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5. Predatory Journals, a literature review. 42-51.
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The progress of the human race over the last 200 years is unprecedented in recent history. Rapid industrialization, urbanization, and consumerism have made lives easier for humankind. Still, these changes come at a very high price. We never anticipated that we will have to pay the price in the form of climate change and global warming. Our planet, the earth, is getting warmer by 0.85 centigrade annually for the last one hundred and seventy years. Hence, glaciers are melting faster than ever, water levels are rising, and cities are sinking, while greenhouse gas emission numbers are at their highest points in human history. Unfortunately we humans are living in anthropogenic epoch and are also speeding up the destruction of the earth’s ecosystem by being the dominant cause of the warming observed since the 20th century. Deforestation coupled with increased greenhouse gas emissions has led to a surge of heat-waves globally. These environmental disasters not only affect the environment, plants, and land but also have a profound direct and indirect impact on the health of people. In fact the health impact has already debuted in the form of worsening key health indicators. In Pakistan alone, the 2015 heat-wave claimed the lives of twelve hundred people in Sindh province. Due to variable rainfall patterns that affect the availability of fresh water, it also affects food production & delivery and brings on the drought. Quality of air, clean drinking water, and availability of food are the top three indicators most influenced by these disasters.

Coupled with these, the more than the frequent occurrence of natural calamities; tsunamis, wildfires, snowstorms, and extremes of temperatures has put an extra financial burden on already, stretched to limits budgets of health. Looking at health climate relationships, any change in climate directly influences the temporal distribution of vector-borne diseases, increasing their epidemic potential. The most common examples of such diseases are Malaria & Dengue fever. Rising temperature and globalization can bring back or intensify the spread of malaria in humid and temperate nation-states that have either eradicated or controlled the vector-borne transmission mechanisms, leading to an epidemic for which these countries are unprepared. In Pakistan, nineteen thousand cases of dengue and thirty mortalities were reported by the National Institute of Health, Pakistan, in the year 2019 which is quite alarming. Speaking about the quality of air, in the preceding hundred years, the world has seen an exponential rise in air pollution leading to more frequent respiratory ailments. Air pollution and greenhouse gas emissions are becoming a leading cause of lung and skin malignancies. It also considered as the major environmental risk factor in the incidence and progression of some diseases such as asthma, lung cancer, ventricular hypertrophy, Alzheimer's and Parkinson's diseases, psychological complications, autism, retinopathy, fetal growth, and low birth weight.

It’s never too late to make a start. If the carbon emission & deforestation are not controlled, the temperatures will continue to rise, the earth could become hotter by 2˚ in the next 30 years. Earth is our only home, and there is no Planet B for humans. We do not have a choice but to slow deforestation and plant more trees. Although, in Africa, Pakistan, India, and United Kingdom, initiatives have been taken on a government level with successes, yet they are not adequate.

The world needs to realize that this is the most serious health crisis of this era; we have to work on war footings, with nations joining hands in this war against the emerging global health crisis, the climate crisis. Minimizing our carbon footprint is the only viable option. The countries that produce more greenhouse gas emissions must be held accountable. We are the generation faced with some tough decisions, and it is up to us to either leave a
better place for our children or a world where a child
will have to fight to survive.

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Empathy and Role modeling. Is it missing?

Editorial

Muhammad Idrees Anwar.
Dean Surgery & Allied, Rawalpindi Medical University.
Executive Editor, Pakistan Journal of Surgery & Medicine.

Let me start by congratulating the dedicated team of Pakistan Journal of Surgery and Medicine (PJSM) whose untiring effort brought this journal of international standard. I have the honor to be part of this professional and enthusiastic galaxy of highly intellectual writers. Insha’Allah you will witness the glory of this journal very soon.

We were never taught “empathy”. In fact, let me admit my ignorance, I did not know what it meant before starting my clinical practice. Late in my clinical practice, I became conversant with emotional intelligence. Yet I feel that I accomplished those skills from my teachers presumably as part of the hidden curriculum. They were my role models and they manifest most compassionate and empathetic attitude toward their patients and doctors alike. Empathy is regarded as an essential quality for being “a good” doctor and most desired attribute by the patients. Being compassionate is the biggest virtue that a physician should possess yet it is considered least important for being promoted in medical school.

Let me admit with sorrow that we see empathy decline among doctors to an alarming extent. This is not just my “gut feeling” but national and international data support this finding. A study done in Lahore showed very low scores in both emotional intelligence and empathy than the average person. In a recent work American doctors themselves have acknowledged empathy erosion in their clinical experiences. One such study performed at the University of Arkansas, validated empathy decline among students in medical schools as the years progressed. Similar results were witnessed among students of Boston School of medicine where empathy scores of students studying in preclinical years were higher than in clinical years. The students attributed stressful working environments, more focus on physical recovery rather than psychological well-being and stressful attitudes of senior colleagues as main reasons.

Today when I have fitted in the shoes of my seniors, I feel that we are not as good role models as our seniors once were. This is affirmed by evidence from all quarters of doctors. The young clinicians are facing mistreatment by superiors, harassment, belittlement, humiliation, gender-specific discrimination, or sexual harassment during training. Another alarming fact was that empathy tends to depreciate as the years progress. Senior physicians tend to become less sensitive and receptive to patient sufferings. This empathetic decline tends to make them rude and insulting towards their juniors and bad role models.

Role models tend to play a crucial role in teaching empathy to medical students. All students and Young physician-in-training are positively influenced by their humanistic mentors.

Let us talk about some solutions to this bewilder.

1. I think the time has come when we should question ourselves and search our souls. “Are we empathetic and good role models?” Obviously, over the years we have retrogressed and must rejuvenate ourselves by reflection. We need to explicitly “role model” for students what we value as important and send a clear message that expressing empathy is good for the patient, the clinician, and the community.

2. Empathy can be improved and successfully taught at medical school especially if it is embedded in the student’s actual experiences with patients. Proper empathy education at both cognitive and attitude levels will greatly influence students’ ability to master this skill and practice it.

3. Good social support and less stress will help students sustain their empathetic attitudes towards their patients. Senior teachers and doctors should feel their responsibility to keep students and young doctors relaxed and well supported during their training.
I wish that we would be able to bring about a positive change in our attitude and prove to be an exemplary role model like our seniors. Thank you.

REFERENCES


CITATION

Smog has reached unhealthy levels as per the US Consulate readings earlier last month. The thick blanket of black smog engulfed Lahore, leading to residents gasping for air and complaining of eye and throat symptoms.

Pakistani authorities do not publish any real-time data on air quality data; all data comes from the US State Department and non-government sensors. The air quality worsens from October to February. Lahore became the second most polluted city in the world that led to Pakistan’s “smog season” the most ill-impacting for children and exposed adults too. Pakistan air pollution has an annual PM 2.5 average of 74.3 µg/m³. Smog has become a fifth season in highly polluted areas like Lahore and Peshawar. These densely polluted areas are under threat due to the lack of action taken towards prevention. Diesel emissions, coal combustion, crop burning, unregulated industrial emissions, and two-stroke vehicles are primary causes. Contrary to current beliefs by the Punjab Environment Department, Indian Punjab farmers are the primary contributing factor. However, unregulated fuel emissions, particularly in steel re-rolling mills that use plastic waste materials, are permanent contributors to the smog epidemic.

More than 5.88% of GDP ($47.8 billion) is the estimated economic burden of air pollution in Pakistan. Critical analysis of social and economic factors is necessary. **WHO IS MOST VULNERABLE TO RISKS FROM SMOG?**

Low to middle-income households are most vulnerable to long-middle term effects of smog. Families who have few earning members that engage in strenuous outdoor activities are likely to face defects. Labourers may likely suffer from smog-related health effects if these trends continue. Active children are exposed to hazardous levels of smog. Children amount to 35% of the population in Pakistan. They are prone to asthma and other respiratory ailments that may reduce the quality of life. Individuals with respiratory diseases are vulnerable to the effects of ozone are sensitive to such drastic changes in air quality in the past few years.

The Ministry of Finance states that the working population in Pakistan is 110 million, which is 60% of the entire population. Around 135,000 deaths per annum are due to the residual air pollution that makes it the leading cause of morbidity and mortality in Pakistan. Smog is a public health emergency that threatens to reduce life expectancy among residents.

**SOCIAL REPERCUSSIONS OF SMOG**

Earning the status of a public health emergency, increased air pollution directly leads to higher hospital admission rates. Visiting tertiary care hospitals like Ganga Ram Hospital, Lahore confirms trends. Adult and pediatric wards highlight a rise in patients undergoing respiratory problems along with throat and eye irritation.

Four-year-olds are admitted for emergency care due to excessive outdoor exposure timings. Children are advised to stay indoors and wear anti-pollution masks. From security guards to manual labourers working on busy streets around Lahore, they are risking permanent damage to their lungs.

Earning members of low-income households are choking on smog. With 11 million complains of burning eyes and headache, this winter has hit five times the legal limit. Smog has single-handedly overpowered other health epidemics in Pakistan by worsening bronchial infection, heart problems, and lung damage.

**ECONOMIC IMPLICATIONS**

As per the Institute for Health Metrics and Evaluation, and World Bank, the global cost for air pollution has accounted for $5.1 trillion, which is 7.2% of the annual GDP. According to The Lancet, the costs of reduced productivity...
due to smog-related diseases are around 0.61-0.82% in Low and Middle-Income Countries (LMIC).\textsuperscript{[7]} If these trends continue, the economic costs will increase to $25 trillion as per the Organization for Economic Cooperation and Development (OECD).\textsuperscript{[8]} A 2011 study suggests that ozone will decrease the productivity of crops to 26% by 2030. If these trends are to be accurate, the economic cost of the epidemic is eye-opening and calls for attention.

Rapid urbanization has increased the number of vehicles in the country. With over 35% of the population dwelling in an urban setting, the number of vehicles has risen to over 11 million in the past 20 years. The smog commission report confirms that the average growth rate of road transportation has increased to 8.5%.

World Bank’s report focused on Indian trends and suggests that economic approaches are necessary; the concept of Disability-Adjusted Life Years (DALYs) and premature death is critical. People who face health issues due to smog as opposed to other disabilities may be linked to DALYs in Pakistan. The effects on income suggest a yield elasticity of 0.7; literature on income elasticity for reducing risks of smog to health is limited, but economic losses in productivity that represent morbidity are evident.

**SMOG- A POLICY ISSUE**

The Pakistan Clean Air Action Plan (PCAP) originated in 2005 failed in its entirety. It never saw the light of day with incomplete objectives. Similarly, Punjab’s Environment Protection Department was unable to meet air quality surveillance in two years.

The need of the hour is an evidence-based policy approach that can help eradicate toxicity in the environment. Policymakers may pick up from China’s first ever-red alert due to smog in 2015.\textsuperscript{[9]} For example, Chinese businesses and schools implemented specific policies to adapt to these severe changes. Campus run websites and websites opted for live broadcasting and taught students from home. The air quality showed improvement by 17.9% in China up to mid-2016.

**CITIZENS’ RIGHT TO DEMAND CLEAN AIR**

All states require AQMS to ensure the collection of data needed with the provision of routine readings. Pakistan Air Quality Initiative has successfully provided live data that the Punjab government should pay heed to.

A study conducted by the University of Chicago suggests that Lahore residents could gain 5.1 years of life expectancy if World Health Organization (WHO) guidelines are followed. If Punjab and other densely polluted areas are to achieve success in limiting the smog epidemic, citizens need to take notice of causes rather than blaming the toxicity on external sources.

**WHERE ARE WE HEADING?**

With long-lasting economic and social effects, healthcare costs have risen. With around 1% of GDP spent on health in Pakistan, preventative health measures are necessary to safeguard the future of Pakistan’s health and economy.

Pakistan requires a commitment to reduce greenhouse gas emissions by 2030. 8% of carbon emissions from the transportation sectors necessitate strict adherence towards the implementation of National Environmental Quality Standards. Vehicles ought to be provided with 4-stroke engines for combusting fossil fuels. Perhaps electric cars can improve air quality along with monitoring their contribution to current pollution.

Pakistan requires a nation-wide system to monitor air quality in cities to drive action. The only way forward is cutting smog that can have two benefits. First, strict measures can reduce greenhouse gases that originally cause air pollution. Second, these modifications address climate change, as well.

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Coronaviruses infect mammals and birds worldwide, and some of these viruses infect humans to cause mild to moderate lower-respiratory tract illnesses and rarely a severe illness. Like other viruses, coronaviruses evolved (change their genetic material and protein structure) and spread from animals to humans. The world has witnessed coronavirus evolving into severe acute respiratory syndrome coronavirus (SARS-CoV) in 2003 and the Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012. Other recent examples include Dengue, Ebola, Chikungunya, Influenza and Zika virus outbreaks. It may or may not be relevant to note that first cases of both SARS-CoV in 2003 avian influenza virus (H5N1) in 1997 were isolated and identified at the same hospital in Hong Kong where the first case of the current outbreak of the Wuhan coronavirus has been identified. The new virus has been named as the Novel coronavirus (2019 nCoV). The current outbreak of the coronavirus originated from the Huanan Seafood Wholesale Market located in Wuhan, Hubei province, China. A cluster of a viral respiratory illness was reported in people who worked at or were frequent visitors to this market. The timing of the onset of this outbreak is very critical, that the time when millions of people travel regionally within China and around the globe concerning the Lunar Chinese New Year. As of 25 January 2020, the current outbreak has caused 42 deaths, and about 1400 persons are infected across China, Thailand, Japan, South Korea, Taiwan, Vietnam, Singapore, Nepal, France, Australia, Malaysia and the USA.

Whenever a viral outbreak happens, lives are lost, and the world is placed at risk of pandemic spread. In the past, grave mistakes have been made in the local and international response to such outbreaks. Such as, Chinese authorities kept SARS-CoV identity hidden and covered up the situation initially in 2003 that led to the devastating spread of the outbreak. Similarly, the response of WHO to the Ebola outbreak in 2014-2015 was glacially slow. It appears that Chinese authorities have learnt a lesson from the SARS-CoV outbreak and therefore have cautiously released the identity and genome sequence of this new virus. Local health administration in Wuhan and WHO have issued detailed guidance on the clinical management of the disease as well as WHO has issued an international travel and trade advice in a timely fashion. The festival of Lunar Chinese New Year that was scheduled to start on 25 January 2020 has been subdued. Tens of millions of people surrounding the epicentre of the outbreak have been put under lockdown, and travel restrictions have been imposed affecting 56 million people only in China. Though millions of people may have travelled to and from the outbreak affected area to the rest of the world with the festival already, these steps would curb the spread of the virus through various ways of its transmission such as consumption of the large amounts of animal meat (suspected source of spread).

Going forward, a continuum of the highest level of diligence and total transparency on accurate disease reporting and data sharing are indispensable enablers for the global healthcare fraternity’s efforts to effectively manage the cases. However, the time to curtail the spread of this newly emerging deadly virus to other parts of the world may have already passed. The identity of the animal reservoir that transmitted the 2019-nCoV virus to humans and the results from animal testing at the aforementioned seafood market would be crucial to aid the control of this disease. Given how fast the spread is moving, human-to-human transmission should also be investigated urgently. In summary, emergence and re-emergence of viruses is a global issue – in today’s globalized world, one person affected anywhere means everyone is at risk everywhere. Therefore, international efforts and collaboration are
required to curtail this challenge. Urgent sharing of authentic scientific data, laboratory reagents, remedies and expertise, and setting up global collaborative networks to aid in outbreak control would make a difference in the current outbreak.

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Prevalence of Muscle dysmorphia and associated health activities in male medical students in Karachi, Pakistan

Original Article
Azza Sarfraz,1 Ali Faisal Sultan,1 Mirza Zain Baig,1 Moheudin Khan,1 Noayna Arshad,1 Rijah Chhapra,1 Sarosh Irfan Madhani,1 Muhammad Owais Abdul Ghani,1 Hassan Bin Khalid,1 Imtiaz Jehan.2
1. Students, Aga Khan University, Karachi, Pakistan.
2. Associate Professor, Department of Community Health Sciences, Aga Khan University Hospital, Karachi, Pakistan.

ABSTRACT

Background: Muscle Dysmorphia (MD) is a subtype of body dysmorphic disorder (BDD) and is currently classified under anxiety disorders (subheading: Obsessive-compulsive disorder) in DSM 5. MD is hypothesized to affect the self-esteem and social outlook of the younger generation. MD shows a higher rate in males and may influence their self-confidence rendering them more prone towards using steroids, supplementary proteins and other drugs to alter their physical outlooks as shown in previous studies. This problem has been on the rise lately due to revolutionary advancement in the media and film industry and the abrupt changes about the standards of physical good looks and body shapes. With the lack of studies done in our population, our study will be helpful to consider the prevalence of the disease in our setting and increase awareness in the general public and clinicians. We hope to help clinicians/therapists find better options in managing the disease.

Materials: We performed a cross-sectional study with a sample size of 246 medical school students in Karachi to collect data through self-administered questionnaires. We used the DSM 5 criteria for the diagnosis of BDD and additional questions on the presence of MD. Nutritional habits, exercise routines, use of supplements and drugs were also obtained for exploratory analysis.

Results: Our study predicted the prevalence of MD to be 25%. Other main findings included statistical significant associations between MD and the thoughts and practice of steroid use for muscularity.

Conclusion: MD is an underdiagnosed and often unrecognized disease that we believe has significant consequences for the young male population. Further work is needed on this in our part of the world. Our research, we believe, can be a stepping stone for further studies that would incorporate wider populations.

Key Words: Muscle Dysmorphia (MD), DSM 5, Medical Students, Male, Body Dysmorphia Disorder (BDD)

INTRODUCTION

Muscle dysmorphia (MD) is a DSM 5 disease characterized by feelings of inadequacy with regards to muscle size in people with an average build. There is an excessive drive for muscularity in patients with MD, which is significantly out of proportion to any need. It is a subtype of body dysmorphic disorder (BDD) and is currently classified under anxiety disorders (subheading: Obsessive-compulsive disorder) in DSM 5. MD has been the centre of much debate in the past. It was originally classified under somatoform illnesses under DSM IV. However, current insights and more recent data have shown similar features to OCD. The basis for this study rests in the hypothesis that MD can have lasting effects on the self-esteem and social outlook of a population of young men. We also hypothesized that the prevalence of the disease is particularly high in young male adults; hence, the study was tailored towards a sample of male medical students. This was well supported by previous literature as it is reported that women have a higher prevalence of eating disorders while men demonstrate higher rates of MD. Previous literature has also shown a much higher rate of substance and steroid abuse in patients with MD. Additionally, patients with MD are seen to...
consume well over their daily requirements of dietary protein. Furthermore, there is a greater reliance on dietary supplements to obtain extra protein content. Tod D (2016) reviewed the current insights on MD and found that it continues to be a poorly understood disease, and there is a lack of robust studies done on the topic. Hence, to add to the limited literature on MD, the authors feel the need to explore the prevalence and potential health concerns that it may cause.

**METHODOLOGY**

We used a cross-sectional study design to assess the prevalence of Muscle Dysmorphia in male medical students aged 19-24 years of age and enrolled in the Aga Khan University and Sindh Medical College. Along with calculating prevalence, we evaluated the use of performance-enhancing drugs/steroids and dietary supplements in the study participants, along with their awareness of protein consumption. These variables were explored in correlation with muscle dysmorphia in the final results discussed below. The study spanned over a period of 5 weeks from March till April 2017.

**Data Collection**

DSM 5 criteria along with queries about thoughts regarding the use or use of steroids, protein supplements and the time spent exercising. Subjects were approached in their respective medical college campuses and courtyards during academic hours. Prior permission had been obtained from both the institutions. Prior to the administration of the questionnaire, consent from the subjects was obtained, and a brief introduction of the study was concurrently given. The questionnaires were then collected in a questionnaire box to ensure anonymity. The approximate time taken to fill in the questionnaire was ten minutes. All participants had a chance to refuse or leave midway filling of the questionnaire. However, no such problems were faced. Convenience sampling method was used.

**Sample Size**

The sample size was calculated to be 246 on OpenEpi Software, using the estimate of population size to be 100,000 male medical students due to lack of data on the exact number of male medical students aged 19-24 in Karachi. The predicted hypothesis of the outcome factor is 20%, Confidence Interval is 95%, and the accepted margin of error is 5%.

**Questionnaire**

In keeping with the objectives of the study, we drafted a questionnaire. The questionnaire was divided into three sections:

- **Section 1:** This section focused on the subject's demographics, including age, name of institution and area of study.
- **Section 2:** This section included the DSM 5 scoring criteria for body dysmorphic disorder. The DSM 5 scoring criteria consist of 5 parts with each part rated on a five-point scale. This was then used to calculate a total score and an average score for each subject. The average score was then interpreted as 0= None, 1= Mild, 2= Moderate, 3= Severe and 4= Extreme
- **Section 3:** This section included general questions related to the subject's usage of steroids, protein supplements and hours spent in physical training.

**Data entry and quality assurance check**

Each researcher was allocated a set of serial numbers, and the filled questionnaires were then manually entered into a questionnaire document on EpiData. Data were analyzed using the data entry program SPSS 21. Data collected from the questionnaires were entered and edited manually. Methods used to prevent data entry errors included double entry and validation following data entry and data analysis screening for outliers during data analysis. Checks were applied on OpenEpi software. Data were cleaned by running frequencies and was then double-checked and entries, peer-reviewed.

**Informed consent**

The informed consent included a brief description of the research topic, along with its objectives to establish informed consent. To further increase the comfort of the subject during filling of the form, anonymity was maintained by keeping the disclosure of identities optional. The responses were secured immediately after collection without being viewed to maintain confidentiality.

**Ethical consideration**

The study was approved by Aga Khan University ethical review committee in April, 2017.

**RESULTS**

Our study population consisted of 252 male medical students between the ages of 19-24. Mean age was 21.67, with the most frequent age being 21 (23.8%), as indicated in table 1.

Tables 2-5 show the findings of DSM 5 criteria used in our questionnaire. The individual scores of each of these components were used to calculate an average score for all the study participants. Table 2 demonstrates findings for hours occupied per day with thoughts of muscle underdevelopment. 152 (60.3%)
<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency (n=252)</th>
<th>Percentage (N= 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>29</td>
<td>11.5 %</td>
</tr>
<tr>
<td>20</td>
<td>24</td>
<td>9.5 %</td>
</tr>
<tr>
<td>21</td>
<td>60</td>
<td>23.8 %</td>
</tr>
<tr>
<td>22</td>
<td>54</td>
<td>21.4 %</td>
</tr>
<tr>
<td>23</td>
<td>57</td>
<td>22.6 %</td>
</tr>
<tr>
<td>24</td>
<td>28</td>
<td>11.1 %</td>
</tr>
</tbody>
</table>

Table 1: Background characteristics of study participants

<table>
<thead>
<tr>
<th>Hours occupied per day with thoughts of muscle underdevelopment</th>
<th>Frequency (n= 252)</th>
<th>Percentage (N= 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Grade 0</td>
<td>152</td>
</tr>
<tr>
<td>Less than 1 hour per day</td>
<td>Grade 1 (mild)</td>
<td>71</td>
</tr>
<tr>
<td>1-3 hours per day</td>
<td>Grade 2 (moderate)</td>
<td>27</td>
</tr>
<tr>
<td>3-8 hours per day</td>
<td>Grade 3 (severe)</td>
<td>2</td>
</tr>
<tr>
<td>More than 8 hours per day</td>
<td>Grade 4 (extreme)</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2: Frequency of average amount of time occupied with thoughts of muscle underdevelopment amongst subjects.

<table>
<thead>
<tr>
<th>Difficulty faced in controlling thoughts of muscle development</th>
<th>Frequency (n= 252)</th>
<th>Percentage (N= 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete control</td>
<td>Grade 0</td>
<td>154</td>
</tr>
<tr>
<td>Usually able to control thought or behavior</td>
<td>Grade 1 (much control)</td>
<td>60</td>
</tr>
<tr>
<td>Sometimes able to control thoughts or behavior</td>
<td>Grade 2 (moderate control)</td>
<td>29</td>
</tr>
<tr>
<td>Infrequently able to control thoughts or behavior</td>
<td>Grade 3 (little control)</td>
<td>7</td>
</tr>
<tr>
<td>Unable to control thoughts or behavior</td>
<td>Grade 4 (no control)</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3: Frequency of degree of distress caused by thoughts of muscle underdevelopment amongst subjects.
Table 4: Frequency of degree to which thoughts of muscle underdevelopment cause subjects to avoid anything, going anywhere or being with anyone.

<table>
<thead>
<tr>
<th>Degree as to which thoughts of muscle underdevelopment cause subjects to avoid anything, going anywhere or being with anyone</th>
<th>Frequency (n= 252)</th>
<th>Percentage (N= 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No avoidance</td>
<td>Grade 0</td>
<td>167</td>
</tr>
<tr>
<td>Occasional avoidance</td>
<td>Grade 1 (mild)</td>
<td>59</td>
</tr>
<tr>
<td>Regular avoidance</td>
<td>Grade 2 (moderate)</td>
<td>19</td>
</tr>
<tr>
<td>Frequent and extensive avoidance</td>
<td>Grade 3 (severe)</td>
<td>7</td>
</tr>
<tr>
<td>Near complete avoidance or housebound</td>
<td>Grade 4 (extreme)</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 5: Frequency of degree to which thoughts of muscle development interferes with school, work, social or family life amongst subjects.

<table>
<thead>
<tr>
<th>Degree to which thoughts of muscle development interferes with school, work, social or family life</th>
<th>Frequency (n= 252)</th>
<th>Percentage (N= 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No avoidance</td>
<td>Grade 0</td>
<td>175</td>
</tr>
<tr>
<td>Slight interference</td>
<td>Grade 1 (mild)</td>
<td>56</td>
</tr>
<tr>
<td>Definite interference with functionality but manageable</td>
<td>Grade 2 (moderate)</td>
<td>17</td>
</tr>
<tr>
<td>Substantial interference</td>
<td>Grade 3 (severe)</td>
<td>4</td>
</tr>
<tr>
<td>Near total interference or incapacitated</td>
<td>Grade 4 (extreme)</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 6: Average score frequency amongst subjects.

<table>
<thead>
<tr>
<th>Average score</th>
<th>Frequency (n= 252)</th>
<th>Percentage (N= 100 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (None)</td>
<td>155</td>
<td>61.5 %</td>
</tr>
<tr>
<td>1 (Mild)</td>
<td>69</td>
<td>27.4 %</td>
</tr>
<tr>
<td>2 (Moderate)</td>
<td>27</td>
<td>10.7 %</td>
</tr>
<tr>
<td>3 (Severe)</td>
<td>1</td>
<td>0.4 %</td>
</tr>
<tr>
<td>4 (Extreme)</td>
<td>0</td>
<td>0 %</td>
</tr>
</tbody>
</table>
Table 7: Prevalence of muscle dysmorphia amongst subjects

Table 8: Frequency of health activities amongst subjects

Table 9: Frequency of health activities based on presence or absence of muscle dysmorphia amongst subjects.
respondents were not occupied with thoughts of muscle underdevelopment throughout the day. 71 (28.2%) respondents spent less than 1 hour per day thinking about muscle underdevelopment, classified as mild. Only 2 (0.8%) respondents were pre-occupied with the thought of muscle underdevelopment spending between 3 till 8 hours per day, classified as severe. No respondents spent more than 8 hours per day, classified as extreme.

Table 3 presents findings for the difficulty faced in controlling thoughts of muscle underdevelopment, 154 (61.1%) respondents were in complete control of their thoughts or behaviour, 60 (23.8%) were usually able to control their thoughts or behaviour, categorized as grade 1, 29 (11.5%) respondents were able to moderately control their thoughts or behaviours, categorized as grade 2 and 7 (2.8%) respondents had little control over their thoughts or behaviours, categorized as grade 3. No respondents lost control over their thoughts or behaviours, classified as extreme.

Table 4 demonstrates findings for the degree to which thoughts of muscle development cause subjects to avoid anything, going anywhere or being with anyone; 167 (66.3%) respondents reported no avoidance pertaining to thoughts of muscle underdevelopment, 59 (23.4%) were mildly caught with thoughts of muscle under development, leading to occasional avoidance, classified as grade 1, 19 (7.5%) respondents were moderately thinking about muscle underdevelopment, causing regular avoidance and categorized as grade 2 and 7 (2.8%) respondents were frequently and extensively avoiding anything, going anywhere or being with anyone, categorized as severe or grade 3. No respondents selected near-complete avoidance of being housebound due to thoughts of muscle underdevelopment.

The average score is summarized in table 6. One hundred and fifty five (61.5%) respondents had an average score of 0, 69 (27.4) respondents had an average score of 1, 27 (10.7%) respondents had 2 and only 1 (0.4%) respondent had an average score of 3. No subject in our study sample had a calculated total score of 4. Average scores were calculated for each subject individually based on the DSM 5 criteria demonstrated in tables 2-5.

The average scores, presented in table 6, were incorporated with part three of our questionnaire, which asked whether the subjects had thoughts of muscle inadequacy. Muscle Dysmorphia was then diagnosed in those subjects who had an average score of 1 and above as well as a positive response to the above question. The findings are summarized in table 7, 63 subjects (25%) were diagnosed with Muscle dysmorphia using the above-mentioned protocol.

Table 8 shows the frequency of all study subjects and their healthy activities, 37 (14.7%) respondents had thought of using steroids or performance-enhancing...
Compte et al. reported a prevalence of 6.99% in their higher than what other studies have suggested. The prevalence of MD in our study comes out to be score frequency, which a score of 1 (mild) had the of the disease. This can be backed by the average for muscle dysmorphia only exhibited a rather mild form concluded that the majority of those labelled positive cases were found to be mild. More specifically, Twenty-five percent of our sample population was DISCUSSION Twenty-five percent of our sample population was found to have muscle dysmorphia. Majority of the positive cases were found to be mild. More specifically, 25% of subjects described the distress caused by this disease as slightly disturbing, 23.8% admitted that they were usually able to control their thoughts of muscle underdevelopment, 23.4% avoided doing anything only occasionally, and 22.2% of subjects admitted that it slightly interfered with their school, work, social or family life. Therefore, it can be concluded that the majority of those labelled positive for muscle dysmorphia only exhibited a rather mild form of the disease. This can be backed by the average score frequency, which a score of 1 (mild) had the second-highest frequency (27.4%) following 0 (none). The prevalence of MD in our study comes out to be higher than what other studies have suggested. Compte et al. reported a prevalence of 6.99% in their sample of male medical students in Buenos Aires. Similarly, Campagna reports a prevalence of 12.7% in males and 4.2% in females. We hypothesize that the relatively high level of prevalence in our population might be due to the severe lack of mental health facilities in our part of the world. Studies show the role of media in changing the ideals of what a young male considers to be the target goal with regards to physical appearance. The desire to be lean and slim has changed to that of being larger and stronger in adolescents. There is also a loose link between anthropometric measurements of subjects and the presence of MD. Obesity correlates positively with MD, as does mesomorphy. The body dysmorphia disorder questionnaire has also been critically analyzed and is found to be an effective screening tool. However, there is an absence of a widely accepted diagnostic tool. Our study explored other variables that included thoughts of steroid use, usage of steroids, usage of supplements and awareness regarding daily protein consumption. Statistically significant associations were found for both thoughts of and usage of steroid use. When we talk about dietary supplementation and protein consumption awareness, we saw higher rate among subjects with the disease, but neither was statistically significant. Subjects with MD also on average spent more time in the gym and in physical activity. Our results show a lot of interesting data with possible implications. Our prevalence value of 25 % contrasts with previous studies which showed it to be in the range of 7 to 13 %. Additionally, it shows a higher prevalence in a younger, more at-risk population. There are statistically significant associations with both thoughts and actual usage of steroids. Both showed very high rates, and this highlights the future implications of the disease. Such high values cannot be ignored and hope to serve as a platform for both future research and societal and clinical awareness. Although no statistically significant associations were found for other variables in the study, we found baseline rates of dietary supplementation and awareness of protein consumption to be high even in the general population. This may mask our data from showing the trend in our positive cases. The study hopes to highlight MD as a growing health concern and one that affects the young health of our population in specific. Mass media consumption and societal paradigm shifts had left the medical and overall community with a disease more prevalent than ever before which was once thought to be negligible.

Strengths and Weaknesses
The strengths of our study include a good sample size and response rate. Our definition of MD was robust and served to make sure there was no over-reporting of the disease. Additional questions were included to make our criteria even stronger. The study is the first of its kind in our population. Additionally, our results are meaningful and have implications for our population. Lastly, our topic is a current day issue. Weaknesses of this study include limited population validity. The authors hope to strengthen further the definition of MD used by other studies, it is a new definition and not one widely used. Lastly, our study does not take into consideration any confounders. The data of our study include a good sample size.

CONCLUSION
MD is an under-diagnosed and under-reported disease. The authors sought out to highlight and mainstream the disease in an effort to show the increasing prevalence and possible health implications. We found the value to be within 5% of our expected outcome of 20% and found statistically significant associations with MD and steroid abuse. The long-term outcomes of our data are vast and should be explored through further studies. We hope our data will serve as a pilot for future research.

ACKNOWLEDGEMENT
The authors would like to acknowledge the efforts of Dr. Imtiaz Jehan, who as the student project supervisor provided the research oversight and technical guidance from Health Sciences (CHS). The students and faculty contributed in the study are listed as authors.

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CONFLICT OF INTEREST
The Authors declare no conflict of interest.

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The Economic impact of Lower Extremity Amputations in Diabetics. A retrospective study from A Tertiary Care Hospital of Faisalabad, Pakistan.

Muhammad Labeeq, Muhammad Ahsan Tariq, Samar Atta Tung, Muhammad Asfand Yar, Waleed Rehman, Sumera Badar Ehsan.

1. Students, Final Year MBBS, Punjab Medical College, Faisalabad Medical University, Faisalabad, Pakistan.
2. Assistant Professor (Medical Education), Punjab Medical College, Faisalabad Medical University, Faisalabad, Pakistan.

ABSTRACT

Background: Among the various complications of diabetes, lower-extremity amputation due to diabetic foot is a common problem. In Pakistan, 6-7% of patients with diabetes suffer from diabetic foot ulceration.

Objectives: Our primary objective was to explore the frequency of diabetic foot amputations, and the secondary objective was to calculate the economic burden of these preventable surgeries on the health budget of the provincial government.

Materials & Methods: It was a retrospective cross-sectional observational study conducted after obtaining approval from the Ethical Review Committee of Allied hospital, Faisalabad Medical University. The data of diabetic foot patients who underwent amputations between July 2017 and December 2017 were retrieved from three Surgical Units (I, II & III), using a purposive sampling technique. All amputations carried out for reasons other than diabetic foot were excluded. The direct medical cost of one diabetic foot amputation was calculated via a local survey of the various private hospitals of Faisalabad. The indirect costs in terms of loss of productivity and disability costs, transport costs, rehabilitation costs were not included in this study. The data were evaluated by using SPSS Version 23.

Results: A total of 85 patients were included in our study. The male to female ratio was 2.7 to 1. The mean direct treatment cost for minor amputation was PKR 46926.00 ± 11730.90 ($382.35 ± 95.58), and the mean direct treatment cost for major amputation was PKR 53720.00 ± 12401.24 ($437.71 ± 101.40). Out of 85 amputations, 63 (74%) were major amputations, and the remaining 22 (26%) were minor amputations. The total cost for 63 major amputations was PKR 3,384,360 ($27568.91) and for 22 minor amputation was PKR 1,032,372 ($8409.67). The net cost came out to be PKR 4,416,732 ($35978.59) for all the 85 cases being reported in a tertiary care hospital of Faisalabad for six months.

Conclusion: Diabetic foot, a preventable complication of long-term diabetes mellitus, has an economic burden on the hospital budget, which, if adequately addressed via primary prevention programme, can yield not just economical but medical benefits as well.

Keywords: Diabetic foot, Limb amputation, Infection, Neuropathy, Diabetes mellitus, Medical Treatment cost.

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder that leads to both health and economic concerns for patients and the healthcare machinery in Pakistan and across the world. Prevention is one of the best health policies that the patients may adopt. This is further fortified by the fact that revamping economic resources can increase the quality of life, especially in the developing world, where health economics plays a vital role in disease control. Diabetes mellitus is affecting millions of lives across the globe, causing preventable losses which can be tackled by global efforts through effective policy-making based on proper research. It has a global prevalence rate of 8.3% and in Pakistan is 11.77%, affecting 7.1 million adult population. Among the various complications of diabetes, diabetic foot is a common problem throughout the world, and despite being preventable, it leads to amputation in poorly compliant cases. Diabetic attentiveness and foot care are
less likely to be observed in illiterates and the poorly aware. This indicates that shortcomings in public awareness and primary prevention do exist. Diabetes mellitus is a serious medical condition affecting 451 million people worldwide as of 2017, and the number is expected to rise in the future, especially in third world countries. The prevalence of diabetic foot in Pakistan is 13.9%. Diabetic foot ulcer has a high recurrences rate, and the American Diabetes Association (ADA) reported a 50% recurrence rate in treated patients after 24.3 months of healing.

Our primary objective was to explore the frequency of diabetic foot amputations, and the secondary objective was to calculate the economic burden of these preventable surgeries on the health budget of the provincial government. Diabetic foot is not only having a deteriorating effect on the quality of life of the patient by causing permanent disabilities but is also a significant burden on our public health budget. If budget is redistributed from treatment to prevention, the economic burden on public health budget alongside the burden of disability on the patient level can be decreased.

**MATERIALS AND METHODS**

This was a retrospective cross-sectional observational study, carried out in the surgical units of a tertiary care hospital in Faisalabad, Pakistan, to estimate the frequency and burden of diabetic foot amputations on the economy.

**Inclusion and Exclusion Criteria**

A total of 85 subjects, selected by non-probability purposive sampling, who underwent transfemoral or above-knee (AK), below knee (BK) and below ankle (BA) amputations, were diagnosed Type II diabetics were included in this study. Patients who underwent amputation for other indications were excluded from this study.

**Type of Amputations**

The lower extremity amputations were categorized into major and minor amputations. Major amputation was defined as an amputation leading to loss of limb, whereas minor amputation was defined as amputation of toes or partial foot.

**Cost Estimation**

The cost of one diabetic foot amputation was calculated via a local survey of the various private hospitals of Faisalabad. All expenses incurred from the first consultation until the operation itself were summed up to obtain the total cost of treatment, which was expressed as the estimated direct medical cost of diabetic foot amputation procedure after deducting 21% profitability margin. The indirect costs in terms of loss of productivity and disability costs, transport costs, rehabilitation costs were not included in this study. The dollar conversion rate was defined as per current exchange rate USD 1 = PKR 122.26.

**Ethical Consideration**

This study was approved by the institutional review board of Faisalabad Medical University via letter number 855/2018 dated 31-03-2018.

**RESULTS**

A total of 85 patients were reported for diabetic foot amputations during six months of duration from July 2017 to December 2017. Out of these, 62 (73%) were male, and 23 (27%) were female [Figure 1]. The ages of reported patients ranged from 18 years to 85 years, with a mean age of 55.12 ± 11.66 years. The patients were divided into four age intervals, and the frequency of cases in each interval was recorded. 5 cases (6%) fall in 18-35 years, 12 (14%) in 36-45 years, 47 (55%) in 46-60 years and 21 (25%) in 61-85 years [Figure 2].

Out of these 85 amputations, 63 (74%) were major amputations, while 22 (26%) were minor amputations [Figure 3]. After deducting 21% profitability margin, the mean direct treatment cost for minor amputation was PKR 46926.00 ± 11730.90 ($382.35 ± 95.58), and the mean direct treatment cost for major amputation was PKR 53720.00 ± 12401.24 ($437.71 ± 101.40).

This study looks further at the total costs, including the detailed breakdown of funding being spent on a diabetic foot amputation surgery in a tertiary care hospital [Table 1].

**DISCUSSION**

Diabetic foot ulcer is one of the many complications of diabetes, requiring urgent intervention. It indicates that a significant portion of the health budget is being spent on the treatment of preventable complications but not on patient education and public awareness. If strategies to reduce the risk of such complications are adopted, a substantial economic benefit can be obtained. Since it was not possible to calculate the cost in a government tertiary care hospital, therefore, a local survey was conducted in the private hospitals of Faisalabad to calculate the cost of the procedure. After deducting the profitability margin of private hospitals, which was taken at 21% (as jointly reported by State Bank of Pakistan and International Finance Corporation), a comparative cost was calculated that was considered to be considered equal to the cost being spent in government hospitals.

Our study showed that the net cost came out to be PKR 4,416,732 ($35978.59) for all the 85 cases being reported during six months in the public sector tertiary care hospital where this study was conducted. The estimated...
**Figure 1:** Gender wise distribution of subjects.

**Figure 2:** Age Wise Distribution of subjects.

**Figure 3:** Major Amputation to Minor Amputation Ratio.

**Table 1:** Breakup of Direct Treatment Cost.

<table>
<thead>
<tr>
<th>No.</th>
<th>Minor Amputation</th>
<th>Major Amputation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Mean ± SD (PKR)</td>
<td>Mean ± SD (PKR)</td>
</tr>
<tr>
<td>1</td>
<td>1350.00 ± 212.13</td>
<td>1350.00 ± 212.13</td>
</tr>
<tr>
<td>2</td>
<td>4100.00 ± 141.42</td>
<td>4100.00 ± 141.42</td>
</tr>
<tr>
<td>3</td>
<td>4300.00 ± 424.26</td>
<td>12900.00 ± 1272.79</td>
</tr>
<tr>
<td>4</td>
<td>1350.00 ± 212.13</td>
<td>1350.00 ± 212.13</td>
</tr>
<tr>
<td>5</td>
<td>7000.00 ± 1414.21</td>
<td>7000.00 ± 1414.21</td>
</tr>
<tr>
<td>6</td>
<td>20000.00 ± 7071.07</td>
<td>20000.00 ± 7071.07</td>
</tr>
<tr>
<td>7</td>
<td>3500.00 ± 707.11</td>
<td>3500.00 ± 707.11</td>
</tr>
<tr>
<td>8</td>
<td>3500.00 ± 707.11</td>
<td>3500.00 ± 707.11</td>
</tr>
<tr>
<td>9</td>
<td>3000.00 ± 0.00</td>
<td>3000.00 ± 0.00</td>
</tr>
<tr>
<td>10</td>
<td>6300.00 ± 2969.85</td>
<td>6300.00 ± 2969.85</td>
</tr>
<tr>
<td>11</td>
<td>2000.00 ± 0.00</td>
<td>2000.00 ± 0.00</td>
</tr>
<tr>
<td>12</td>
<td>3000.00 ± 1414.21</td>
<td>3000.00 ± 1414.21</td>
</tr>
<tr>
<td></td>
<td>Total Mean Direct Treatment Cost in PKR</td>
<td>59400.00 ± 14849.24</td>
</tr>
<tr>
<td></td>
<td>Total Mean Direct Treatment Cost in PKR after deduction of 21% profitability margin</td>
<td>46926.00 ± 11730.90</td>
</tr>
<tr>
<td></td>
<td>Total Mean Direct Treatment Cost in USD after deduction</td>
<td>382.35 ± 95.58</td>
</tr>
</tbody>
</table>
CONCLUSION

More resources should be allocated to primary prevention programs. It will not only decrease the incidence of diabetic foot ulcers but also substantially reduce the financial cost of treatment. Therefore, strategies on a national scale should be devised to run public awareness programs, including the establishment of dedicated diabetic clinics in all public sector secondary and tertiary hospitals to deal with diabetic patients, promoting patient compliance to hyperglycemia control and preventing damage from long-term complications. Record keeping of the direct and indirect costs of treatment needs to be improved and digitized in public sector hospitals to conduct further research on health economics. Disability and rehabilitation programs, including regular follow-ups of patients after diabetic foot amputations, are required to be initiated by the government to reduce the burden of treatment on patient’s end after disability. The government should strengthen the primary prevention programs to educate the masses about diabetes and its preventable complications. However, more studies are required in this area to determine the economic burden due to these indirect costs.

LIMITATIONS

Some limitations exist due to the narrow area of the study’s application. Due to limitations of the analog record-keeping of funds and lack of digital hospital records in a public sector tertiary care hospital, the direct determination of the procedure cost was not possible. Despite having limitations, this retrospective study is essential for a developing country with limited data on health economics. Further higher scale studies are needed to address this issue in more detail.

REFERENCES


CONFLICT OF INTEREST

The Authors declare no conflict of interest.

HOW TO CITE

Correlation of Atrial Fibrillation with Left Atrial Volume in Patients with Mitral Stenosis. A single centre study from Pakistan

Original Article

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3. Medical Officer, Pathology, Services Institute of Medical Sciences, Lahore, Pakistan.

ABSTRACT

Background: Rheumatic heart disease has a strong association with mitral valve stenosis. Atrial fibrillation is one of the most common complications of this condition and is a poor prognostic factor. Early detection and prompt management of atrial fibrillation can help to improve the quality of life and increase the life expectancy of the patients. We carried out this study to investigate the significance of left atrial volumetric changes in mitral stenosis and its correlation with atrial fibrillation.

Methodology: We audited the data of 60 patients of rheumatic heart disease who had mitral valve stenosis. The patients were randomized into atrial fibrillation (Group A) and normal sinus rhythm (Group B). We conducted this cross-sectional analytical study at Cardiology Department, Mayo Hospital, Lahore, from 1st February 2017 to 31st January 2018. We only included those patients who consented to be a part of this study and fulfilled our predefined inclusion criteria. Left atrial volume was measured by prolate ellipse method and biplane methods on echocardiography. The Data was analyzed on SPSS v20.

Results: Sixty patients were included in the study. Among the subjects, thirty-six (60%) were males, and twenty-four (40%) were females. Atrial fibrillation was noted in 43.33% of the patients of mitral valve stenosis. There was a marked difference in the mean volume of the left atrium among the two groups. We observed that the mean area of the mitral valve for Group A patients was larger than that of patients in Group B. Our study showed an inverse correlation between left atrial volume and mitral valve area among Group A patients.

Conclusion: Patients of mitral stenosis are at an increased risk of developing atrial fibrillation if the left atrial volume is increasing. All patients with mitral stenosis should have routine echocardiography & measurement of left atrial volumes, so that proper treatment can be started if the left atrial volume is increasing, to prevent atrial fibrillation.

Keywords: Normal Sinus Rhythm, Mitral valve Stenosis, Left Atrial Volume, Atrial Fibrillation, Left Atrial Dilation.

INTRODUCTION

Structural abnormality of the mitral valve, leading to left ventricular inward flow obstruction is called Mitral valve stenosis. Rheumatic fever is the most common cause of mitral valve stenosis. Surgeons have observed during mitral valve replacement that in the majority of the patients with mitral stenosis, there is a substantiation of rheumatic heart disease. About 40% of the patients with chronic rheumatic heart disease have either mitral regurgitation or mitral stenosis. Patients suffering from rheumatic mitral stenosis constitute two-thirds of total cases of mitral stenosis. Atrial fibrillation is a documented complication of long-standing mitral stenosis and occurs secondary to atrial enlargement [Figure 1]. It has a herculean association with the size of the left atrium, the total duration of its pathological enlargement, and the age of the patient. Enlarged left atrium precludes the effective emptying of the atrium into the ventricle, subsequently causing excessive pooling of blood into the left atrium and reduction of its "pump boost" function. Left atrial dilation adversely affects the slow, as well as fast conductive pathways in the walls of the atria, thus predisposing the patients to atrial fibrillation. Paroxysmal or persistent atrial fibrillation can precipitate pulmonary enema in up to

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23
Echocardiographic measurements, required for the estimation of left atrial volume (LAV), were taken at least five times if the baseline rhythm was atrial fibrillation. All echocardiographic studies were performed by one diagnostic cardiac sonographer with the same echocardiographic instrument (VIVID 7) according to a standardized protocol, viz a viz “prolate ellipse method.”

The measurements of left atrium were performed in four chambers, the apical view labeled as D2 and D3, and the parasternal long-axis view labeled as D1. The left atrial volume was calculated using the following formulas:

\[
\text{Left Atrial Volume in ml} = D1 \times D2 \times D3 \times 0.523.
\]

block randomization. Group A patients had atrial fibrillation (n=30), and Group B patients had normal sinus rhythm (n=30). Our study groups had established diagnosis of mitral stenosis with a positive history of rheumatic fever.

**Inclusion Criteria**
All patients who were legally adults, diagnosed cases of rheumatic mitral stenosis, belonging to both genders, were included in this study.

**Exclusion Criteria**
Patients with hyperthyroidism, marked left ventricular dysfunction having ejection fraction less than 35% on echocardiography, congenital heart disease, and long-standing coronary artery disease were excluded from our study.

**Patient Characteristics**
The patients who fulfilled our pre-defined criteria were recruited for this study. The study procedure was explained to them. Demographic information like name, age, sex, race or ethnicity, and address were noted. A detailed history and physical examination were done for all the patients. All the patients underwent baseline systemic evaluation. Routine serum chemistry, including a lipid profile, was done for all. Standard twelve lead electrocardiogram was recorded, followed by echocardiographic studies for each patient.

**Estimation of Left Atrial Volume**
Echocardiographic measurements, required for the estimation of left atrial volume (LAV), were taken over at least five times if the baseline rhythm was atrial fibrillation. All echocardiographic studies were performed by one diagnostic cardiac sonographer with the same echocardiographic instrument (VIVID 7) according to a standardized protocol, viz a viz “prolate ellipse method.”

The measurements of left atrium were performed in four chambers, the apical view labeled as D2 and D3, and the parasternal long-axis view labeled as D1. The left atrial volume was calculated using the following formulas:

\[
\text{Left Atrial Volume in ml} = D1 \times D2 \times D3 \times 0.523.
\]
The other method employed to calculate volume was the biplane area-length method:

$$\text{LA volume} = 0.85 \times A1 \times A2 / (L1 - L2/2).$$

Inclusion and exclusion criteria were followed in letter and spirit to control the confounding variables and minimize bias.

**RESULTS**

This study included 60 patients. There were 36 male subjects (60%) and 24 (40%) female subjects. The mean age of our subjects was 37.33±10.01 years with minimum age 20 years and maximum age of 60 years, respectively [Table 1].

We noticed a significant left atrial size variation among the two groups. In our study, the mean left atrial size for Group A was 75.23±18.62, whereas for Group B, it was 42.30±12.30 [Table 2].

The mitral valve area was significantly reduced in both groups. Group A patients had a mean mitral valve area of 1.252±0.541 cm², whereas Group B patients had a mean mitral valve area of 0.870±0.368cm² [Table 3].

We found a significant association between echocardiographic changes and left atrial volumes. Scans of Group A patients revealed abnormally large left atria, with volumes greater than 75 in nearly half of the subjects [Table 4]. In Group B, the left atrial volume was <45 in the majority of the subjects, and no significant left atrial enlargement was noted [Table 4]. The difference of left atrial volumes amongst the study groups was found to be statistically significant, with a p-value of < 0.001.

Echocardiographic findings showed a significant difference in mitral valve area dimensions in the 2 study groups. It is interesting to note that among the patients of Group B, the mitral valve area was <1.0 in the majority (n=27, 90%) [Table 5].

Among the Group B patients, left atrial volume and mitral valve area showed a negative moderately significant correlation ($r= -0.436$, $p<0.001$). Whereas in Group A, Left Atrial Volume, and Mitral Valve Area showed a very weak inverse correlation ($r= -0.012$, $p=0.952$) [Figure 2].

**DISCUSSION**

Rheumatic fever is a condition affecting children and the juvenile population. Rheumatic heart disease is a commonly reported complication of rheumatic fever. It's typically preceded by a sore throat and, if not diagnosed in time, can lead to permanent mutilation of the mitral valve of the heart. The causative organism is a bacterium called Streptococcus pyogenes, a member of group A beta-hemolytic Streptococci family. There is pathological calcification of mitral valve due to autoimmune reaction, ultimately leading to mitral stenosis, which is irreversible and can only be corrected surgically in advanced cases. Mitral valve stenosis hampers proper filling of the left ventricle, the end-diastolic volume is markedly reduced, leading to diminished stroke volume and failure of "pump boost" action of the heart. This starts a vicious cycle, which ultimately leads to left atrial enlargement and atrial fibrillation. Atrial fibrillation is one of the most alarming complications of advanced rheumatic heart disease and can be managed if diagnosed in time. During the course of mitral stenosis, enlargement of the left atrium is considered a key element. Changes in the left atrial pressure secondary to stenosis of the mitral valve lead to the enlargement of the left atrium over time and atrial fibrillation is considered to be a secondary phenomenon.

The increase in left atrium tension due to an increase in pressure as a consequence of mechanical obstruction at the mitral valve leads to increased oxygen consumption by the myocardium. Myocardium dilates due to increased workload and ultimately leads to heart failure. The disarray of myocardial cells and an increase in tension of the left atrial wall results in electrophysiological and conductive changes leading to atrial fibrillation. Due to improper filling of ventricles, the blood supply to vital organs, especially the brain, is impaired, which predisposes the patient at risk of stroke, dementia, and Alzheimer’s disease. Additionally, one of the most feared complications of atrial fibrillation is heart failure, which adds to the misery of the patient. The disease is prevalent in low-income communities worldwide and is a leading cause of sudden cardiac death in these communities.

**CONCLUSION**

Rheumatic fever is prevalent in low socioeconomic...
### Table 1: Age wise distribution of patients

<table>
<thead>
<tr>
<th></th>
<th>Group A (n=30)</th>
<th>Group B (n=30)</th>
<th>Total (n=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>75.23</td>
<td>42.30</td>
<td>56.57</td>
</tr>
<tr>
<td>SD</td>
<td>18.62</td>
<td>12.30</td>
<td>22.41</td>
</tr>
<tr>
<td>Min</td>
<td>71.9</td>
<td>23.01</td>
<td>7.19</td>
</tr>
<tr>
<td>Max</td>
<td>106.70</td>
<td>76.00</td>
<td>106.70</td>
</tr>
</tbody>
</table>

### Table 2: Descriptive Statistics For Left Atrial volume

<table>
<thead>
<tr>
<th></th>
<th>Group A (n=30)</th>
<th>Group B (n=30)</th>
<th>Total (n=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1.252</td>
<td>0.870</td>
<td>1.031</td>
</tr>
<tr>
<td>SD</td>
<td>0.541</td>
<td>0.368</td>
<td>0.484</td>
</tr>
<tr>
<td>Min</td>
<td>0.50</td>
<td>0.60</td>
<td>0.50</td>
</tr>
<tr>
<td>Max</td>
<td>2.50</td>
<td>2.00</td>
<td>2.50</td>
</tr>
</tbody>
</table>

### Table 3: Descriptive statistics for mitral valve area

<table>
<thead>
<tr>
<th></th>
<th>Group A (n=30)</th>
<th>Group B (n=30)</th>
<th>Total (n=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;45</td>
<td>1(3.0%)</td>
<td>21(70%)</td>
<td>22</td>
</tr>
<tr>
<td>45-55</td>
<td>0(0%)</td>
<td>10(33.33%)</td>
<td>10</td>
</tr>
<tr>
<td>56-65</td>
<td>4(13.33%)</td>
<td>1(3.0%)</td>
<td>5</td>
</tr>
<tr>
<td>66-75</td>
<td>8(26.66%)</td>
<td>1(3.0%)</td>
<td>9</td>
</tr>
<tr>
<td>&gt;75</td>
<td>43.33(50%)</td>
<td>1(3.0%)</td>
<td>14</td>
</tr>
</tbody>
</table>

### Table 4: Association between Atrial Fibrillation & Left Atrial volumes
Table 5: Association between Atrial Fibrillation (AF) & Mitral valve area (MVA)

<table>
<thead>
<tr>
<th>MVA</th>
<th>(n=30)</th>
<th>(n=30)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.0</td>
<td>13(42.3%)</td>
<td>27(90.0%)</td>
<td>40</td>
</tr>
<tr>
<td>1.1-1.5</td>
<td>4(13.33%)</td>
<td>0(0%)</td>
<td>4</td>
</tr>
<tr>
<td>&gt;1.5</td>
<td>13(42.33%)</td>
<td>3(10.0%)</td>
<td>16</td>
</tr>
</tbody>
</table>

populations. Partially treated rheumatic fever predisposes the patient to the development of mitral stenosis and atrial fibrillation. Our findings depicted a higher frequency of atrial fibrillation in mitral stenosis as well as higher left atrial volume in patients with atrial fibrillation. Our study findings may help to identify patients in sinus rhythm to screen those at risk of developing atrial fibrillation by using echocardiography. It may also aid in the management by using either antiarrhythmic medication or prophylactic anticoagulation or both for the prevention of thromboembolism.

LIMITATIONS OF CURRENT STUDY

As with any study, there are some limitations to this study as well. Echocardiography is an essential component of this study. As it is a non-invasive modality, there are intra-observer and inter-observer variations during studies because technically, it is very difficult to reproduce the same images. Our study used 2-Dimensional echocardiography for all the measurements. In comparison to 3-Dimensional echocardiography and Cardiovascular magnetic resonance (CMR), 2-Dimensional echo underestimates the LA volumes due to geometric assumptions, LA foreshortening, and manual tracing errors. For future studies, we may need to use these advanced modalities to get more accurate LA measurements.

REFERENCES

CONFLICT OF INTEREST
The Authors declared no conflicts of interest.

HOW TO CITE

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Acute-on-chronic liver failure: MELD score 30-day mortality predictability and etiology in a Pakistani population.

Original Article

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ABSTRACT

Background: Cirrhosis is a pathological condition that ultimately leads to liver failure. Acute on chronic liver failure (ACLF) has a high short term mortality rate. Viral hepatitis is the most common cause of liver failure in our local population. We carried out this study to identify the 30-day mortality and etiology of patients presenting with ACLF using Model for End-Stage Liver Disease (MELD) score predictability.

Methodology: This was a descriptive case series, conducted at Sheikh Zayed Hospital, Lahore, Pakistan from January 31, 2018 to July 30, 2018. One hundred and eighty five patients who met the inclusion criteria were enrolled using 95% confidence level and 4% margin of error. Data was entered and analyzed with SPSS version 23.0. Numerical variables including age was presented by Mean ± S.D. Categorical variables i.e. gender, etiology of acute-on-chronic liver failure and 30-day mortality were presented by frequency and percentage. Data was stratified for age, gender, duration of chronic liver disease and MELD grade to address the effect modifiers. Post-stratification chi-square test was calculated using 95% significance (p≤0.05).

Results: Majority of the enrolled patients were male (74.6%) while only 25.4% of the patients were female. One hundred and thirty patients (70.3%) had underlying viral hepatitis while twelve patients (6.5%) and forty three patients (23.2%) presented with alcoholic liver disease and drug-induced ACLF, respectively. Eighty patients (43.2%) died within 30 days of admission. The 30-day mortality with respect to MELD grade was statistically significant (p<0.001) with the highest mortality noted in grade-IV and thirty five patients (43.8%) dying within 30 days of admission (p<0.001). Grade-II and III MELD scores also contributed to the 30-day mortality with twenty three patients (28.8%) and nineteen patients (23.8%) dying within 30 days of admission (p<0.001).

Conclusion: MELD scores are able to accurately predict the short-term mortality in patients with ACLF and viral hepatitis was the most common etiology in our population. Early detection and use of appropriate prognostic models may alleviate mortality and morbidity in patients with ACLF.

Keywords: Acute-on-chronic liver failure, model for end-stage liver disease, cirrhosis, etiology, short-term mortality.

INTRODUCTION

Cirrhosis is a pathological condition defined by diffuse fibrosis, disruption of the intrahepatic arterial and venous flow, portal hypertension and leading to liver failure. Two phases of cirrhosis have been identified, compensated and decompensated. While compensated cirrhosis is asymptomatic, decompensated cirrhosis manifests with ascites, variceal haemorrhage and/or hepatic encephalopathy with a mean survival of approximately 3-5 years. Unless contraindications are present, patients may need to be evaluated for liver transplant. Depending on the underlying etiology, the decompensated cirrhosis may be reversed, such as due to alcohol abuse, obesity or chronic viral hepatitis. Acute on chronic liver failure (ACLF) is defined as acute decomposition of cirrhosis associated with organ failure and high short-term 28-day mortality. This is a separate entity when compared to decompensated hepatic cirrhosis due to occurrence of...
One hundred and eighty five patients presenting to the emergency department of Gastroenterology at Sheikh Zayed Hospital, Lahore who met the inclusion criteria were enrolled into our study. Detailed history and written informed consent to participate in the study was taken from each patient. The patients' age and gender were noted and they were evaluated for ACLF as per operational definitions. The patients were managed as per standard departmental protocols. The 30-day mortality was recorded as well as demographic details and etiology in the attached proforma. Laboratory testing was acquired at Sheikh Zayed hospital and the patients were managed by a single medical team to minimize bias. Confounding variables were controlled by exclusion.

organ failure, systemic inflammation, specific precipitating factors and high risk mortality. In the Indian population, frequently-identified etiologies in patients presenting with ACLF include alcoholism followed by viral hepatitis and drugs. The 30-day mortality in patients with ACLF ranged from 42.6% till 55% in the Indian Population. However, the 30-day mortality in the Bangladeshi population was much lower at 16.67%. In the Pakistani population, the most frequent etiology of ACLF was viral hepatitis (33.3%) followed by drugs (23.6%) while alcoholic liver disease was identified in only 8.3% of the patients. In the same cohort, the 30-day mortality was 39.3% in patients presenting to the Sindh Institute of Urology and Transplantation (SIUT), Karachi. Patients with higher Model for End-Stage Liver Disease (MELD) scores had a higher frequency of mortality (66.7% vs. 33.3%; \( p=0.001 \)) using MELD<30 vs. MELD ≥30. There are wide variations globally regarding the frequency of mortality with limited data in the Pakistani population. In Pakistan, viral hepatitis has been identified as the most common underlying etiology for ACLF. However, there are considerable geographic differences regarding the prevalence of viral hepatitis across Pakistan. The following study aims to identify the 30-day mortality and etiology of patients presenting with ACLF to a tertiary care hospital using Model for End-Stage Liver Disease (MELD) score predictability.

SUBJECTS AND METHODS
This was a descriptive case series, conducted at department of gastroenterology, Sheikh Zayed Hospital, Lahore, Pakistan from January 31st 2018 to July 30th 2018.

Operational Definitons
a) Acute-on Chronic Liver Failure (ACLF): Liver cirrhosis was diagnosed with the following 2 criteria on ultrasonography:
1) coarse shrunken liver and 2) dilated portal vein (>50 x normal).
Diagnosed cases of liver cirrhosis for duration of disease of ≥1 year who presented with jaundice (total bilirubin >5 mg/dl) and coagulopathy (international normalised ratio ≥1.5) were then selected with a diagnosis of acute-on-chronic liver failure.

b) Model for End-Stage Liver Disease (MELD) Grading: Patients diagnosed with ALCF within the last 24 hours who were included in the study and were graded per Model for End-Stage Liver Disease (MELD):
   a. Grade-I: 6-10
   b. Grade-II: 11-18
c. Grade-III: 19-24
d. Grade-IV: 25-40

c) Etiological spectrum:
   a. Viral Hepatitis: Patient diagnosed with Hepatitis A, B, C and E by ELISA.
   b. Alcoholism: Patients presenting with history of alcoholism in ≤6 months with gamma glutamyl transferase (γGGT) ≥50 IU/lit in serum.
   c. Drug Induced: Patients presenting with history of one or more of the following medication in the preceding 2 weeks:
      i. General anestheisa
         1. Halothane
         2. Chloroform
         3. Isoflurane, Enflurane, Desflurane
         4. Nitrous oxide
      ii. Interferon therapy
      iii. Anti-Tuberculous Therapy
      iv. Homeopathic medication
     v. Herbal medication

d) 30-day Mortality: Death of enrolled patients within 30 days of presentation to the hospital.

Sample Size
Sample size of 185 was calculated with 95% confidence level and 4% margin of error while estimating expected percentage of drug induced hepatitis as 8.3% in patients with ACLF. The subjects were selected by non-probability consecutive sampling.

Inclusion Criteria
Adult patients of either gender, aged 20-60 years and diagnosed with acute-on-chronic liver failure (as per operational definition) in the last 24 hours.

Exclusion Criteria
Patients with chronic renal disease (serum creatinine levels ≥1.5 mg/dl), heart failure (ejection fraction ≤60%), respiratory failure (SpO2/FiO2<214) and/or cancer (diagnosed cases as preclinical record).

Data Collection
One hundred and eighty five patients presenting to the emergency department of Gastroenterology at Sheikh Zayed Hospital, Lahore who met the inclusion criteria were enrolled into our study. Detailed history and written informed consent to participate in the study was taken from each patient. The patients’ age and gender were noted and they were evaluated for ACLF as per operational definitions. The patients were managed as per standard departmental protocols. The 30-day mortality was recorded as well as demographic details and etiology in the attached proforma. Laboratory testing was acquired at Sheikh Zayed hospital and the patients were managed by a single medical team to minimize bias. Confounding variables were controlled by exclusion.
Data Analysis
Data was entered and analyzed using SPSS version 23.0. Numerical variables including age was presented by Mean ± S.D. Categorical variables i.e. gender, etiology of acute-on-chronic liver failure and 30-day mortality were presented by frequency and percentage. Data was stratified for age, gender, duration of chronic liver disease and MELD grade to address the effect modifiers. Post-stratification chi-square test was calculated using 95% significance (p≤0.05).

RESULTS
Majority of the enrolled patients were male (74.6%) while only 25.4% of the patients were female [Table 1]. Seventy six patients were >50 years (41.1%) while sixty patients (32.4%) and forty nine patients (26.5%) were between 36-50 and 20-35 years, respectively [Table 2].

The duration of cirrhosis was 1-3 years in sixty seven patients (36.2%), 3-5 years in sixty one patients (33%) and >5 years in fifty seven patients (30.8%) [Table 3]. Thirty seven patients (20.0%) had MELD grade-I, while forty six patients (24.9%), fifty three patients (28.6%) and forty nine (26.5%) patients presented with MELD grades-II, III and IV respectively [Table 4].

Seventy six patients were >50 years (41.1%) while only 25.4% of the patients were female [Table 1].

Eighty patients (43.2%) died within 30 days of admission [Table 6]. The 30-day mortality with respect to MELD grade was statistically significant (p<0.001) with the highest mortality noted in grade-IV with thirty five patients (43.8%) dying within 30 days of admission (p<0.001) [Table 7]. Grade-II and III MELD scores also contributed to the 30-day mortality with twenty three patients (28.8%) and nineteen patients (23.8%) dying within 30 days of admission (p<0.001) [Table 7].

There was no statistical significance of gender-based etiology (p<0.770) and gender-based 30-day mortality (p<0.210). Additionally, no statistical significance was observed for gender-based etiology (p<0.770), gender-based 30-day mortality (p<0.210), age-based etiology (p<0.170) and age-based 30-day mortality (p<0.801). The etiology of ACLF (p<0.437) and 30-day mortality (p<0.605) with respect to duration of disease was not statistically significant (p<0.437). The etiology of ACLF with respect to MELD score was also insignificant (p<0.389).

DISCUSSION
This is a novel study as it assesses the role of MELD score in ACLF as a prognostic marker in our local Pakistani population. Acute-on-chronic liver failure (ACLF) is prevalent in the South-Asian population due to high burden of viral hepatitis. However, no prognostic models have been developed with specific data in this target population. ACLF presents with multiple complications and has a short-term mortality rate of 50-90%. While the most effective treatment modality is liver transplantation, there is a dearth of liver donors and the cost of procedures are high. It is crucial to diagnose and determine the prognosis of patients with ACLF in order to categorize patients in need of liver transplantation or only intensive medical care. The most commonly used model for its prognostic potential in ACLF is the model for end-stage liver disease (MELD) scoring system and it was established to determine the short-term prognosis in patients with liver cirrhosis who were undergoing transjugular intrahepatic portosystemic shunts as well as to categorize the urgency of patients requiring liver transplantation by the United Network for Organ Sharing (UNOS). MELD is based on three easily attainable biochemical variables including serum bilirubin, serum creatinine, and international normalized ratio (INR) of prothrombin time. The modified MELD scoring system incorporates the measurement of serum sodium levels. In January 2016, the Organ Procurement and Transplantation Network Policy 9.1 was updated to include serum sodium in the MELD score grading system. The model has been shown to accurately predict the short-term mortality of patients independent of etiology and complications such as portosystemic encephalopathy and spontaneous bacterial peritonitis. Previous data indicates the validation of MELD score in predicting the 3-month mortality in cirrhotic patients. However, these models may not be ideal for use in the Pakistani population and their potential to predict outcomes of patients in non-transplantation setting is not entirely clear. The prognosis of ACLF is dependent on multiple factors including multi-organ failure and brain oedema. Since MELD scores rely on serum markers including creatininem, INR and bilirubin, it is likely that correction of these measures via methods including plasma exchange or replacement therapy may negatively skew the MELD scores. It is important to interpret MELD scores with precaution since better scores may not be representative of the severity of disease in the patients. Our study reports a high short-term 30-day mortality rate, 43.2%, in patients admitted due to ACLF. The MELD scoring system was used to categorize the severity of ACLF and the results are statistically significance for predicting the 30-day mortality with respect to MELD.
### Table 1: Frequency distribution of gender.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>138</td>
<td>74.6</td>
</tr>
<tr>
<td>Female</td>
<td>47</td>
<td>25.4</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table 2: Frequency distribution of age groups.

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-35 years</td>
<td>49</td>
<td>26.5</td>
</tr>
<tr>
<td>36-50 years</td>
<td>60</td>
<td>32.4</td>
</tr>
<tr>
<td>&gt;50 years</td>
<td>76</td>
<td>41.1</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table 3: Frequency distribution of duration of disease

<table>
<thead>
<tr>
<th>Duration of disease</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 years</td>
<td>67</td>
<td>36.2</td>
</tr>
<tr>
<td>3-5 years</td>
<td>61</td>
<td>33.0</td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>57</td>
<td>30.8</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table 4: Frequency distribution of MELD grade

<table>
<thead>
<tr>
<th>MELD grade</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade-I</td>
<td>37</td>
<td>20.0</td>
</tr>
<tr>
<td>Grade-II</td>
<td>46</td>
<td>24.9</td>
</tr>
<tr>
<td>Grade-III</td>
<td>53</td>
<td>28.6</td>
</tr>
<tr>
<td>Grade-IV</td>
<td>49</td>
<td>26.5</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table 5: Frequency distribution of etiology of ACLF.

<table>
<thead>
<tr>
<th>Etiology of ACLF</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viral hepatitis</td>
<td>130</td>
<td>70.3</td>
</tr>
<tr>
<td>Alcoholic liver disease</td>
<td>12</td>
<td>6.5</td>
</tr>
<tr>
<td>Drugs</td>
<td>43</td>
<td>23.2</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 6: Frequency distribution of 30-days mortality.

<table>
<thead>
<tr>
<th>30-days mortality</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>80</td>
<td>43.2</td>
</tr>
<tr>
<td>No</td>
<td>105</td>
<td>56.8</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 7: Stratification of 30-days mortality with respect to MELD grade.

<table>
<thead>
<tr>
<th>MELD grade</th>
<th>30-days mortality</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ycs</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Grade-I</td>
<td>3</td>
<td>34</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>3.8%</td>
<td>32.4%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Grade-II</td>
<td>19</td>
<td>27</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>23.8%</td>
<td>25.7%</td>
<td>24.9%</td>
</tr>
<tr>
<td>Grade-III</td>
<td>23</td>
<td>30</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>28.8%</td>
<td>28.6%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Grade-IV</td>
<td>35</td>
<td>14</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>43.8%</td>
<td>13.3%</td>
<td>26.5%</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>105</td>
<td>185</td>
</tr>
</tbody>
</table>

CONCLUSION
The prospective study presents data for 30-day mortality and etiology of patients admitted with acute-on-chronic liver failure in a tertiary care hospital. The MELD score grading system is able to accurately predict the short-term mortality in patients with ACLF. Viral hepatitis was the most common etiology of cirrhosis in our population. These findings are consistent with previous studies that were conducted to validate the MELD score grading system as a liver disease severity index. While our study did not compare other prognostic models, application of the MELD score grading system needs to be scrutinized for use in the South-Asian population before being used for its predictive potential in short-term mortality of patients with ACLF.

LIMITATIONS
Our study has a few limitations. First, we collected data from a single center that may introduce bias. Second, our sample size was small and we used a single MELD score instead of serial delta scores. Third, we did not compare MELD scores with other prognostic models. Last, the cut-offs used for the MELD scores in our study have not been validated by other studies in the South-Asian population. It may be of use to identify and validate accurate scoring systems for the South-Asian population which may lead to better survival in the population. Appropriate cut-points help isolate patients at risk of high mortality further prompting aggressive and correct management.

REFERENCES
4. Jain R, Thakur MB. Acute on Chronic Liver Failure:

CONFLICT OF INTEREST
The Authors declared no conflicts of interest.

HOW TO CITE

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Relative Odds of Neck Pain to Helmet Use Among Motorcyclists: A Case-Control Study.

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Acceptance: Jan 22, 2020
Publication: Feb 1, 2020

ABSTRACT
Background: Neck pain is a widespread problem among motorcyclists, which is often neglected. There is limited research on the motorcycle's ergonomics, particularly in the context of the interaction between the riders and motorcycle. Motorcycle helmets have proven to increase the weight on the neck, thus causing more burdens which can lead to neck pain.

Methodology: Case-Control study design was opted to measure the relative odds of neck pain in relation to the helmet use as an exposure. A total of 260 (mean age of 22.58 ± S.D. 1.95 years) undergraduate students were selected using purposive sampling. The case to control ratio was 1:4 (54 Cases and 206 Controls) where cases were defined as the motorcyclists having neck pain with a riding experience of more than one year. The neck pain and disability scale were obtained using a self-administered questionnaire. Chi-square and binary logistic regression were used to calculate the significant relationship and odds of neck pain amongst motorcyclists with and without helmet use.

Results: The study results showed that out of 260 motorcyclists, 190 (73.1%) were helmet users, and 54 (20.8%) had neck pain, 70 (27.9%) helmet users had a neck pain prevalence of 11 (4.2%). The relative odd to have neck pain was 2.13 times more amongst the motorcyclists using the helmet as compared to that of non-helmet users. The logistic regression results showed significant results (P < 0.05) with regards to the BMI, helmet weight and duration of helmet use but did not show a significant relation with average motorcycle use per day unless it exceeded 70 kilometres.

Conclusion: Use of helmet can be a potential cause of neck pain amongst motorcyclist users but the odds to have neck pain enhance with the increase in motorcycle use per day. The protective benefits are multi-fold for helmet use which outreaches the negative impact, including neck pain amongst motorcyclists.

Keywords: Helmet use, neck pain, motorcyclists.

INTRODUCTION
Motorcycles are the most convenient source of transportation. Helmets have been shown to have a protective effect in the event of road traffic accident, saving head, brain and facial tissue from serious injury. Most of the road fatalities in developing countries are because of motorcycle accidents. Although a cheap source of transportation, yet the motorcycles are not safe because, in most two-wheelers, the centre of gravity is not standardized. Another reason for accidents is the speed of the vehicle. The chance of fatal injury increases many folds at higher speeds. Though not often discussed, neck pain is one of the commonly encountered problems by motorcyclists who regularly use helmets while riding. There is limited literature available regarding the discomfort among motorcyclists and the occurrence of neck pain because of helmet use. Discomfort in motorcyclist's body parts during the ride can be due to the poor posture, poor suspension of the bike, high speed, seat height, the position of handlebars and footrests. Cyclists and motorcyclists who travel for shorter distances may also experience neck and upper back pain. It has been
observed the helmets serve as an additional weight on the head, and this can contribute towards the head and neck discomfort as well as restrict the range of motions of the individual's neck. One of the reasons identified by a large number of motorcyclists for not wearing a helmet during riding was neck pain as they contributed the neck pain to the helmet's weight which caused discomfort if worn for a long time. Motorcyclists reported a significant restriction in their head and neck range of motion after prolong use of a helmet. There is an excellent scope for researchers to research motorcyclists as there is very little evidence available on this subject. There is a need to satisfy the motorcyclists about their posture concerning their motorcycle use. The rate of helmet use in various countries is different, as, in Iran, it varied from 8.6% to 75%. The helmet use rate is 56% in Pakistan, 19.7% in Spain, and 90% in Vietnam, and these rates were determined among adults. Some researchers suggest that the neck pain experienced by the motorcyclists can be due to the seating posture during the riding process. However, no research has been undertaken to evaluate the neck pain levels among the motorcyclists during their riding process while wearing a helmet. Our study will highlight the discomfort levels among motorcyclists who regularly wear helmets while riding. The objectives of this study were to identify the relationship between neck pain and helmet use among helmet and non-helmet user motorcyclists among undergraduate university students of Lahore, Pakistan, and the level of significance between neck pain and helmet use. The findings may be helpful for other researchers to conduct more studies as well as get a better understanding of neck pain with helmet use.

**METHODODOLOGY**

It was a case-control study conducted through quantitative analysis directing to determine the relative odds of neck pain among motorcyclists and the significance of normal motorcycle use per day, helmet weight, durations of helmet use, BMI, motorcycle riding experience and neck pain among helmet users. Students enrolled in undergraduate universities of Lahore, Pakistan, were selected by purposive sampling technique. The cases were described as those motorcyclists who were using a motorcycle for more than one year, wearing a helmet for more than one month and having neck pain while controls were described as those motorcycle riders, who had regularly been riding for more than one year and used helmet regularly but did not have neck pain. The sample size was calculated as 260 in which case to control ratio was 1:4 at a 95% confidence interval using online software (AUSVET). Students were approached, and after the informed consent to participate in our study, they were given a demographic questionnaire and neck pain and disability scale questionnaire. The questionnaires were explained to all the participants and they were also informed about the aims and objectives of our study. Students were given the right to opt or withdraw from the study if they did not want to participate in our study. The demographic data collected was age, university, respective department, helmet use, per day average motorcycle use, helmet weight, duration of helmet use, the regularity of use of helmet, neck pain while wearing a helmet were asked and a previous diagnosis of any musculoskeletal problem. The neck pain and disability scale (NPAD) questionnaire were used as an objective measurement in those motorcyclists who experienced neck pain while wearing a helmet during their journey. The NPAD questionnaire has a reliability of 0.93 and the validity of 0.45. Chi-square and regression analysis were applied to the following variables: age, helmet weight, duration of helmet use, average motorcycle use per day and neck pain) to determine the significance and relative odds. The data obtained was analyzed by categorizing each variable.

**RESULTS**

Out of 260 motorcyclists, 190 (73.1%) were helmet users, and 70 (26.9%) were non-helmet users. There were 54 (20.8%) subjects who were using a helmet with associated neck pain. The participants who were helmet users without neck pain were 136 (52.3%). A total of 11 (4.2%) participants were non-helmet users but had neck pain. Fifty-nine (22.7%) participants were non-helmet users and without neck pain [Table 1]. The subjects were divided into three categories based on average motorcycle use per day. In the first category, which ranged from 10 to 40 kilometres, 21 subjects had neck pain and accounted for 8.1% of the entire group. In the second category, which ranged from 40 to 70 kilometres, there were 19 (7.3%) subjects, and in the third category, which ranged to greater than 70 km, 25 (9.6%) subjects were identified. Overall, 65 (25%) participants out of 260 participants reported the presence of neck pain. In our study, 192 (75%) subjects did not have neck pain with 74 (28.5%) in the first category, 67 (25%) in the second category and 54 (20.8%) in the third category. The regression analysis of neck pain with normal motorcycle use per day did not show a significant relation (p=0.266). However, the Exp (B) value of third category (70 to 100 km) revealed a significant
### Table 1: Helmet use or non-helmet use and occurrence of neck pain

<table>
<thead>
<tr>
<th>Do you experience neck pain?</th>
<th>yes</th>
<th>no</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you use a helmet while riding a motorcycle? yes</td>
<td>54 (20.8%)</td>
<td>136 (52.3%)</td>
<td>190 (73.1%)</td>
</tr>
<tr>
<td>no</td>
<td>11 (4.2%)</td>
<td>59 (22.7%)</td>
<td>70 (26.9%)</td>
</tr>
</tbody>
</table>

### Table 2: Relationship of average motorcycle use per day with neck pain

<table>
<thead>
<tr>
<th>Average Motorcycle use per day in kilometers</th>
<th>Do you experience neck pain?</th>
<th>Total</th>
<th>Sig. (0.266)</th>
<th>Exp (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-40 kilometers</td>
<td><strong>Count</strong></td>
<td>21</td>
<td>74</td>
<td>95</td>
</tr>
<tr>
<td>%</td>
<td><strong>%</strong></td>
<td>8.1%</td>
<td>28.5%</td>
<td>36.5%</td>
</tr>
<tr>
<td>40-70 kilometers</td>
<td><strong>Count</strong></td>
<td>19</td>
<td>67</td>
<td>86</td>
</tr>
<tr>
<td>%</td>
<td><strong>%</strong></td>
<td>7.3%</td>
<td>25.8%</td>
<td>33.1%</td>
</tr>
<tr>
<td>70-100 kilometers</td>
<td><strong>Count</strong></td>
<td>25</td>
<td>54</td>
<td>79</td>
</tr>
<tr>
<td>%</td>
<td><strong>%</strong></td>
<td>9.6%</td>
<td>20.8%</td>
<td>30.4%</td>
</tr>
</tbody>
</table>

### Table 3: Relation of BMI with neck pain

<table>
<thead>
<tr>
<th>BMI Categories</th>
<th>Do you experience neck pain?</th>
<th>Total</th>
<th>Sig. (0.033)</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td><strong>Count</strong></td>
<td>6</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>%</td>
<td><strong>%</strong></td>
<td>2.3%</td>
<td>1.9%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Normal Weight</td>
<td><strong>Count</strong></td>
<td>31</td>
<td>78</td>
<td>109</td>
</tr>
<tr>
<td>%</td>
<td><strong>%</strong></td>
<td>11.9%</td>
<td>30.0%</td>
<td>41.9%</td>
</tr>
<tr>
<td>Overweight</td>
<td><strong>Count</strong></td>
<td>16</td>
<td>80</td>
<td>96</td>
</tr>
<tr>
<td>%</td>
<td><strong>%</strong></td>
<td>6.2%</td>
<td>30.8%</td>
<td>36.9%</td>
</tr>
<tr>
<td>Obese</td>
<td><strong>Count</strong></td>
<td>12</td>
<td>32</td>
<td>44</td>
</tr>
<tr>
<td>%</td>
<td><strong>%</strong></td>
<td>4.6%</td>
<td>12.3%</td>
<td>16.9%</td>
</tr>
</tbody>
</table>
Table 4: Relation of Neck Pain with Duration of Helmet Use.

<table>
<thead>
<tr>
<th>Duration of Helmet Use</th>
<th>Do you experience neck pain?</th>
<th>Total</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>non helmet user</td>
<td>Count 11</td>
<td>59</td>
<td>70</td>
<td>0.992</td>
</tr>
<tr>
<td>0.10-1.00 years</td>
<td>Count 24</td>
<td>46</td>
<td>70</td>
<td>0.045</td>
</tr>
<tr>
<td>1.00-4.00 years</td>
<td>Count 24</td>
<td>58</td>
<td>82</td>
<td>0.118</td>
</tr>
<tr>
<td>4.00-8.00 years</td>
<td>Count 6</td>
<td>32</td>
<td>38</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The obtained basal metabolic index values were categorized as follows:
1. underweight,
2. normal weight,
3. overweight and

Table 5: Relation of Neck Pain with Helmet Weight In Kilograms

<table>
<thead>
<tr>
<th>Helmet Weight in Kilograms</th>
<th>Do you experience neck pain?</th>
<th>Total</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>non helmet user</td>
<td>Count 11</td>
<td>59</td>
<td>70</td>
<td>0.808</td>
</tr>
<tr>
<td>0.25-1.25</td>
<td>Count 31</td>
<td>36</td>
<td>67</td>
<td>0.004</td>
</tr>
<tr>
<td>1.30-1.90</td>
<td>Count 19</td>
<td>75</td>
<td>94</td>
<td>0.441</td>
</tr>
<tr>
<td>2.00-3.00</td>
<td>Count 4</td>
<td>25</td>
<td>29</td>
<td>0.001</td>
</tr>
</tbody>
</table>
4. obese

The underweight category had 6 (2.3%), participants, with neck pain while the normal weight, overweight and obese categories had 31 (11.9%), 16 (6.2%), and 12 (4.6%) participants with neck pain, respectively. The subjects with no neck pain were 5 (1.9%), 78 (30%), 80 (30.8%), and 32 (12.3%) based on the BMI categories: underweight, normal weight, overweight, and obese categories, respectively. Table 3 shows a significant relationship between BMI and neck pain (p=0.033).

Keeping the obese category as a constant, the odds of neck pain are not much higher in all other BMI categories but are comparatively higher in the overweight category. The Exp (B) values in the underweight, normal weight, overweight and obese categories are 0.313, 0.944, 1.875, and 2.667[Table 3]. The duration of helmet use in years categorized as follows:

1. no helmet use,
2. 0.1-1 years of use,
3. 1.4-4 years of use
4. 4.4-8 years of use.

Twenty four subjects had neck pain (9.2%), and 46 reported no neck pain (17.7%) with 0.1-1 years of use. With 1-4 years of use, 24 (9.2%) subjects reported neck pain and 58 (22.3%) subjects had no neck pain. With 4-8 years of use, only 6 participants had neck pain (2.3%), and 32 had no neck pain (12.3). There were also 11 non-helmet users who reported neck pain (4.2%) and 59 non-helmet users who did not have neck pain (22.7%). Binary logistic regression on helmet duration and neck pain was applied, and it indicated a significant relationship between helmet use and duration of helmet use (p=0.035) and the Exp (B) value of the fourth category was 5.333. It reflects that the odds of developing neck pain are drastically higher in the fourth category than the rest of the categories[Table 4].

Helmet weight was measured with the help of a digital weighing scale and categorized into three different groups:

1. 0.25-1.25 kilograms
2. 1.30-1.90 kilograms
3. 2.00-3.00 kilograms.

In the second category, which ranges from 0.25-1.25 kilograms, 31 subjects had neck pain (11.9%), and 36 subjects had no neck pain (13.8%). In the third category, which ranges from 1.30-1.90 kilograms, 19 subjects reported with neck pain (7.3%) and 75 subjects did not report neck pain (28.8%). In the fourth category, only 4 participants were having neck pain (1.5%), and 25 were having no pain (9.6%). We found out a significant relationship between helmet weight and neck pain (p<0.001). The Exp (B) value of the fourth category is 6.250, and in relation to that, the Exp (B) of the second and third categories is 0.186 and 0.632, respectively. The odds of developing neck pain in the second and third category are less likely. The fourth category remains constant, and the chances of developing neck pain with helmet weight are higher in the third category as compared to the second category because Exp(B) is 0.583 and 1.733 for second and third category respectively. The fourth category has the highest relative risk of developing neck pain [Table 5].

The odds ratio was estimated by binary logistic regression, and it was 2.126 between neck pain and helmet use. An ROC curve was also established to evaluate the correspondence between subjective and objective measurement and to check the sensitivity of the NPADS questionnaire. The area under the ROC curve was 0.904, indicating a 90% correspondence between the subjective and objective neck pain measurement and denoted good sensitivity of the NPADS questionnaire [Figure 1].

**DISCUSSION**

This research was proposed to determine any association or significant relationship between motorcyclists who uses helmets and the development of neck pain with helmet use. Overall, it was found that motorcyclists who use helmets had a two times higher risk or chance of developing neck pain in the long run as
as compared to the non-helmet user. Neck pain in motorcyclists can be due to the helmet weight, distance travelled per day, duration of helmet use and motorcycle riding experience. It was also found in our study that individuals with more than five years of motorcycle riding experience had more chances of developing neck pain as compared to those who had less than five years of motorcycle riding experience.

There was a significant relationship with average motorcycle use per day. More use was associated with more odds of developing neck pain. Other variables including BMI, helmet weight and age did not have a significant relationship, but in logistic regression, these variables had an impact on neck pain in the long term. It means that these variables will affect the incidence of neck pain. There is currently limited literature available which can exclusively identify the relationship between neck pain and helmet use. Very few studies have been conducted on motorcyclists’ discomfort during the riding process. One of the studies conducted in Malaysia showed that 51.35% of male motorcyclists had musculoskeletal problems in their neck and head while riding a motorcycle. The study supports the findings of our study as with the increase of average motorcycle use per day, the chances of neck pain also increase.

Research was also conducted in Karachi, Pakistan, estimating the prevalence of helmet use and to determine why non-helmet users do not wear helmets. In this study, 44% of the subjects reported physical discomfort, particularly in the neck and head as a reason for not wearing a helmet. On the whole, helmets are very useful in preventing head injuries during fatal road accidents by protecting the head and neck. Contrary to that, increased helmet weight proved to be a contributor to the incidence of neck pain among motorcyclists. In Pakistan, the material used in the manufacturing of helmets does not meet the international standards thus leading to poor quality and non-standardized helmets in the market. However, it is not advised to avoid wearing helmet rather take measures to prevent neck pain during motorcycle riding and encounter those factors to reduce the incidence of neck pain among motorcyclists. This study provides a canvas for future researchers to evaluate those factors and contributors which had not been taken into account in this research paper, for example, the engine design and size of the motorcycle, comfortability of helmets, forward head posture of the rider, and the jerky movements of the motorcycle on the road could be contributing towards the neck pain.

**CONCLUSION**
The odds of having neck pain increases as the average motorcycle use per day increases. The BMI of the participants has a significant relationship (p=0.030) with neck pain, and the odds are directly proportional to the BMI. The duration of helmet use also has a significant relation with neck pain (p=0.035), and the odds of neck pain are increasing as the helmet weight increases. A significant relationship is found between helmet weight and neck pain (p=0.000) and the odds of having neck pain with helmet weight rises as the helmet weight increases. The motorcycle user students who wear a helmet while riding motorcycle has two times higher odds of having neck pain as compared to those motorcycle user students who do not wear a helmet while riding a motorcycle.

**LIMITATIONS OF CURRENT STUDY**
There were many confounding variables in our study including the biomechanical adaptations of the individual during riding, poor posture habits of the subjects, any undiagnosed musculoskeletal disorder, engine size and helmet size that can affect the outcome variable of neck pain. Our study encourages physiotherapists to consider these variables to find out any relationship of motorcyclists with neck pain. Our study showed a significant relationship and association of helmet use and neck pain, but the sample size was small, thereby limiting generalization.

**CONTRIBUTIONS TO SCIENTIFIC KNOWLEDGE**
Helmets are useful and protective gadgets for bike riders. Undoubtedly, they contribute towards the prevention of head and neck injuries during road traffic accidents. There is no substitute for the unprecedented benefits of the helmets for motorcyclists. On the other hand, the non-standard helmets with less or no ergonomic adaptability are the leading cause of neck discomfort in the motorcyclists. This study highlighted the relationship of helmet weight and neck pain that would be helpful for helmet manufacturing companies to make ergonomically fit and standardized helmets with appropriate weight to lessen the burden of neck pain among motorcyclists. This research paper will open a new area of research as very little work has been done on the effects of machines on humans. This study is reflecting on how the interaction between a motorcycle (machine) and human can lead to some serious musculoskeletal problems or disorders. This study will benefit not only healthcare professionals to know more about the contributing factors of neck pain but
also to the manufacturing companies to focus not only on the style but also on the ergonomic adaptability and weight of the helmets. It is not a recommendation for motorcyclists to avoid helmet use during riding due to the fear of neck pain instead try to cope with the factors mentioned above, having the fact that they could be decremented.

REFERENCES


CONFLICT OF INTEREST

The Authors declared no conflicts of interest.
Predatory Journals: A Literature Review


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ABSTRACT

Background: Predatory publishing is an exploitative fraudulent open-access publishing model. Most predatory journals do not follow policies that are set forth by organizations including the World Association of Medical Editors (WAME), the Committee on Publication Ethics (COPE), the Council of Science Editors (CSE), and the International Committee of Medical Journal Editors (ICMJE). Jeffrey Beall, an associate professor at the University of Colorado Denver and a librarian at Auraria Library, coined the term ‘predatory journals’ to describe pseudo-journals. Our literature review has highlighted that predatory journal authorship is not limited to early-career researchers only. Majority of authors are unfamiliar with practices in pseudo journals despite publishing manuscripts.

Methodology: For the purpose of this review, a systematic literature search was carried in October 2019 of the following databases: (1) Web of Science (all databases), (2) ERIC, and (3) LISTA. All stages of the review process included access to the search results and full articles for review and consequent analysis. Articles were added after screening full-text articles by meeting the inclusion criteria and meeting none of the exclusion criteria. As there were a high number of articles reporting findings on predatory journals, they were further screened re-evaluating them for any deviations from the theme of this study. Relevant material published within the last five years was used.

Results: After a thorough review, 63,133 were located using the Boolean logic. After reviewing 63 abstracts and titles for relevance, 9 articles were included in the literature review. Four themes are concerned with the results of the synthesis that demarcate legitimate and predatory publications. They include factors: (1) Related to the journal, (2) Academic and professional, (3) Dissemination, and (4) Personal.

Conclusion: Our literature review found that there is a lack of one single definition for predatory journals. We believe that it is essential for potential authors and young researchers to have clear guidelines and make demarcations of potential journals that seem dubious. Moreover, the authors’ selection of publishers should be modified to control the risks of tainting ‘open-access’ publishing with fraudulent journals. The academic and research community ought to revise their criteria and recognize high quality and author journals as opposed to ‘predatory’ journals. Research mentorship, realigning research incentives, and education is vital to decrease the impact of predatory publishing in the near future.


INTRODUCTION

Predatory publishing is an exploitative fraudulent open-access publishing model. With the introduction of electronic journals around the millennium shift, mainstream publishers confirm electronic licensing’s role in dominating the business model. “Predatory” refers to the idea that these entities prey on scholars for a financial profit via open-access processing charges without meeting scholarly publishing standards. Most of these journals do not follow policies that are set forth by organizations including the World Association of Medical Editors (WAME), the Committee on Publication Ethics (COPE), the Council of Science Editors (CSE), and the
International Committee of Medical Journal Editors (ICMJE). A side effect of this transformation in the publication is the radical change in revenue models. Many innovative journals have placed focus on becoming service providers to authors rather than content publishers. The open-access model places authors as the donators that pay publishers wherein the article becomes readily available.

Jeffrey Beall, an associate professor at the University of Colorado Denver and a librarian at Auraria Library, coined the term predatory publishers to describe pseudo-journals. Beall compiled yearly lists of possible, potential or probably predatory open access journals from 2011 to 2017. Beall also listed concrete criteria that identified such journals with an updated index that continues to locate the pseudo-journals. Two additional lists, hijacked journals and misleading metrics, were added in 2015.[3]

Hijacked journals refer to counterfeit websites that mimic legitimate journals to solicit submissions and collecting publication fees from authors who are misled to believe that the journal is legitimate. The misleading metrics list highlighted counterfeit impact factors and other journal measures that predatory publishers use to deceive scholars.[6-7] However, on January 17, 2017, Beall’s website was dismantled with unclear reasons. The list was alarmingly lengthy with 1294 journals enlisted as of January 3, 2017. He employed Principles of Transparency and Best Practice in Scholarly Publishing from COPE, WAME, DOAJ, and Open Access Scholarly Publishers Association (OASPA). The effort involved in formulating Beall's list was impressive, and it was a well-reasoned starting point for scholars who planned to investigate the journal's or publisher’s credibility.[4]

However, Beall did not list the specific criteria used to give these journals a status of ‘predatory’ and blacklisted specific journals from Low and Middle-Income Countries (LMICs) on the count of having little or no geographic diversity. Beall’s biases against open access publishing models were criticized. Therefore, WAME has added cautionary measures against the use of Beall’s list as the singular method to determine whether the journal is legitimate or predatory.[10]

METHODS

Search Strategy

For the purpose of this review, a systematic literature search was carried in October 2019 of the following databases: (1) Web of Science (all databases), (2) ERIC, and (3) LISTA. The most relevant studies that were agreed by all authors were selected. The following search items were used across the identified databases as appropriate: “Predatory”; “Pseudo;” “Predatory journals”; “Pseudo journals”; “Predatory publishers.” The terms were searched in combination by using the Boolean logic (AND, OR).

Inclusion Criteria and Selection Process

The eligibility criteria for publications to be reviewed were: (1) empirical investigations in the discipline, (2) focus on predatory journal relevance to research outcomes, (3) peer-reviewed and published in the NLM database, and (4) available in English. Articles that referred to predatory and pseudo journals were thoroughly examined because the term “predatory” refers to exploitative and fraudulent money-garnering processes. All articles citing opinion pieces, editorials, and short-communications were extruded to avoid redundancy in data analysis.

Critical Appraisal

The search adhered to the process delineated in figure 1. A critical appraisal was required, and it was obtained by providing a rationale for excluded studies and the inclusion of final studies. All stages of the review process included access to the search results, full articles for review and consequent analysis. Following reviews of duplicates in the isolated databases, titles and abstracts were reviewed. Articles were added after screening full-text articles by meeting the inclusion criteria and meeting none of the exclusion criteria. As there were a high number of articles reporting findings on predatory journals, they were further screened re-evaluating them for any deviations from the theme of this study. Additional searches listed by author names were not conducted. We did not formally rank these article based on their quality assessment as we expected heterogeneity of all selected review materials. A meta-analysis was not conducted in this study; a synthesis of our findings is presented.

FINDINGS

In total, 63,133 articles were identified in the databases, enlisted in table I. After reviewing their abstracts and titles for relevance, 9 articles were included in the literature review, presented in table II. The excluded articles did not meet the inclusion criteria. However, they were related (e.g., predatory journals with their challenges today), as they had little qualitative focus or lack of novel findings.

Description of Findings

Of the reviewed articles, all of them were published after 2015 that reflects the growing awareness about the processes pertaining to predatory publishing. The articles were published in education and other scientific journals including BMC Medicine, Journal of pathology.
informatics, and Sultan Qaboos University medical journal. Data for one focused on two developing regions. In contrast, another overviewed the knowledge and motivations that researchers had while publishing in predatory journals. The key finding of the studies published in BMC included the problems that researchers faced during the publishing process.

**Concepts and basic metrics of predatory journals**

The authors of the studies included their conceptualization of the predatory model with central links among all. The studies mainly emphasized on the awareness or lack thereof among researchers from different backgrounds. With a key focus placed on the concept of predatory or pseudo journals, it is imperative to emphasize their delineation.

Cohen et al. (2019) set the premise of their survey by noting that predatory journals fail to fulfill the basic foundations of biomedical publication. These include the peer review process, circulation of materials, and access in perpetuity. While there is raised awareness in the scientific press today, Cohen et al. propose that no study has directly assessed the perceptions of the editors and authors involved. Their primary objective was to understand the motive that authors have to publish with potentially predatory journals while also assessing the editors’ point of view. Cohen et al.’s stance that these so-called predatory journals take advantage of the open-access publication model fits in the state of events today.

From the basic design of the predatory journals, early-career physicians may not suspect them to be illegitimate, and they are incentivized in an attempt to advance their careers. Their study proposes the defining criteria of a predatory journal is a point of contention among many researchers today. Beall’s list is based on a single researcher’s criteria has been a controversial

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**Table 1:** Search process and items found.

<table>
<thead>
<tr>
<th>Search process</th>
<th>Items found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web of Science (all databases) and ERIC and LISTA</td>
<td>All papers without keywords</td>
</tr>
<tr>
<td>63,133 with keywords 'predatory' AND/OR 'predatory journals' AND/OR 'predatory publishing' AND/OR 'pseudo journals'</td>
<td>63,009 papers excluded</td>
</tr>
<tr>
<td>124 potentially relevant papers screened by abstracts and title</td>
<td>61 papers excluded</td>
</tr>
<tr>
<td>63 full texts reviewed for inclusion</td>
<td>56 papers excluded</td>
</tr>
<tr>
<td>2 additional publications identified</td>
<td></td>
</tr>
<tr>
<td>9 publications identified as review material</td>
<td></td>
</tr>
</tbody>
</table>

*Search topics were included in the title, abstract, or keywords.*
business that is mainly concentrated on exposing scandals involving journals and publishers and the mere lack of peer review. The evident lack of comprehensive studies about this phenomenon consists of the extent of open access journals and their regional distribution. Shen and Björk state that scholarly journals have evolved like many areas in business and society. Electronic delivery of big bundles of journals with the addition of e-licensing is the dominating business model today. The authors classify open access journals as the main branch with a peculiar sub-branch named as predatory journals. Shen and Björk mention that a wide variety of these journals make individual articles available after payment only, termed as hybrid open access. Direct open access is termed as ‘gold’. In addition, there is also a green route where third parties and authors can provide manuscript versions of their articles by providing internet availability and access; this is done on authors’ webpages of subject-based repositories. A recurring theme is the use of Article Processing Charges (APCs) that has seen a rise in the last decade. Some journals have also reached

Table 2: Summary of the literature review.

<table>
<thead>
<tr>
<th>Authors/ Year</th>
<th>Title</th>
<th>Defining Criteria</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohen et al. (2019)</td>
<td>Perspectives from authors and editors in the biomedical disciplines on predatory journals: survey study.</td>
<td>No study has assessed the perceptions of editors and authors involved. Predatory journals fail to fulfil basic elements of the biomedical publication.</td>
<td>Qualitative survey</td>
</tr>
<tr>
<td>Shen and Björk (2015)</td>
<td>‘Predatory’ open access: a longitudinal study of article volumes and market characteristics.</td>
<td>A lack of comprehensive studies about regional extent and distribution is seen. This longitudinal study relates key marketing trends with expressing article volumes.</td>
<td>Longitudinal</td>
</tr>
<tr>
<td>Cortegiani et al. (2019)</td>
<td>Predatory open-access publishing in anaesthesiology.</td>
<td>The study offers unique findings in the realm of anaesthesiology.</td>
<td>Quantitative</td>
</tr>
<tr>
<td>Stejnovski and Marušić (2017)</td>
<td>Does small equal predatory? Analysis of publication charges and transparency of editorial policies in Croatian open access journals.</td>
<td>Critical links between the quality of work by editors and the business model are presented.</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Mercier et al. (2018)</td>
<td>Invitations received from potential predatory publishers and fraudulent conferences: a 12-month early-career researcher experience.</td>
<td>A 12-month period with a junior scholar as the corresponding author has important findings relating to electronic invitations.</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Krasowski et al. (2019)</td>
<td>Burden and characteristics of unsolicited e-mails from medical/scientific journals, conferences, and webinars to faculty and trainees at an academic pathology department.</td>
<td>Both trainees and professionals receive a high volume of e-mails for publishing conference reports and manuscripts. The report analyzes studies localized to one academic medical centre.</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Shanmugam et al. (2017)</td>
<td>Potential predatory and legitimate biomedical journals: can you tell the difference? A cross-sectional comparison.</td>
<td>A cross-sectional comparison of potential, legitimate subscription-based and legitimate open access journals.</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Cobey et al. (2019)</td>
<td>Knowledge and motivations of researchers publishing in presumed predatory journals: a survey.</td>
<td>The experiences and motivations of those who have published in predatory journals are analyzed with an open-ended survey.</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Beshyeh (2019)</td>
<td>Authors’ selection of target journals and their attitudes to emerging journals: a survey from two developing regions.</td>
<td>A cross-sectional study that assesses practices and attitudes that influence decisions when choosing journals for publication.</td>
<td>Qualitative</td>
</tr>
</tbody>
</table>
a very high scientific status that the authors tend to mention with reference to PLOS ONE, a successful model of mega journals. However, Shen and Björk write that the subclass of journals that provides rapid publishing without a set system for peer reviews is linked to pseudo-publishers. Also, authors require publications for their curriculum vitae, which is where ‘predatory publishers’ comes into action. Shen and Björk’s assess the current number of articles published by predatory publishers every year. Namely, their distribution, the countries that they are published in, processing charges, and the rapidity of publishing. Cortegiani et al. (2019) define predatory publishing as an exploitative fraudulent open-access publishing model that works under the false pretence of legitimate publishing without truly providing legitimate editorial services. The authors analyze this information in the field of anesthesiology and related specialities such as critical and respiratory medicine, intensive care, pain medicine, and emergency care. Cortegiani et al. ’s view that the phenomenon has increased considerably in the past decade has led to challenging issues in the scientific community. Over half a million articles are published in predatory journals. Cortegiani et al. mention that the most convenient method is using spam e-mail to solicit scholars to join the editorial board and submit articles. However, at the early stage of scientific careers, there is a weakened ability to judge the ethics and reputability of said journals. The study presents activities of potentially predatory journals and publishers linked to anesthesiology and other specialities.

Stojanovski and Marušić (2017) approach the term predatory publishers and journals from the perspective that journals from small communities may be perceived as predatory. However, the authors state that other characteristics, such as the quality of their editorial work and business model, ought to be analyzed before categorizing. Stojanovski and Marušić write about the importance of transparency, in the research and development community where around USD 2 trillion is invested on a global scale. The public funds a significant portion of this research. A large portion of scientific knowledge is produced by commercial companies. However, the authors note that around 70% of the research results are irreproducible. The peer-review process has also been criticized for its slow process, despite its role as the backbone in the research community. Stojanovski and Marušić mention the 352-year long history that scholarly journals have with commercial publishers taking over after World War II. The study notes that journals in Croatia share common problems with regional or local journals that come from scientific peripheries.

Mercier et al. (2018) review unsolicited electronic invitations that potential predatory publishers send over a period of 12 months. Publishing a manuscript as a medical trainee or during postgraduate studies is a valuable accomplishment, particularly if journals have a peer-review process worth noting. These are classic ways to present scientific discoveries in the community. However, the number of barriers to publication and the lack of experience to publish scholarly communications have led to the emergence of predatory publishing. To promote manuscript submission, publishers often use aggressive marketing campaigns. The critical link that is common among ‘predatory’ outlets includes fake addresses, impact factors, including a wide area of topics, and incentives such as rapid peer-review processes. Mercier et al. voice their concerns about the state of affairs of these journals wherein inaccurate data seem to threaten the integrity of scientific communication. The crux of every predatory publisher is the lack of adherence to ethical guidelines by COPE or ICMJE. In addition, the authors note that this phenomenon is an emerging hazard. Predatory or fraudulent conferences also present an emerging hazard that misleads hundreds of researchers. The study describes all unsolicited invitations from potential fraudulent conferences or predatory publishers over a 12-month period as a corresponding author and junior researcher. Krasowski et al. (2019) note that conference presentations and journal publications are highly critical activities for those in commercial and academic research thereby impacting admission to schools, consideration for promotion and awards. As a result, the past two decades has shown an explosion in academic journals that operate online. The journals have been criticized for their quality, mass e-mail tactics, and editorial insight. Krasowski et al.'s definition of 'predatory journal' is used to describe journals that have poor quality and used aggressive marketing tactics. While no standard definition is in use today, most of the articles reviewed for this study tend to have distinct underlying elements.

Shamseer et al. (2017) conduct a cross-sectional comparison of legitimate biomedical and potential predatory journals. They state that the internet has transformed scholarly publishing with the advent of open access publishing. These journals pose particular problems in the emerging research market today. Shamseer et al. compare characteristics of different types of biomedical journals that include presumed legitimate,
fully open access journals, potential predatory journals, and presumed legitimate subscription-based biomedical journals. Many potential authors and researchers are unaware of the problem that many predatory journals are indistinguishable from legitimate journals. The difference between legitimate and pseudo-journals is a specific topic of interest today that helps to define the term ‘predatory journals’ in the current landscape. Cobey et al. (2019) identify the threat of presumed predatory journals as a further layer of complexity to the journal selection process. Seemingly, these outlets exploit the open access-publishing model. Without action by stakeholders in the process, there is a failure to address the motivation behind researchers. A public review of German researchers was conducted in a study; it was found that over 5000 scientists published in the journal where a peer review access did not occur. Another study assesses the factors that influence the decision to choose publications. The author assesses the practices and attitudes of potential authors in the current landscape. The key driving factors that influence decisions in Africa and the Middle East in choosing the target journal include the indexation status, impact factor, the international status, and possibly free publication.

**Methods used in the articles**

Of the 9 reviewed studies, 8 combined qualitative methods, one included a longitudinal study, whereas two others used a survey format. One was a cross-sectional study, while another used e-mail based findings. Cohen et al. accessed Beall’s list and identified 2567 publishers; 350 were chosen via a random generator. Their study included a survey, randomized control trial into the control group, with summary statistics that described the cohort. Shen and Björk carried out a three-stage-sampling method. Whereas, Cortegiani et al. (2019) checked journal websites based on their enrolling criteria; both studies employed descriptive statistics using excel. Stojanovski and Marušić used the Croatian repository using OASPA principles. Their collected information outlined location, peer review level, types of papers, and number of peer reviewers. Mercier et al. conducted a prospective extraction of invitations, and conference data regarding unsolicited electronic invitations over a year; descriptive statistics were summarized with medians, IQR, and SD. Krasowski et al. led a survey with analysis of e-mail data in spreadsheets such as articles in the journal being reviewed, mention of the term ‘rapid, Index Copernicus, and ISSN’. Shamseer et al. and Beshyah led a cross-sectional study; the former study identified journals in three comparison groups including potential predatory, presumed legitimate open-access, and presumed legitimate subscription-based. The latter used a questionnaire shared via survey monkey, found data regarding academic and professional characteristics and calculated a score to determine authors’ influencing factors. Both studies utilized descriptive statistics and provided a summary of continuous and dichotomous data. Cobey et al. had online survey links that were used with MailMerge software. Surveys were shared via Survey Monkey links, with summary statistics regarding motivations, experiences, and knowledge of researchers.

**RESULTS**

Four themes are concerned with the results of the synthesis. They include factors:
1. Related to the journal,
2. Academic and professional,
3. Dissemination,
4. Personal.

**Related to the journal**

Factors related to the journal analyze whether the paper fits with the journal, the appearance or perception of the journal, and the ease of publishing. Cohen et al. find that on the surface, these journals provide a seemingly beneficial service to authors. In a cohort study, an analysis of authors’ awareness of the journal’s perception was assessed. The authors submitting to predatory journals mentioned that they underwent revisions as part of the process. It was also estimated that 35% of these articles were rejected. However, these findings do not bring awareness to the peer-review process that the journals govern. The predatory journal market’s worth today is around $74 million, with estimates of global subscription reaching $10.5 million. A few of the identified journals were indexed in Scopus and PubMed. False indexing and dubious metrics were key characteristics identified across predatory journals in many studies. Reported locations of these journals were assessed via Google Maps and a study showed ‘unreliable’ results in around 50% of the cases. Only 33% of the assessed journals reported that the presence of EIC is a requirement for an international recommendation. Less than 25% of them reported their policies against scientific misconduct. The availability of instructions for reviews was present in only 30.3% of the studies analyzed. A study showed that 23.3% journals sent e-invitations to promote the use of their business model. A mention of PubMed or MEDLINE was noted in 19.7% of e-mails sent to authors. 38.8% of these e-mails noted peer review in
their communication, with 2.6% mentioning numeric factor. 76.4% of the journals that described their indexation categories were not found in the resources and databases examined, hence, confirming fraudulent metrics related to the journal.\[23\]

**Academic and Professional**

Factors related to academic and professional metrics include general publishing pressure. Other causes include building careers, and seeking employment. Many authors are aware of predatory publishing, and they are not necessarily tricked into publishing. However, as universities promote ‘international publications,’ authors publish in journals without questioning quality measures.\[17\] A global North-South dilemma prevails where developing countries homogenize the view of ‘academic achievements’ based on how often one publishes. In this sense alone, authors and their affiliations are a structural problem where the lack of placement in ‘high quality’ journals leads them to publish in ‘pseudo’ journals. A study termed ‘Gold open access journals’ in the Croatian database as ones that published free of charge and that did not fit the criteria for predatory journals. However, their standards of publication still required quality control and attention.\[19\]

Mercier et al.’s study confirmed that unsolicited e-mails from publishers are a common occurrence. Only 35.3% of invitations were related to the author’s work in the year-long study. An oncologist received about 100 spams by potential predatory publishers. Another individual received 26 invitations. Yet another study noted that 55.9% respondents thought that these journals provided new opportunities for authors and researchers without affecting their professional standing.\[20,23\]

**Dissemination**

Factors related to dissemination include open access, its wide readership, and the international scope of the journal. As far as the international scope and presence is concerned, Cohen et al.’s study found that 40% of authors were from high-income countries, with 23% of authors from India.\[16\]

Shen and Björk found that some journals in 2012 charged on average $800, whereas publications that charge around $104 dominate the market today.\[20\]

However, Shamseer et al. note that journals are priced anywhere less than $150. Around 75% of predatory journals were localized to LMICs as compared to 19.56% of open access journals. Indian journals also have a propensity in the single-journal stratum. A very low share of authors (2.2%) and publishers (0.5%) from South America is witnessed, as opposed to countries like Nigeria and India that show higher statistical trends. It was found that electronic invitations were received from UK, Italy, Spain, United Arab Emirates, Netherlands, Thailand, and Singapore, who posed as conference organizers.\[20\]

As far online correspondences were concerned, 33.2% e-mails retrieved in the study were localized to the United States, with combined keywords including ‘keynote speaker’ or ‘platform organizer.’ Often, journal editors are unaware of ethical rules and regulations. Beshyah notes that around 33% of authors from Africa and the Middle East had no previous experience in publishing. Hence, the deficiency of strong research culture in developing countries leads to a lack of awareness regarding key metrics to identify emerging journals as legitimate.

**Personal**

Personal factors include the lack of knowledge and awareness, in addition to the interest to publish. In a cohort study, the authors reported that publication is an imperative facet in terms of academic promotion.\[16\]

While many editors were familiar with predatory journals, 67% of them were unaware. A high prevalence is seen in the United States and India. However, the services provided by these journals require caution in branding for authors and editors. It was proposed that 47% of the responding authors had been a part of the scholarly publishing process for over 15 years.\[16\] ‘Think. Check. Submit’ is a new initiative that promotes integrity, educates new researchers, and builds credible research links in the community.\[16\]

In another study, 18.3% of respondents noted that they perceived the journal based on the familiarity of the name of the journal, a platform for submission, along with their ideas that high-quality journals operate with nepotism.\[22\]

Around 28% of respondents in a study were still oblivious to the dubious nature of the journal as their affiliations accepted their publications in said journals.\[23\]

However, 65.9% of participants did not face any career risks related to the predatory nature of publishing.

**DISCUSSION**

In the modern era, internet use has enabled open access publishing to flourish. Traditional scholarly publishing is a multi-faceted process involving copyright transfers from authors to publishers with allocated fees to provide access to manuscripts. However, traditional publishing methods are not preferred by many due to high costs or prejudices in the process. An open-access model allows authors to retain rights to their work while also permitting immediate availability to readers with allocated fees. Typically, the process of open access articles is associated with online circulation and publication. Both traditional methods and open access models encompass peer review, editing, and article promotion. With the digitalization of scholarly content, the presence of so-called “predatory” publishing...
has risen. Our literature analysis on Croatian open access journals reveals that majority of them do not have article processing charges. This was a central demarcation from predatory journals; however, transparency in editing policies is not always distinct. As far as the transparency of editorial work is concerned, the majority of Croatian journals had clear guidelines about authors’ responsibilities. These findings were similar to journals in Eastern and Central Europe. Our literature review has highlighted that predatory journal authorship is not limited to early-career researchers only. Majority of authors studies in one article were unfamiliar with practices in pseudo journals, despite being published in questionable journals. It was found that 39% of editors were unaware of the practices that such journals conducted. Pseudo-journals cause problems that are limited and regional in origin. We believe that the volumes of publishing in these journals will cease in terms of growth in the near future. Open access publishing has rapidly gained momentum due to the action of policymakers and funders. However, this mainly creates opportunities for researchers from countries where predatory publishing is accessible; particularly because journal policies waive article processing charges for these authors. Probable or potential predatory open-access journals and publishers are broadly present in anesthesiology and other fields. Our analysis found that researchers lack a detailed review of journals' characteristics in the COPE, DOAJ, and ICMJE registries. Our literature review provides an accurate view of the state of open access publishing today. Simply put, the world of scholarly publishing is far from black and white. Lists of ‘predatory’ publishers and journals are no longer reliable, and all stakeholders have improved our review. Only new and relevant material, published within the last five years, was used. However, we recognize the limitations of our analysis. We did not adopt PRISMA guidelines; however, the extensive pilot study followed a methodology of literature search and review. Moreover, a qualitative analysis was not led, although the addition of said analysis would not have improved our review. Only new and relevant material, published within the last five years, was used. As predatory/pseudo publishing has garnered attention in the near future, Potential authors necessitate a thorough check of the journal's reported location, policies of scientific misconduct, and English language form before submitting their manuscripts. Our literature review suggests that there is a lack of one single definition for predatory journals. We believe that it is essential for potential authors and young researchers to have clear guidelines and make demarcations of potential journals that seem dubious. Moreover, the authors’ selection of publishers should be modified to control the risks of tainting open access publishing with fraudulent journals. Editors ought to embrace full transparency of the journal's structure and policies. This will promote the quality of the journal and demarcate legitimate journals from predatory ones. Journal repositories and indexing databases must be made available publically. Clear Criteria will ensure that journals do not misuse the open-access publishing system for financial gains. Finally, the academic and research community ought to revise their criteria and recognize high quality and author journals as opposed to 'predatory' journals.

LIMITATIONS
Our literature analysis provides an accurate view of the current situation regarding predatory journals and their widespread presence in the open access system. However, we recognize the limitations of our analysis. We did not adopt PRISMA guidelines; however, the extensive pilot study followed a methodology of literature search and review. Moreover, a qualitative analysis was not led, although the addition of said analysis would not have improved our review. Only new and relevant material, published within the last five years, was used. As predatory/pseudo publishing has garnered attention in the near future, these sources represent current experiences. Although our search included articles indexed in PubMed, only relevant reports in English were selected.

CONCLUSIONS
Our literature review provides an accurate view of the state of open access publishing today. Simply put, the world of scholarly publishing is far from black and white. Lists of ‘predatory’ publishers and journals are no longer
reliable, and all stakeholders are responsible for transparency and integrity in the publication process. Our review also found that the promotion of Index Copernicus and the associated Index Copernicus value was standard in e-mails sent by publishers. Our literature review has highlighted that predatory journal authorship is not limited to early-career researchers only.

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CONFLICT OF INTEREST
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ABSTRACT

Fungi are eukaryotes with many functions. Earlier, fungi were classified in the plant kingdom but were later classified as a separate kingdom due to their unique cell walls. Fungi are heterotrophs like animals and are more closely related to animals. The perception of fungi is inconspicuous due to their small sizes and their ability to grow symbiotically in plants, animals, other fungi, and parasites. Fungi are used for their nutrition, fermentation potential, and bactericidal potential. However, fungi are also toxic due to certain bioactive compounds known as mycotoxins. Candida and Aspergillus are invasive species that contribute to a high percentage of mycoses in oncological and haematological patients. The mortality rate due to invasive aspergillosis and candidiasis is high, at 4% and 2%, respectively. In the agriculture sector, a significant contributor to damage to crops globally is the invasion of filamentous fungi. Fungi invasion destroys over 125 million tons of wheat, rice, soybeans, potatoes, and maize annually. If prevented, 600 million people may be fed. Therefore, it is vital to consider the dual role of fungi, therapeutic, and pathogenic.

Keywords: Filamentous fungi, β- lactam antibiotics, Mycotoxins, Gene transfer, Secondary metabolites.

INTRODUCTION

Fungus, plural fungi, are eukaryotes and consist of yeasts, rusts, smuts, mildews, molds, and mushrooms. Earlier, fungi were classified in the plant kingdom. However, the organisms were then isolated as a separate kingdom due to their mode of nutritional intake, i.e., vegetative growth and lack of chlorophyll and unique structural and physical characteristics. Fungi are of significant environmental and medical importance. While some can live freely in the soil or water, others live symbiotically with plants and animals. The mode of nutrition for fungi is digestion of organic matter externally and absorption using their mycelia. The growth of fungi is evident by their tips of filaments known as hyphae. Fungi are friends and foes simultaneously. The mortality rate due to invasive aspergillosis and candidiasis is high, at 4% and 2%, respectively. On the one hand, the filamentous fungus *Aspergillus terreus* is pathogenic as it causes invasive aspergillosis by producing numerous mycotoxins. These mycotoxins are a significant cause of spoilage of food such as nuts and cereals in the subtropical and tropical regions. On the other hand, *A. terreus* also serves as a source of secondary metabolites and organic acids, and due to which it is used enormously by the pharmaceutical and biotechnological industries. Lovastatin is a polyketide derivative of *A. terreus*, which acts as a cholesterol-reducing agent. In the agriculture sector, a significant contributor to damage to crops globally is the invasion of filamentous fungi. Fungi invasion destroys over 125 million tons of wheat, rice, soybeans, potatoes, and maize annually. If prevented, 600 million people may be fed.

Additionally, it has been successfully utilized for the treatment of coronary artery disease, one of the major causes of middle-aged deaths in the Western world. On the other hand, *A. terreus* also serves as a source of secondary metabolites and organic acids, and due to which it is used enormously by the pharmaceutical and biotechnological industries. Lovastatin is a polyketide derivative of *A. terreus*, which acts as a cholesterol-reducing agent. In the agriculture sector, a significant contributor to damage to crops globally is the invasion of filamentous fungi. Fungi invasion destroys over 125 million tons of wheat, rice, soybeans, potatoes, and maize annually. If prevented, 600 million people may be fed. Therefore, it is vital to consider the dual role of fungi, therapeutic, and pathogenic.

**Keywords:** Filamentous fungi, β- lactam antibiotics, Mycotoxins, Gene transfer, Secondary metabolites.
leads to ergotism, which has caused deaths in the middle Ages in Europe, exceeding 40,000. Therapeutic and pathogenic properties of ergot alkaloids are known for centuries, and currently, these alkaloids are employed in the manufacture of synthetic drugs for the treatment of migraines. Aspergillus gossypii is one of the common fungi which cause pathogenesis in plants such as stigmostomycosis in citrus fruits and cotton. Ashbya gossypii has been recorded as one of the primary producers of riboflavin, commonly known as vitamin B2. Riboflavin is an essential vitamin that is not synthesized by humans; thus, it has to be provided by dietary supplements and food. Currently, Ashbya gossypii is utilized in the industry as a riboflavin producer.

**FILAMENTOUS FUNGI AS PRODUCERS OF SECONDARY METABOLITES.**

Filamentous fungi possess extensive metabolism. Therefore, they serve as crucial producers of significant bioactive compounds. Secondary metabolites produced by fungi have contributed significantly to the food and crop industry. Secondary metabolites do not impact intermediary metabolism, and these are not important for the survival of fungi. Secondary metabolites are found to provide melanin, and they exhibit significant potency as anti-bacterial, antifungal, and insecticidal activity. The diversity of secondary metabolites is very high, and genes for biosynthesis are organized in clusters that are controlled by chromatin remodelling and transcriptional regulation. They have been organized into different classes of compounds, namely fatty acid derivatives, polyketides, non-ribosomal peptides, alkaloids, and terpenes. In December 1971, Cyclosporine A was discovered in a soil sample and manifested with immunosuppressive activity in Norway. Such “silent” clusters of the gene have been activated by the over expression of global regulators or cluster-encoded, epigenetic modifications as well as co-cultivation experiments. Co-cultivation of Aspergillus nidulans triggers the synthesis of orsellinic acid inducing expression of transcriptional regulator AfoA of Aspergillus nidulans that further trigger the synthesis of asperfuraneone, a polyketide. These unique methodologies may lead to the identification and engineering of new secondary metabolites, which may prove to be beneficial for pharmaceutical and biotechnological industries.

**HORIZONTAL GENE TRANSFER IN FUNGI.**

Horizontal gene transfer (HGT) has been observed in prokaryotes and was not given importance in eukaryotes. However, recent evidence indicates the importance of HGT in unicellular organisms. In fungi, various mechanisms have been identified that facilitate HGT owing to the transfer of foreign genetic material into recipient cells to allow expression of functional protein via host genomes. HGT supports selective advantage to the hosts in order to prevent pseudogenization. HGT and lateral gene transfer (LGT) across different species is a well-known phenomenon for bacterial evolution. However, recently it has been discovered to play an essential role in fungal evolution as well. Marcet-Houben et al. reviewed sixty fully sequenced prokaryotic-derived genomes utilizing strict phylogenomic criteria. The findings revealed that has revealed that 713 bacterial genes were transferred to the genetic material of fungi, indicating the importance of HGT in fungal evolution. Genes transferred by bacteria to the fungal genome requires adaptation into the new eukaryotic host system. The expression of secondary biosynthesis genes in eukaryotes is regulated through various regulators. Such eukaryotic regulators are VeA and LaeA, both of which are components of a multi-subunit based protein complex, and it controls gene expression. The protein complex also includes genes that encode for β-lactams involved in the secondary metabolite synthesis of fungi.

**BETA-LACTAM ANTIBIOTICS.**

Fungi have an essential role in the therapeutic approaches used in modern medicine. Many species contribute to antibiotics due to their metabolites. Currently, β-lactam antimicrobial drugs are widely used as anti-bacterial agents globally and are produced using small peptides of fungi. Penicillin G is naturally occurring penicillin; however, synthetic penicillins have broader spectrums of biological activity. When compared to penicillins, Cephalosporin C has been reported to have a broader spectrum of anti-bacterial activity. Penicillium chrysogenum can biosynthesize both penicillins and cephalosporins. The corresponding genes responsible for the biosynthesis are a constituent of an early cluster of genes that includes pcbC and pcBA as well as a late cluster of genes which comprises of cefEF and cefG genes. Different genes of Ac. chrysogenum has been transferred to Penicillium chrysogenum via genetic engineering as an alternate biosynthetic producer of Cephalosporin C. Two reactions in the biosynthesis of β-lactam antibiotics are catalyzed by isopenicillin: 1) N synthase and 2) non-ribosomal peptide synthetase, leading to the production of an intermediate compound, isopenicillin N, which is integral to the class of penicillins.
The antibiotic potential of Cephalosporin C has been improved via semisynthetic derivatives. Pharmaceutical industries have reported the development of these cephalosporins as effective against methicillin-resistant Staphylococcus aureus (MRSA), the burden of which has increased in hospital-acquired infections. Recently, the cephalosporin cefotiboprole has been identified as the pioneer of broad-spectrum cephalosporin for its potential against MRSA\[23\]. Another cephalosporin derivative, ceftaroline, has also been marketed for use against resistant infections. This indicates that the derivatives of cephalosporins are vital antibiotics for future applications in medicine.

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CONFLICT OF INTEREST

The Authors declared no conflicts of interest.

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A Rare Case of Foreign Body Ingestion, Mimicking as Mesenteric Cyst. "Case Report".

Case Report
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ABSTRACT

Background: Foreign body ingestion by children is a commonly encountered problem and accounts for a significant emergency visits among pediatric population. Although these ingested foreign bodies pass spontaneously and uneventfully, a subset of such bodies may become trapped in the digestive tract, eventually leading to significant injury. Most of these bodies are radio-opaque and detectable radiologically, but some radio-lucent may become a diagnostic dilemma and subtle management issue.

Case Report: We report a case of a one-year girl who presented after accidental ingestion of foreign body with signs and symptoms of acute intestinal obstruction. Initially we were unable to diagnose the cause, but later the radiological investigation suspected a mesenteric cyst. After failure to respond to conservative measures she underwent exploratory laparotomy, and a jelly ball was removed from the gut. The patient had uneventful post-operative recovery and was kept on follow-up for three months without any complication.

Conclusion: These patients do not respond to conservative measures and need surgery on an emergency basis. It is likely that if left untreated may have caused Intestinal perforation and irreversible shock. Radiolucent foreign bodies are difficult to diagnose and need high level of suspicion. Need of the hour is to educate the parents to be extra vigilant as “prevention is better than cure”.

Keywords: Foreign body ingestion, Intestinal Obstruction, Mesenteric Cyst, Crystal jelly ball.

INTRODUCTION

Foreign body ingestion is a common problem in children less than three years and can lead to severe consequences if not diagnosed and managed timely.\[^{1,2}\] Un-witnessed foreign body ingestion poses a diagnostic challenge as parents do not report to the hospital till children are critically ill. Unlike adults, the children may not be able to articulate proper history and physical findings may also be unremarkable.\[^{3,4}\] Children may present with signs and symptoms of acute intestinal obstruction. Un-Witnessed foreign body ingestion may lead to delay in reporting and treatment until children are critical. Conventional investigations may not be able to pick their real cause. Hence they may require CT scans. Since all hospitals do not have access to CT scans; thus, it all comes down to plain abdominal radiographs and ultrasound to diagnose these children, especially in periphery hospitals. The most common presentation of foreign body ingestion is the signs and symptoms of acute intestinal obstruction. Most cases can be diagnosed by X-Ray erect abdomen as the majority of foreign bodies are radiopaque, consisting of objects like magnets, buttons, batteries, plastic toys, pencils and coins. On the contrary, radiolucent objects may be challenging to diagnose on traditional X rays hence require an additional ultrasound and/or CT scans. Despite advancements in technology and imaging, detecting foreign bodies is still a diagnostic challenge in the emergency departments. The ultrasound is quite sensitive but is operator dependent while CT Scan may be unavailable in some clinical settings.\[^{5,6}\] Herein, we report a case of a one year girl who presented to the emergency department of our hospital with signs and symptoms of acute intestinal obstruction due to ingestion of crystal jelly ball mimicking as a mesenteric cyst on...
ultrasound.

CASE REPORT

A one-year female child presented to the emergency department of Children's Hospital and the Institute of Child Health, Lahore, with complaints of abdominal distension, vomiting, and constipation for last eight days. On admission, her vitals were within the normal range at her age while the physical exam divulged a distended, tender abdomen with absent bowel sounds. Digital rectal examination revealed a rectum full of feculent material.

Her routine lab workup was unremarkable. On plain X-ray abdomen erect, there were dilated gut loops with multiple air-fluid levels. Ultrasonography of abdomen showed dilated, content filled gut loops and a near-total absence of peristaltic movements in Hemi abdomen and pelvis. A provisional diagnosis of subacute intestinal obstruction was made, and it was decided to manage the patient conservatively. Nasogastric tube aspiration was initiated, which yielded almost 200 ml bile stained aspirate. The patient had saline enema at night, which was repeated in the morning with no faecal movement. Despite these conservative measures, the patient's symptoms did not improve. Repeat ultrasound on first post-admission day by a senior consultant, showed a well-defined cystic area along with large bowel measuring 2.7 cm x 2.5 cm x 2.6 cm with thin walls. Clinicians believed that it was a case of intestinal mesenteric cyst responsible for her obstructive symptoms.

Even after twenty-four hours of conservative management, the patient showed no signs of recovery, and rather her condition worsened, hence it was decided to perform an exploratory laparotomy.

The abdomen was opened by a standard midline laparotomy incision. An intraluminal foreign body was noted at approximately ten centimetres from the ileocecal junction, which was soft in consistency and approximately the same dimensions as described on ultrasound [Figures 2,3]. Since it was not adherent to the gut, a firm green round jelly ball was delivered by enterotomy quietly easily and gut primarily repaired by vicryl 3/0 sutures. No other finding was identified on detail abdominal survey and abdomen was closed with Vicryl 1 continuous running sutures. The patient was kept nil per orally and received antibiotics for forty-eight hours along with analgesics. Postoperatively she did very well and had an uneventful recovery with the return of bowel movements the next day. The patient had no complications in the three-month follow-up period in the outpatient clinic.
DISCUSSION
Due to their natural curiosity, children have a tendency to place things in their oral cavities. This is all a part of normal developmental behaviour. They tend to ingest these foreign bodies, but luckily most of them pass spontaneously. In rare instances, when they fail to pass, they can lead to serious life-threatening complications like obstruction, stricture, or even perforation of the bowel. This is a major concern, and it has been reported that pediatric population accounts for up to eighty per cent cases of such foreign body ingestions. Since ingested foreign bodies can cause severe and life-threatening complications hence such ingestions in the pediatric population to require early diagnostic workup and prompt management. The main signs and symptoms occur due to partial or complete obstruction of the gut, which causes dilatation of a proximal portion of the bowel loops. The patient is usually constipated, has electrolyte imbalance due to continuous vomiting and is often dehydrated. Aggressive resuscitation is needed to correct electrolyte imbalance and prevent other complications like shock and multiple organ failure.

X-ray is the primary diagnostic tool that might help in the identification and localization of the ingested foreign body. Foreign bodies may be visible on plain X-rays but with a limitation that it can pick only radio-opaque materials like sharp objects, cell batteries, currency coins, magnets, bone particles and metallic objects. Whereas radiolucent objects like organic materials are challenging to visualize [Figure 4]. Moreover, during radiography, patients are exposed to ionizing radiations which have documented side effects over time. Multiple air-fluid levels in the obstructed gut is a piece of secondary evidence for obstruction and/or foreign body. The ultrasonography is less invasive and a better diagnostic tool to diagnose such abdominal pathologies as it uses sound waves instead of ionizing radiation. In the expert hand, it has high sensitivity, reliability and specificity and that too without radiation hazards. These bodies cast a dense hyper-echoic image, but the image becomes hypo-echoic if haemorrhage or hematoma formation in surrounding tissue is present. A mesenteric cyst is a rare entity of proliferated lymphatic cells in mesentery that has no communications with other lymphatic systems. The cyst may or may not involve retro-peritoneum. The most common location is ileal mesentery, but it can be found anywhere from the duodenum to the rectum. It is a benign pathology in the majority of cases, and the bulk of the mesenteric cysts are found incidentally. There are multiple classification systems, but widely accepted is by Beahrs and colleagues. According to this etiologic based classification, mesenteric cysts can be divided into embryonic, developmental, traumatic, neoplastic and infective cysts. The mesenteric cysts are found in 40% of patients en-passant with or without symptoms. Classically mesenteric cyst presents with recurrent episodes of partial intestinal obstruction with or without vomiting. Examination reveals a painless, palpable, fluctuant and freely moving abdominal swelling. In children, the most common presentation of mesenteric cyst is as an acute small intestinal obstruction which may or may not be associated with volvulus. On physical examination, a mass may or may not be palpable. The X-ray can be helpful, but ultrasonography is an investigation of choice. Both conditions have quiet similar signs and symptoms, and both require laparotomy. The foreign body is removed after enterotomy while the cyst is enucleated with or without resection anastomosis.

CONCLUSION
The final diagnosis of foreign body ingestion is made on the basis of history, examination and radiology. Radiolucent foreign bodies are highly perplexing to diagnose but may be led on the basis of an ultrasound of the abdomen if radiographic tests are negative. Perilous effects of misdiagnosis or delay may otherwise lead to life-threatening complications. Neglected children are critical, usually dehydrated and ought to be optimized for surgery. Overall, intestinal perforation and shock are the gravest complications of such ingestions. Thus the need of the hour is to educate the parents that they should be extremely vigilant with children as “prevention is better than cure”.

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Case Report
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ABSTRACT

Background: An ectopic pregnancy (EP) is a type of conception in which, the fertilized egg is lodged outside the uterine cavity. Twin ectopic pregnancies are a rarity, and the reported cases of twin tubal pregnancies are a handful to date.

Case Report: We report a case of a 35 years old patient who presented to the emergency with the complaint of lower abdominal pain and intermittent vaginal discharge. She was diagnosed with twin tubal alive gestation, underwent exploratory laparotomy and right salpingectomy.

Conclusion: Ectopic pregnancy can occur even in the absence of known risk factors. Its incidence is on the rise. It is a leading cause of first-trimester maternal deaths and can be easily diagnosed with Beta HCG levels and transvaginal ultrasound.

Keywords: Tubal Gestation, Tubal Twin Gestation, Ectopic pregnancy, first trimester mortality, maternal mortality, Transvaginal Ultrasound, tubal surgery.

INTRODUCTION

An ectopic pregnancy (EP) occurs when a fertilized egg lodges itself at sites other than the endometrial lining of the uterus. Salpinges are the most common sites of ectopic pregnancy. The last three decades have seen a colossal amplification in the global incidence of EP. The reported incidence of ectopic gestation is 1:112 to 1:1308 in Pakistan.[1,2] EP used to be a chief causative factor of first-trimester maternal mortality in the past, but recent advances in medical imaging, surgical techniques, improved emergency care and availability of minimally invasive laparoscopic surgery have led to earlier detection & prompt management of EP thus overall reducing the maternal mortality from 3.5 to 2.6 per 10'000 ectopic pregnancies according to one study.[3,4]

Ectopic gestation is a potentially life-threatening problem, responsible for 10% first-trimester maternal mortality.[5] Much has been reported in the literature about ruptured and unruptured single ectopic gestation. It is noteworthy that the incidence of live twin ectopic gestation in natural conception is still unheard of and accounts for only 1 in 200 ectopic pregnancies.[6] The pioneer case report of alive tubal twin EP was published in 1891.[7] There are hundreds of cases, reporting single ectopic gestation, all of which were diagnosed pre-operatively, with the aid of routine and trans-vaginal ultrasonography, but there are only a handful of case reports of alive unilateral tubal twin conceptions with normal heartbeats on fetal poles on presentation.[8] Tubal-twin EP occurring unilaterally is a rare occurrence in itself, but the rarest is the bilateral tubal pregnancy.[9]

A total of 242 case reports of tubal-twin gestations have been published in the literature, with 17% (n=42) reported in the last ten years. Unilateral alive tubal twin gestation is a rarity. To date, only 12 cases of live twin tubal gestations have been reported.[8,9]

We present a unique case of right tubal-twin ectopic gestation in a natural conception with normal heartbeats exhibited on both the gestational sacs. This case presented to the emergency of the Gynaecology unit on call. It was diagnosed as a case of viable tubal-twin ectopic pregnancy based on history, examination, transabdominal, and transvaginal (TVS) Doppler ultrasonography with color flow imaging and M mode.

CASE REPORT
Gravida 8, para 3, 36 years old female presented to the Obstetrics & Gynaecology emergency of Bolan Medical Complex Hospital, Quetta Pakistan on June 1st, 2018.
with history of amenorrhoea for ten weeks, frequent pains in lower abdomen and vaginal spotting for the last 12 and 6 days respectively. She was vitally stable, a-febrile. Examination of the abdomen revealed grade 3 tenderness in the pelvic area with guarding all over the abdomen. Per vaginal examination was done on which pelvic floor tenderness was noted, cervical os was not open, and there was slight spotting. The urine was sent for the pregnancy test, which came back positive. Her complete blood count revealed anaemia (Hb=9g%). The other haematological and routine chemistry parameters were within the normal range. She screened negative for viral hepatitis, and her blood group was A-positive. Her past obstetrical history included seven normal pregnancies, all delivered through spontaneous vaginal delivery. There was no significant history of abortion in the past. There was no significant history of sexually transmitted diseases, abdomino-pelvic surgeries, intrauterine contraceptive device placement, or fertility treatment. The history of systemic disease was negative. Her last pregnancy was two years ago. The patient was immediately sent to diagnostic radiology on call for emergent transvaginal ultrasound (TVS). A transvaginal Doppler ultrasound with the colour flow was performed using standard frequency endocavity transducer (GE Healthcare, USA). Realtime greyscale scan showed uterus to be in an antverted, anteflexed position, which was moderately bulky, with endometrial thickness of 12mm. The uterine wall had a higher echogenic signal. No gestational sac was evident with-in the uterus. The right ovary had a normal size (2.7 × 0.7 × 1.8 cm) and volume (3.9cc). The right adnexa showed abnormal echo patterns, which on a detailed scan revealed to be two separate embryonic poles within one gestational sac. There was no intertwin membrane between the two fetuses. Separate heartbeats were recorded in both the embryonic poles within a single gestational sac, which was confirmed on colour Doppler, M Mode, and grey scale TVS. The diameter of the gestational sac was 23 mm, which approximated the gestational age of 10 weeks. The crown-rump length of the first twin was 3.3 cm with a heart rate of 104 per minute, and the second twin was 3.2 cm with a heart rate of 112 per minute, which augmented the gestational age of 10 weeks. The left ovary appeared normal. At the time of the scan, the abdomen was devoid of free fluids and blood. Based on history, examination & investigations, a diagnosis of alive twin ectopic (monochorionic, monoamniotic) pregnancy in the right fallopian tube with an approximate gestational age of 10 weeks, was made. The on-call consultant gynaecologist counselled the patient about her situation; An informed consent for laparotomy and salpingectomy was obtained. While the patient was being shifted to operation theatre from emergency, she collapsed, and her blood pressure dropped to 60/ not recordable mmHg. Hemacryl infusion was started, and the patient was put under general anaesthesia. Emergency laparotomy was done under strict aseptic measures. The abdomen was opened through a lower midline incision, tissues dissected & gently retracted. There were about 2 litres of blood in the abdomen, and bleed was coming from ruptured right ampullary ectopic
pregnancy [Figures 1 & 2]. The hemostasis was secured, the right salpingectomy was done, and the wound closure was done in layers with Vicryl 3/0, Vicryl 2/0, and Prolene 1 sutures. Postoperative recovery was unremarkable, and she was discharged on the third postoperative day. She was kept on regular followup through the outpatient department for six months after surgery and remained well.

DISCUSSION

Ectopic gestation accounts for 2% of pregnancies and 16% of all the pregnancies presenting to the emergency on-call units. Ectopic gestation is a diagnostic challenge, and delay in diagnosis may have serious implications for females of childbearing age. The patient is usually missed due to overlap of the symptoms with miscarriage, such as amenorrhoea, pain, and vaginal bleeding. This condition is one of the preeminent causes of maternal deaths in the 1st trimester and is responsible for 4-10% of entire pregnancy linked mortalities. The patient may lose a fallopian tube and even ovary, thus compromising her future fertility. The incidence of ectopic pregnancies has been increasing for the last few decades. Many risk factors have been identified for EP; Advanced maternal age, positive history of pelvic inflammatory disease, ectopic gestation, surgery of fallopian tubes, pregnancy after tubal ligation, multiple sexual partners, intra-uterine contraceptive devices, smoking, medical treatment of infertility assisted reproductive technology and congenital uterine anomalies increase the risk of ectopic gestation up to 54%. It is interesting to note that there was no known risk factor in 3 out of 12 reports of unilateral twin tubal gestations with fetal cardiac activity, reported between 1994 and 2015. Our patient did not have any risk factors that predisposed her to the development of EP. In the United States, the incidence of ectopic pregnancy has risen four-fold since 1970 (from 0.5% of all pregnancies to 2%).

As reported in the literature, 97% of EP occurs in fallopian tubes, including; Ampullary EP accounts for 55% of the cases whereas isthmic EP, and fimbrial EP account for 25% and 17% respectively. EP has also been reported in the ovary, cervix, abdominal cavity, and extra-abdominal sites in less than 5% of the cases. Our patient had right adnexa tubal twin EP, in the ampulla of right salpinx. One of the most sensitive markers of pregnancy is the serum β-hCG level. The serum β-hCG level doubles every 48 - 72 hours in normal gestation. Clinicians should suspect an EP when serum β-hCG level is 1500 IU/L, or higher and TVS shows an empty uterine cavity. Single EP has a lower β-hCG level as compared to normal intrauterine gestations; however, tubal twin EPs may mimic normal gestation as they have higher levels of beta-hCG. TVS has transformed the trends in diagnosis of early conception and other obstetrical-gynecological conditions and has become the clinician’s first choice for evaluating first-trimester gestation and its complications. It has a better resolution for pelvic organs as compared to transabdominal ultrasound. TVS allows excellent visualization of the female reproductive system and easily detects an ectopic mass with or without an embryo and provides elaborate information about adjacent structures. EP is becoming common, but tubal twin EP is a very rare condition, and among published reports of tubal twin EPs, to-date, only 8 cases of alive twin tubal EP have been reported. In our patient, two separated heartbeats were recorded in both the embryos while performing TVS on M mode and colour doppler with no free fluid or blood in the abdominal cavity. While she was being shifted to the operation theatre, she went into hypovolemic shock, and ruptured tubal twin ectopic pregnancy was found per operatively.

Twin gestation is more prevalent among those females who have a positive past and family history of twin pregnancies. In the case of our patient, past, and family histories were negative for twin gestations. The majority (95%) of the unilateral twin tubal EPs are monochorionic and monoamniotic. The TVS of our patient reported the same possibility. For the unilateral tubal twin pregnancies, surgical intervention is superior to medical management with methotrexate. There have been less than ten reports of tubal twin EP (3 unilateral, 1 bilateral) treated with methotrexate. However, Arikan et al. suggested that the nonsurgical treatment may be favoured in tubal twin EPs in case of stable maternal vital signs and negative fetal cardiac activities. EP related morbidity and mortality are on a gradual decline, because of improved diagnostic methods and superior management protocols. Twin tubal pregnancies are at a higher risk of developing complications as compared to single tubal pregnancies because two gestational sacs would double the volume and increase the chances of rupture.

CONCLUSION

Ectopic pregnancy can occur even in the absence of known risk factors. Its incidence is on the rise in the last few decades. A few of patients presenting with ectopic gestation can be given a trial of conservative management, and when conservative management fails, surgery should be considered. It is a leading cause of first-trimester maternal deaths and can be easily
diagnosed with Beta HCG levels and transvaginal ultrasound.

REFERENCES


CONFLICT OF INTEREST

The Authors declared no conflicts of interest.

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Hyperparathyroidism presenting as acute pancreatitis: Case Report of mortality.

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ABSTRACT
Background: Acute pancreatitis may be caused by a myriad of factors, hypercalcemia secondary to hyperparathyroidism, albeit is a rare cause of acute pancreatitis but not unheard of. If the underlying cause of acute pancreatitis is diagnosed, goal-directed management becomes possible, reducing morbidity and mortality. Though acute pancreatitis on its own presents significant mortality, hypercalcemia, especially detected late, augments this.

Case Report: We report a case of acute pancreatitis secondary to hyperparathyroidism. The patient was undiagnosed at the time of admission and presented with non-specific gastrointestinal symptoms. After admission, he developed multi-organ dysfunction and was managed by intensive care. The patient died within hours of admission despite our best efforts. Diagnosis of acute pancreatitis secondary to hyperparathyroidism was suspected on the basis of hypercalcemia, confirmed by a posthumous result of a raised parathyroid hormone assay.

Conclusion: When a patient is admitted in the emergency department with a suspicion of acute pancreatitis, serum calcium levels and its reporting should be expedited to as early as possible. Hypercalcemia in the setting of acute pancreatitis merits a multidisciplinary approach and expedited parathyroid hormone levels sent with a high suspicion of long-standing untreated hyperparathyroidism. Hyperparathyroidism is a cause of silent hypercalcemia and can be lethal if not diagnosed in time.

Keywords: Pancreatitis, hyperparathyroidism, hypercalcemia, management complications, mortality.

INTRODUCTION
Acute pancreatitis has an incidence ranging from 4.5-79.8 per 100,000 per year worldwide.¹ It can have serious complications in up to 20-30% of presentations with a mortality figure of up to 1.62 per 100,000 cases worldwide.² It shares a decent share of annual admissions in the general surgery and gastroenterology services. Causes include alcohol, gallstone disease, abdominal surgery or blunt trauma, drug-induced, hypertriglyceridemia, infection, cancer, post-ERCP and hypercalcemia amongst others. About half the cases of all acute pancreatitis are caused by gallstones, followed by alcohol, usually binge drinking.³ Acute pancreatitis can be managed without any long term complications with immediate hospitalization and admission and appropriate care based on severity, whether in the ward or in the intensive care unit.⁴,⁵,⁶ Hyperparathyroidism leading to hypercalcemia and secondary pancreatitis is a rare disease entity, with approximately 2.5% of patients presenting with pancreatitis being diagnosed with hyperparathyroidism.

However, patients with hyperparathyroidism may have a pancreatic disease with an incidence of about 1.5%-13%. The data available is variable, and the question about disease severity remains dependent on which was discovered first the hypercalcemia or pancreatitis.⁷ Hypercalcemia though a rare finding in its own, could be caused by various etiologies, hyperparathyroidism, multiple myeloma, malignancy and sarcoidosis being some of the common causes of long-standing and possibly silent hypercalcemia.⁸ Hypercalcemia may present as chronic pancreatitis or acute pancreatitis, and in cases with acute pancreatitis, the disease severity is likely to be associated with greater
morbidity and mortality as the long-standing hypercalcemia is more likely to have already affected other organ systems, and the usual treatment for pancreatitis might fall short. On the basis of severity, hypercalcemia is classified into mild (10-12 mg/dl), moderate (12-14mg/dl) and severe (>14 mg/dl).\(^9\)

We present an unusual presentation of hyperparathyroidism presenting as acute pancreatitis culminating in multiple organ failure and death of the patient.

**CASE REPORT**

We present the case of a 42-year-old hypertensive male, who presented in the emergency room during the night with complaints of mild epigastric pain for five days and three episodes of vomiting over the last 24 hours. His past history was unremarkable. He was vitally stable, with a blood pressure of 130/80 mmHg, heart rate of 90 beats per minute, respiratory rate of 20 per minute and saturations of 98%. The examination was only remarkable for tenderness in the epigastric region, not associated with any guarding or rigidity and normal bowels sounds. He was started on pain medications, anti-emetics, ceftriaxone, a proton-pump inhibitor, and a ringer lactate infusion at 120ml/hr and admitted with a suspicion of pancreatitis. He was nil per mouth till further orders. Catheterisation was done to monitor urine output.Labs, including a complete blood count (CBC), liver function tests (LFTs), renal function tests (RFTs) and urine examination were sent at the time. A chest x-ray was done that did not show any active pulmonary pathology. An ultrasound was ordered to be carried out in the morning. His amylase returned in the morning, which was elevated at 514IU. However, on repeat examination 6 hours later, his epigastric tenderness was worsening in severity, and his chest now had a few scattered rhonchi. His saturations were dropping to 90% and oxygen at 2 litres per minute via nasal prongs was attached that promptly corrected the hypoxia, and 1-litre fluid rushed. His antibiotic was changed from ceftriaxone to imipenem. The patient was shifted to the ICU for intensive monitoring, and an ECG was done that showed poor R-wave progression, and a cardiology consult was requested. Troponin-I was done, which was negative. His labs from the night of admission showed normal LFTs, a raised alkaline phosphatase at 603U/L, RFTs were deranged, with a creatinine of 2.2mg/dL and urea of 56mg/dL, and a creatinine clearance that was compromised at 46.40, his medications were adjusted according to renal dosing. Coagulation profile was unremarkable, and his CBC was only remarkable for a platelet count of 120,000 u/L and a raised WBC count of 14.8 and neutrophilia. LDH was 720U/L, and Glucose random was 96mg/dL. Ranson’s score was 1/5.

His serum calcium was sent that returned later in the afternoon, and an ABG was done that was normal. An ultrasound done in the morning after an evening of admission showed a left renal calculus, mild abdominopelvic ascites and echogenic debris in the gallbladder.

At this point, our impression was that he had gallstone pancreatitis with possible underlying acute on chronic kidney injury. He was conscious and alert till late afternoon. He started becoming slightly confused later in the evening; however, GCS was 15/15. Calcium returned at 3:00 P.M. and was 14.8 mg/dL with a normal albumin level. A parathyroid hormone assay was sent to make a diagnosis with multiple myeloma in the differentials. Malignancy and sarcoidosis were lower on the list due to a normal chest x-ray. The patient was in hypercalcemic crisis, and 2 l normal saline was rushed, and forced diuresis was done with 100 mg of furosemide. His urine output in the last 6 hours was 200 ml. Despite the forced diuresis his urine output in the antecedent 6 hours only increased by 250 ml.

Repeat labs at 10:00 P.M. showed calcium of 16.6 mg/dL, LFTs were now deranged with elevated bilirubin, ALT and AST. His creatinine was now 3.5mg/dL and urea 88mg/dL. Serum electrolytes besides calcium were normal throughout.

On examination, the patient was not maintaining oxygen saturations by face mask, was progressively becoming tachycardic, and his blood pressure which was previously maintained at 130-140/90-100 had shot up to 160/80. He was becoming confused and agitated, and his GCS had started to drop. He was intubated at 12:00 A.M., within 24 hours of his admission and kept on SIMV mode with an FIO\(_2\) of 40%; Propofol and Atrelax infusions were used for sedation and paralysis.

His chest had increased rhonchi and abdomen was slightly distended. A diagnosis of multi-organ dysfunction was made, and forced diuresis was continued. A repeat ABG before intubation showed metabolic acidosis with partial respiratory compensation. Despite all efforts, early in the morning, he started to decompensate, was not maintaining his blood pressures and inotropic support was started. His urine output overnight while on mechanical ventilation, had only increased by 150 ml. Nephrology was consulted for urgent dialysis; however, the patient, even on maximum ventilatory & inotropic supports, couldn’t maintain his saturations and pressures.
and went into cardiac arrest. Despite extensive cardiopulmonary resuscitation, he did not revive. His parathyroid hormone assay returned shortly after and was 1145.4 pg. / ml. (Normal reference range: 15-68.3 pg. / ml).

DISCUSSION
Most of the serum calcium in the body is bound to albumin and rest is in ionized form. The level of serum calcium varies with the serum albumin level. The severity of the disease depends on the level of calcium. Most of the cases with mild hypercalcemia remain asymptomatic. The most frequent gastrointestinal manifestations of hypercalcemia are constipation, heartburn, nausea & loss of appetite. Vague abdominal pain is also a common gastrointestinal manifestation of hypercalcemia. Patients may have oliguria; a renal failure in such patients can be treated with correction of serum calcium levels and repeated hemodialysis. Chronic hypercalcemia can lead to the formation of renal stones, as was with our patient.

Neuropsychiatric manifestations of hypercalcemia manifest as alternation in cognition and can progress to stupor and coma if untreated. Abnormally high serum calcium cause cardiac arrhythmias, shortens the QT interval and predisposes the patient to sudden cardiac death in some instances.[12] The diagnosis of primary hyperparathyroidism is made on the basis of persistently elevated serum calcium levels in the presence of abnormally high parathyroid hormone levels.[13]

Hypercalcemic crisis is a medical emergency that could present with gastrointestinal, renal and neurological involvement presenting as a diagnostic challenge due to the differential list that is exhaustive; and has been attributed to high mortality, which was nearly universal up until the late 1950s and 60s. A recent study showed that their patients with hypercalcemia had a 33.3% mortality rate.[14] Other studies show variable mortality some as low as 14%. However, the cornerstone of management remains forced diuresis along with bisphosphonate therapy, that might decrease the days it takes to reach eucalcemia to 4-5 days with bisphosphonates versus an average of 14-15 days without bisphosphonates- and expedited parathyroidectomy. The mortality seems to be higher in those with confusion and oliguria developing.[13]

Unfortunately for our patient, we presume he had long-standing hypercalcemia that developed into a hypercalcemic crisis with pancreatitis; developing and augmenting rapidly in severity for the five days before he presented to us, and was already at the beginning of multi-organ dysfunction syndrome (MODS) when we received him, and the MODS accelerated exponentially in the 24 hours that he was in the ICU leading to his death. The disease is rapidly progressing, and there is the involvement of multiple systems. The mortality in pancreatitis secondary to hyperparathyroidism varies from 14-30%, and it becomes higher when the central nervous system and renal system is involved.[10-11,12]

In our patient, the delay of a few hours in sending serum calcium from presentation might have affected the outcome, but marginally. However, the role of expediting serum calcium levels in a patient with pancreatitis at presentation or a presumed diagnosis cannot be stressed upon more, knowing that in a rare and small percentage of patients pancreatitis could be secondary to hypercalcemia which would effectively change management goals largely.

Waiting for 48 hours to send serum calcium might be devastating, and from our experience, patients who present with suspicion of pancreatitis should have serum calcium sent at the time of workup for suspected pancreatitis to avoid unnecessary delays. Further, expediting parathyroid hormone levels in a patient with hypercalcemia and pancreatitis could lead to an urgent parathyroidectomy that might change the outcomes in such patients.

CONCLUSION
When a patient is admitted with a suspicion of acute pancreatitis, serum calcium should be sent on an emergent basis to rule out hypercalcemia as a cause. The management of pancreatitis depends on identifying the underlying cause; hyperparathyroidism should be investigated if hypercalcemia is found. Multidisciplinary teams should be involved in the treatment of such patients, and if merited, parathyroidectomy should be done to normalize calcium.

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CONFLICT OF INTEREST
The Authors declared no conflicts of interest.

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Awareness of Swine Flu Among the Medical Students of Shaikh Zayed Medical College Rahim Yar Khan.

Short Communication
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2. Assistant Professor, Pulmonology, Shaikh Zayed Medical College, Rahim Yar Khan, Pakistan.
3. Professor, Pulmonology, Shaikh Zayed Medical College, Rahim Yar Khan, Pakistan.

ABSTRACT
Background: Swine flu is a viral disease affecting upper as well as lower respiratory tracts. Due to limited resources in a developing country like Pakistan, medical students (the future medical practitioners) should be familiar with the basic knowledge, attitude and practice regarding this infectious disease so that they can help the community during its outbreaks.

Objective: To determine the basic knowledge and awareness of swine flu among the medical students of Shaikh Zayed Medical College, Rahim Yar Khan.

Methodology: This cross sectional observational study was carried out among the medical students of Shaikh Zayed Medical College, Rahim Yar Khan during April – May 2019 through a pre-designed pro-forma. A total of three hundred pro-forma were distributed in all classes of MBBS from first year to final year, among which 211 were returned, completely filled by the respondents. The responses of 45 students were disregarded as they hadn’t heard about swine flu. Remaining 166 questionnaires were included in the study and further analyzed for results. Data was then analyzed with SPSS version 22.0.

Results: Majority of respondents (n=151, 91%) correctly replied “virus as its causative agent”. Majority of respondents (n=138, 83.1%) responded “respiratory droplet as mode of transmission”. One hundred and sixty six questionnaires were further analyzed for results. Regarding treatment and prevention of swine flu, 123 (74.1%) replied it as treatable disease and a significant number of students (n=154, 92.8%) deemed it as preventable. About half (45.8%) of participants did not know about vaccine availability in Pakistan and only 42 (25.3%) students correctly answered that vaccination was the best measure to prevent swine flu.

Conclusion: Satisfactory results were seen about knowledge and awareness regarding epidemiology, etiology and mode of transmission. However, deficiencies were seen in awareness about vaccination and prevention of swine flu. So there is a need for health education awareness programs in medical and dental schools on regular basis.

Key words: Swine Flu, Knowledge, Awareness, Medical Students, Viral Infections.

INTRODUCTION
Swine flu is a communicable viral disease which causes potential upper and lower respiratory tract infections. It is caused by a sub-type of influenza A virus i.e. H1N1 and is generally a disease of pigs. This disease commonly occurs in people working in close contact with pigs and then spreads from person to person through respiratory droplets. During 1918 flu pandemic (Spanish flu), about 500 million people were infected and approximately 50-100 million died. Swine flu was found as human influenza in that pandemic.

Since then multiple outbreaks were seen in the 20th century but in April 2009, a significant event occurred when a new strain, the H1N1 virus came out, resulting in swine flu pandemic, as declared by World Health organization (WHO) in June 2009. Pakistan’s neighboring country, India is the 3rd largest country, suffering from swine flu where this disease affected more than 27000 people and was responsible for the deaths of 1700 people in 2015. Pakistan is among the countries that are susceptible to...
swine flu outbreaks. A large number of influenza outbreaks in various parts of the country including Sindh and Punjab have been reported. In 2014 swine flu outbreak, in Pakistan was noticed in areas of Dera Ghazi Khan, Taunsa and Multan, where 05 patients died due to this infection. After that, multiple cases have been reported every year with significant mortality and morbidity. Pakistan is remarkably susceptible to the swine flu pandemic due to certain reasons. Pakistan shares its borders crucially with China and India, both the countries having large number of natives, high pig densities and wide range of swine flu reported cases. Punjab and Sindh (which are the most affected areas of Pakistan) share borders with the most affected Indian provinces like Rajasthan, Punjab and Gujarat. Moreover, every year, a significant number of Pakistanis (495,270 in the year 2019) visit Saudia Arabia for pilgrimage purpose, can easily acquire swine influenza infection from carriers of different parts of the world. An increased mortality rate among the infectious diseases produces anxiety and distress among the community and request for specific tests and treatment rises even among the asymptomatic individuals. This puts an extra pressure over the government to manage the epidemic circumstances with restricted funds. As inhabitants of a developing country, we lack the basic diagnostic and technical facilities for the reporting and treatment of swine flu cases. Measures should be taken through different campaigns and awareness programs in the community regarding prevention of this disease. Medical and dental students are exposed to the affected people in the community as well as in clinical wards during their posting. As they are the future medical practitioners, they should be familiar with the basic knowledge of this infectious disease. That’s why we conducted this study among the medical students of Shaikh Zayed Medical College, Rahim Yar Khan to evaluate their basic understanding of swine flu as adherence to preventive planning can be increased with better awareness.

**METHODOLOGY**

This cross sectional observational study was carried out during April – May 2019 among the medical students of Shaikh Medical College, Rahim Yar Khan. The study was conducted after the approval of the institutional review board. The subjects were selected by non-probability convenience sampling. A pre-designed pro-forma consisting of multiple choice questions as well as close ended questions was distributed for data collection. A total of three hundred pro-forma were distributed in all classes of MBBS from first year to final year, among which 211 were returned, completely filled by the respondents. The responses of 45 students were disregarded as they hadn’t heard about swine flu. Remaining 166 questionnaires were included in the study and further analyzed for results. Incomplete, partially filled or the pro-forma with multiple marked or ambiguous answers were excluded from the study. The qualitative data was expressed in terms of percentages. Data was then analyzed with SPSS version 22.

**RESULTS**

Out of total 300 distributed questionnaires among the medical students, we received 211 filled pro-forma, among which 45 (21.3%) students had not heard about swine flu. Remaining 166 completely answered questionnaires were further analyzed for result. 151 (91%) students correctly replied virus as the causative agent and 138 (83.1%) responded respiratory droplet as mode of transmission(Table 1).Regarding treatment and prevention of swine flu, 123 (74.1%) replied it was treatable disease and a significant number of students (n=154, 92.8%) responded it was preventable. Only 42 (25.3%) respondents correctly answered that vaccination was the best measure to prevent swine flu. Only 71.7% students knew that there was a vaccine for swine flu (p-value 0.004) and about half of the participants (n=76, 45.8%) were not aware that vaccination was available in Pakistan (p-value 0.010) [Table 2].

**DISCUSSION**

Our study has several findings. Regarding epidemiology of swine flu, we observed that 78.7% of our participants knew about its occurrence, most (n=151, 91%) agreed that swine flu was caused by a virus while remaining claimed it as bacterial (n=08, 4.8%) and parasitic (n=07, 4.2%) infection. When asked about mode of transmission, 83.1% replied it through respiratory a droplet which is quite better than two studies, that documented that only 51% individuals had correct information about spread of this infection. Regarding awareness, treatment and prevention of swine flu, 123 (74.1%) students replied it was a treatable disease and only 102 (61.4%) students knew about treatment availability in Pakistan. It may be explained by tight and busy clinical schedule of medical students. Majority of them don’t take part in awareness programs and seminars arranged for common epidemics. In our study, knowledge and awareness about vaccination of swine flu was not satisfactory. Similarly, when asked about the best measure to prevent swine flu, only 42 (25.3%) students replied it as vaccination (p-value 0.011). These findings of awareness about vaccination should be
taken seriously as little knowledge about this important aspect of swine flu will badly affect the management of patients during outbreaks. Here lies the responsibility of medical educationists to engage medical & dental students in all types of seminars and awareness campaigns programs for common epidemics like swine flu, Dengue Fever and Congo Fever etc. because medical students are the future diagnosticians and they should be motivated and encouraged to take part in common community based health programs. It is also the responsibility of the medical education planners to include these common epidemics in the curriculum of medical students so that they may take interest right from the start of their medical career. As g

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variable</th>
<th>Results</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ever heard about swine flu</td>
<td>Yes 166 (78.7%)</td>
<td>211</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 45 (21.3%)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Causative agent</td>
<td>Virus 151 (91%)</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bacterial 08 (4.8%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parasitic 07 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Mode of Transmission</td>
<td>Respiratory Droplet 138 (83.1%)</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct Contact 19 (11.4%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blood Transfusion 09 (5.4%)</td>
<td></td>
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Table 1: Awareness about Epidemiology of Swine Flu

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variable</th>
<th>Results</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Is it a treatable disease?</td>
<td>Yes 123 (74.1%)</td>
<td>0.040</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 42 (25.3%)</td>
<td>01 (0.6%)</td>
</tr>
<tr>
<td>2.</td>
<td>Treatment availability in Pakistan?</td>
<td>Yes 102 (61.4%)</td>
<td>0.111</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 64 (38.6%)</td>
<td>00 (0%)</td>
</tr>
<tr>
<td>3.</td>
<td>Swine flu preventable or not?</td>
<td>Yes 154 (92.8%)</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 12 (7.2%)</td>
<td>00 (0%)</td>
</tr>
<tr>
<td>4.</td>
<td>Any vaccination for swine flu?</td>
<td>Yes 119 (71.7%)</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 47 (28.3%)</td>
<td>00 (0%)</td>
</tr>
<tr>
<td>5.</td>
<td>Vaccination available in Pakistan?</td>
<td>Yes 90 (54.2%)</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 76 (45.8%)</td>
<td>00 (0%)</td>
</tr>
<tr>
<td>6.</td>
<td>Life Threatening Complication?</td>
<td>Yes 146 (88%)</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No 20 (12%)</td>
<td>00 (0%)</td>
</tr>
<tr>
<td>7.</td>
<td>Best Measure to prevent swine flu?</td>
<td>Hand Washing 24 (14.5%)</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of face mask 68 (41%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Isolation of Patient 32 (19.3%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vaccination 42 (25.3%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Awareness about Treatment and prevention of Swine Flu
eneral public and community people are in touch with newspapers, television & social media and they have more knowledge and awareness about common epidemics and infectious diseases, it is also responsibility of medical students themselves to be aware of current issues of public health as they are the future doctors and they may face the public questions regarding these issues when epidemics are high, so their basic knowledge about common infectious disease should be improved and up to the mark.

CONCLUSION

Our study showed satisfactory findings regarding awareness about epidemiology of swine flu. Most of the respondents were aware about its etiology and mode of transmission. However, it was very alarming that 45 (21.3%) students even did not know about swine flu and low level of knowledge was observed about vaccination and preventive measures among our respondents. As awareness about epidemics is progressing among the general population through media, medical students should be up to the mark in this aspect. So there is a need for health education awareness programs in medical schools on regular basis. Proper motivational approach by constructing educational plans may be helpful to change individual’s knowledge and awareness about epidemics.

LIMITATIONS

Our study has certain limitation. We conducted this study in the months of April – May 2019 which is not swine flu season. Knowledge and awareness about infectious diseases among the medical students as well as in other non-medical institutions and universities will be higher when these epidemics are at their peak. Secondly, in our medical institution, we don’t have dental students, so we could not include dental students in our study. Thirdly, we could not divide the students in pre-clinical (1st year and 2nd year MBBS) and clinical (3rd year to final year MBBS) groups as knowledge and awareness of clinical group might be higher as compared to pre-clinical classes. Lastly, the sample size in our study was also small.

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CONFLICT OF INTEREST

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Professional Secrecy And Privileged Communication In Medical Practice.

Short Communication

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2. Former House Officer, Mayo Hospital, Lahore, Pakistan.

ABSTRACT

A medical professional has the faith and confidence of society in him/her. It is his utmost duty and responsibility to uphold the ethical standards of confidentiality, set forth in the Hippocratic Oath, the Declaration of Geneva, the International Code of Medical Ethics and the World Health Organization. Communication between the physician and his patient is privileged. This information can only be divulged, in part, under special circumstances.

Keywords: Professional Secrecy, Privileged Communication, Confidentiality, Trust, Misconduct.

OUR RESPONSIBILITY AS A MEDICAL PROFESSIONAL.

A man who is known to be good at keeping secrets is the one who has greater esteem in society. The genuineness of his character would be admired with certitude around town. This ideal image of a noble man's relation to his society is the basic description of what a medical healthcare practitioner’s association should be with each and every one of his patients. Such a dishonesty free environment would make our healthcare units free of any skepticism of the patients regarding the people who’re treating them. Doctor-patient “interaction” would evolve into “mutualism” and rapport would undoubtedly grow between the 2 parties. A sick person’s eyes, in times of despair & hopelessness, after his Lord; turn to those who have been given the capability to bless them back to good health. To that someone who believes us to be healers”, the least they deserve is utmost loyalty towards their cause which also includes respecting their confidentiality concerning any detail they’d like to keep private. When someone confides in you, they are handing you over a sacred object and you have promised to fulfill their covenant by not losing it.

So far we've solely taken an ethical approach to this discussion, but if laws concerning the profession are included as well; the term “Professional Secrecy” is what it ought to be called. The doctor being the 'professional' by the book cannot unveil a client’s information. (Whether it be personal or seemingly not). Any particulars about the patient should be safeguarded by the physician as a part of his humanitarian duty, even after his client has died. Not surprisingly, every doctor is under an ethical oath to withstand this standard as well.

The Hippocratic Oath, the Declaration of Geneva 1948, the International Code of Medical Ethics and the World Health Organization have set in stone, the rules of professional secrecy. Similar sentiments are expressed in the “Code of Ethics” formulated by the Pakistan Medical & Dental Council (PMDC).

A GLIMPSE FROM THE PAST.

The Quaid-e-Azam (RA), while suffering from a terminal case of pulmonary tuberculosis, emaciating to just skin & bones, he had a personal Parsi physician, Dr. Patel at Bombay. In the course of medical examination, he kept Quaid's illness in absolute secrecy—he used to get Quaid’s chest X-rays done personally and destroy the films. Had Lord Mount Batten come to know the probable mortality of his illness at that time – he would have delayed the process of independence and Pakistan would not have come into existence. This example left us the ideal standards of morality, with an excellent representation of the substantial consequences that may result if a patient's particulars are left to be invaded.

BREACH OF PROFESSIONAL SECRECY.
Professional Secrecy also includes the assurance of the fact that the hospital shall guarantee the safekeeping of his details, & if not the doctor's insurance would have to be sacrificed, as such negligence is a direct violation of the patient's right to the maintenance of professional secrecy. This means the client can sue the target physician or any other healthcare worker & the practitioner can even get their license to practice medicine taken away forever. Such punishments signify the vitality of this legal & ethical code since it relieves the patient of any reluctance he might have disclosing personal details which may affect his reputation, job, personal or social life. This also helps the physician in getting a complete history from his client which eases the diagnostic pathway to administering full treatment. In Western countries, this important principle is practiced with great concern. For instance, the US has designed a HIPAA law solely to provide privacy standards to protect the patient's medical records & other health info provided to health plans. The law carries strict penalties & risks of devastating lawsuits .e.g. in 2013, an HIV-positive patient asked an office manager to fax his medical records to his new urologist. Instead, the very busy office manager accidentally faxed them to his new employer. It was a simple case of number-mix-up, but despite heartfelt apologies from the manager and the urologist, the patient wasn't mollified. He reported the incident. Luckily, the result was just a warning and a mandate for regular HIPAA training. So we see, mistakes are human, but a single slip in the process can crash an entire practice. Many other examples show that frequently, HIPAA law violations don't stem from malicious intent, but from a poor understanding of the law itself resulting in not enough care being taken during the handlings.[7]

The same is the case in Pakistan, only the major difference being in the fact no necessary actions are taken to ensure confidentiality in the first place. Doctors and paramedical staff discuss the patient's condition openly with their fellow doctors in clinics, cafeterias or elsewhere, forgetting the fact they are disclosing their patient's secret publically. In this way, there is a complete ruin of the client's confidence. This practically highlights the amount of damage that may occur on the trust of a sick person who's had to face such violation which makes it clear that in spite of being one of the most traditional moral concepts in health care, secrecy is still one of the less respected principles. This is particularly worrying considering our times of intense exposition of privacy. Today's world of social networking has given a maximum invasive window to the world of secrets, as opposed to the key-hole apertures to information back in the days of photo albums and typewriters. Almost anyone can grab any required information, be it illegal to & more importantly transfer it to the rest of the world in the blink of an eye. Hundreds of people in each country have been violated in the same way; let it be an intentional act of criminal defamation or an accident, forever shattering their esteemed reputation in the community (in the worst-case scenario) which can never be undone. Pakistan is facing the same tragedy with no one to stop these trouble mongers misusing their social media & ruining lives every day.

**PRIVILEGED COMMUNICATION.**

As much as we've emphasized the importance of upholding professional secrecy, there are some circumstances in which disclosing that same private info is the ethically superior act and is also within the circle of law & order of the country. Such divulgence, which is specific to the concerned authority, also makes them a confidant of the patient whose shoulders would carry the same burden of duty regarding the preservation of the patient's data. This disclosure is known as "privileged communication."[8] Such a privilege can be claimed, disclosure of professional secrets justified, only if made in good faith & with caution; and is not a product of some other incentive or isn't driven by jealousy, revenge or maliciousness, and to ensure it is least embarrassing to the patient, as in the following circumstances; When a patient needs referral, he/she had suicidal tendencies, is refusing treatment, is legally insane, threat to the community at large (infectious/communicable diseases as notified by local governments). In cases of child abuse, child neglect, criminal matters, and legal matters, the treating physician has the absolute privilege and it's his/her statutory duty, moral obligation and responsibility to inform the authorities.[9]

Thus; nobility, honesty, kindness & commitment to their duties are the key morals that distinguish a person in a white coat from the rest of humanity. The burden lies on us to keep the sacred bond with our patients safe and polished and be professionally alert in everything we say and do. Since trust and respect are both sides of the same coin, you can't have one without the other; safeguarding private info is a major concern that has to be looked into and paid more attention to Pakistan. Only then can we glue back the broken ties between our sick society and doctors, while simultaneously eradicating the paradigms that have lead to making our people believe that doctors are nothing more than 'butchers'. PMDC definitely needs to make more efforts.
for the implementation of this cause & any acts against it need to be condemned seriously.

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CONFLICT OF INTEREST
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Analysis of Essential Medicines Used for Emergency Care in Pakistan

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ABSTRACT

Introduction: According to the World Health Organization (WHO), essential medicines (EM) have the ability to meet the health care needs of maximum individuals. High accessibility to essential medicines (EM) was proposed under the Millennium Development Goal. The access to high quality, suitable, and inexpensive essential medicines is an essential constituent of health care systems.

Methodology: This retrospective cross-sectional observational study was performed at Jinnah Hospital Lahore from February 2018 to November 2018, for analysis of essential medicine usage in a public sector tertiary care hospital of Pakistan. The data were collected from records of patients admitted in the emergency department.

Results: Drugs prescribed per encounter were estimated to be 3. Most patients got a single antibiotic, and cephalosporin was the most commonly prescribed antibiotic.

Conclusion: The concept of essential drugs has gained high acceptance, but the EMs should be prescribed logically, appropriately and should be in line with WHO guidelines.

Keywords: Essential Medicines, Emergency Health care, World Health organization

INTRODUCTION

Essential Medicine concept, a revolution in healthcare, dawned in 1977 when the World Health Organization (WHO) published the first list of essential medicine (EM). EMs as per the updated definition of 2002, are "the medicines that satisfy the priority health care needs of the population". One of the major challenges faced by the National health care systems globally is the provision of suitable, reliable, equitable health services that are easily accessible to the majority of the population. High accessibility to EMs in third world countries was proposed under Millennium Development Goal 8. The World Health Organization's EM list furnishes countries with a plan of choosing financially savvy and top-notch drugs. At commencement, in 1977, the EMs were characterized as "medicines that are of utmost importance, and are basic, indispensible and necessary for the health needs of the population". EMs are chosen on the basis of the prevalence of the disease, safety, efficacy, and cost-effectiveness of the drug. As per WHO guidelines, they should have the ability to meet the health care needs of maximum individuals, should be quality assured and should be available at all times, in sufficient quantity, in proper dose at a price that is affordable for all. The ethical utilization of medicines is a critical determinant of the quality of healthcare services provided to patients and is crucial to the recovery of the patient.

The scope of critical health challenges being faced by third world countries is tremendous. High prices of EMs make their universal availability a complicated issue and prudent use of EMs in public sector hospitals is a fact that is seldom stressed upon. The aim of this study was to assess the EMs prescribed in the Accidents and Emergency (A & E) department of the Jinnah Hospital, Lahore, Pakistan. The results of this study could support the hospital officials to formulate and enforce relevant interventions to augment the logical use of medications in the A & E department of the Jinnah Hospital Lahore which will not only be beneficial in financial terms but will also ensure the availability of EMs.

METHODOLOGY

This retrospective cross-sectional observational study was performed at the (A & E) of Jinnah Hospital Lahore. Our hospital is a 1500 bedded tertiary-care public sector
teaching institute which caters to needs of a vast patient population from the urban and rural regions of central Punjab. The hospital records of patients admitted through the emergency department between February 2018 to November 2018, irrespective of age, gender and diagnosis were included. The prescribing indicators were defined according to literature. [6]

Following parameters were studied from patient files; the average number of drugs prescribed per encounter (standard 1.7–2.0), the drugs prescriptions by generic names (standard 100%), the percentage of antibiotic prescription (standard 20.0–26.8%), encounters when intravenous injections were used (standard 13.4–24.1%), EMs prescriptions (for which the standard is 100%). Continuous data are expressed as mean ± S.D. Nominal data were expressed as percentages. No formal statistical hypothesis was tested.

RESULTS
The records of 2262 patients were accessed. Drugs prescribed per encounter were estimated to be 3.5 drugs per encounter. Medications endorsed by generic names were found out to be 89% (ideal worth 100%). Antibiotics were recommended 76.3% (ideal worth 20.0–26.8%) of the times. (ideal worth 13.4–24.1%). Out of 2262 patients, 1758 (77.7%) patients received single anti-biotic, 499 (22.1%) received two anti-biotics, and 5 (0.2%) received three anti-biotics. Cephalosporins were the most generally prescribed class of antibiotics (81.5%) trailed by penicillins (6.4%), fluoroquinolones (6.2%) and metronidazole (4.7%). Among the cephalosporins, ceftriaxone contributed the most being prescribed 71.8% of times followed by cefotaxime (5.6%) [Table 01].

DISCUSSION
The logical usage of EMs mandates that the patients receive medicines suitable to their clinical requirements, in accordance to their diagnosis, in a dosage that addresses their own personal requirements for the appropriate time, at the lowest possible cost to themselves, their community and the health care providers. The inappropriate, irrational use of EMs, especially antibiotics, is becoming a global problem. Our study showed that 76.3% of the patients received antibiotics in the A & E department. A study showed that one-third of patients visiting emergency departments received in-appropriate antibiotics prescription while in A & E. There are many weaknesses in pharmaceutical regulation such as quality assurance, lack of unified pricing, un-regulated prescriptions and weak supply management, which over-all cause, inappropriate prescriptions and non judicious use of EMs especially antibiotics. In our study, the number of medications recommended per encounter was more than 3, which is not in accordance with the standard practice of 2–3 medication per encounter. [3,6,10] Majority of subjects were prescribed medicine with generic names which are in accordance with standard norms.

CONCLUSION
The concept of essential drugs, which was put forward in 1977, has gained high acceptance as a rational approach of rendering advanced, commercial and evidence-based health care. EMs should be prescribed logically, appropriately and should be in line with WHO guidelines. Appropriate use of EMs not only ensures there round the clock availability but also reduces financial strain on the public sector hospitals.

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ABSTRACT

Background: Gallstones ileus is small bowel obstruction secondary to gallstones, caused by impaction of gallstones in the intestinal lumen. It is more common in the older population but can affect any age.

Case Report: We present a case of a 63-year-old male patient, known case hypertension, presented with complaints of pain and distention of the abdomen, nausea and vomiting. Plain abdominal x-rays showed small bowel obstruction. This mechanical obstruction of the gastrointestinal tract was caused by a gall-stone in the distal jejunum.

Conclusion: Gallstone ileus may be initially managed conservatively. A large stone or an elusive diagnosis may necessitate emergency surgery.

Keywords: Gallstone ileus, Fistula closure, Intestinal obstruction, Bowel obstruction.

INTRODUCTION

Gallstone ileus is characterized by a mechanical intestinal obstruction that is quite deceptive and difficult to diagnose. Gallstones ileus accounts for 1-4% of the cases of intestinal obstruction in the population and is often a missed diagnosis. It is caused by the blockage or obstruction of the intestinal lumen secondary to impaction of gallstones. The usual age of the patient is between 65 to 80 years, but it has been reported in younger patients as well. The mortality in gallstone ileus is unusually high and has been reported up to 27%. In the United States, the rate of gallstone ileus is as low as 0.095% among the cases of mechanical bowel obstruction. Bartolin was the first to report a case of gallstone ileus in 1654. This entity has been frequently described in the literature. The ideal management of gallstone ileus remains debatable, but surgical intervention has been shown to reduce the morbidity and improve outcome in the patients. We report an unusual case of small bowel obstruction, which was successfully managed with timely surgical intervention.

CASE REPORT

A 63 years old male resident of Gujranwala, Pakistan presented in the emergency department on 19th August 2016 with complaints of generalized abdominal pain, bilious vomiting and constipation for the past two days. On examination, the patient was dehydrated, afebrile, had tachycardia with a heart rate of 112 per minute, normal blood pressure and respiratory rate of 16 breaths per minute. Abdominal examination revealed guarding and generalized tenderness, more pronounced in right hemi-abdomen. Routine baselines were sent. X-ray abdomen erect and ultrasound abdomen were performed in the emergency department. His plain abdominal x-ray showed evidence of small bowel obstruction. Haemoglobin, platelet count, serum amylase and liver function tests were within the normal range. Renal function tests were also normal, except potassium levels that were markedly decreased (2.6mmol/l). He was admitted, advised nil per oral and managed conservatively by instituting intravenous fluids, potassium replacement, analgesics and antibiotics. A nasogastric tube and Foley’s catheter were passed. Pain and tenderness persisted despite conservative treatment. A contrast-enhanced CT scan of the abdomen was carried out three days after admission. It demonstrated moderate intra and extra-hepatic pneumobilia, moderate dilatation of small bowel loops up-to-the distal jejunum. A 2.3 x 2.7 cm well-defined, round, hyperdense focus with central...
hypodensity, was visible in distal jejunum with collapsed gut loops distal to it. There appeared to be a well-defined, thick-walled, air-containing, blind end structure in the GB fossa with surrounding mesenteric haze.

After informed consent, an exploratory laparotomy was performed via midline umbilical sparing incision, which revealed a wide cholecysto-duodenal fistula, surrounded by dense adhesions. Jejunal loops were dilated up to the distal jejunum where a hard lemon-sized object could be palpated in the lumen of the gut. An enterotomy was made to reveal a large gallstone (4 cm × 4 cm × 3cm). The gallstone was removed and the enterotomy repaired in two layers with vicryl 3/0 [Figures 2 & 3]. The subcutaneous tissue was closed in layers and abdomen with prolene 1.

The patient had an uneventful recovery and was discharged on the seventh postoperative day and was kept on follow up through outpatient department for three months.

DISCUSSION
Gallstone ileus most commonly presents with colicky abdominal pain. Common complications associated with the gallstone disease are acute cholecystitis, choledocholithiasis with or without acute cholangitis, acute pancreatitis, and empyema of the gallbladder that may cause gangrene. Cholecystoduodenal, cholecystobiliary and cholecystocolic fistulae are rare complications of untreated cholelithiasis. Gallstone ileus occurs when a large gallstone passes through a fistulous tract, formed between the gallbladder and duodenum, and obstructs the lumen of the small intestine. The usual site of obstruction is the terminal ileum, but the stone may get lodged anywhere in the length of the small intestine if it becomes large enough during its passage. In our case, the gallstone had obstructed the distal part of the jejunum. The stone may even lodge into the first part of duodenum causing gastric outlet obstruction, a condition referred to as Bouveret syndrome.

Clinical presentation of gallstone ileus is seldom clear and specific. History of biliary symptoms is only evident in one-third of the patients. The patients may have vomiting with abdominal pain. A tender right upper quadrant of abdomen and leukocytosis may mimic acute cholecystitis. Dehydration and electrolyte imbalance may point towards intestinal obstruction. Chest x-ray reveals dilated and air-filled small intestinal loops. Diagnosis of gallstone ileus can be clinched on plain x-ray of abdomen by demonstrating the classic triad of small bowel obstruction, ectopic gallstone, and air in the biliary tree on plain abdominal x-ray film. Even if two of these signs are present, it is considered pathognomonic. However, these features can be seen in merely one-third of the cases. Diagnosis may be missed when aerobilia cannot be detected or if the gallstone is not calcified enough to be visible on a radiograph. CT scan has made the diagnosis of gallstone ileus easier. CT scan has an overall sensitivity of 93%,
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CONFLICT OF INTEREST

The Authors declared no conflicts of interest.

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**Retrospective Autopsy based analysis of nature and prevalence of Fatal Injuries in Lahore.**

**Short Communication**

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**ABSTRACT**

**Background:** Autopsy is a medical examination conducted after death to ascertain the cause of death. For Clinical autopsies, the permission of the next of kin is required. In suspicious deaths, an autopsy is a legal requirement and is performed by the coroner or medico-legal surgeon.

**Methodology:** Retrospective analysis of records of forensic medicine from January 1st, 2016 to December 31st, 2016, was done to observe fatal injuries causing death, their nature, and prevalence. The deaths, in which cause of death was Fatal Injury were included in our study. These cases were analyzed with respect to age, gender, cause and manner of death, number and location of injuries and the approximate time lag between injury and death. All data were entered into SPSS.

**Results:** A total of 785 autopsies were conducted at the Department of Forensic Medicine and Toxicology, King Edward Medical University, Lahore in 2016, 42.8% fulfilled our inclusion criteria and were included in the study. Cases of firearm injuries were maximum constituting 46.4%, followed by RTA (13.7%) and blunt trauma (11.9%). Most victims were in the age bracket of 21-40 (55.1%) with a male to female ratio of 4.09:1. Head was the predominant site involved.

**Conclusion:** Fatal injury deaths are mostly due to firearm injuries. Victims are more commonly males and majority cases die immediately after sustaining the injury. Manner of death is predominantly homicidal. Efforts should be made to prevent and properly manage fatal injuries.

**Key words:** Fatal Injuries, Firearm, RTA, Homicide, Immediate death, Medicolegal Autopsy, Clinical Autopsy.

**INTRODUCTION**

Death is the ultimate fate of human experience and is followed by respectful lawful burial of the deceased. In many cultures, an autopsy is performed in all cases to ascertain and establish the final cause of death. But in most of the countries, clinical autopsies require the permission of next of kin. Autopsy, necropsy, and a post-mortem examination are synonymous and are used to elaborate the medical examination conducted after death to ascertain the cause of death. Autopsy starts by establishing the identity of the deceased. Owing to religious and cultural beliefs, different cultures have treated the deceased per their norms. From mummification to ornamental display, history is full of instances, but all cultures have one thing in common, their deceased have been treated with respect. In cases where there is suspicion of foul play, homicide, suicide, drowning and any other death where mode of death is suspicious, autopsy becomes a legal requirement, and under Pakistani law, sections 174 & 176 of the Criminal Procedure Code of Pakistan make it a legal obligation of the law enforcement agencies to investigate all cases of unnatural deaths, conduct autopsies and exhume bodies to hold judicial inquests for establishing final cause of death and to provide justice. The cause of death in suspicious cases can only be given by a medico-legal surgeon who is a registered medical practitioner and is authorized by the law to perform autopsies. Ptolemy I Soter of Egypt (362-282 BC) legalized post mortem examinations and since then, it has become standard to perform an autopsy in every suspicious death case. Inflicting harm to the body by an outside force is defined...
as injury. It can cause a breach of anatomical continuity of the body which may result in disability or fatality. The incidence of deaths due to injury is increasing gradually with time. Between 1990 to 2013, deaths due to injuries increased by 10.7%, from 4.3 million to 4.8 million globally.[6] According to estimates, road traffic accidents (RTAs), homicides and suicides; already three leading causes of unnatural deaths will jump-up the ladder, and would be enlisted in the top 20 causes of death with road traffic accidents holding 5th, suicide, and homicide being at 12th and 18th position respectively.[7] Some of the highest death rates in the Eastern Mediterranean Region which also includes Pakistan are due to injuries like RTAs and inter-personnel fights; ranging around 146,000 deaths and 2.8 million injuries from RTAs.[7] Since the data regarding the frequency or incidence of injuries in Pakistan is limited; the major source of information on injuries is hospital records. In view of the above, the present retrospective study is designed to observe fatal injuries causing death, their nature, and prevalence on scrutiny of autopsy records.

**METHODOLOGY**

**Study Design & Setting**

It was a Retrospective analysis of autopsy records of autopsies conducted between 01.01.2016 to 31.12.2016 at the Department of Forensic Medicine and Toxicology, King Edward Medical University Lahore. The study was started after obtaining ethical approval from the institutional review board of King Edward Medical University vide letter number 184/RC/KEMU dated 06/10/2019.

**Inclusion & Exclusion Criteria**

Only those cases were included in this study in which the cause of death was “fatal injury”. All other causes of death were excluded from the study. The injury was defined as per section 44 of the Pakistan Penal Code.

**Study Subjects**

This retrospective analysis encompassed the records of 785 autopsies which were performed in 2016. The samples were selected by non-probability purposive sampling. All the cases where death was attributed to fatal injuries were included in the study. All the other cases, where the cause of death was other than fatal injuries, were excluded.

**Data Collection Procedures**

The archives of the Forensic Medicine Department of King Edward Medical University were accessed and various parameters were noted from autopsy reports, Police inquest reports and death certificates of the subjects. These parameters included age, gender, cause of death, manner of death, number and location of injuries and probable time between injury and death. All the collected data was the Statistical Package for Social Sciences (SPSS Version 20) was used to analyze the said data.

**Data Analysis Procedures**

The data was analyzed to see the frequency of cause and mode of death and was further classified age wise & gender-wise among the study population.

**RESULTS**

During the year 2016, total deaths from the fatal injuries were 336, accounting for 42.8% of the total autopsies conducted. In our study, the Incidence of firearm victims was the highest being 46.4% of the total fatal injury cases followed by RTA with 13.7% just ahead of blunt trauma (11.9%) lying on 2nd and 3rd places respectively. Stab wound took fourth place with 9.8%. The percentage of injuries that were attributed to mechanical asphyxia cases (smothering, gagging, strangulation, throttling, and hanging) altogether was 7.2%. No cause was attributed as unknown or unspecified[Figure 1].

Males were far ahead of females with 80.4% of all the injuries with an overall male to female ratio of 4.09:1. Most of the injuries were suffered by people in the age group 21-40 years, sustaining more than half of these injuries (55.1%). The third decade showed the maximum incidence (30.4%) with a maximum of 102 cases while the age group 1-10 years suffered the least. Twenty-six percent of the deaths occurred in the hospital, while the rest occurred at the site of the incidents, on the way to the hospital or were not mentioned[Table 1]. The most common age group in our study was 21-30 years (n=102, 30.35%) followed by 31-40 years (n=83, 24.70%) and 41-50 years (n=52, 15.47%). The leading reason of fatal injuries among the males was firearm (n=141, 52.2%), followed by RTA (n=38, 14%), while in females the leading cause of fatal injury was firearm (n=15, 22.7%), followed by blunt trauma and strangulation and throttling (each accounted for n=9, 13.6% of the total victims). Firearm, blunt trauma, burns and RTAs were seen in all the age groups. No fatalities due to smothering/gagging and electrocution were recorded in males and females of any age group, respectively. Victims of mechanical asphyxia had a female predominance with female to male ratio of 2.42:1 despite the overall male prevalence in our study[Table 2]. Homicides accounted for 255 (75.9%), 57 deaths were accidental (17%) and only 24 deaths were suicidal (7.1%) in nature[Table 3]. No autopsy was labeled undetermined during the period of study. Top body parts affected by single-site fatal injuries with their comparison in males and females are shown in figure 2.
In both male and female cases, head injuries accounted for major fatalities, 32.6%, and 30.3% respectively. A significant portion of victims including 89 males (32.9%) and 19 females (28.9%) with a total of 108 cases (32.14%) sustained multiple site injuries at the time of death. The whole body was affected in 21% of female subjects whereas only 7% of male subjects suffered total body injuries at the time of death. By utilizing the tri-modal mortality model, the timing of deaths in this study was distributed as immediate death, early
while the occurrences of burn injuries and mechanical asphyxia were more common in females, similar to that found by He S et al., Latif M et al. and Aamer R et al. respectively. This finding points towards the relevance that death due to burns and asphyxia caused by hanging is more common in females in this part of the world.

DISCUSSION

In the present study, deaths due to fatal injuries constituted 42.8% of the total autopsies conducted during the year 2016. This is highly in-contrast to 7.1% and 8% incidence found by other researchers. That indicates the high rate of medicolegal autopsies of unnatural deaths in this part of the world, highlighting law and order fiasco, uncontrolled and undisciplined traffic and overall mental stress prevailing in the society.

Out of the 336 cases in the present study, 46.4% (n=156) were caused by firearm injuries that are significantly high to 2.09% incidence quoted by Sachan R et al. and low in comparison to 85% found by Chotani et al. This is a pointer towards the poor control of the state over possession of firearm weapons, an alarming problem that needs to be addressed vigorously by the authorities to decrease the incidence of fatal injuries caused by firearm leading to death.

The occurrence of deaths as a result of fatal injuries due to RTAs was comparable to the incidence found by Alonge et al. in Bangladesh in 2011 and Gopalakrishnan et al. This finding is evidence of overall poor traffic discipline in the whole of that area including India and Bangladesh and the incidence of fatal injuries due to RTA leading to death can be significantly decreased by educating the masses about traffic and implementation of traffic rules.

In the present study, Deaths from injuries caused by stab wounds were found to be 9.8% that is in contrast to 3% found by Chotani et al. in Karachi, Pakistan and to 0.3% found by Swann et al. in Glasgow, Scotland. This finding indicates that the use of sharp edge or pointing weapons to produce fatal injuries to cause death is more in Lahore as compared to Karachi.

Mechanical asphyxia cases contributing 7.2% of the total injury fatalities in the present study that correlate well with that found by Aamer R et al. in Lahore, Pakistan whereas Blunt trauma victims, in the present study, with a percentage of 11.9% were comparable to that found by Clark C et al. in 2013 and 2014. Bomb Blast cases constituting 4.5% are in accordance with Chotani’s study.

In the present study, incidence of fatal injuries was found to be more in males (80.4%) as compared to females (19.6%), similar to that found in other studies while the occurrences of burn injuries and mechanical asphyxia were more common in females, similar to that found by He S et al., Latif M et al. and Aamer R et al. respectively. This finding points towards the relevance that death due to burns and asphyxia caused by hanging is more common in females in this part of the world.

The peak incidence of fatal injuries was in the third decade of life which is comparable to the studies of other authors. Incidence of homicide was more than accidental and suicidal deaths which are in contrast to other studies. The third decade is more vulnerable to deaths due to fatal injuries, prima facie, indicating aggressive and extrovert trends of young in this part of the world, so need to be addressed by counseling through a massive campaign by media to reduce the frustration prevailing in the young.

The topmost body part affected by fatal injuries in this study is the head region, followed by the chest and abdomen, this finding of the present study is similar to that narrated by Clark et al. That highlights the use of helmets and other safety measures like seat belts. As far as the timing of death is concerned, the frequencies of early, immediate and late deaths found in the present study are in accordance with that found by Sobrino J et al. but are in contrast to the study by Sachan R et al. These differences may be attributed to the anatomical region of the body suffered injuries, sample size, socioeconomic and culture of the area.

CONCLUSION

Injury fatalities are much more common in our country than in other regions of the world. Deaths by firearm injuries account for the largest form of fatal injury mortalities. Deaths due to fatal injuries are greater in males than in females while the occurrence of burn injuries and mechanical asphyxia is found to be more in females as compared to males. Homicide is the manner of death in most cases. Most of the victims died immediately within an hour. These conclusions should help the organizations working for socio-economic development, justice and security to reduce the incidence of fatal injuries and to accurately measure the burden of mortality.
fatal injuries in Pakistan, the issue must be analyzed at a national level. Practical actions that should be taken include raising awareness in the community to prevent injuries, training at all health care levels for better management of fatal injuries and building injury research groups at research institutes.

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CONFLICT OF INTEREST
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**ABSTRACT**

**Background:** The radial artery is the smaller terminal branch of the brachial artery. It is one of the most commonly used arteries for various interventions. Anatomical variations exist and can predispose patients to iatrogenic injury if the operator is unaware of normal radial artery morphology. The present study focuses on giving detailed information about radial artery measurements in our local population.

**Methods:** This was a cross-sectional observational study, conducted in the anatomy department of Jinnah Medical College Peshawar from 2017 to 2018. This study was conducted on 42 formalin-fixed cadavers, yielding 84 upper limbs. The radial artery was dissected and studied; length, external and internal diameters were measured. Data was entered in SPSS v20 and analyzed. Results: The mean age of the study population was 36 ± 11.25. Male to female ratio was 1:1. The most common site of origin of the radial artery was distal to head of the radius. The right radial artery was longer than the left. The right radial artery was broader in males as compared to females with a p-value of <0.05. The external and internal diameters of the radial artery decreased gradually from start to the endpoint for both the genders. The external diameters of the left radial artery were greater than those on the right side. The right radial artery had a larger internal diameter than the left side.

**Conclusion:** The anatomy and morphology of radial artery have many documented variations. Radiologist and surgeons should have a good understanding of normal morphological variations of radial artery.

**Keywords:** Radial diameter, wrist, Radial artery, morphological variations.

**INTRODUCTION**

The blood supply to the arm is from the brachial artery, which is a direct continuation of the axillary artery. It arises underneath the teres major muscle. The artery travels on the ventral aspect of the arm till it reaches the cubital fossa, beneath the bicipital aponeurosis. In the inferior part of the cubital fossa, the brachial artery bifurcates into radial and ulnar arteries. The radial artery (RA) is the smaller terminal branch of the brachial artery. It arises at the level of the neck of radius and runs on the lateral aspect of the forearm, beneath the brachioradialis muscle, lateral to the flexor carpi radialis. For some part of its course, it is in direct contact with the radius bone, then it passes on the floor of the anatomical snuffbox, passing on the dorsal aspect of scaphoid and trapezium and terminates by forming the deep palmar arch of the hand. In the lateral part of the forearm, during its course, the RA lies close to the radial nerve. Throughout its course, the artery is accompanied by radial vein. The RA may be absent, hypoplastic or there may be trifurcation of the brachial artery in the cubital fossa, leading to significant anatomical variations. These morphological variations of RA predispose it to iatrogenic injury during vascular surgeries, arterial cannulation, cardiology interventions and interventional radiological procedures. It is because of this reason that it is of utmost importance to study radial artery, in cadavers so that we can have a better knowledge about the standard external and internal diameters, thicknesses and variable origins of the artery that is most commonly used for recording pulse, invasive blood pressure monitoring, cardiac catheterization, and forms 50% of blood supply of hand. The focus of the present study is to give extensive details.
to the physicians on the features of the radial artery, such as its origin level, wall thickness, external and internal diameters in our local population.

**METHODOLOGY**

The study was a cross-sectional observational study, conducted in the anatomy department of Jinnah Medical College Peshawar, from January 2018 to January 2019 on 84 upper limbs specimens (42 right, 42 left). All the cadavers were formalin-fixed. Only those cadavers were included in this study who had intact upper limbs and torso. The data was obtained by dissections of 42 cadavers with equal gender distribution (male to female ratio of 1:1). To minimize bias, each limb dissection was done by the same team, following predefined protocols in the same environment. After appropriate exposure, the dissection was started in a strictly controlled environment. The skin and fasciae of the arms and forearms of formalin-fixed cadavers were removed. The axillary artery was exposed in the axilla by opening up the axillary sheath and was followed until the lower border of teres major muscle. The brachial artery was followed in the anterior compartment of the arm, until its bifurcation in cubital fossa into ulnar and radial arteries. The radial artery was followed carefully throughout its course in the forearm until its termination in the deep palmar arch of the hand. The external diameters were measured at 1 cm distal to the origin, 4cm from cubital fossa and in anatomical snuffbox. The widest portion of the artery at these points was measured using a standard set of vernier callipers (0-150 mm). The internal diameters of the radial artery were measured at cubital fossa and wrist, at the widest point of the artery. The length of the radial artery, from its origin to the terminal point, was measured using a standard measuring tape. The diameters were recorded in millimetres (mm) and the length was recorded in centimetres (cm).The origin, termination of the radial artery and any anatomic variation were carefully noted in each upper limb. All the data was entered in SPSS v20. Mean and standard deviations of the variables were calculated. Student t-test was applied to variables to compare the variation in external and internal arterial diameters in the right and left upper limbs in both genders.

**RESULTS**

A total of 42 cadavers (84 upper limbs) were included in this study. It took us one week to thoroughly study the RA in both limbs of each cadaver. Age was ascertained from the record of anatomy department. The mean age for male cadavers was 34 ± 8.2 years, whereas the mean age for female cadavers was 38 ±15.1 years. The overall mean age for the present study was 36 ± 11.25 years with a range of 24 to 48 years. In total, 84 upper limbs from 42 cadavers were dissected to examine the origin of RA along with its wall thickness, length, internal and external diameters. In our study, RA originated proximally to head of radius on the left side in 2 male subjects (2.38%), whereas, in 82 of the subjects (from both genders), RA originated distal to the head of the radius on the left (97.61%). We noticed that right radial artery was broader in males as compared to females with a p-value of <0.05. The thickness of the radial artery was more at its origin and at its termination points. The difference of external diameter (thickness) was 1.5±0.25mm in right arm and 1.25±0.5mm in the left arm at the point of origin of radial arteries.

The external and internal diameters of the radial artery decreased gradually from start to the endpoint for both the genders[Table 2]. The internal and external diameters of RA was greater on the right side when compared to left. The mean external diameter of RA at the origin in our study was 3.53±0.86 at its origin on the right, whereas the mean external diameter of the left radial artery was 3.46±0.79. The mean internal diameter of RA at its origin on the left was 3.23±0.81, and on the right, it was 3.28±0.76 [Table 2]. The left radial artery had a greater external diameter than the right one at the point of origin in all the dissected limbs of male subjects. Interestingly, at the wrist, the thickness and the external diameters of the left radial artery were bigger than that on the right side. However, the right radial artery had larger internal diameter than left side In our study, the males had thick radial arteries at their origins as compared to females, and the results were statistically significant (p<0.05) [Table 2].

**DISCUSSION**

The vascular variations in embryonic growth of limbs depend exclusively on the growth of buds plexus. The classic ‘sprouting’ theory of vascular bud development postulated that the arteries of the upper limb originated from a single trunk of the axial artery in a predefined manner. Several variations in arterial origins and course can occur due to any flaws in embryonic evolution of the buds plexus. The variations in the vasculature of the upper limb are seen 9% to 18.5% of the cases. The radial artery is commonly variable in origin and route; this variation may affect the diagnosis, surgery and post-operative management of the patient. These medical implications are associated with anatomical vascular variations of the radial artery. Accordingly, for clinicians it is vital to understand the diameter, thickness and the radial artery variability because the radial artery is one of
<table>
<thead>
<tr>
<th>Radial artery</th>
<th>Side</th>
<th>Mean (mm)</th>
<th>Standard dev (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>Left</td>
<td>215.7</td>
<td>25.7</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>229.8</td>
<td>27.9</td>
</tr>
<tr>
<td>Females</td>
<td>Left</td>
<td>211.5</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>217.345</td>
<td>24.9</td>
</tr>
<tr>
<td>Total</td>
<td>Left</td>
<td>213.6</td>
<td>24.1</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>223.65</td>
<td>26.4</td>
</tr>
</tbody>
</table>

Table 1: Mean size of Radial Artery in our subjects.

<table>
<thead>
<tr>
<th>Radial artery</th>
<th>Side</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>External</td>
</tr>
<tr>
<td>Female</td>
<td>Left</td>
<td>3.21 (.67)</td>
</tr>
<tr>
<td></td>
<td>Origin</td>
<td>2.98 (.59)</td>
</tr>
<tr>
<td></td>
<td>Wrist</td>
<td>3.26 (.68)</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>3.05 (.65)</td>
</tr>
<tr>
<td></td>
<td>External</td>
<td>3.64 (.85)</td>
</tr>
<tr>
<td></td>
<td>Origin</td>
<td>3.63 (.83) *</td>
</tr>
<tr>
<td></td>
<td>Wrist</td>
<td>3.26 (.68)</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>3.05 (.65)</td>
</tr>
<tr>
<td>Male</td>
<td>Left</td>
<td>3.46 (.78)</td>
</tr>
<tr>
<td></td>
<td>Origin</td>
<td>3.37 (.77)</td>
</tr>
<tr>
<td></td>
<td>Wrist</td>
<td>3.53 (.86)</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>3.37 (.79)</td>
</tr>
</tbody>
</table>

Table 2: Internal diameters, external diameters and thickness of radial artery at wrist and origin.
*Significant (P<0.05) value **Significant (P<0.05) value
the primary access points for interventional procedures like aneurysm coiling and cardiac catheterizations. The iatrogenic mistake may be reduced these precautions.[9] In the majority of cases, the radial artery originates distal to the upper margin of the radial head.[10] The high origin radial artery is referred to as the artery beginning from the brachial or axillary artery.[11] In our study, about 80% of the radial artery arose from brachial bifurcation near the head of the radius, just distal to its superior margin. We noted that in 8.33% (n=7) of our cases, it had high origin. Nasr et al. showed that the radial artery had an external diameter of 3.3mm at its starting point, and 3.1mm at the styloid process, which is same as our study. It is interesting to note that the left external diameter was found to be smaller than the right one in all samples. For males, the external diameters were larger as compared to females. Yoo et al. report that the external diameter of the radial artery narrowed from its origin point to termination.[12] Previous research has shown that the internal diameter of the radial artery is large in male than female.[13] The present study shows that the internal diameter of the radial artery is larger in male than females, which is following published literature. This study is in accordance with the previous research works that the right side of the radial artery is more dominant than the left. There is more variation in the radial artery at origin than at termination. Radial artery is wider at origin than termination and gradually narrows along its course.[14]

**CONCLUSION**

Any kind of anatomical variations that are encountered during cadaveric dissections alongside surgical or clinical procedures are to be reported and taken into account. As noted, RA is one of the most commonly used arterial vessels for monitoring, interventions and a wide variety of procedures. To avoid iatrogenic injuries radiologists and surgeons should have good understanding of normal morphological variations of RA. This changeable morphology of the RA may cause vascular injury during surgeries and interventional procedures. Hence, it is imperative to note the various possible arrangements of the arterial pattern of the upper limb. Numerous anatomical variations of the radial arteries and the vascular territory in the hand are of concern for surgical methods. Therefore, it is clinically significant to recognize the external and internal diameters, thickness and changeable origin level of the radial artery in our local Pakistani population. Interventional cardiologists, interventional neurologists, hand, orthopedic, vascular, and plastic surgeons require further awareness of the anatomic variations of the origin, course, and distribution of the radial artery while planning and conducting surgeries of the upper limb.

**REFERENCES**


**CONFLICT OF INTEREST**
The Authors declared no conflicts of interest.

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