median cubital vein under aseptic measures, collected in vacutainer and centrifuged at 4000 rpm to separate serum. Samples were stored in the freezer at -70°C for future analysis. Serum levels of superoxide dismutase, malondialdehyde, glutathione and catalase were measured by spectrophotometric methods after standardization and slight modifications according to laboratory conditions.[14-17] Patients with any other complication associated with diabetes were excluded from the study.

STATISTICAL ANALYSIS

Data was statistically analyzed and presented in graphical form by using the Graph Pad Prism 5 software. Differences between groups were evaluated by ANOVA followed by Bonferroni post hoc test and expressed as mean±standard deviation by using $p \leq 0.05$ as significant value.

RESULTS

A total of 300 patients were included in this study, out of this 60% were males and 40% were females. The study subjects were divided into three groups, group A had normal individuals, group B with AMI patients and group C included patients suffering from both diabetes mellitus and AMI.

Serum mean SOD level was significantly low (0.055±0.03 U/L) in group C patients while its levels were 0.071±0.02 U/L in group B and 0.087±0.0007 U/L in group A. Statistically significant difference (p-value=0.015) was observed in patients having DM and AMI from the other two groups. These results are shown in figure 1.

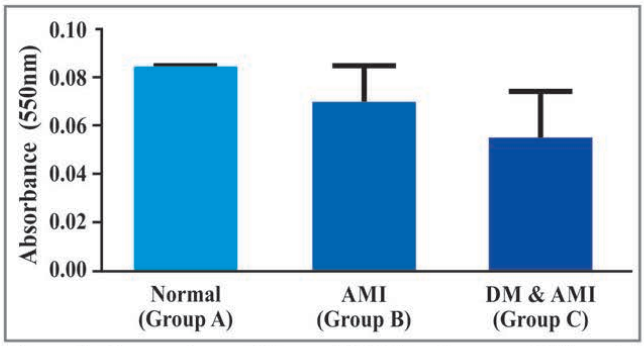

Figure 1: Comparison of Serum SOD Level among Different Groups

High MDA levels were estimated in serum of group C patients i.e. 0.09±0.013 U/L as compared to group B (0.06±0.0031 U/L) and group A (0.05±0.0003 U/L) (Figure 2).

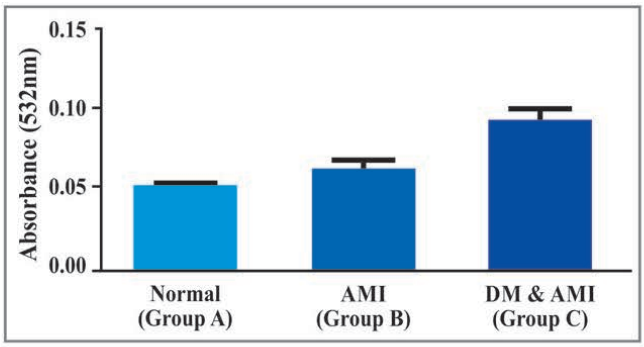

Figure 2: Comparison of Serum MDA Level among Different Groups

Group C showed significantly low values (0.84±0.042 U/L) when catalase enzyme was measured in serum. Normal individuals of group A had high levels of catalase (1.05±0.035 U/L) and CAT level in group B including patients with AMI was 0.91±0.009 U/L (Figure 3).

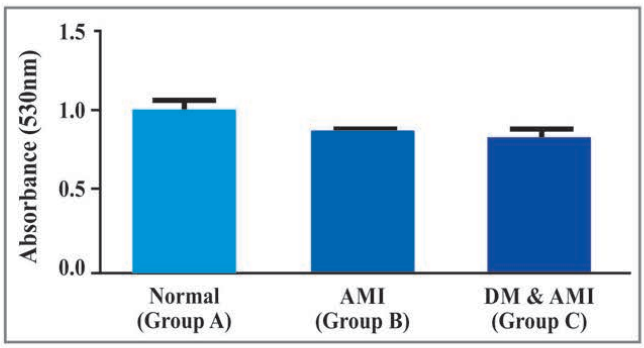

Figure 3: Comparison of Serum Catalase Level among Different Groups

When glutathione levels were assessed in serum, group A showed maximum value (0.11±0.005U/L) as compared to group B (0.05±0.004 U/L) and Group C (0.05±0.003 U/L). Glutathione levels were found lower in patients with both diabetes mellitus and acute myocardial infarction as shown in figure 4.

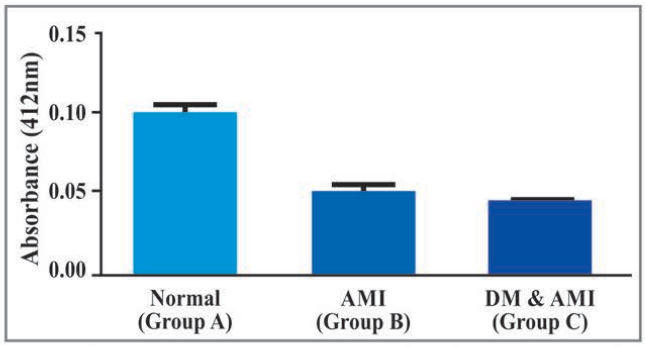

Figure 4: Comparison of Serum GSH Level among Different Groups

DISCUSSION

The disturbance between the antioxidant defense system and the generation of free oxygen radicals (ROS) is called oxidative stress. Many protective enzymatic and nonenzymatic antioxidants are generated because of regular production of ROS during cardiac cell metabolism which constitute antioxidant reserve and play a role to limit the tissue concentration of these reactive species. For the normal structure and functioning of myocardial cells, there must be a balance between antioxidant defense system and ROS generation.[18]

In our study, it has been observed that there is a significant decrease in the antioxidants superoxide dismutase, catalase and glutathione in diabetic and nondiabetic AMI patient. In diabetic patients a significant increase in malondialdehyde concentration was found when compared to the normal group and nondiabetic AMI patients. This is in accordance with the study of Fatima et al. who demonstrated that the levels of SOD, CAT and GSH were declined and MDA level was raised in diabetic AMI patients than nondiabetic AMI patients.[4]

Begum et al. suggested that in both diabetes mellitus and atherosclerosis MDA concentration is raised and reaction between MDA and protein is the major cause of AMI and stroke in atherosclerosis.[19] According to the study conducted by Slatter et al., concentration of malondialdehyde is raised in diabetes mellitus and deposits of MDA were also found in atherosclerotic plaque which leads towards AMI and other cardiac abnormalities. Their findings are in accordance with our findings. Slatter et al. also suggested that the use of dietary antioxidants is of huge interest in the protection of cardiovascular diseases.[20]

In another study done by Patil et al. decreased level of GSH in AMI patients were found.[21] Similar results were observed in our study. Oxidative stress has been considered as an important contributor in the progression of AMI. As a result of the natural protective mechanism, myocardial antioxidants inhibit the oxidative damage during AMI. He also suggested that glutathione plays a role in the protection of cardiac muscle cells against ROS damages and a decrease in cellular GSH level would reduce recovery after ischemia.[21]

Our data suggested a decrease in antioxidant catalase activity in diabetic AMI patients when compared with nondiabetic and normal patients. Similar to our observation Abou-Saif et al. also suggested that in diabetic AMI patients a significant decrease in catalase level has been observed.[22]

In a study conducted by Kesavulu et al. decrease in antioxidant enzyme catalase in diabetic and nondiabetic patients with AMI was observed. They also found that the plasma level of MDA was significantly elevated in diabetic AMI patients as compared to nondiabetic AMI and normal patients.[23]

Elevated levels of MDA in our patients are an indication of oxidative stress in AMI patients. The results reflected that the rise was more in diabetic AMI patients. This work is also proved by Dubois-Rande et al. who showed a decline in antioxidant enzyme activities and rise in MDA level in diabetic and cardiac abnormalities.[24] Thus the current study clearly shows increased oxidative stress in patients of diabetes with AMI. Depression of the antioxidant system is the main reason for these observations. Hyperglycemia increases the risk of oxidative stress in AMI.

CONCLUSION

Diabetic patients who also suffer from AMI are more prone towards the risk of oxidative damage as compared to patients who just have AMI because the oxidative stress markers damage cardiac cells and the prognosis in diabetic AMI patients are also poor. Diabetic patients must be careful towards their health and should make a check on their diet to avoid AMI.

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ORIGINAL ARTICLE

Mechanical Outcome of Direct Composite Resin Veneers

Muhammad Moazzam, Mubashir Rasheed, Saima Razaq Khan, Ali Farooq, Irsam Haider, Muhammad Azeem

ABSTRACT

Objective: The objective of the present study was to assess the mechanical outcome of direct composite veneers in accordance with the United States Public Health Service (USPHS) criteria.

Methodology: It was a descriptive case series conducted at Lahore Medical and Dental College, Lahore. Ethical approval was taken and informed consents were obtained from patients. One hundred teeth were selected by non-probability purposive sampling technique and Filtek Z350 (3M) composite resin was used as a direct restorative material. All teeth were restored with composite resin veneers with the complete protocol. All composite veneers were assessed according to USPHS criteria during a one-year period. The data was analyzed using SPSS version 24.

Results: All composite resin veneers performed well according to mechanical aspects of USPHS criteria including proximal contact point, marginal adaptation, polishability and anatomic form.

Conclusion: The clinical performance of the direct restorations was excellent as per USPHS criteria in all aspects.

Keywords: *Mechanical outcome. Direct composite veneers. USPHS criteria.*

INTRODUCTION

Newer hybrid composite resins with improved filler technology, filler matrix bonding and modified resin monomer are indicated for aesthetic areas. Hybrid composite resins are radio-opaque and contain micro-fine glass filler (58-75% by volume) of around 1µm in comparison to conventional hybrid composite resins. The micro and nano-filled composites are considered to have superior mechanical properties with better polishability due to the presence of very small fillers.[1]

Intraorally the composite restorations are affected by the occlusal load which leads to wear.[1] In clinical settings tooth wear results from processes such as attrition, abrasion, abfraction, corrosion and fatigue which are collectively defined as bio-trio corrosion.[2] Wear of composite restorations results in loss of contour and contact, increased roughness, staining and plaque retention, morphological changes, fatigue, hygroscopic expansion and breakdowns. Majority of the in vivo studies have used United States Public Health Service (USPHS) criteria to qualitatively assess the wear of composites clinically while in vitro studies have quantitatively measured wear which is important in posterior dentition.[3-5] A few investigators have also investigated surface morphological wear by analyzing restoration of anatomic form, proximal contact, polishability and marginal adaptation.[6] Enamel is thought to be a consistent reference material and standard when evaluating wear tribology of restorative materials.[4]

We used Filtek Z350 (3M) which is a nano-filled composite and works well in intraoral conditions showing wear resistance comparable to the enamel. This study evaluated the clinical mechanical outcome of direct composite resin veneers according to the modified USPHS criteria.

METHODOLOGY

It was a descriptive case series conducted at the Lahore Medical and Dental College, Lahore. The research protocol was approved by the ethics committee of the institution. Patients were informed of the complete procedure, informed consent was obtained and patients were asked for permission about publishing his/her photographs and data. One hundred teeth were selected for direct composite resin veneers fulfilling inclusion criteria from the Operative Dentistry Department of Lahore Medical and Dental College, Lahore by non-probability purposive sampling technique. The patients of both genders between 13-28 years were recruited. Each patient required multiple direct composite resin veneers. All patients were given oral hygiene instructions preoperatively. Patients with poor oral hygiene, periodontal diseases, bruxism and non-vital teeth were excluded. An operator prepared, restored and finished 100 veneers with complete protocol and manufacturers' directions within one year.

After proper isolation of teeth, periodontal prophylaxis was carried out and the color of restorations was selected with VITAPAN classic shade guide and patient's approval was obtained. Tooth reduction was 0.2mm, 0.5mm and 0.7mm for gingival, mid body and incisal edge respectively with diamond points, i.e.,

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depth marker, flat end taper, flame shaped, torpedo, flat end cylinder (MANI, JAPAN) to create enough space for composite and improve results of aesthetic restoration. Incisal chamfer provided space for composite and incisal edge length was dictated by the aesthetic (translucency, E-position, F-position) and functional (phonation and centric occlusion) requirement. Acid etching with 37% phosphoric acid (Adper single bond-2, total-etch adhesive, 3M) was done for 20 seconds. Teeth were rinsed for 20 seconds with water. Bonding resin (Adper single bond-2) was applied with micro brush and was cured for 15 seconds. Resin composite (Filtek Z350, universal restorative, 3M) was placed and cured for 15 seconds. Later finishing was done with finishing diamond burs, finishing strips and soflex disks (3M). Unnecessary tooth reduction was not done. Patients were also informed about possible sensitivity. Clinical mechanical acceptability of restorations was checked according to the modified USPHS criteria with the naked eye and sickle shaped explorer (Table 1).[7]

Veneers were rated independently with a mirror and probe. Veneers were assessed after placement (baseline evaluation) and 12 months later using the modified USPHS criteria.[7]

For each of the criteria, a score of 1, 2 & 3 was used to indicate clinical acceptability and score 4 & 5 indicate progressively less degrees of clinical acceptability (Table 1).

The percentage of acceptable and unacceptable results at baseline and at 12 month interval was measured.

STATISTICAL ANALYSIS

Data was recorded using the Statistical Package for the Social Sciences (SPSS) version 24. Baseline and after 12 months score for each parameter was compared using paired t-test. P-value of less than 0.05 was considered significant.

RESULTS

One hundred patients with direct composite veneers were evaluated in one year. All patients were evaluated for 12 month recalls. Filtek Z350 showed 100% acceptable results for anatomic form in our study according to USPHS criteria at baseline and after 12 months. All restorations were acceptable at baseline, whereas, 99% restorations showed acceptable results and 1% restorations were unacceptable according to the criteria after 12 months and it was because of secondary caries. All restorations were polished according to protocol with soflex disks (3M) and were acceptable at baseline evaluation. Only 1 restoration was clinically unacceptable and fell into score 4 after 12 months. At baseline and after 12 months of evaluation with USPHS criteria all restorations were acceptable. Results of the clinical evaluation at the 12 month follow-ups are presented in table 2. Paired t-test was applied for each parameter on baseline and 12 monthly score and p-values were found to be insignificant (>0.05).

Table 1: Modified USPHS Criteria

Scores		Mechanical Parameters			
		Anatomic Form	**Marginal Adaptation**	**Polishability**	**Proximal Contact Point**
1	**Clinically excellent**	Restoration's contour is continuous with existing anatomic form	Restoration is adapted to the tooth surface, no ledge, no discoloration	Restoration has shine and gloss like tooth	Floss hinders passing through the contact point
2	**Clinically good (after correction probably very good)**	Restoration is slightly over or under contoured	Restoration is adapted to the tooth surface, slight ledge and discoloration at margin	Smooth and satin, highly reflective	------
3	**Clinically satisfactory (minor shortcomings, no unacceptable effect but not adjustable without damage to the tooth)**	Restoration has slight overhang or slight enamel/dentin is exposed	Discoloration between tooth and restoration, slight ledge which can be corrected by finishing and polishing	Rough and shiny, slightly reflective	------
4	**Clinically unsatisfactory**	Restoration and the tooth has a gap with loss of anatomic form	Discoloration at the resin-enamel interface, crevice more than 1mm	Rough and dull, not reflective	------
5	**Clinically poor (replacement necessary)**	Restoration is missing or broken or severe pain in tooth	Explorer penetrates deep into the crevice between margin of tooth and restoration	Rough and dull surface with loss of shine, easy plaque accumulation	Floss moves through contact point freely

Table 2: Mechanical Evaluation of Nano-fill Composite at Baseline and after 12 months

Scores		Mechanical Parameters							
		Anatomic Form		Marginal Adaptation		Polishability		Proximal contact Point	
		Baseline n=100(%)	12 months n=100(%)	Baseline n=100(%)	12 months n=100(%)	Baseline n=100(%)	12 months n=100(%)	Baseline n=100(%)	12 months n=100(%)
1	Clinically excellent	100(100%)	94(94%)	100(100%)	99(99%)	100(100%)	95(95%)	100(100%)	99(99%)
2	Clinically good(after correction probably very good)		03(03%)		01(01%)				01(01%)
3	Clinically satisfactory(minor shortcomings, no unacceptable effect but not adjustable without damage to tooth)		03(03%)		03(03%)				
4	Clinically unsatisfactory				01(01%)		01(01%)		
5	Clinically poor (replacement necessary)								
Overall score		Acceptable (100)	Acceptable (100)	Acceptable (100)	Acceptable (99)	Acceptable (100)	Acceptable (99)	Acceptable (100)	Acceptable (100)

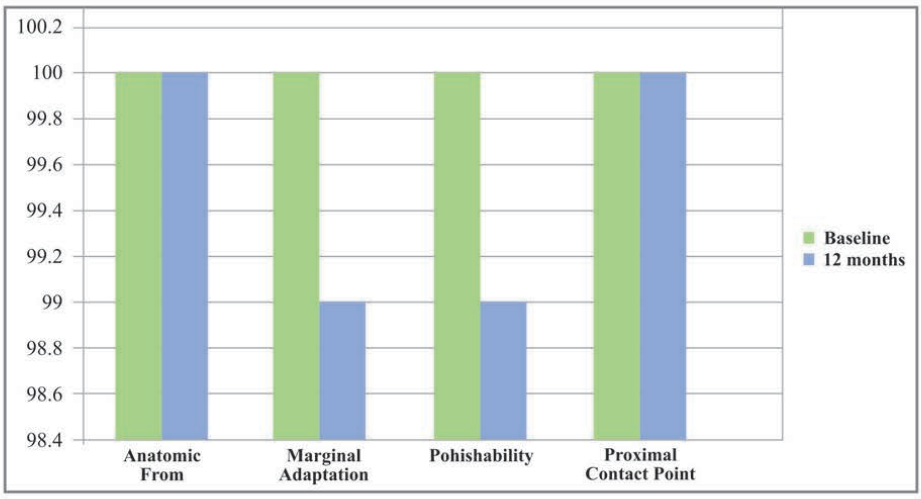

Figure 1: Percentage of Acceptable Results of Mechanical Parameters

DISCUSSION

The changes in the anatomy of the restorations provide an indication of the alteration in the morphology of the restored surfaces due to wear. In this study, high scores were achieved for the criteria of anatomic form, marginal adaptation, polishability and proximal contact point for the majority of the patients which may suggest the minimal effect of wear on composite restoration. As described previously in the literature, all composite restorations were placed with incremental technique in order to minimize shrinkage and micro-leakage.[8] As described in previous papers, the absence of post-operative sensitivity in the current study may be attributed to the careful placement of the restorations and optimal mechanical properties of the composite resins that reduce hydrostatic dentine fluid movement.[9-11] Intact interproximal contact was found in 99% of the cases as a recommended matrix band was used during the buildup of proximal contact point while open contact was found in 1% of the cases at 12 month follow-up.

Since resin composite used was Filtek Z350 nano-fill, its polishability was excellent and polished surfaces were maintained even after 12 months, but one resin composite veneer scored 4 after 12 months. Its polished surface was lost may be due to the friction of food,

improper finishing and polishing or antagonistic teeth leading to staining. No sign of wear or fracture was detected. The stain was developed on the cervical roughened surface due to pigment absorption.

Authors from previous studies have reported a comparable deterioration of marginal integrity with micro-hybrid composites due to shrinkage, c-factor, butt-joint occlusal margin and self-etch adhesives.[12-16] A systematic review reported an annual failure rate of 0-45% for composite restorations.[17] Many studies have reported acceptable results for conventional hybrid composite (tetric ceram) in the posterior load bearing area of the oral cavity but only a few trials have demonstrated the performance of micro-hybrid (gradia direct posterior) and nano-hybrid (TEC) composites.[18] Filtek Z350 demonstrated acceptable results for anatomic form while there was no significant difference between nano-filled composite and tetric ceram. No failure of restorations was observed at the end of the follow-up period which is in contrast to previous longitudinal studies which have reported a failure rate from 1.1% to 7%.[6,13-15,18] Previous studies have reported satisfactory clinical performance of tetric ceram with 1.9% to 3.3% failure rates.[12,13] All restorations demonstrated acceptable wear pattern when evaluated with USPHS criteria. However, it should be understood that the current system does not offer optimal evaluation of wear clinically, therefore, the reported advantages of mechanical properties of the composite material cannot be confirmed.

CONCLUSION

At baseline and after 12 months, Filtek Z350 (3M) resin composite performed clinically well in anterior veneers. The nano-filled composite showed enamel-like vertical wear, color and translucency. The clinical performance of the direct restorations was excellent as per USPHS criteria in all aspects. Overall unacceptable results were very less. However, longer evaluations are necessary.

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ORIGINAL ARTICLE

Efficacy of Intra-articular Platelet-rich Plasma in Patients of Knee Osteoarthritis

Farooq Azam Khan, Maria Aslam, Muhammad Tahir Saeed

ABSTRACT

Objective: To evaluate the efficacy of autologous intra-articular platelet-rich plasma (PRP) injections in patients of knee osteoarthritis.

Methodology: This was a prospective study carried out on 50 patients (10 males & 40 females) visiting the outpatient department of Orthopedic Surgery, Sharif Medical City Hospital, Lahore. The study was approved by the ethical committee of the institution. The patients fulfilling the inclusion criteria were asked to fill Western Ontario and McMaster Osteoarthritis criteria (WOMAC) questionnaire. Informed written consent was taken from the patients. Using aseptic techniques, PRP was injected intra-articularly in the affected knee. Three PRP injections were given intra-articularly at 1 week intervals. Patients were regularly followed up after 3 weeks, 6 weeks, 3 months, 6 months and 1 year of the last PRP injection. Each parameter of the WOMAC index was compared with the baseline score at each follow-up. The data obtained was analyzed using SPSS software version 25.

Results: The mean age of the patients was 50.82±8.6 years; male to female ratio was 1:4. According to the Kellgren-Lawrence scale, 5(10%) patients had grade I, 16(32%) patients had grade II and 29(58%) patients had grade III osteoarthritis. The mean score of all WOMAC parameters improved significantly as compared to the baseline score before the treatment. There was a significant improvement in joint pain, stiffness and functional ability after PRP injections.

Conclusion: Intra-articular injections of autologous platelet-rich plasma in osteoarthritic knee joint are effective in relieving joint pain & stiffness and improve the functional capacity in the patients of knee osteoarthritis.

Keywords: *Platelet-rich plasma. Knee osteoarthritis. WOMAC index.*

INTRODUCTION

Osteoarthritis is a chronic inflammatory condition of synovial joint in which degeneration of articular cartilage occurs. It adversely affects the quality of life of the patient.[1] The cartilage is avascular and the cells have low mitotic activity. So, healing potential is limited in cartilage and eventually it leads to irreversible damage. Knee joint osteoarthritis is one of the most common musculoskeletal disorders of old age. The main symptoms of knee osteoarthritis are knee pain, stiffness, swelling and functional disability.[2,3]

Different treatment options are used for symptomatic relief of the patient with knee osteoarthritis (OA) like oral chondroprotective drugs, pain killers, intra-articular steroids injections but no treatment modality can cure osteoarthritis.[4-6]

Platelet-rich plasma has emerged as a new treatment option for patients with knee OA due to the presence of various growth factors like transforming growth factor-β (TGF-β), platelet-derived growth factor (PDGF) and insulin-like growth factor (IGF) in the α-granules of the platelets.[7,8] Platelet-rich plasma is a portion of plasma which contains four to five times higher platelet concentration than the normal platelet count in a healthy person.[9,10]

The National Institute for Health and Care Excellence (NICE) recommended "Current evidence on platelet-rich plasma injections for knee osteoarthritis raises no major safety concerns. However, the evidence on efficacy is limited in quality. Therefore, this procedure should only be used with special arrangements for clinical governance, consent and audit or research".[11]

Various international studies showed the positive effects of PRP on knee OA. The patients showed a significant improvement in symptoms and their functional ability after PRP injections.[12-14] Platelet-rich plasma is a better treatment modality as compared to hyaluronic acid (HA).[8,9,15] Growth factors are released from PRP immediately and last for about three weeks. This sustained release of growth factors from PRP helps in cartilage healing thus improving the clinical condition of the patient.[16]

Osteoarthritis of the knee joint is a common chronic disorder associated with significant morbidity. Despite a variety of non-surgical treatments, the patient experience pain with limited physical activity. There are still a few randomized controlled studies which clarify the effectiveness of optimal therapy of platelet-rich plasma after 1 year. This study was planned to evaluate the efficacy of 3 PRP injections with one week intervals on the functional ability of the patient with follow-up of 1 year.

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METHODOLOGY

This was a prospective study carried out on 50 patients (10 males & 40 females) visiting the outpatient department of Orthopedic Surgery, Sharif Medical City Hospital, Lahore. The study was approved by the ethical committee of the institution and consecutive sampling technique was used. The patients of age ≥40 years with knee pain for greater than 3 months and radiologic evidence of articular damage (grades 1-3 of Kellgren-Lawrence scale) were enrolled in our study. Kellgren-Lawrence scale is based on criteria of the American College of Rheumatology and is shown in figure 1.

Patients with secondary osteoarthritis, systemic diseases like rheumatic diseases, coagulation disorders, severe cardiovascular diseases, immune suppression, malignancy, infection or active wound of the knee were excluded from the study.

The patients fulfilling the inclusion criteria were asked to fill the WOMAC questionnaire. In patients with osteoarthritis of both knee joints, the worse affected knee joint as per WOMAC score (higher score) was selected and in patients with osteoarthritis of the single knee joint the same affected knee joint was selected. Plain radiograph of the selected knee joint was done (standing anteroposterior and lateral view). Each parameter of the WOMAC index was compared with the baseline score at each follow-up. Figure 2 shows the WOMAC index.

Using aseptic technique, 30 ml of venous blood was drawn from the antecubital vein of the patient in the Pathology Laboratory and collected in three 10 ml

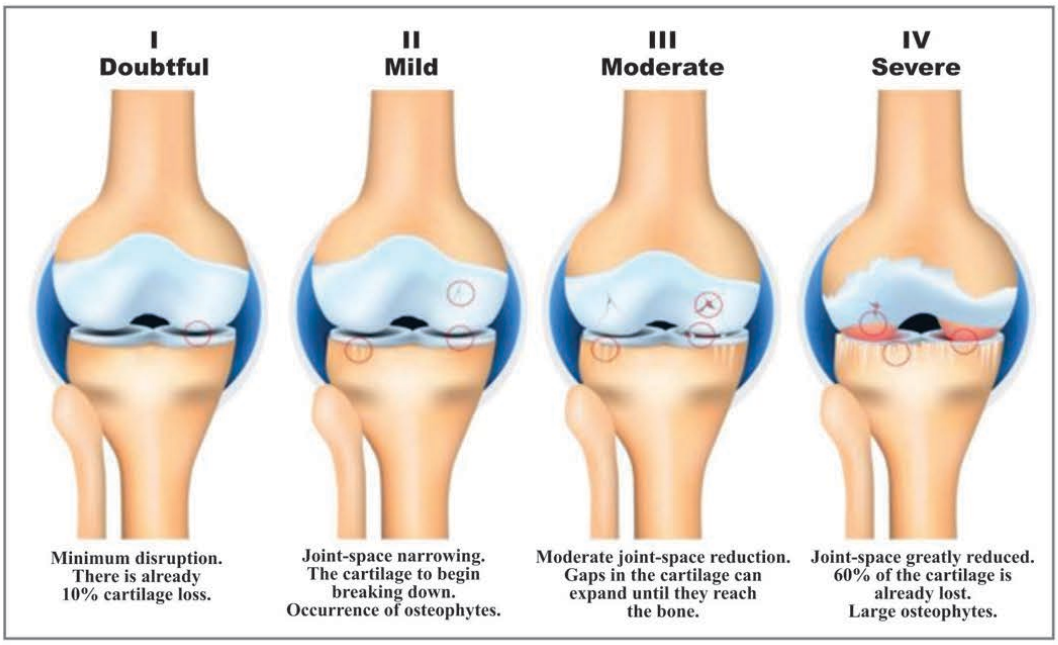

Figure 1: Grades of Knee Osteoarthritis Based on the Kellgren-Lawrence Scale

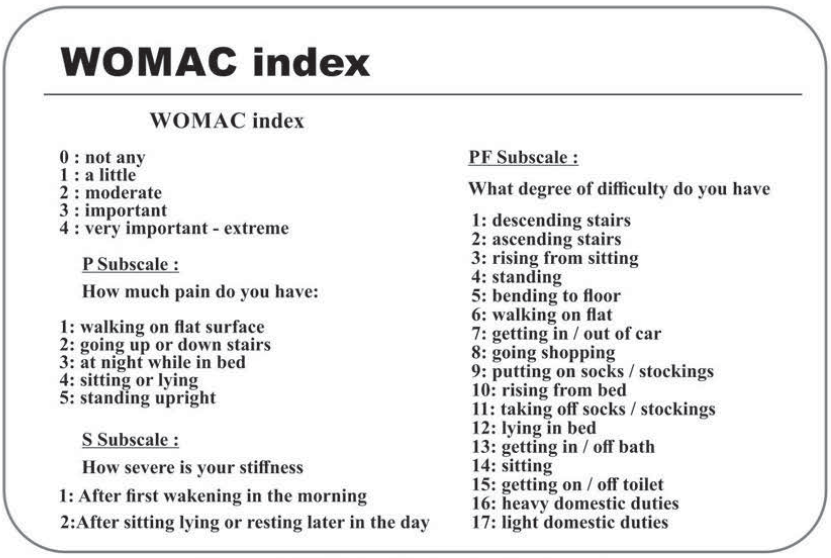

Figure 2: WOMAC Index for Patients Assessment

vacutainer containing 1 ml of 3.2% sodium citrate as an anticoagulant. Platelet-rich plasma was prepared by the soft and hard spin method. The final product of 5-6 ml of PRP was obtained and it was injected intra-articularly in the affected knee on the same day. Platelet count assessment was done initially in the whole blood as well as in PRP in all the patients.

After taking informed written consent, the patient was shifted to the operation theatre. The patient was placed in the supine position. Under the aseptic conditions, 4-5ml of PRP was injected in the knee through an anterolateral approach using 22 gauge needle with local anesthetic injection lignocaine 2%. No exogenous factor was used for platelet activation. The aseptic dressing was done by the bandage. Three PRP injections were given intra-articularly at 1 week intervals. Patients were regularly followed up after 3 weeks, 6 weeks, 3 months, 6 months and 1 year after the last PRP injection. At each visit, the assessment was done using the WOMAC questionnaire.

STATISTICAL ANALYSIS

The data obtained was analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. The quantitative variables were measured as mean±SD. Qualitative variables were shown as frequencies and percentages. Paired t-test was used to compare mean values of pretreatment and posttreatment WOMAC index parameters. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

The mean age of the patients was 50.82±8.6 years; male to female ratio was 1:4. According to the Kellgren-Lawrence scale, 5(10%) patients had grade I, 16(32%) patients had grade II and 29(58%) patients had grade III osteoarthritis.

The baseline score of WOMAC index parameters (pain, stiffness & physical function) was compared with mean values after 1 year of completion of treatment. Our results showed that all the parameters were improved on the subsequent follow-up visit. A statistically significant difference (p-value=0.001) was found when the pretreatment pain score was compared with mean pain score at follow-up after 1 year. Joint stiffness and physical functioning of the joint also improved significantly after 1 year of treatment (p-value <0.001).

Table 1 shows the mean value of the baseline WOMAC index parameter with the posttreatment score calculated after 6 months and 1 year of treatment. Four patients (8%) developed mild pain and swelling of the knee joint after injection which resolved spontaneously within 3 days by rest and ice application. Infection was not reported in any patient.

Table 1: Baseline and Posttreatment WOMAC Index Parameters

Parameter	Mean Score		
	Pretreatment	6 Months Posttreatment	1 Year Posttreatment
Pain	12.8±1.9	6.5±1.1	7.5±1.5
Stiffness	5.6±0.8	2.9±0.5	2.6±0.7
Physical Function	39.5±5.4	17.9±3.5	20.4±2.3

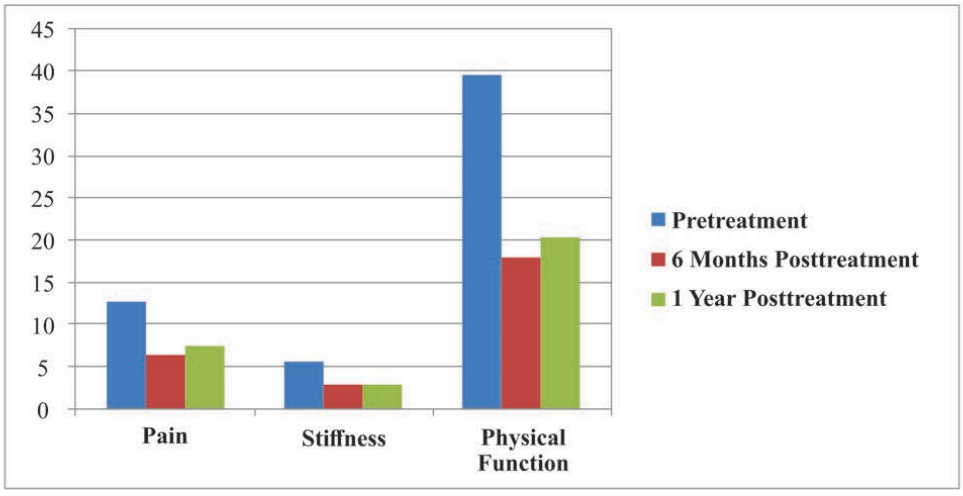

Figure 3: WOMAC Index Parameters Before and After Treatment with PRP Injections

DISCUSSION

Osteoarthritis of the knee joint is the most common inflammatory degenerative joint disorder. Treatment of osteoarthritis has relied on symptomatic interventions. The goals of a therapeutic approach in knee osteoarthritis are to alleviate pain and improve the functional capacity of joint.[1-3]

Platelet-rich plasma is the new upcoming treatment modality for the patients with knee osteoarthritis. Cartilage has a very limited self-regeneration capacity. Growth factors released from platelets aid in the regeneration of cartilage and decrease the inflammation. Our results showed that three PRP injections after 1 week intervals significantly improved pain, reduced the stiffness and improved the functional ability of the knee. Sanchez et al. found that PRP was more effective than hyaluronic acid injections.[17]

A study conducted by Kon et al. included fifty patients of knee OA. They were treated with 3 intra-articular injections of PRP and were examined after 2 & 6 months. The results were compared with two groups of patients treated with hyaluronic acid injections. Group I was managed with high molecular weight hyaluronic acid and group II was given low molecular weight hyaluronic acid injection. Patient satisfaction and the effects of therapy were also recorded. Follow-up of the patients after 6 months showed that PRP injections had better results as compared to hyaluronic acid HA.[14]

Other studies conducted by Smith et al. and Tietz et al. also showed that in patients with knee osteoarthritis pain was significantly reduced by autologous PRP injections.[18,19] Vaquerizo et al. showed that intra-articular injections of PRP had better results as compared to hyaluronic acid in primary and secondary efficacy analysis both at 24 and 48 weeks. Patients had a significant clinical improvement, reduced pain and improved joint stiffness.[20]

A study conducted by Jubert et al. included 75 patients with advanced knee osteoarthritis. It showed that even a single intra-articular injection of PRP can relieve pain and improve physical function of joint.[21]

According to our results, the WOMAC index significantly improved in the follow-up after treatment as compared to the baseline score. These results indicated the symptomatic relief and functional recovery in patients after 6 months and 1 year of PRP injections. Similar results were found in a study conducted to validate the outcomes of PRP injections in patient of knee osteoarthritis after 6 months & 12 months of treatment. Clinical outcomes and WOMAC score were significantly better after PRP injections and resulted in significant clinical improvements up to 12 months post-injection.[16]

Our study showed that it is safe and feasible to use PRP injections in the treatment of knee osteoarthritis. The outcome was measured in all patients undergoing the treatment at follow-up after 1 year. Platelets rich plasma significantly reduces the pain and stiffness and increases the functional capacity of the knee joint.

CONCLUSION

Intra-articular injections of autologous platelet-rich plasma (PRP) in osteoarthritic knee joint are effective in relieving joint pain & stiffness and improve the functional capacity in the patients of knee osteoarthritis.

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CASE REPORT

Uterine Lipoleiomyoma: Case Report of a Rare Entity

Saba Durrani, Asma Iqbal, Tashhir Rana

ABSTRACT

Uterine lipoleiomyomas are a rare benign variant of uterine leiomyomas with the reported incidence of 0.02-0.3% in the literature. It is usually seen in obese postmenopausal women and result from fatty morphogenesis of smooth muscles in uterine leiomyoma. In this case report, we are presenting a large lipoleiomyoma in a nulliparous postmenopausal woman with its typical presentation on computed tomography, gross morphology and histopathology.

Keywords: *Lipomatous uterine tumors. Lipoleiomyoma. Uterine leiomyoma.*

INTRODUCTION

Uterine lipoleiomyomas are a rare benign variant of uterine leiomyoma with a reported incidence of 0.02-0.3% in the literature.[1] It is an admixture of a variable amount of smooth muscle fibers, fats cells and fibrous tissues and is thought to be secondary to the fatty metamorphosis of smooth muscles of leiomyomas.[2] Although lipomatous uterine tumors are rare, other fats containing tumors that can occur in the uterus are pure lipomas, fibrolipomyomas, angiomyolipomas and lipomyosarcomas.[3] In this case, we report the presence of a large uterine lipoleiomyoma in a postmenopausal woman causing pressure symptoms necessitating its surgical removal. It has a typical presentation on computed tomography, gross morphology and histopathological examination.

CASE REPORT

A 55-year-old postmenopausal nulliparous woman with the complaint of urinary retention for 1 week presented to the Gynaecology Department of Sharif Medical City Hospital, Lahore. She was referred to the Radiology Department for diagnostic workup. Her ultrasound showed a large heterogeneous mass arising from the posterior wall of the uterine body pushing the uterine cavity anteriorly, findings were suggestive of a large uterine fibroid. She was further evaluated with contrast-enhanced computerized tomography (CT) scan abdomen and pelvis which demonstrated a 9.5x10.5x9cm (CCxAPxTR), well-defined mixed density heterogeneously enhancing mass arising from the posterior uterine wall. The mass was predominantly solid with the prominent fatty central component and had a significant mass effect on the uterus and urinary bladder. The mass had preserved fat planes between the bladder, rectum and other viscera. On the basis of CT scan finding the most likely diagnosis was lipoleiomyoma, however, due to the huge size of the

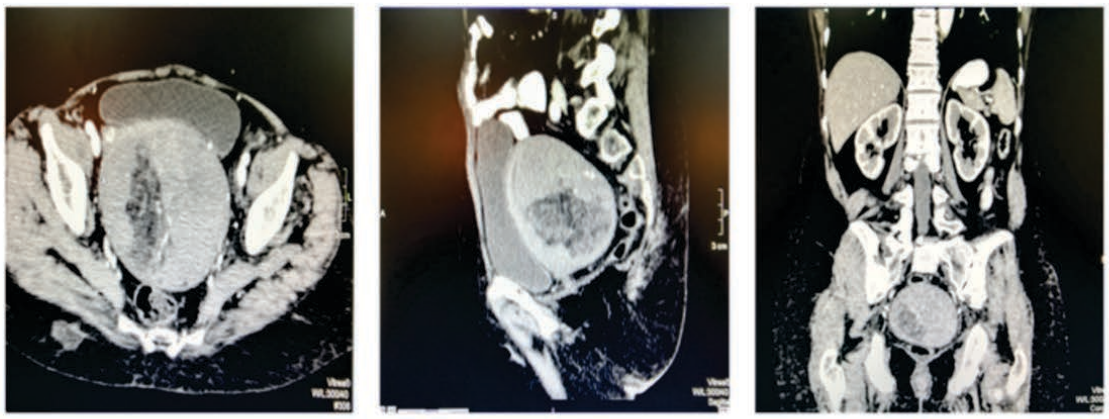

Figure 1: Post Contrast CT Scan Axial and Sagittal Image through Pelvis Showing a Well Marginated Heterogeneously Enhancing Solid Mass with Central Fatty Component

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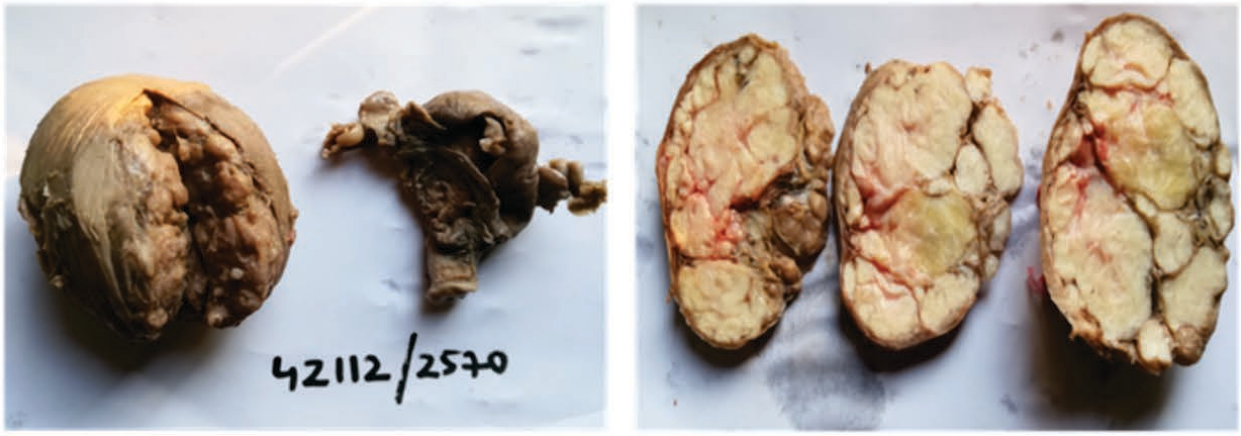

Figure 2: Macroscopic View of Mass Shows a Lobulated, Multinodular, Predominantly White Tan Color Mass with Few Nodules Yellowish in Color Suggestive of Fats

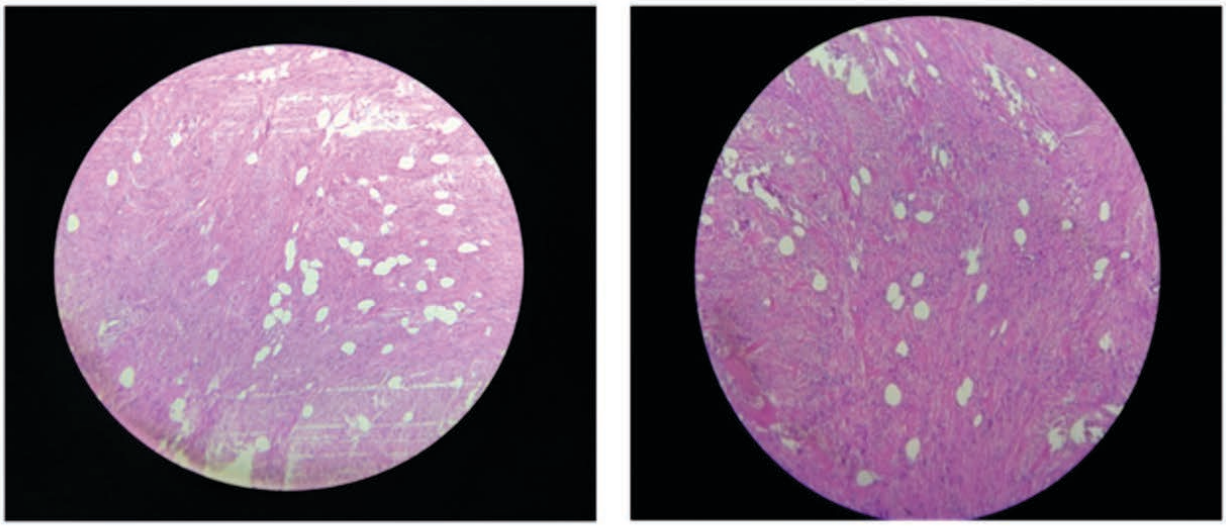

Figure 3: Microscopic Slides from the Tumor Showed Lobules of Mature Adipose Tissue Intermingled with the Fascicles of Smooth Muscle Cells with No Nuclear Atypia

mass possibility of sarcomatous change could not be excluded entirely.

The patient was planned for exploratory laparotomy and uterine myomectomy. Through Pfannenstiel incision, the uterine mass was approached, however, due to the huge size of the lesion the patient underwent total hysterectomy and bilateral salpingo-oophorectomy along with the removal of the mass. The mass was eventually sent for histopathological examination. Macroscopically the section revealed a 10.5x10.0x8.0cm, lobulated, multinodular, predominantly white tan color mass with few nodules yellowish in color. Microscopically, slides from the tumor showed lobules of mature adipose tissue intermingled with the fascicles of smooth muscle cells. There was no nuclear atypia within the smooth muscle cells. These histopathological findings were typical for lipoleiomyoma and no other abnormality was detected.

DISCUSSION

As fat tissue is not native to myometrium therefore lipomatous tumors of the uterus are rare benign neoplasms. Histologically they can be pure lipomas, mixed or can be a very rare malignant form fat containing tumors.[4] They are typically seen in obese post-menopausal women and are frequently associated with the presence of ordinary leiomyomas.[5] Their most frequent location is uterine corpus and is usually intramural. Clinically they may remain completely silent or present with signs and symptoms of an ordinary leiomyoma.[6]

Histologically, leiomyomas are found to have an admixture of mature smooth muscles, fat cells and a variable amount of fibrous tissue. Presence of fat in lipoleiomyoma has been thought secondary to fatty morphosis of smooth muscles in leimyomas.[4-6]

Imaging plays a crucial role in diagnosing the nature of

lipomatous tumors, detecting the site of origin and guiding its management. Common differentials for pelvic fatty tumors are benign cystic ovarian teratomas, uterine fatty benign and malignant tumors.[6] On ultrasonography lipoleimyoma typically presents as hyperechoic well defined uterine mass which is encased by a hypoechoic rim.[6,7] Computerized tomography scan and Magnetic resonance imaging (MRI) are more specific in depicting the fatty composition of these lesions. On CT scan they appear well-circumscribed mass arising from the uterus which is predominantly fatty with areas of nonfat-soft tissue density. On MR imaging, their lipomatous nature is depicted by high signal intensity on T1W, presence of chemical shift and fatty component is further confirmed on fat suppression techniques.[7,8] It is important to differentiate lipoleiomyomas from other fatty pelvic tumors on the basis of imaging as they are totally benign and require no management.[8]

CONCLUSION

Uterine leiomyomas are rare benign tumors of uterus which are when asymptomatic require no surgical management. Imaging plays a crucial role in differentiating them from other pelvic fatty masses and confidently depicting their site of origin. These can grow in size to large masses simulating malignant tumors. Few cases of lipoleiomyomas with sarcomatous change have also been reported in the literature. It is important for the physician to be aware of this rare form of leiomyoma, with clinical symptoms similar to leiomyomas but having specific radiological and histological appearance.

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