QUARTERLY

Print ISSN 1815-4018
Online ISSN 2410-5422

JIIMC

Journal of Islamic International Medical College

RIPHAH
ISLAMIC INTERNATIONAL
MEDICAL COLLEGE

September 2019, Vol.14, No.3

Indexed in:
WHO-Index Medicus (IMEMR)

Recognized by:
Pakistan Medical & Dental Council (PMDC)
Higher Education Commission, Pakistan (HEC)

JIIMC JOURNAL OF ISLAMIC INTERNATIONAL MEDICAL COLLEGE

Print ISSN 1815-4018 **PMDC No. IP/0059** **Recognized by PMDC & HEC**
Online ISSN 2410-5422

MAILING ADDRESS:
Chief Editor
Islamic International Medical College
274-Peshawar Road, Rawalpindi
Telephone: 111 510 510 Ext. 207
E-mail: chief.editor@riphah.edu.pk

Journal of Islamic International Medical College
Quarterly

Sep 2019; Vol.14, No.3
Print ISSN: 1815-4018
Online ISSN: 2410-5422

RIPHAH
ISLAMIC INTERNATIONAL
MEDICAL COLLEGE

JIIMC

"Journal of Islamic International Medical College (JIIMC)" is the official journal of Islamic International Medical College. The college is affiliated with Riphah International University and located in Rawalpindi (Punjab) Pakistan.

JIIMC is a peer reviewed journal and follows the uniform requirements for manuscripts submitted to Biomedical journals, is updated on www.icmj.org. JIIMC has a large readership that includes faculty of medical colleges, other healthcare professionals and researchers. It is distributed to medical colleges, universities and libraries throughout Pakistan.

For Online Submission Visit: eJManager.com
Published by IIMC, Riphah International University Islamabad, Pakistan
Web Site: jiimc.riphah.edu.pk

Correspondence Address:
Prof Dr. Muhammad Nadeem Akbar Khan
Managing Editor
Journal of Islamic International Medical College (JIIMC)
Westridge-III, Pakistan Railways Hospital
Tel: +92-51-5481828 Ext: 217
E mail: prh.jiimc@riphah.edu.pk

Recognized by: Pakistan Medical & Dental Council ; Higher Education Commission (HEC) Islamabad (Category Y)
Indexed in: WHO - Index Medicus for Eastern Mediterranean Region (IMEMR), Scientific Journal Impact Factor (SJIF), International Scientific Indexation, Scopemed (ejmanager)
Registered with: International Serials Data System of France
Covered by: Pakmedinet, PASTIC inventory "Directory of Scientific Periodicals of Pakistan"- Pakistan Science Abstracts (PSA), Directory of Research Journal Indexing (DRJI)

CONTENTS

Volume 14 Number 3 September 2019

Journal of Islamic International Medical College
Procedure for online submission of manuscript

1. **VISIT website:** http://my.ejmanager.com/jiimc/
2. **CLICK** Submit your Manuscript (Right Corner)
3. **For New User:**
    - **CLICK** " Here for Registration"
    - Type your email address.
    - Get registered- Fill the form properly and click **submit**.
    - You will receive an e mail from eJManager.com
    - **CLICK** on this mail to note " User Name and Password"

2. **Article Submission:** Submit your manuscript/article by following steps:
    - **CLICK** "Submit New Manuscript" in the right upper portion of window
    - Read the Instructions for authors carefully before submitting your manuscript

→ http://my.ejmanager.com/jiimc/>Submit your Manuscript >Journal of Islamic International Medical College>Registration>Login>Submit New Manuscript >(Follow Steps)> Save the page and continue

EDITORIAL

Patient Safety a 'Right or Privilege'

Saima Aslam, Paul Barach, Zakiuddin Ahmed

Is Patient Safety a 'Right or a Privilege'? The intention while treating patients is always to “do no harm” and yet, it does not always turn out that way. Healthcare interventions are meant to benefit people and promote wellness; unfortunately many times they present a risk of harm. Patients still suffer from wrong treatment or medications, preventable falls in hospitals, hospital acquired infections and many other events that are harmful. An international report published in 2018, reported that 1/10 of all patients suffer preventable adverse events, two decades after The Institute of Medicine found that 98,000 people die in hospitals in the US each year because of medical errors that could have been prevented.[1,2]

Patient Safety has now emerged as a fundamental concept in healthcare.[3] It is defined by the Institute of Medicine as “the prevention of harm to patients”. A growing emphasis is being put on the system of healthcare delivery that 1) prevents errors, 2) learns from the errors that occur, and 3) is built around a culture of safety that supports and enables and involves healthcare professionals, organizations and patients.[3,4]

The history of patient safety goes back more than a century. In 1854, Florence Nightingale, a nurse and statistician, used evidence-based quality improvement to reduce preventable harm in the Crimean War. A century later in 1964, Schimmel in his paper “The hazards of hospitalization” reported that 20% of the patients admitted to the medical wards experienced one or more untoward episode and 10% had a prolonged or unresolved episode.[5] The Agency for Healthcare Research and Quality, known as AHRQ, was formed in 1989, to produce evidence to make health care safer, higher quality, more accessible, equitable, and affordable, and to ensure that the evidence is understood and used.[6]

Patient safety initiatives in the UK emerged from a wide set of influences and events during the 1970s and 1980s. Finally, in 1999, all chief executives of health care trusts were given a statutory duty and framework, known as clinical governance, to manage and actively promote risk management, quality, and safety. This resulted in considerable progress in addressing patient harm.[7] Now there is much greater awareness to the problem, a more reflective approach to error and harm, policy initiatives to address safety, a dedicated research program, and a more humane approach to injured patients and their families.[7,8]

There is little information on the existing culture and practices regarding Patient Safety in Pakistan.[9,10,11] In Pakistan, we need to focus first on assessing the culture of care and on creating an increased awareness for patient safety among healthcare professionals. This will create a critical mass of healthcare workers to lead the patient safety journey. On a larger scale the healthcare system is weak and fragmented in Pakistan. The Government is rapidly promoting health network formation at the local level, but they rarely provide guidance on how to assemble or succeed. There is no central or national governing body for healthcare management. It is primarily the responsibility of provincial governments. During the past 5 years, the Punjab and Sindh Healthcare commission bodies have been formed.[12,13] The commissions have formulated local acts known, respectively, as the Punjab and Sindh Health Commission Acts. The Acts contain a defined set of regulations for the healthcare facilities in Punjab and Sindh, respectively. The prime aim of these Acts is to register all healthcare facilities in Pakistan followed by licensing and accreditation.[12,13,14]

Some of the specific challenges for Pakistan's Healthcare Commission quality initiatives are a lack of national healthcare accreditation system and integrated national guidelines, policies, procedures

Department of Riphah Institute of Healthcare Improvement & Safety Riphah International University, Islamabad

Correspondence:
Dr. Saima Aslam
Assistant Director
Riphah Institute of Healthcare Improvement & Safety
Riphah International University, Islamabad
E-mail: saima.aslam @riphah.edu.pk

Funding Source: NIL; Conflict of Interest: NIL
Received: July 28, 2019; Revised: August 06, 2019
Accepted: August 10, 2019

on healthcare quality and patient safety which as mentioned on the patient safety Acts.[12,13] In a recent study Jafree et. al. reported that "nurses" perceive the culture in public hospitals of Pakistan to be punitive and that individuals are not supported or made to feel comfortable in reporting errors.[9] The fear and lack of psychological safety is not very different in the private sector. Hospital acquired infections is one of the highest problems in Pakistani hospitals. As reported by Shaikh et. al in 2008, data from a tertiary care hospital in Sindh showed that the frequency of hospital acquired infections was 29% with urinary tract infections being the most prevalent at 39%, followed by respiratory tract infections 30.1% and blood stream infection in 23.7% of patients admitted to ICU. Other infections identified were skin, soft tissue, wound and gastrointestinal tract infections.

Infection control and prevention measures are essential components of quality healthcare quality and patient safety.[11,15] Pakistan's first national infection guidelines were established in 2006, with the help of the National AIDS control program. It was noted that hand hygiene is rarely practiced as observed in government hospitals.[11] Self-assessment of trainee physicians at a tertiary hospital revealed that only 17% were aware of the WHO recommendations for hand hygiene and hospital acquired infection risks.[11]

There are many challenges in addressing the national levels of quality and patient safety in Pakistan. One way to overcome these challenges is to develop regional and national groups of improvement-minded leaders. These local leaders can be mentored to build trust and lasting relationships, share ideas and expertise, and learn from successes of others.

There is an urgent need to address Patient Safety as a priority in our system. We recommend funding research at all levels of healthcare to address the gaps that exist in our system regarding the delivery of safe medical care. The Pakistani government and the Ministry of Health need to focus on policy development for Patient Safety as a national priority. This should include setting minimal standards for healthcare delivery, a central reporting and audit and accreditation system, as well as mandating patient safety education at all levels of healthcare training and practice.

REFERENCES:

1. National Academies of Sciences, Engineering, and Medicine. (2018). crossing the global quality chasm: Improving health care worldwide. National Academies Press.
2. Global Priorities for Patient Safety Research. (n.d.). World Health Organization. Retrieved from http://whlibdoc.who.int/publicaton/2009/97892415986_eng.pdf.
3. 10 facts on Patient Safety. (n.d.).Retrieved from http://www.who.int/features/factfiles/patient_safety/en/index.html
4. Erickson, S. M., Wolcott, J., Corrigan, J. M., & Aspden, P. (Eds.). (2003). Patient safety: achieving a new standard for care. National Academies Press.
5. Schimmel, E. M. (1964). The hazards of hospitalization. Annals of internal Medicine, 60(1), 100-110.
6. Rockville, M. (March 2018). Agency for Healthcare Research and Quality: A Profile. Content last reviewed March 2018. Agency for Healthcare Research and Quality. Retrieved from https://www.ahrq.gov/cpi/about/profile/index.html
7. Small, S. D., & Barach, P. (2002). Patient safety and health policy: a history and review. Hematology and Oncology Clinics of North America, 16(6), 1463-1482.
8. Barach, P. (2003). The end of the beginning. Journal of Legal Medicine, 24(1), 7-27.
9. Jafree, S. R., Zakar, R., Zakar, M. Z., & Fischer, F. (2017). Assessing the patient safety culture and ward error reporting in public sector hospitals of Pakistan. Safety in Health, 3(1), 10.
10. Shah, N., Jawaid, M., Shah, N., & Ali, S. M. (2015). Patient safety: Perceptions of medical students of Dow medical college, Karachi. J Pak Med Assoc, 65(12), 1261-1265.
11. Gille, L. (2018). Mycoplasma bovis: Sources of infection, prevalence and risk factors (Doctoral dissertation, Ghent University).
12. Sindh Healthcare Commission Act 2013. (2015 June 08) Retrieved from http://www.pas.gov.pk/uploads/acts/sindhAct No.VII 2014. Pdf.
13. Punjab, G. o. (30 July 2010). Punjab Healthcare Commission Act 2010. Punjab Gazette, 465-477.
14. http://www.nacp.gov.pk/introduction/national_heath_policy/NationalHealthPolicy-2001.pdf
15. Shaikh, J. M., Devrajani, B. R., Shah, S. Z., Akhund, T., & Bibi, I. (2008). Frequency, pattern and etiology of nosocomial infection in intensive care unit: an experience at a tertiary care hospital. J Ayub Med Coll Abbottabad, 20(4), 37-40

ORIGINAL ARTICLE

Antimicrobial Susceptibility Pattern of Isolates From Diabetic Foot Ulcers

Zubair Ahmad Khan, Jamil Ahmad, Omer Nasim, Zainab Rustam

ABSTRACT

Objective: To identify different organisms from diabetic foot ulcers and their antibiotic susceptibility.

Study Design: It was an institution based descriptive cross sectional study.

Place and Duration of Study: The study was conducted at Rehman Medical Institute, Hayatabad, Peshawar from 1st June 2017 to 31st December 2018.

Materials and Methods: A total of 88 specimen have been collected from a sample of 60 diabetic patients who have clinically infected foot ulcers and 99 pathogens wereisolated. The samples includes pus, tissue and fluid under study were cultured on blood agar and McConkey plates. Anaerobic culture medium 1 (AN1) was used for isolating anaerobes. The micro-organisms were identified through gram staining, culture and analytical profile index 20E. The sensitivity to a particular antibiotic was determined by Kirby-Bauer disk diffusion method.Anti-microbial susceptibility testing of isolates was performed as per the guidelines recommended by the Clinical Laboratory Standard Institute (CLSI).

Results: The most commonly isolated organisms were Escherichia coli (36.2%), Staphylococcus aureus (80%), Klebsiella pneumoniae (13%) and Pseudomonas aeruginosa (11.6%). Polymicrobial growth was found in 19 cultures. The ratio of gram-negative and gram-positive organisms isolated was 2.3. Gram-negative bacteria accounted for 69.7%, while gram-positive bacteria accounted for 30.3%. Staphylococcus aureus (87%) isolates were resistant to penicillin, ampicillin, levofloxacin, ceftriaxone & cefoxitin. High levels of resistance to amoxicillin/Clavulanic acid 15 (93.57%), ampicillin 20 (100%), ciprofloxacin 17 (89.47%) and co-trimoxazole 12 (85.71%) was seen in Escherichia coli.

Conclusion: E. coli are the most common pathogen isolated from diabetic foot ulcers. Their antibiograms suggest that resistance is on the rise and antimicrobial therapy should be selected based on culture results and antimicrobial sensitivity patterns.

Key Words: *Anti-Bacterial Agents, Chronic Disease, Diabetic Foot, Gram Negative Bateria, Gram Positive Bacteria, Staphylococcus Auerus.*

Introduction

Diabetes mellitus is a chronic disease which affects a large portion of our population. The history of diabetic foot ulcers is a serious concern as the risk of expiry at five years of a patient is 2.5 times more as compared to patients with diabeties not having a foot ulcer.[2] A recent report shows that the prevalence of diabetes mellitus is 11.77% in Pakistan and is expected to rise.[1] It is a health concern associated with major complications such as foot ulcers, retinopathy, nephropathy, and neuropathy.[2,3] The incidence of foot ulcers in diabetics ranges from 6% to 11% according to several reports.[4,5] The estimated lifetime risk of developing a foot ulcer is 15% - 25%.[6] A major concern for diabetic patients is foot ulcers as they frequently lead to amputation of the lower extremity and are a source of morbidity. In a study, almost 21.5% of patients with diabetic foot infection underwent minor or major amputationat some point intheir treatment or life.[7]

Diabetic foot infections are either monomicrobial or polymicrobial and the most common infecting organisms are Staphylococcus aureus, *Escherichia coli*, Pseudomonas aeruginosa, and Enterobacter.[8,9] Early recognition of the lesion and immediate initiation of appropriate antimicrobial therapy based on culture and antimicrobial susceptibility tests is crucial for controlling the infection, improving quality of life and preventing morbidity. One of the

Department of Surgery
Rehman Medical Institute, Peshawar
Correspondence:
Dr. Zubair Ahmad Khan
Associate Professor
Department of Surgery
Rehman Medical Institute, Peshawar
E-mail: zubair.ahmad.khan71@gmail.com

Funding Source: NIL; Conflict of Interest: NIL
Received: February 13, 2019; Revised: August 20, 2019
Accepted: August 22, 2019

challenges in managing microbial infections is the emergence of multi-drug resistance mechanisms in some microbes such as Pseudomonas aeruginosa and Staphylococcus aureus rendering them less susceptible to antimicrobial agents.[10] This limits our choices of effective antibiotics making the treatment of diabetic foot more complicated and difficult. Antimicrobial susceptibility test is a prerequisite for treating diabetic foot infections which can help us choose effective therapeutic regimens.

The rationale behind the study is that antimicrobial susceptibility tests should be done frequently considering the emergence and rise of multi-drug resistant (MDR) organisms so the changing trends in the susceptibility patterns of the microbes are known. The objective of this study is to identify different organisms from diabetic foot ulcers and their antibiotic susceptibility.

Materials and Methods

This was an institution based descriptive cross sectional study conducted at Rehman Medical Institute. A sample of 60 diabetic patients with clinically infected foot ulcers admitted in RMI (Rehman Medical Institute), over the period from 1st June 2017 to 31st December 2018, they were identified through request forms sent to the microbiological laboratory of the institute. The forms consist of patients demographic and clinical details and are signed by the treating consultant. The study started after obtaining clearance from the institute's ethics review board.

Patients with diabetic foot infections are being included in this study if they have had an infected ulcer or wound or previous amputation. Exclusion criterion is non-diabetic patient open wound infections.

Age, gender, nature of clinical specimen, species of isolated pathogen and antibiogram of pathogens are recorded from the hospitals clinical microbiological laboratory.

Specimens are obtained after the wound had been washed vigorously with saline and debrided. The base of the ulcer is scraped with sterile curette to obtain specimen and sent to the lab for culture and antibiotic sensitivity testing. The samples which includes pus, tissue and fluid are processed for isolation of aerobes and anaerobes. The samples which includes pus, tissue and fluid are cultured on blood agar and McConkey plates. Anaerobic culture medium 1 (AN1) is used for isolating anaerobes at an incubation temperature of 37°C. The micro-organisms are identified through gram staining, culture and analytical profile index 20E. The sensitivity/resistance to a particular antibiotic is determined by Kirby-Bauer disk diffusion method and extended spectrum ß lactamase producers are identified by ß lactamase inhibitor combination.

Isolates are tested for antimicrobial susceptibility by the standard disk diffusion method following the guidelines recommended by the Clinical Laboratory Standards Institute (CLSI). 11 Disk diffusion method on Mueller-Hinton agar plates is used to test for antibiotic sensitivity. The disks are dried and stored in the refrigerator. After drying the plate, antibiotic discs (6 per 9cm plate) are applied. The isolate is scored resistant or susceptible based on CLSI guidelines 11. After parametric data collection, the data is analyzed and compiled in tabular form in Microsoft Excel 2016. The statictical test applied for calculation of *p* value is t-test which yielded a p-value of less than 0.05 which is regarded as statistically significant.

Results

A total of 60 patients were analyzed for this study, out of which 16 (26.6%) were females and 44 (73.3%) were males. Their age ranged between 21 and 86 years and the mean age of subjects was 52.88±14.7 specimens were collected from 60 patients and 99 pathogens were isolated.

Table I: Profile of Bacteria Isolated from Infected Foot Ulcers in Diabetic Patients Specimens (99 Isolates)

Bacteria category	Frequency (%)
n Isolates	
Aerobic and facultative isolates	
Gram negative	(n=69)
E. coli	25 (36.2%)
Klebsiella pneumonia	9 (13%)
Pseudomonas aeruginosa	8 (11.6%)
Acinetobacter	7 (10.14%)
Pseudomonas species	2 (2.89%)
Proteus mirabilis	9 (13%)
Proteus vulgaris	2 (2.89%)
Klebsiellaoxytoca	2 (2.89%)
Morganellamorganii	2 (2.89%)
Citrobacter species	1 (1.44%)
Enterobacter species	2 (2.89%)
Gram positive	(n=30)
Staphylococcus	24 (80%)
Enterococcus species	6 (20%)

Polymicrobial growth was found in 19 cultures. The ratio of gram negative and gram-positive organisms isolated was 2.3. Gram-negative bacteria accounted for 69 (69.7%), while gram-positive bacteria accounted for 30 (30.3%). Organism isolated from different cultures are summarized in Table I.

Table II: Antimicrobial Proportion Resistance (%) and It's Pattern of Gram-Positive Bacterial Isolates from Infected Foot Ulcers in Diabetic Patients

Proportion Resistance (%)		
Antimicrobial agent	**Staphylococcus (n=24)**	**Enterococcus (n=6)**
Amikacin	3(17.65%)	
Amoxicillin	1 (100.00%)	
Amoxicillin/Clavulanic acid	2 (100.00%)	0 (0%)
Ampicillin	4 (100.00%)	2 (100%)
Ampicillin/Sulbactam	1 (100.00%)	
Cefaclor	2 (100.00%)	
Cefazolin	2 (100.00%)	
Cefoxitin	20 (86.96%)	
Cefpodoxime	2 (100.00%)	
Ceftizoxime	3 (100.00%)	
Ceftriaxone	3 (100.00%)	
Cefuroxime	3 (100.00%)	
Cephalexin	3 (100.00%)	
Chloramphenicol	4 (16.67%)	3 (60%)
Ciprofloxacin	12 (92.31%)	4 (100%)
Clarithromycin	0 (0.00%)	
Clindamycin	5 (21.74%)	
Co-trimoxazole	2 (18.18%)	
Doxycycline	3 (12.50%)	4 (100%)
Erythromycin	18 (81.82%)	5 (100%)
Gentamicin	10 (52.63%)	5 (83.33%)
Levofloxacin	15 (100.00%)	
Linezolid	1 (4.35%)	0 (0%)
Minocycline	6 (27.27%)	5 (83.33%)
Moxifloxacin	1 (25.00%)	
Norfloxacin		
Penicillin	20 (100.00%)	2 (50%)
Rifampicin	3 (13.64%)	5 (100%)
Teicoplanin		1 (25%)
Tigecycline		0 (0%)
Vancomycin	1 (4.35%)	2 (33.33%)

The results of susceptibility tests are summarized in Table II and III. Table II shows the antimicrobial susceptibility patterns of gram-positive isolates from specimens. Almost all of Staphylococcus aureus (87%) isolates were resistant to penicillin, ampicillin, levofloxacin, ceftriaxone & Cefoxitin. Approximately 18 (81%) exhibited resistance to erythromycin whereas 1 (4.3%) was resistant to vancomycin.

Table III shows the antimicrobial susceptibility patterns of gram negative isolates from specimens. High levels of resistance to amoxicillin/Clavulanic acid 15 (93.57%), ampicillin 20 (100%), ciprofloxacin 17 (89.47%) and co-trimoxazole12 (85.71%) was seen in *Escherichia coli*. More than half of the isolates of Pseudomonas aeruginosa were resistant to ciprofloxacin, gentamicin, imipenem, and levofloxacin.

Discussion

Diabetic foot ulcers are often non-healing due to several underlying factors and complications such as neuropathy, peripheral vascular disease and high plantar pressures[12], they are one of the main reasons of hospitalization of persons with diabetes with super added infections and subsequent impaired healing. Proper management and care of diabetic foot infection can decrease the frequency of infection-associated morbidity, need for hospitalization and incidence of limb amputations. One of the reasons for poorly managed diabetic infections are the lack of understanding of the microbial prevalence and effective therapeutic regimens.[13]

In this study, the predominant pathogens are gram-negative bacteria; *Escherichia coli* being common etiological agent followed by *Staphylococcus aureus* and *Klebsiella pneumonia*. Similarly, in another study gram-negative bacteria were also the most common pathogen with *Proteus Mirabilis* being the dominant one.[14] There seems to be a change in the trend of the organisms causing infections as earlier studies have shown gram-positive bacteria as the predominant organism causing diabetic foot infection.[15,16]

Polymicrobial infection are seen in 25% specimens, whereas in two other studies it was seen in 51% and 50% specimens.[14,17] Monomicrobial cultures are more than polymicrobial cultures (73 vs 15) in this study with an average of 1.12 pathogen isolated per specimen. This ratio is less, compared to other studies, whose ratios were 1.85 and 1.5.[14,18] This can be attributed to the less severity of the foot infection and low pathogenicity of isolated organisms in this study. Severe infections usually yield polymicrobial isolates and in some cases, three or more organisms may be cultured.[18] In our study, no culture yielded more than two pathogens. Mild infections are

Table III : Antimicrobial Proportion Resistance (%) and It's Pattern of Gram Negative Bacterial Isolates from Infected Foot Ulcers in Diabetic Patients (99 Isolates)

Antimicrobial Agent	Escherichia Coli	Klebsiella Pneumonia	Pseudomonas Aeruginosa	Acinetobacter	Pseudomonas A Species	Proteus Mirabilis	Proteus Vulgaris	Klebsiella Oxytoca	Morganella Morganii	Citrobacter Species	Enterobacter Species
N	25	9	8	7	2	9	2	2	2	1	2
Amikacin	3 (12%)	4 (44.44%)	4 (50%)	6 (100%)	1 (50%)	1 (11.11%)	1 (50%)	1 (50%)	0 (0%)	0 (0%)	0 (0%)
Amoxicillin	1 (100%)					1 (100%)					
Amoxicillin/ClavulanicAcid	15 (93.75%)	3 (75%)				5 (71.43%)	1 (50%)		2 (100%)		1 (100%)
Ampicillin	20 (100%)	8 (100%)	1 (100%)	4 (100%)		6 (75%)	1 (100%)	2 (100%)	2 (100%)	1 (100%)	1 (100%)
Ampicillin/Sulbactam	11 (91.67%)			1 (100%0		0 (0%)	0 (0%)				
Aztreonam	22 (88%)	8 (88.89%)	5 (71.43%)		1 (50%)	2 (22.22%)	0 (0%)	1 (50%)	0 (0%)	1 (100%)	
Cefazolin	1 (100%)										
Cefepime	20 (83.33%)	9 (100%)	5 (62.50%)	6 (100%)	1 (50%)	2 (33.33%)	1 (50%)	1 (50%)	1 (50%)	1 (100%)	
Cefixime	1 (100%)						1 (100%)				
Cefoperazone /Sulbactam	7 (38.89%)	3 (33.33%)	1 (100%)	6 (100%)		1 (12.5%)	0 (0%)	1 (50%)	0 (0%)	0 (0%)	0 (0%)
Cefotaxime	8 (80%)	2 (100%)		2 (100%)		0 (0%)	1 (100%)	1 (100%)	0 (0%)		1 (100%)
Ceftazidime	13 (81.25%)	5 (100%)	4 (50%)	7 (100%)	1 (100%)	1 (25%)	0 (0%)	1 (100%)	0 (0%)	1 (100%)	1 (100%)
Ceftriaxone	15 (83.33%)	8 (100%)		6 (100%)		2 (28.57%)	0 (0%)	1 (50%)	1 (100%)	1 (100%)	1 (100%)
Cefuroxime	5 (100%)										
Chloramphenicol						1 (100%)					
Ciprofloxacin	17 (89.47%)	5 (71.43%)	5 (62.50%)	6 (100%)	2 (100%)	3 (33.33%)	2 (100%)	0 (0%)	1 (50%)	0 (0%)	
Colistin/Polymixin B	0 (0%)	0 (0%)		0 (0%)		3 (60%)		0 (0%)	0 (0%)	0 (0%)	
Co-Trimoxazole	12 (85.71%)	4 (80%)		4 (100%)		6 (75%)	1 (100%)	1 (50%)	1 (100%)	1 (100%)	1 (100%)
Doxycycline	10 (76.92%)	3 (75%)		0 (0%)		1 (100%)	1 (100%)				
Erythromycin											
Gentamicin	10 (50%)	4 (57.14%)	4 (57.14%)	6 (100%)	1 (100%)	2 (40%)	1 (100%)	1 (50%)	1 (100%)	0 (0%)	
Imipenem	4 (20%)	3 (50%)	4 (57.14%)	3 (100%0	2 (100%)	3 (33.33%)	2 (100%	1 (50%)	1 (100%)	0 (0%)	
Levofloxacin	14 (77.78%)	3 (50%)	4 (57.14%)		1 (100%)	1 (14.29%)	1 (100%)	1 (50%)	0 (0%)		0 (0%)
Meropenem	2 (18.18%)	3 (42.86%)	1 (50%)	5 (100%)		1 (20%)		1 (50%)	0 (0%)		0 (0%)
Minocycline	3 (37.50%)			0 (0%)							
Piperacillin/Tazobactam	10 (41.67%)	4 (44.44%)	4 (57.14%)	7 (100%)	0 (0%)	1 (11.11%)	1 (50%)	1 (50%)	0 (0%)	0 (0%)	1 (50%)
Tobramycin	1 (100%)										

frequently monomicrobial.

In our study, Staphylococcus aureus isolates are found to be susceptible to vancomycin (95%) but in other studies, susceptibility to vancomycin was 100%.[14,17] Resistance is seen against most of the antibiotics such as penicillin, ciprofloxacin, ceftriaxone except gentamicin. A similar trend was seen in another study but in our case, erythromycin is resistant to most of the pathogens (81.82%) but in the referenced study, erythromycin was almost 70% sensitive.[14] Enterococcus showed varying susceptibility to antibiotics, but it is uniformly resistant to ampicillin and 33% resistant to vancomycin this is alarming because these results are different from results of a 2012 study done in Iran in which only 4% of *Enterococcus* isolates were resistant to ampicillin and almost all isolates were susceptible to vancomycin.[22] This shows that over the years the susceptibility pattern of *Enterococcus* is changing and empirical use of these antibiotics in diabetic foot ulcer (infected) should not be encouraged.

Of the 8 strains of Pseudomonas aeruginosa screened, more than half showed resistance to amikacin, gentamicin, and imipenem. Intermediate resistance is seen towards ciprofloxacin (62.5%). The resistance pattern of Pseudomonas aeruginosa is similar to findings of a study done in Italy in which the microbe showed similar resistance to ciprofloxacin but least resistance to amikacin which is a different pattern compared to our result.[19]

Proteus mirabilis strains are often least resistant to ciprofloxacin (33%) and gentamicin (40%) but resistance against ampicillin (75%) and amoxicillin/clavulanic acid (71.43%) was more. But, in a 2012 study done in Kuwait, Proteus mirabilis showed around 13% resistance towards ciprofloxacin, 23% towards gentamicin, 45% towards ampicillin and 28% towards amoxicillin/clavulanic acid. It is apparent that over the years, the resistance of antibiotics mostly used in empirical therapy is increasing and approach towards them should be reconsidered.[20]

Increased resistance to cefepime and ceftriaxone is observed among Escherichia coli and Klebsiellapneumoniae. Escherichia coliis least resistant to amikacin and meropenem. The resistance of many isolates of both species can be explained by the production of extended-spectrum beta-lactamases (ESBL) rendering them resistant to extended-spectrum cephalosporins.[21] Similar susceptibility results of E. coli were observed in a study conducted in India where resistance to cefepime was maximum and to meropenem was minimum.[23]

The limitations of our study included a lack of easy access for tissue cultures and clinical signs of infections. In future, more studies are recommended in this region to isolate the common organisms in diabetic foot patients and their susceptibility to different drugs at an earlier stage and to use appropriate antibiotics inorder to decrease Multi Drug Resistance (MDR) organisms.

Conclusion

This study shows that the most common pathogen isolated from diabetic foot ulcers is Escherichia coli. Multi-Drug-Resistant organisms are alarmingly high in the diabetic foot ulcers. Vancomycin, colistin/ polymixin, and imipenem are the only effective drugs against Multi-Drug Resistance organisms. The antibiogram of this study suggests that most pathogens remain sensitive to a few agents, but resistance is on the rise.

REFERENCES

1. Meo SA, Zia I, Bukhari IA, Arain SA. Type 2 diabetes mellitus in Pakistan: Current prevalence and future forecast. J Pak Med Assoc. 2016;66(12):1637–42.
2. Gregg EW, Sattar N, Ali MK. The changing face of diabetes complications. The lancet Diabetes & endocrinology. 2016 ;4(6):537-47.
3. Armstrong DG, Boulton AJ, Bus SA. Diabetic foot ulcers and their recurrence. New England Journal of Medicine. 2017 ;376(24):2367-75.
4. Margolis DJ, Malay DS, Hoffstad OJ, Leonard CE, MaCurdy T, de Nava KL et al. Incidence of diabetic foot ulcer and lower extremity amputation among Medicare beneficiaries, 2006 to 2008. InData Points Publication Series [Internet] 2011 Feb 17. Agency for Healthcare Research and Quality (US)
5. Zubair M, Malik A, Ahmad J. Incidence, risk factors for amputation among patients with diabetic foot ulcer in a North Indian tertiary care hospital. The Foot. 2012 ;22(1):24-30.
6. Schaper NC, Van Netten JJ, Apelqvist J, Lipsky BA, Bakker K. International Working Group on the Diabetic Foot (IWGDF). Prevention and management of foot problems in diabetes: a Summary Guidance for Daily Practice 2015, based on the IWGDF Guidance Documents. Diabetes/metabolism research and reviews. 2016 ;32:7-15.
7. Li X, Xiao T, Wang Y, Gu H, Liu Z, Jiang Y, et al. Incidence, risk

factors for amputation among patients with diabetic foot ulcer in a Chinese tertiary hospital. Diabetes research and clinical practice. 2011 Jul 1;93(1):26-30.

8. Tiwari S, Pratyush DD, Dwivedi A, Gupta SK, Rai M, Singh SK. Microbiological and clinical characteristics of diabetic foot infections in northern India. J Infect Dev Ctries. 2012;6(4):329–32.
9. Ramakant P, Verma AK, Misra R, Prasad KN, Chand G, Mishra A, et al. Changing microbiological profile of pathogenic bacteria in diabetic foot infections: time for a rethink on which empirical therapy to choose? Diabetologia [Internet]. 2011 Jan;54(1):58–64.
10. Tacconelli E. Antimicrobial use: risk driver of multidrug resistant microorganisms in healthcare settings. Curr Opin Infect Dis 2018;22(4):352–8.
11. CLSI. Performance Standards for Antimicrobial Susceptibility Testing. 28TH ed. CLSI supplement M100. Wayne, PA: Clinical and Laboratory Standards Institute; 2018.
12. Bakker K, Apelqvist J, Schaper NC, International Working Group on the Diabetic Foot Editorial Board. Practical guidelines on the management and prevention of the diabetic foot 2011. Diabetes/metabolism research and reviews. 2012;28:225-31.
13. Alavi A, Sibbald RG, Mayer D, Goodman L, Botros M, Armstrong DG, et al. Diabetic foot ulcers: Part I. Pathophysiology and prevention. Journal of the American Academy of Dermatology. 2014;70(1):1-e1.
14. Dwedar R, Ismail DK, Abdulbaky A. Diabetic foot infection: microbiological causes with special reference to their antibiotic resistance pattern. The Egyptian Journal of Medical Microbiology. 2015 ;38(3174):1-8.
15. Mantey I, Hill RL, Foster A V, Wilson S, Wade JJ, Edmonds ME. Infection of foot ulcers with Staphylococcus aureus associated with increased mortality in diabetic patients. Commun Dis public Heal [Internet]. 2000 Dec [cited 2018 Dec 2];3(4):288–90.
16. Dang CN, Prasad YDM, Boulton AJM, Jude EB. Methicillin-resistant Staphylococcus aureus in the diabetic foot clinic: a worsening problem. Diabet Med [Internet]. 2003 Feb [cited 2018 Dec 2];20(2):159–61.
17. Yasin M, Zafar S, Rahman H, Khan TA, Nazir S, Shah S, et al. Baseline characteristics of infected foot ulcers in patients with diabetes at a tertiary care hospital in Pakistan. J Wound Care [Internet]. 2018 Oct 1;27(Sup10):S26–32.
18. Akhi MT, Ghotaslou R, Asgharzadeh M, Varshochi M, Pirzadeh T, Memar MY, Bialvaei AZ, Sofla HS, Alizadeh N. Bacterial etiology and antibiotic susceptibility pattern of diabetic foot infections in Tabriz, Iran. GMS hygiene and infection control. 2015;10.
19. Bessa LJ, Fazii P, Di Giulio M, Cellini L. Bacterial isolates from infected wounds and their antibiotic susceptibility pattern: some remarks about wound infection. International wound journal. 2015;12(1):47-52.
20. Benwan K Al, Mulla A Al, Rotimi VO. A study of the microbiology of diabetic foot infections in a teaching hospital in Kuwait. J Infect Public Health 2018;5(1):1–8.
21. Versalovic, J. Manual of clinical microbiology. 10th ed. Washington, DC: ASM press; 2011.
22. Rouhipour N, Hayatshahi A, Nikoo MK, Yazdi NM, Heshmat R, Qorbani M. Clinical microbiology study of diabetic foot ulcer in Iran; pathogens and antibacterial susceptibility. Afr J Microbiol Res.. 2012;6(27):5601-8.
23. Sekhar SM, Vyas N, Unnikrishnan MK, Rodrigues GS, Mukhopadhyay C. Antimicrobial susceptibility pattern in diabetic foot ulcer: A pilot study. Annals of medical and health sciences research. 2014;4(5):742-5.

ORIGINAL ARTICLE

Association of Acute Coronary Syndrome with Waist Hip Ratio in Local Population of Islamabad Capital Territory, Pakistan

Hesham Naeem[1], Farrah Qayyum[2], Hina Qayyum[3], Saba Murad[4], Zara Khalid[5]

ABSTRACT

Objective: To determine the frequency and association of waist-hip ratio with acute coronary syndrome in local population of Islamabad, Pakistan.

Study Design: Analytical cross-sectional.

Place and Duration of Study: The study was carried out in the department of Cardiology, Pakistan Institute of Medical Sciences, Islamabad for the duration of six months (December 2014-June 2015).

Materials and Methods: A total of 388 patients presented with acute coronary syndrome which included patients with unstable angina, non-ST elevation and ST elevation MI. Non-probability purposive sampling was used for sample selection. After taking informed consent, a self-structured questionnaire was used to collect the data. Waist-hip ratio was assessed using tape measure. Waist circumference was measured between the last rib and iliac crest, whereas the measurement of hip circumference was done at the level of greater trochanters. A waist-hip ratio of >0.85 for females and >0.9 for males was taken as abnormal. Data was analyzed on SPSS Version 17.0. Chi square test was applied to find out the association between waist-hip ratio and other variables whereas p- value of < 0.05 was considered as significant.

Results: Out of total 388 acute coronary syndrome patients, 70.9% patients were males and 29.1% were females. The mean age of these patients was 47.5±18.46 years. Out of the total study population, 59.5% patients of ACS had abnormal waist hip ratio (>0.9). Among the patients having abnormal waist hip ratio, 62.9% were males and 51.3% were females. 71.6% patients presented with STEMI, 18.8% with NSTEMI and 9.5% with unstable angina. Chi square test depicted non-significant association of waist-hip ratio with ACS (p>0.05). A significant association was found between WHR and gender (p<0.05).

Conclusion: There is no significant association between waist-hip ratio and acute coronary syndrome. The frequency of acute coronary syndrome is highest among males, with maximum prevalence of STEMI, followed by NSTEMI and unstable angina.

Key Words: *Acute Coronary Syndrome, Coronary Artery Disease, Obesity, Waist-Hip Ratio.*

Introduction

One of the highest reasons of mortality in developing countries is attributed to cardiovascular diseases, which refer to a group of cardiac conditions which include coronary heart disease (CHD), coronary artery disease (CAD) and acute coronary syndrome (ACS). ACS is associated with myocardial infarction (MI) and is usually symptomatic such as the presence of unstable angina.[1] A report by the Heart Disease and Stroke Statistics update of the American Heart Association in 2016 showed that CHD is prevalent in 15.5 million individuals aged > 20 years, and there was a proportional increase in prevalence with age in both genders.[2] One third of all the fatalities in persons aged 35 years and above occurs due to CHD.[3] In Pakistan, acute coronary syndrome is more prevalent in males.[4]

Risk of heart diseases increases in the presence of risk factors. A most common modifiable risk factor is sedentary lifestyle or physical inactivity leading to obesity.[5] Globally, overweight and obesity are being considered as main public health issues due to their relation with various chronic diseases for instance type 2 diabetes, cardiovascular diseases and cancers.[6] There are multiple means of estimating the

[1]*Department of Cardiology*
Rawalpindi Institute of Cardiology, Rawalpindi
[2]*Department of Medicine*
Yusra Medical and Dental College, Islamabad
[3]*Department of Paediatrics*
Bahria University Medical and Dental College, Karachi
[4,5]*Department of Rehabilitation*
Foundation University, Islamabad

Correspondence:
Dr. Zara Khalid
Department of Rehabilitation
Foundation University, Islamabad
E-mail: zara_awan@hotmail.com

Funding Source: NIL; Conflict of Interest: NIL
Received: January 01, 2019; Revised: March, 2019
Accepted: July 15, 2019

body size or excess body weight, of which the most commonly used method, is the traditional measurement of body mass index (BMI). However in the last few years, alternative measures of central adiposity, namely waist-height ratio, waist circumference and waist-hip ratio (WHR) have been found to be better for prediction of CVD risks as compared to BMI, due to their accurate depiction of body fat distribution.[7,8] It is also due to the fact that multiple metabolic abnormalities are associated with increased visceral adiposity. These include a decrease in glucose tolerance, reduction in insulin sensitivity and deranged lipid profile, all of which are CVD and type 2 diabetes risk factors.[9]

There is found to be uncertainty and variation regarding the performance of these anthropometric measures across different ethnicities. Among the Asian population, central obesity is emerging as a problem, as these individuals have large waist circumference (WC), but a normal BMI. As per WHO guidelines, BMI 25-29.9 kg/m^2 which lies in overweight category, corresponds with a WC of 80.0-87.9 cm in women and 94.0-101.9 cm in men and a WHR of 0.9 and 0.85 in males and females respectively. Yet these values are derivative of Caucasians, and might not be applicable for the non-Caucasian population. It is still unclear that which of the afore-mentioned measures has a strong association with the risk of developing cardiovascular disease in various ethnicities.[6]

It is reported in literature that waist hip ratio is the most useful and favored method of measuring obesity for the purpose of identification or prediction of CVD risk factors.[10,11] Risk stratification is an essential part of initial diagnosis and management of acute coronary syndrome. Hence the value of assessment of waist-hip ratio as a quantifiable measure of obesity, during physical examination of at-risk patients still needs to be determined in our population. As per our knowledge, data regarding the relation of these measures with cardiac diseases in Pakistani population is still lacking. Therefore, this study was carried out to determine the frequency and association of waist-hip ratio with acute coronary syndrome (ACS) in local population of Islamabad.

Materials and Methods

An analytical cross-sectional study was conducted on 388 patients with acute coronary syndrome reporting to Cardiology department of Pakistan Institute of Medical Sciences, Islamabad. This study spanned over duration of six months (December 2014-June 2015). Sample calculation was done using Rao soft sample size calculator, while keeping 95% confidence interval and 5% margin of error. Non-probability purposive sampling technique was employed. The inclusion criteria comprised of 30-70 years aged male and female patients, presenting with coronary artery disease or acute coronary syndrome consisting of non-ST elevation myocardial infarction, ST elevation MI and unstable angina. The patients with chronic kidney disease, compensated or decompensated liver disease or with gestation were not included the study. Ethical approval was obtained from the ethics review committee of Pakistan Institute of Medical Sciences, Islamabad. Informed consent from all participants was taken after explaining the study procedure. Demographic data was recorded using a self-structured questionnaire. Waist-hip ratio was assessed by measuring the waist and hip circumference with a tape measure. The subjects were instructed to stand straight with feet closed together, arms at sides and even distribution of body weight. The measurement of waist circumference was done mid-way between the last rib and iliac crest, whereas hip circumference was measured at the level of greater trochanters, with legs close together. A waist-hip ratio of >0.85 for females and >0.9 for males was taken as abnormal.[12] Statistical analysis of data was done on SPSS (Version 17, SPSS Inc, and USA). Frequencies and percentages were used to express the categorical variables. Chi square test was applied to find out the association between waist-hip ratio and other variables whereas p- value of ≤ 0.05 was considered as significant.

Results

The sample comprised of 388 ACS patients including 275 (70.9%) males and 113 (29.1%) females. (Table I) The mean age of the sample was 47.5±18.46 years.

In this study the patients were divided into three categories according to their diagnosis. The results showed 278 (71.6%) patients presenting with ST elevation myocardial infarction (STEMI), 73 (18.8%) with non-ST segment elevation myocardial infarction (NSTEMI) and 37 (9.5%) with unstable angina. Gender wise distribution of the 3 types of ACS

presentation has been shown in Table I. Chi square test of association showed non-significant association of waist-hip ratio and acute coronary syndrome (p>0.05). (Table II)

Out of total 388 patients, 231 (59.5%) had abnormal waist hip ratio. Among the patients having abnormal waist hip ratio, there were 173 (62.9%) males and 58 (51.3%) females. Chi square test of association depicted significant association of gender with waist-hip ratio (p<0.05). (Table III)

Table I: Demographics and Presentation of ACS Subjects (N=388)

Diagnosis	Males N (%age)	Females N (%age)
Total ACS patients	275 (70.9%)	113 (29.1%)
1. STEMI	195 (70.9%)	83(73.5%)
2. Non-STEMI	55(20%)	18(15.9%)
3. Unstable Angina	25(9.1%)	12(10.6%)

Table II: Association of Waist-Hip Ratio with Different Types of ACS

Variables		Waist-hip ratio		p-value
		Normal** (n)	Abnormal*** (n)	
Diagnosis	STEMI	115	163	0.422
	Non-STEMI	25	48	
	Unstable Angina	17	20	

**Normal WHR (≤ 0.85 for Female, ≤0.9 for Male)

***Abnormal WHR (> 0.85 for Female & >0.9 for Male)

Table III: Association of Waist-Hip Ratio with Gender (Males & Females)

Variables		Waist-hip ratio		p-value
		Normal** (n)	Abnormal*** (n)	
Gender	Males	102	173	0.035*
	Females	55	58	

* Shows Significant Value p < 0.05

**Normal WHR (≤ 0.85 for Female, ≤0.9 for Male)

***Abnormal WHR (> 0.85 for Female & >0.9 for Male)

Discussion

This study was conducted to find out the frequency and association of waist-hip ratio with acute coronary syndrome (ACS) in local population of Islamabad. The patients were divided into three distinct categories according to the type of acute coronary syndrome with which they presented to hospital.

We observed a majority of sample presenting with ST elevation myocardial infarction (STEMI) which was the most frequent type of ACS among both genders, followed by non ST elevation myocardial infarction (NSTEMI), and then unstable angina. These results are similar to the results of a study conducted in 2013 on the role of central obesity in risk stratification after an acute coronary event, in which total 285 patients were admitted wherein 96.1% reported myocardial infarction (STEMI and NSTEMI) and 3.9% had unstable angina.[13] Regarding gender distribution, 71% of our sample comprised of male patients with ACS and only approximately 29% females. As per a review article on gender differences in coronary heart diseases, the development of cardiovascular diseases occurs 7-10 years later in women as compared to men. The risk of developing heart diseases is quite often underestimated in women and the resulting under-recognition along with different clinical presentation leads to a reduced representation of females in studies and clinical trials.[14]

There are various measures to assess abdominal adiposity as a means of predicting CVD risk factors, of which waist-hip ratio (WHR) is the most favored. In the current study, more than half almost 60% of the sample had abnormal waist-hip ratio, higher than the normative standard. A study on central obesity and mortality risk in older adults with coronary artery disease concluded that higher values of waist hip ratio are predictive of a greater risk of mortality. [15]

In our study, we found a non-significant association between waist hip ratio and acute coronary syndrome. Our results support the findings of a study on relationship of physical fitness v/s BMI with CAD and cardiovascular events in women which also showed that after adjusting for other risk factors, BMI and other abdominal obesity measures (WHR, waist circumference) were not significantly associated with coronary artery disease or its adverse effects (p=0.05-0.88). Rather physical fitness and functional capacity were more important and were significantly associated with cardiovascular outcomes such as ACS.[16] No significant association was found between abnormal waist-hip ratio and acute coronary syndrome possibly because acute coronary syndrome is multi-factorial and depends on

other risk factors as well. Contrary to this, a study on impact of body mass index and WHR on clinical outcomes in patients with STEMI showed that highest WHR was one of the mortality risk factors due to ACS. Yet this study also recommended further observing these associations in larger population cohort studies.[17]

The results of the current study also found that waist hip ratio was significantly associated with gender, wherein the proportion of males was higher in abnormal WHR category as compared to females. This is in contradiction to a study done on southern Chinese population which showed that abdominal obesity was more prevalent in females. Gender differences could be explained by the hormonal changes and varying physical activity levels in males and females.[18]

Overweight and obesity, be it central or abdominal, poses many challenges for treatment of coronary heart diseases. The cornerstone of primary prevention is the assessment of atherosclerotic cardiovascular disease risk which includes estimation of multiple risk factors. Management of obesity along with associated increase in physical activity and cardiorespiratory fitness levels is currently being recommended for a subsequent reduction in cardiovascular morbidity and mortality burden.[19,20]

The current study has been conducted in only one hospital of Islamabad limiting the generalization of the results to whole population. However, future studies on larger samples and in multiple settings are recommended to observe the association of ACS with other probable risk factors using objective measures.

Conclusion

Based on the results of statistical data analysis we conclude that there is no significant association between waist-hip ratio and acute coronary syndrome. The frequency of acute coronary syndrome is highest among males, with maximum prevalence of STEMI, followed by NSTEMI and unstable angina. Furthermore, a significant association exists between WHR and gender.

REFERENCES

1. Lippi G, Sanchis-Gomar F, Cervellin G. Chest pain, dyspnea and other symptoms in patients with type 1 and 2 myocardial infarction. A literature review. International journal of cardiology. 2016;215:20-2.
2. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. Executive summary: heart disease and stroke statistics-2016 update: a report from the American Heart Association. Circulation. 2016;133(4):447-54.
3. Rosamond W, Flegal K, Furie K, Go A, Greenlund K, Haase N, et al. Heart disease and stroke statistics—2008 update. Circulation. 2008;117(4):e25-e146.
4. Jafary MH, Samad A, Ishaq M, Jawaid SA, Ahmad M, Vohra EA. Profile of acute myocardial infarction (AMI) in Pakistan. Pakistan Journal of Medical Sciences. 2007;23(4):485.
5. Leischik R, Dworrak B, Strauss M, Przybylek B, Schöne D, Horlitz M, et al. Plasticity of health. German Journal of Medicine. 2016;1:1-17.
6. Huxley R, Mendis S, Zheleznyakov E, Reddy S, Chan J. Body mass index, waist circumference and waist: hip ratio as predictors of cardiovascular risk—a review of the literature. European journal of clinical nutrition. 2010;64(1):16.
7. Welborn T, Dhaliwal S. Preferred clinical measures of central obesity for predicting mortality. European journal of clinical nutrition. 2007;61(12):1373.
8. Ashwell M, Hsieh SD. Six reasons why the waist-to-height ratio is a rapid and effective global indicator for health risks of obesity and how its use could simplify the international public health message on obesity. International journal of food sciences and nutrition. 2005;56(5):303-7.
9. Organization WH. Waist circumference and waist-hip ratio: report of a WHO expert consultation, Geneva, 8-11 December 2008. 2011.
10. Welborn TA, Dhaliwal SS, Bennett SA. Waist-hip ratio is the dominant risk factor predicting cardiovascular death in Australia. Medical journal of Australia. 2003;179(11/12):580-5.
11. Dalton M, Cameron A, Zimmet P, Shaw J, Jolley D, Dunstan D, et al. Waist circumference, waist–hip ratio and body mass index and their correlation with cardiovascular disease risk factors in Australian adults. Journal of internal medicine. 2003;254(6):555-63.
12. Organization WH. Obesity: preventing and managing the global epidemic: report of a WHO consultation on obesity, Geneva, 3-5 June 1997. Geneva: World Health Organization; 1998.
13. Martins A, Ribeiro S, Gonçalves P, Correia A. Role of central obesity in risk stratification after an acute coronary event: Does central obesity add prognostic value to the Global Registry of Acute Coronary Events (GRACE) risk score in patients with acute coronary syndrome? Revista Portuguesa de Cardiologia (English Edition). 2013;32(10):769-76.
14. Maas AHEM, Appelman YEA. Gender differences in coronary heart disease. Netherlands Heart Journal. 2010;18(12):598-603.
15. Sharma S, Batsis JA, Coutinho T, Somers VK, Hodge DO, Carter RE, et al., editors. Normal-weight central obesity and mortality risk in older adults with coronary artery disease. Mayo Clinic Proceedings; 2016: Elsevier.
16. Wessel TR, Arant CB, Olson MB, Johnson BD, Reis SE, Sharaf BL, et al. Relationship of physical fitness vs body mass index

with coronary artery disease and cardiovascular events in women. Jama. 2004;292(10):1179-87.

17. Lee S-H, Park J-S, Kim W, Shin D-G, Kim Y-J, Kim D-S, et al. Impact of body mass index and waist-to-hip ratio on clinical outcomes in patients with ST-segment elevation acute myocardial infarction (from the Korean Acute Myocardial Infarction Registry). The American journal of cardiology. 2008;102(8):957-65.
18. Hu L, Huang X, You C, Li J, Hong K, Li P, et al. Prevalence of overweight, obesity, abdominal obesity and obesity-related risk factors in southern China. PloS one. 2017;12(9):e0183934.
19. Lavie C, Arena R, Alpert M, Milani R, Ventura H. Management of cardiovascular diseases in patients with obesity. Nature reviews Cardiology. 2018;15(1):45.
20. Arnett DK, Blumenthal RS, Albert MA, Michos ED, Buroker AB, Miedema MD, et al. 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease. Journal of the American College of Cardiology. 2019:26029.

ORIGINAL ARTICLE

Comparison between Hydro Dilatation and Intra Articular Steroid Injection in Patients with Frozen Shoulder in Term of Pain Relief and Range of Movement

Raja Adnan Ashraf[1], Sohail Iqbal Sheikh[2], Nabeel Sabir[3]

ABSTRACT

Objectives: To compare the effect of intra articular steroid injection and hydro dilatation of the shoulder joint to improve disability and pain management in adhesive capsulitis.

Study Design: Randomized controlled trial.

Place and Duration of Study: The study was carried out at the department of Orthopaedics, from 25th June 2017 to 24th July 2018.

Materials and Methods: Diagnosed cases of Adhesive Capsulitis in outpatient clinic of Orthopaedics from both genders were part of the study. A total of 30 patients presented in Orthopaedics outpatient department were randomized into 2 groups by lottery method; group A received Intra-articular steroid injection and group B was treated with hydraulic dilatation of the glenohumeral joint. Both groups received regular, supervised physiotherapy sessions during follow up visits. Patient's pain scores and range of mobility were observed over a period of twelve weeks. Follow up reviews were done at intervals of 2, 6, 8 and 12 weeks. Data analysed with SPSS version 23.

Results: Total 18 female and 12 male patients were included in analysis. Results were categorized into excellent, good, fair and poor, over parameters like Visual Analogue Scale and range of motion (ROM). During follow up visits, 4% of patients from Group A and 36% of the patient from Group B had excellent, 56% from Group A and 34% from Group B had good, 26% from Group A and 24% from Group B had fair, while 14% from Group A and only 6% from Group B had poor results . Group B showed significantly improved pain scores and mobility.

Conclusion: Based on results of our study, distension of glenohumeral joint with normal saline in patients of frozen shoulder produces significant pain relief and improves range of motion as compared to intra articular steroid injection.

Key Words: *Adhesive Capsulitis, Hydrotherapy, Intra-Articular Injection.*

Introduction

Adhesive Capsulitis is a commonly prevalent shoulder joint pathology among adult population.[1] In diabetics the incidence is nearly 20% while in general population an overall prevalence ratio is 3-5%.[2] Females have higher incidence than males during their fourth to sixth decade of life.[3] This is a chronic condition and its exact aetiology remains unknown.[4] It is characterized by the formation of adhesions at the synovium and capsule of the shoulder joint due some sort of inflammation and the primary site of adhesions is the axillary fold, junction of capsule and anatomical neck of humerus.[5]

Different treatment options are available for frozen shoulder with individual limitations.[6] Manipulation under anaesthesia (MUA) is frequently used treatment modality for frozen shoulder syndrome but is associated with risks such as fracture of the humerus, rotator-cuff tears, and tears of the labarum or injury to the brachial plexus.[7] Intra articular steroid injection may benefit some patients.[8] Arthroscopic release under anaesthesia is invasive procedure with restricted known benefits.[9] Intensive physical therapy has slow outcomes in improvement of range of motion.[10] Home exercise regimens do not show any significant betterment in natural recovery.[11] Besides above mentioned treatments, there are documented literary evidences in favour of hydro

[1,2]*Department of Orthopaedics*
Islamic International Medical College
Riphah International University, Islamabad
[3]*Department of Orthopaedics*
Benazir Bhutto Hospital, Rawalpindi

Correspondence:
Dr. Raja Adnan Ashraf
Assistant Professor
Department of Orthopaedics
Islamic International Medical College
Riphah International University, Islamabad
E-mail: dr.addi79@yahoo.com

Funding Source: NIL; Conflict of Interest: NIL
Received: May 28, 2019; Revised: August 26, 2019
Accepted: August 27, 2019

dilatation method for treatment of frozen shoulder.[12] After hydro dilation, there is lesser degree of disability and better outcome for the patients.[13] Simon Bell et al in his study demonstrated hydro dilatation of the shoulder as a very effective management option in adhesive capsulitis. It involves the technical ability to get maximum distension.[14] In the literature there is no evidence that suggest specific subgroup in the population have an increased risk of frozen shoulder compare with other population.[15]

The rationale of this study is to apply, assess and promote the use of hydro dilation therapy in the management of adhesive Capsulitis in our practice if the results are favourable, because technically it is easier and safe and there is limited research data available on this modality of treatment in our country, while it is being practiced successfully in other parts of the world. Also theoretically there is less chance of morbidity like infection with the use of this method as compared with steroid injection. Thus this study was carried out to compare the effect of intra articular steroid injection and hydro dilatation of the shoulder joint to improve disability and pain management in Adhesive Capsulitis.

Materials and Methods

A randomized controlled study conducted in Orthopaedic outpatient department of Pakistan Railways General Hospital, Rawalpindi between 25th June 2017 and 24th July 2018 for a period of 13 months. Study was commenced after being approved from the ethical board committee of the hospital. Selected patients were given written informed consent. 30 patients ranging from 40-60 years of age who presented with frozen shoulder having pain, stiffness, limited range of motion (ROM) for a minimum of two months without any prior history of trauma were included in the study on the basis of convenience sampling. 30 diagnosed patients of Adhesive Capsulitis were randomized into 2 groups by lottery method. Group-A patients (n=15) received Intra-articular steroidal injection while group B (n=15) were managed with hydro dilatation. The clinical assessment was recorded on study performa by the researcher trainee. After the injection, all patients were advised domestic physiotherapy sessions. Patients were on regular follow up in outpatient department for three months after 2, 6, 8 and 12 weeks.

Patients having serious pathologies like previous fracture of ipsilateral humerus, rheumatoid arthritis, osteoarthritis of shoulder, having major medical disorders, immunocompromised and history of allergic reaction to local anaesthetics were left out of the study. Data analysed with SPSS version 23.

The patient evaluation was done on the parameters of pain as assessed on visual analogue pain scoring and range of motion assessed in degrees of arc.

Intra-articular Injection: Patient was placed supine over a table with supporting pillow under opposing shoulder. Portal of entry was marked on skin by a pen at the point 3-cm inferior and 1-cm medial to postero-lateral tip of acromion. All septic measures were properly taken. A mixture of 1cc 2% Lidocaine HCl and 2 ml (80mg) methylprednisolone acetate was injected through conventional posterior route for arthroscopy of shoulder. After successfully traversing the posterior soft spot between teres minor and infraspinatus muscles, a 22 gauge spinal needle was inserted with tip pointing anteriorly toward coracoid process. The position was checked frequently and mixture was injected slowly to achieve maximum possible joint infiltration.

Technique of Hydraulic Distension: Under aseptic measures, a 22-gauge, 3.5 inch needle was inserted superior to anatomical neck of humerus and injection was given under joint abducted to 90 degree and main joint flexed to 90 degree.[15] 4-ml local anaesthetic inserted mixed with 50-mL normal saline. Fluid was infiltrated slowly inside. This results in a loss of resistance. The needle was then removed. Rupture occured in almost all patients receiving hydrotherapy.

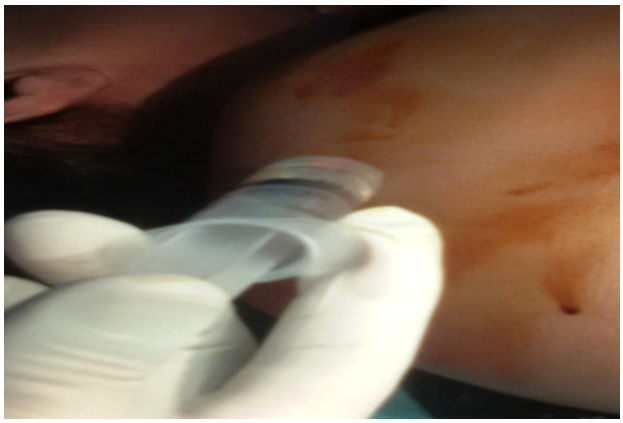

Fig 1: Water Being Injected for Hydrodilation

During preliminary interviewing, pain levels and mobility range were recorded and progressive records were maintained at intervals of 2, 6, 8 and 12 weeks respectively. The level of pain subjectively was measured using VAS while performing shoulder joint movements with 10 being the upper limit of pain and 0 consider as no pain. ROM was calculated with a goniometer in abduction and external rotation planes. Data was collected in the form of variables and analysed using SPSS version 23. Percentages were calculated for qualitative data i.e., gender. Chi-square test was employed for comparing the differences between the clinical assessments in 2 groups. P-value < 0.05 was considered statistically significant.

Results

Results were categorized into excellent, good, fair and poor, over parameters like Visual Analogue Scale and range of motion (ROM). During follow up visits, 4% of patients from Group A and 36% of the patient from Group B had excellent, 56% from Group A and 34% from Group B had good, 26% from Group A and 24% from Group B had fair, while 14% from Group A and only 6% from Group B had poor results . Group B showed significantly improved pain scores and mobility. The mean pain level in group A before intervention was 9 that reduced to a mean level of 4 while in Group B the pain level before intervention was 8 that reduced to mean of 2 pain level.

At baseline, there was insignificant difference was between the groups in terms of VAS and ROM. Pain improved markedly during all times of follow up particularly in group B. Range of active motion showed no notable variation at the base time between two groups. During Outpatient follow ups, at 4 regular intervals, abduction, flexion and external rotation showed significant difference between the groups with gradual improvement from week 2 to 8. No complication occurred in hydro dilatation group, while 3 patients receiving intra-articular steroidal injection complained of anterior shoulder pain. 5 patients from group A complained that pain took 2 to 3 days to settle. Only one patient from group B reported post distension symptom flare up, which settled within 48 hours. There was no marked difference between level of pain and disability scoring between frozen shoulder patients with and without diabetes initially, though long term improvement was found significantly better in diabetic patients who received hydro dilatation.

Table I. Mean ROM Pre-Hydro Dilatation in all Subjects n (30)

Aetiology Capsulitis	Patient Numbers (n=30)	External Rotation	Glenohumeral Abduction	Active Elevation
Group A	15	25-56	55-81	113-152
Group B	15	28-62	60-80	124-154

Table II: Mean ROM Post-Hydro Dilatation (HD) in all Subjects n(30)

Aetiology Capsulitis	Patient Numbers (n=30)	External Rotation	Glenohumeral Abduction	Active Elevation
Group A	15	45-76	75-130	133-162
Group B	15	42-68	80-120	128-158

Discussion

According to our results patients treated who were offered hydro dilatation for the treatment of Adhesive Capsulitis showed significant improvement as compared to the other group treated with intra articular steroid injection. Gam et al. demonstrated marked improvement in ROM in patients managed using hydro distension with corticosteroid compared with the corticosteroid alone.[16] In one of the studies undertaken by Harris et al. he was unable to find significant difference between groups. Conclusion however cannot be drawn, although mean improvement was similar in both groups.[17] In one study, ROM was almost equal in the two groups at follow-up, a result in accordance with Corbeil et al.[18] This lack of difference between groups may be due to inadequate hydro dilatation. In our study, a volume of around 50 ml was used with the actual volume infiltrated depending on distensibility of the capsule before rupturing. Other researchers have been using large amount of fluid, like Buchbinder et al. who on average infiltrated 43 ml.[19]

Various researchers have recommended hydro dilatation procedure based on results which were obtained with a standardized physiotherapy protocol.[20,21,22] In our study, all patients were subjected to a physiotherapy protocol. The frequency of injections infiltrated in our study was dependent upon previous studies done in the literature.[23,24] Most of the studies in literature have opted for a single injection trial. Some employed 3 injections, while Gam et al. reported infiltrating a total of 6 injections. Though under-powered, Gam's study showed that dilatation is superior to simple

injection by providing an improved ROM.[25] However, infiltrating 3 injections rather than one may have been unfortunate given the objective of study to identify the treatment effectiveness of hydro dilatation. There are chances that a corticosteroid injection may be causing improvement in this disease. Repeated injections may add up to this, creating a small margin for improvement. Whether hydro dilatation effects are cumulated if these infiltrations are repeated is still a topic of debate. It is rather a possibility that the effects of hydro dilatation might have been identified easily, if only a single injection was infiltrated.

The findings in our study are in favour of the use of hydro dilatation of the shoulder joint in comparison to intra-articular steroids in Adhesive Capsulitis. In addition, patients in group B revealed significantly better ROM plus better pain scores. Effects of hydrotherapy lasted much longer than the other group. Hydro dilatation was without complications and patients tolerated it very well. Hydro dilatation is a rather cost effective and better treatment modality when compared with intra-articular steroids, with minimal risk of complications. Study limitation included less number of patients in both groups with a minor trend of poor follow up.

Our study is however limited in terms of duration of the patients follow-up and further research must be encouraged in terms of long-term outcome of the patients treated with hydrotherapy for the management of Adhesive Capsulitis.

Conclusion

Capsular hydro dilatation compared with intra articular steroid injection improves outcome in Adhesive Capsulitis more effectively and can offer prompt improvement in range of motion. It can be employed as the first line intervention in the treatment of Adhesive Capsulitis targeting both pain relief and restoration of range of motion.

REFERENCES

1. Lin MT1, Hsiao MY2, Tu YK3, Wang TG1. Comparative Efficacy of Intra-Articular Steroid Injection and Distension in Patients with Frozen Shoulder: A Systematic Review and Network Meta-Analysis. 2018 Jul;99(7):1383-1394.
2. Kyung-Hee Kim,a Jung-Woo Suh,b and Ki Young Ohb. The effect of intra-articular hyaluronate and tramadol injection on patients with adhesive capsulitis of the shoulder. 2017; 30(4): 913–920.
3. S. Rymaruk1 and C. Peach1. Indications for hydrodilatation for frozen shoulder. 2017 Nov; 2(11): 462–468.
4. Wang W1, Shi M, Zhou C, Shi Z, Cai X, Lin T, Yan S. Effectiveness of corticosteroid injections in adhesive capsulitis of shoulder: A meta-analysis. 2017 Jul;96(28):e7529.
5. Buchbinder R, Hoving JL, Green S, Hall S, Forbes A. Short course prednisolone for adhesive capsulitis (frozen shoulder or stiff painful shoulder): a randomised, double blind, placebo controlled trial. Ann Rheum Dis. 2004, 63: 1460-1469.
6. Rangan A, Hanchard N, McDaid C. What is the most effective treatment for frozen shoulder?. BMJ. 2016 Aug 23;354.
7. De Palma AF. Loss of scapulohumeral motion (frozen shoulder). Clin Orthop Relat Res. 2008; 466(3):552–60.
8. Lee JC, Sykes C, Saifuddin A, Connell D. Adhesive capsulitis: sonographic changes in the rotator cuff interval with arthroscopic correlation. Skeletal Radiol. 2005; 34(9):522–7.
9. Mengiardi B, Pfirrmann CW, Gerber C, Hodler J, Zanetti M. Frozen shoulder: MR arthrographic findings. Radiology. 2004; 233(2):486–92.
10. Rutten MJ, Collins JM, Maresch BJ, Smeets JH, Janssen CM. Glenohumeral joint injection: a comparative study of ultrasound and fluoroscopically guided techniques before MR arthrography. Eur Radiol. 2009; 19(3):722–30.
11. Depelteau H, Bureau NJ, Cardinal E, Aubin B, Brassard P. Arthrography of the shoulder: a simple fluoroscopically guided approach for targeting the rotator cuff interval. AJR Am J Roentgenol. 2004; 182(2):329–32.
12. Robinson CM, Seah KT, Chee YH, Hindle P, Murray IR. Frozen shoulder. J Bone Joint Surg. 2012;94(1):1–9
13. Smith CD, Hamer P, Bunker TD. Arthroscopic capsular release for idiopathic frozen shoulder with intra-articular injection and a controlled manipulation. Ann R Coll Surg Engl. 2014; 96:55–60.
14. Hsu JE, Anakwenze OA, Warrender WJ, Abboud JA. Current review of adhesive capsulitis. J Shoulder Elbow Surg. 2011; 20:502–514.
15. Debeer P, Franssens F, Roosen I. Frozen shoulder and the Big Five personality traits. J Shoulder Elbow Surg. 2014; 23:221–226.
16. Jerosch J, Nasef NM, Peters O, Mansour AM. Mid-term results following arthroscopic capsular release in patients with primary and secondary adhesive shoulder capsulitis. Knee Surg Sports Traumatol Arthrosc. 2013;21:1195–1202
17. Le Lievre HM, Murrell GA. Long-term outcomes after arthroscopic capsular release for idiopathic adhesive capsulitis. J Bone Joint Surg. 2012;94:1208–1216.
18. Waszczykowski M, Fabiś J. The results of arthroscopic capsular release in the treatment of frozen shoulder - two-year follow-up. Ortop Traumatol Rehabil. 2010;12:216–224
19. Cinar M, Akpinar S, Derincek A, Circi E, Uysal M. Comparison of arthroscopic capsular release in diabetic and idiopathic frozen shoulder patients. Arch Orthop Trauma Surg. 2010; 130:401–406.
20. Baums MH, Spahn G, Nozaki M, Steckel H, Schultz W. Functional outcome and general health status in patients

after arthroscopic release in adhesive capsulitis. Knee Surg Sports Traumatol Arthrosc. 2007; 15:638–644.
21. Quraishi NA, Johnston P, Bayer J, Crowe M, Chakrabarti AJ. Thawing the frozen shoulder. A randomised trial comparing manipulation under anaesthesia with hydrodilatation. J Bone Joint Surg Br. 2007; 89:1197–1200.
22. Smith CD, Hamer P, Bunker TD. Arthroscopic capsular release for idiopathic frozen shoulder with intra-articular injection and a controlled manipulation. Ann R Coll Surg Engl. 2014; 96:55–60.
23. Jerosch J, Nasef NM, Peters O, Mansour AM. Mid-term results following arthroscopic capsular release in patients with primary and secondary adhesive shoulder capsulitis. Knee Surg Sports Traumatol Arthrosc. 2013; 21:1195–1202.
24. Tighe CB, Oakley WS. The prevalence of a diabetic condition and adhesive capsulitis of the shoulder. South Med J. 2008; 101:591–595.
25. Klinger HM, Otte S, Baums MH, Haerer T. Early arthroscopic release in refractory shoulder stiffness. Arch Orthop Trauma Surg. 2002; 122:200–203.

ORIGINAL ARTICLE

Effect of Betulinic Acid Vs Simvastatin on Hypelipidemic Mice Model

Abeerah Zainub, Farhana Ayub, Abdul Khaliq Naveed, Saira Jahan, Saddaf Ayub, Aisha Hasan

ABSTRACT

Objective: To compare the effect of Betulinic acid and Simvastatin on Triglycerides and Low Density Lipoprotein Cholesterol (LDL-C) in Balb/C Mice.

Study Design: Experimental randomized control trial.

Place and Duration of Study: Study was conducted at Biochemistry department Islamic International Medical College Rawalpindi in collaboration with National Institute of Health Islamabad from November 2017 to April 2018.

Materials and Methods: A total of 40 mice were randomly divided into 4 groups. Excluding one of the 4 groups as negative control, the remaining three were fed with high fat diet for 21 days to achieve raised levels of Triglycerides and Low density lipoprotein. After that out of the three high fat diet fed groups, one group was left untreated considering the positive control group and of the other 2 groups one was treated with simvastatin and 2nd one was given betulinic acid for the next 21 days. Sampling was done by cardiac puncture on 42nd day. Triglycerides and LDL-C levels were measured in serum samples. Data thus obtained was analyzed by one way ANOVA through SPSS 21.

Results: Study showed that positive control group showed a rise in mean triglycerides levels from 130mg/dL to 220mg/dL and mean LDL-C from 23mg/dL to 46mg/dL. Betulinic acid showed significantly better control than simvastatin as mean serum levels of Triglycerides were 146mg/dL as compared to 178mg/dL and mean serum levels of LDL-C were 28mg/dL as compared to 34mg/dL of simvastatin. Considering the $p<0.05$, TGs had a ($p<0.001$) and LDL-C had a ($p<0.001$).

Conclusion: Betulinic acid showed a far better control over the levels of Triglycerides and LDL-C in HFD fed Balb/C mice as compared to simvastatin.

Key Words: *Betulinic Acid, LDL-C; low density lipoprotein cholesterol, Simvastatin.*

Introduction

Atherosclerosis is a “lipid-driven” inflammation of the arterial wall[1], caused by the accumulation of excess lipids into the arterial wall.[2] It has been observed over the years that atherogenesis phenomenon is caused by triglyceride rich lipoproteins (i.e low density lipoproteins LDL).[3] Triglycerides in the serum are derived from fats in our food or from other energy sources. Hypertriglyceridemia is characterized by elevation in triglyceride levels[4] and is independently associated with cardiovascular disease (CVD). High levels of LDL-cholesterol is an indication of extra lipids in blood, which results in increased risk of cardiovascular complications.[5] Globally conducted estimation of deaths because of CVD by 'WHO' revealed 17.5 million deaths in the year 2012.[6] While according to 2013 Global Burden of Disease Study, CVD is responsible for 30% of deaths worldwide.[7] In the last half of the 20th century many epidemiological and experimental studies identified high levels of LDL-C as being atherogenic and advocated a linear relationship with rate of onset of CHD; notable among these are The “Framingham Heart Study”[8], the “Lipid Research Clinics” (LRC) trial by Patsy and Wies in 2014, and the “Multiple Risk Factor Intervention Trial” (MRFIT) in 2013. NLA (National Lipid Association) expert panel advised Lifestyle and drug therapies intended to reduce morbidity and mortality associated with dyslipidemia.[1] Statins are the mainstay of treatment options in management of hyperlipidemia.[1] They block the de-novo synthesis of cholesterol by inhibiting “3-hydroxy-3-methyl-glutaryl- coenzyme A reductase”, simultaneously upregulating the LDL-C receptors and enhancing the clearance of plasma lipoproteins. Thus, statins work in a “self-limiting” manner and manage cholesterol

Department of Biochemistry
Islamic International Medical College
Riphah International University, Islamabad

Correspondence:
Dr. Abeerah Zainub
Assistant Professor
Department of Biochemistry
Islamic International Medical College
Riphah International University, Islamabad
E-mail: abeera@live.com

Funding Source: NIL; Conflict of Interest: NIL
Received: February 01, 2019; Revised: July 18, 2019
Accepted: July 19, 2019

levels in blood.[9] Although generally statins are endured well but poor compliance[10] with them may be caused by many of the side effects, including gastrointestinal disturbances, body-aches, respiratory problems, and headaches. Of all these adverse effects Liver and Muscle related problems are remarkably higher in numbers.[11,12,13,14] Recently, in blood, higher levels of glucose and glycosylated hemoglobin Hb-A1C have also been reported in association with administration of Statins.[13] As evidence gap is still there, the American College of Cardiology/American Heart Association (ACC/AHA) Blood Cholesterol Guidelines 2013 included dyslipidemia in the recommendations for high priority research areas.[15]

Keeping the recommendation in view we chose a noble compound named Betulinic acid (BA), a triterpene with a pentacyclic structure. This is found in the in leaves of Ziziphus spina-christi[16] as well as from stem of white bark birch tree[17] , and in various other plants in tropical regions such as Tryphyllumpeltaum, Ancistrocladusheyneaus, Diospyorosleucomelas, Tetracerabolivіana, and Syzygiumformosanum. BA and its derivatives have been the subject of intense study which is primarily focused on their anti-cancer effects, anti-HIV, anti-bacterial, anti-inflammatory, antimalarial, anti-helminthic, and other pharmaceutical properties.[18,19] The direct effect of Betulinic Acid on lipid metabolism is recently being evaluated for the better treatment options available to treat dyslipidemia. As it proved to be beneficial in the treatment of nonalcoholic fatty liver disease (NAFLD).[20]

In this study we compared the effect of Betulinic acid and Simvastatin on Triglycerides and Low Density Lipoprotein Cholesterol in Balb/C Mice.

Materials and Methods

This experimental randomized control trial was conducted in department of Biochemistry at Islamic International Medical College of Riphah International University in collaboration with National Institute of Health Islamabad in 6 months duration from November 2017 to April 2018. After getting approval from the Ethical Review Committee (ERC) of Islamic International Medical College, and Regulatory Authority of National Institute of Health Islamabad a total of 40 subjects were randomly selected from a population of male mice bred in the animal house of NIH according to international standards for experimental purposes. For this our inclusion criteria was Balb/c adult mice (6-7 weeks old). Only healthy male mice weighing 30±5gms were selected under the guidance of a veterinary doctor and animal house supervisor appointed by NIH. These 40 subjects were randomly divided into 4 groups where every member of the population had the same chance of being in any of the four groups and all four groups were exposed to 12 hour light/dark cycle while being provided with a temperature of 22±5°C, kept and maintained at NIH with the help of NIH approved animal handlers. Subjects were equally divided into 4 groups. Group I was named NC for negative control and was given normal rodent chow throughout the experiment (42 days). Group II named PC (positive control) was provided with High Fat Diet (HFD consisted of 25% fats, 25% sucrose and 50% standardized Rodent chow[20,21] purchased from NIH) throughout the experiment (42 days). Group III named BA (betulinic acid) was provided with HFD for 21 days. Afterwards they were treated with betulinic acid while being fed with standardized rodent chow from day 22 to day 42 i.e the last day of experiment. Group IV named SIM (simvastatin) was also provided with HFD for 21 days. And from day 22 onwards they were treated with simvastatin while being fed with standardized rodent chow from day 22 to day 42 i.e last day of experiment.

On day 21 after overnight fast serum samples of 2 subjects from HFD groups (i.e PC, BA and SIM) were collected on random selection method to ensure established hyperlipidemia. After the confirmation of established hyperlipidemia, two groups i.e BA and SIM were administered with treatment drugs Betulinic Acid and Simvastatin respectively, at the dosage searched from literature (i.e; Betulinic acid: 10mg/kg/day[20] and Simvastatin: 10mg/kg/day[22]). Considering 30gm weight, their doses were 0.3mg per mouse. Drugs obtained were in powder forms and readily soluble in water so they were administered in dissolved form through oral route. During this time HFD was discontinued for the treatment groups BA and SIM.

On the final day after an overnight fast samples were taken after anaesthetizing the mice in a closed lid glass jar containing cotton wool soaked in

chloroform. Sampling was done through cardiac puncture 1.5±0.5ml of blood was collected from each subject and was stored in previously labeled SST (serum separating tube with clot activating gel) and were placed upright in a stand in a cold storage box. Samples were analyzed within 24 hours of collection. After separating serum by centrifugation at 2500rpm for 10 min, samples were analyzed with reagents purchased from Merck. Protocol of technique used for Triglycerides levels was endpoint direct method and for LDL-C levels was enzymatic direct endpoint method. Semiautomated biochemical analyzer Merck 300 was used for the analysis of Triglycerides and LDL-C.

Collected data was analyzed using SPSS (Statistical Package for Social Sciences) software version 21, used for the analysis of data. Normally distributed quantitative variables were expressed as Means±S.E.M. as it was an analysis between 4 groups so One-way ANOVA (analysis of variance) was applied and the differences among group means was observed while a p-value of <0.05 was set to be significant.

Results

Levels of serum triglycerides were compared in the form of Mean±S.E.M. serum triglyceride in positive control group was 220 ±7.727 mg/dL as compared to negative control group 130.7 ±4.883 mg/dL with a p<0.001. While treatment groups BA with 146.2 ±16.03 mg/dL and SIM with 178.8 ±6.959 mg/dL showed significant reduction with p<0.001 and p<0.05 respectively. This is evident in Fig 1.

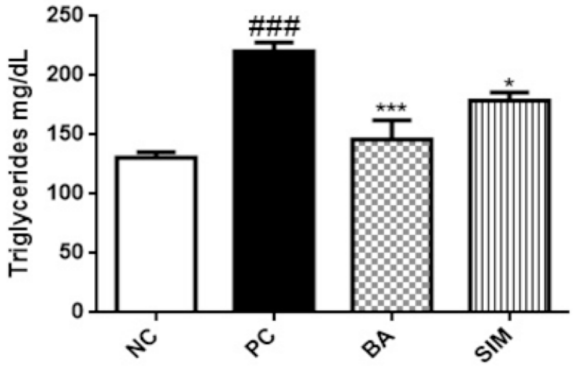

Fig 1: Graphical Presentation of the Results of Serum Triglycerides (Mg/Dl) In All 4 Groups.

Hash (#) denotes comparison between NC and PC, our results showed P<0.001 comparison of NC and PC. Steric (*) denotes comparison of BA and SIM with PC, our results showed *** P<0.001 when compared with PC.

Mean±S.E.M of serum LDL-C levels of positive control group was 46.86±1.844 mg/dL with a p<0.001 as compared to negative control group 23.17±2.088 mg/dL. While treatment group BA had 28.00±3.033 mg/dL with p<0.001 and SIM had 34.83±1.537 mg/dL with p<0.01. The comparative analysis is depicted in Fig 2.

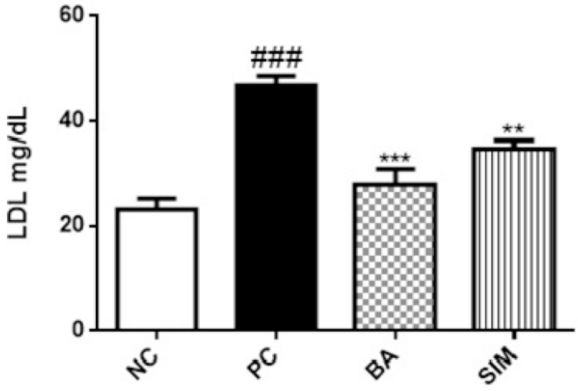

Fig 2: Graphical Presentation of the Results of Serum LDL-C (Mg/Dl) In All 4 Groups.

Hash (#) denotes comparison between NC and PC, our results showed P<0.001 comparison of NC and PC. Steric (*) denotes comparison of BA and SIM with PC, our results showed *** P<0.001 when compared with PC.

Discussion

Dyslipidemia has been responsible for a considerable proportion of Atherosclerotic CVD in the world.[23] For its management a four step approach has been recommended to lower ASCVD which include modification of life style, lowering blood cholesterol levels by the use of drugs (statins). However over the course of decades only approach that has shown overwhelming body of evidence is the drug (statins) therapy approach.[15] Therefore in the guidelines for management of Hyperlipidemia issued by American College of Cardiology / American Heart Association (ACC/AHA), research in this field to the develop better treatment options for management of hyperlipidemia has been recommended.[15] So, we observed effects of betulinic acid on Triglycerides and LDL levels in serum of hyperlipidemic Balb/c mice.

Our study demonstrated that BA treated group kept lipid levels in blood near normal which is in accordance with Quan HY et al. who studied that betulinic acid alleviates non alcoholic fatty liver disease (2013)[20] and Ahangarpour et al. who studied the effect of betulinic acid on leptin, adiponectin, hepatic enzyme levels and lipid profiles in streptozotocin–nicotinamide-induced diabetic mice (2018).[24]

Triglycerides are absorbed from intestines.[25] High levels of Triglyceridess result in increased LDL formation by liver giving rise to ox-LDL and vascular inflammation.[26] Betulinic Acid was determined to effectively lower down Triglycerides.[27] And in this study, at same dosage of 10mg/kg body wt, BA showed a better control of serum Triglycerides ($p<0.001$) as compared to SIM ($p<0.05$) in hyperlipidemic mice as evident in Fig. 1. Additional studies which were conducted by Hai Yan Quan et al[20,27] and Ahangarpour et al.,[24] backed our findings in their animal based researches.

With HFD, LDLc level rise because of excess Triglycerides absorption from intestines and their further accumulation in lipoprotein particle giving rise to LDLc.[25] It was observed that reducing LDLc levels decreased endothelial inflammation.[26] Present study determined that Serum LDL-c levels in BA and SIM were found to be lowered when compared with PC (hyperlipidemic) group and BA showed significantly ($p<0.001$) better results as compared with SIM ($p<0.01$). This is depicted in Fig.2 and is in agreement with the findings of studies on mice by Ahangpour et al. [24]and Juan Peng et al.[28]

Conclusion

It is concluded that, Betulinic Acid and simvastatin both have comparable effects in the rectification of hyperlipidemia in Balb/C mice. Simvastatin efficiently treats hypertriglyceridemia and lowers down LDL-C but betulinic acid shows an overall better control. Hence it may be a good alternative to statins but further researches in this field are needed because Betulinic Acid is a novel compound whose safety profile is yet to be evaluated by the researchers.

REFERENCES

1. Jacobson TA, Ito MK, Maki KC, Orringer CE, Bays HE, Jones PH, et al. National Lipid Association Recommendations for Patient-Centered Management of Dyslipidemia: Part 1—Full Report. J Clin Lipidol. 2015;9(2).
2. Owens AP, Byrnes JR, Mackman N. Hyperlipidemia, tissue factor, coagulation, and simvastatin. Vol. 24, Trends in Cardiovascular Medicine. 2014. p. 95–8.
3. Nordestgaard BG. Triglyceride-Rich Lipoproteins and Atherosclerotic Cardiovascular Disease: New Insights from Epidemiology, Genetics, and Biology. Circ Res. 2016;118(4):547–63.
4. Ruchel JB, Braun JBS, Adefegha SA, Guedes Manzoni A, Abdalla FH, de Oliveira JS, et al. Guarana (Paullinia cupana) ameliorates memory impairment and modulates acetylcholinesterase activity in Poloxamer-407-induced hyperlipidemia in rat brain. Physiol Behav [Internet]. 2017;168:11–9. Available from: http://dx.doi.org/10.1016/j.physbeh.2016.10.003
5. Mann S, Beedie C, Jimenez A. Differential effects of aerobic exercise, resistance training and combined exercise modalities on cholesterol and the lipid profile: review, synthesis and recommendations. Vol. 44, Sports Medicine. 2014. p. 211–21.
6. Rao W, Su Y, Yang G, Ma Y, Liu R, Zhang S, et al. Cross-sectional associations between body mass index and hyperlipidemia among adults in northeastern China. Int J Environ Res Public Health. 2016;13(5).
7. Bhatnagar P, Wickramasinghe K, Williams J, Rayner M, Townsend N. The epidemiology of cardiovascular disease in the UK 2014. Heart. 2015.
8. Mahmood M, Hoque H, Mahmood SA, Quayum MA. Prevention of Ischaemic Heart Disease. Univ Hear J. 2014;10(1).
9. Zimmer M, Bista P, Benson EL, Lee DY, Liu F, Picarella D, et al. CAT-2003: A novel sterol regulatory element-binding protein inhibitor that reduces steatohepatitis, plasma lipids, and atherosclerosis in apolipoprotein E*3-Leiden mice. Hepatol Commun [Internet]. 2017;1(4):311–25. Available from: http://doi.wiley.com/10.1002/hep4.1042
10. De Vera MA, Bhole V, Burns LC, Lacaille D. Impact of statin adherence on cardiovascular disease and mortality outcomes: a systematic review. Br J Clin Pharmacol [Internet]. 2014;78(4):684–98. Available from: http://doi.wiley.com/10.1111/bcp.12339
11. El-Salem K, Ababneh B, Rudnicki S, Malkawi A, Alrefai A, Khader Y, et al. Prevalence and risk factors of muscle complications secondary to statins. Muscle and Nerve. 2011;44(6):877–81.
12. Schachter M. Chemical, pharmacokinetic and pharmacodynamic properties of statins: An update. Fundam Clin Pharmacol. 2005;19(1):117–25.
13. Park Y, Rha S-W, Choi BG, Choi SY, Goud A, Lee S, et al. Impact of Simvastatin on Development of New-Onset Diabetes Mellitus in Asian Population: Three-Year Clinical Follow Up Results. J Am Coll Cardiol [Internet]. 2014;63(12):A2128. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0735109714621318
14. Aghasadeghi K, Nabavi S, Amirmoezi F, Attar A. Vitamin E supplementation for treatment of statin induced hepatocellular damage: A randomized, double-blind, placebo-controlled trial. Int Cardiovasc Res J.

2018;12(1):29–33.

15. Stone NJ, Robinson JG, Lichtenstein AH, Bairey Merz CN, Blum CB, Eckel RH, et al. 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults: A report of the American college of cardiology/American heart association task force on practice guidelines. Vol. 63, Journal of the American College of Cardiology. 2014. p. 2889–934.
16. Nader MA, Baraka HN. Effect of betulinic acid on neutrophil recruitment and inflammatory mediator expression in lipopolysaccharide-induced lung inflammation in rats. Eur J Pharm Sci. 2012;
17. Lee SY, Kim HH, Un S, 3 P. Letter to the editor: RECENT STUDIES ON BETULINIC ACID AND ITS BIOLOGICAL AND PHARMACOLOGICAL ACTIVITY. EXCLI J [Internet]. 2015;14:199–203. Available from: http://dx.doi.org/10.17179/excli2015-150
18. Kobayashi RK, Gaziri LC, Vidotto MC. Functional activities of the Tsh protein from avian pathogenic Escherichia coli (APEC) strains. J Vet Sci. 2010;11(4):315–9.
19. Wu J, Niu Y, Bakur A, Li H, Chen Q. Cell-free production of pentacyclic triterpenoid compound betulinic acid from betulin by the engineered Saccharomyces cerevisiae. Molecules. 2017;22(7).
20. Quan HY, Kim DY, Kim SJ, Jo HK, Kim GW, Chung SH. Betulinic acid alleviates non-alcoholic fatty liver by inhibiting SREBP1 activity via the AMPK-mTOR-SREBP signaling pathway. Biochem Pharmacol [Internet]. 2013;85(9):1330–40. Available from: http://dx.doi.org/10.1016/ j.bcp.2013.02.007
21. Del Pozo R, Mardones L, Villagrán M, Muñoz K, Roa S, Rozas F, et al. Efecto de una dieta alta en grasas en el proceso de formación de cálculos biliares de colesterol. Rev Med Chil. 2017;145(9):1099–105.
22. Song X, Wang J, Wang P, Tian N, Yang M, Kong L. 1H NMR-based metabolomics approach to evaluate the effect of Xue-Fu-Zhu-Yu decoction on hyperlipidemia rats induced by high-fat diet. J Pharm Biomed Anal [Internet]. 2013;78–79:202–10. Available from: http://dx.doi.org/10.1016/j.jpba.2013.02.014
23. Venkitachalam L, Wang K, Porath A, Corbalan R, Hirsch AT, Cohen DJ, et al. Global variation in the prevalence of elevated cholesterol in outpatients with established vascular disease or 3 cardiovascular risk factors according to national indices of economic development and health system performance. Circulation. 2012;125(15):1858–69.
24. Ahangarpour A, Shabani R, Farbood Y. The effect of betulinic acid on leptin, adiponectin, hepatic enzyme levels and lipid profiles in streptozotocin-nicotinamide-induced diabetic mice. Res Pharm Sci. 2018;13(2):142–8.
25. Taskinen MR, Borén J. New insights into the pathophysiology of dyslipidemia in type 2 diabetes. Atherosclerosis. 2015;239(2):483–95.
26. Caliceti C, Rizzo P, Ferrari R, Fortini F, Aquila G, Leoncini E, et al. Novel role of the nutraceutical bioactive compound berberine in lectin-like OxLDL receptor 1-mediated endothelial dysfunction in comparison to lovastatin. Nutr Metab Cardiovasc Dis [Internet]. 2017;27(6):552–63. Available from: http://dx.doi.org/10.1016/j.numecd.2017.04.002
27. Quan HY, Kim DY, Kim SJ, Jo HK, Kim GW, Chung SH. Betulinic acid alleviates non-alcoholic fatty liver by inhibiting SREBP1 activity via the AMPK-mTOR-SREBP signaling pathway. Biochem Pharmacol. 2013;85(9):1330–40.
28. Peng J, Lv YC, He PP, Tang YY, Xie W, Liu XY, et al. Betulinic acid downregulates expression of oxidative stress-induced lipoprotein lipase via the PKC/ERK/c-Fos pathway in RAW264.7 macrophages. Biochimie [Internet]. 2015;119:192–203. Available from: http://dx.doi.org/10.1016/j.biochi.2015.10.020

ORIGINAL ARTICLE

Experience of Loneliness and Suicidal Ideation among Young Adults: The Moderating Role of Gender

Meh Para Siddique, Rubina Hanif

ABSTRACT

Objective: To assess the experience of loneliness and suicidal ideations among young adults.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: The study was conducted from March 2015 to February 2016 across the young adults residing in Rawalpindi and Islamabad.

Materials and Methods: Purposive sampling technique was used for data collection from community sample young adults (N=308; aged between 18-25 years). Self-report measures that are, De Jong Gierveld Loneliness scale and Scale for Suicidal Ideation were used for the data collection.[1,2] Participants were categorized as suicide ideators and non-ideators through independent sample t-test. Bivariate Pearson correlation was also calculated. Afterward, the moderating role of gender was assessed in the relationship between suicidal ideation and loneliness.

Results: Loneliness was positively correlated with suicidal ideations. Individuals identified as suicide ideators scored significantly higher on both of social and emotional loneliness as compare to non-ideators. In an alliance, gender significantly moderated the relationship between suicidal ideations and emotional loneliness where females with a higher level of emotional loneliness were more prone to develop the suicidal ideations.

Conclusion: In general young adult population suicidal ideation is significantly associated with loneliness. This point outs the desired significance of efforts to minimize loneliness with regards to diminishing its detrimental effects on well-being as well as general health of young adults.

Key Words: *Loneliness, Suicidal Ideation, Young Adults.*

Introduction

Agreeing to World Health Organization every year around 800000 individuals die because of suicide, constituting one individual in every 40 seconds.[3] Every single case of such death itself establishes a tragedy. Above all, they also intensely affect the mental health of surrounding individuals along with the social order of society, thus such affected individuals often require the desired psychosocial support.[4] Numerous risk dynamics for suicidal behavior was recognized, given as lower class economic status, history of child neglect and abuse, and mental illness.[5-7] Protecting elements as social support, religious associations, and life contentment are interrelated in a way to decline the ratio of suicide.[8,9] One-fourth significant indicator in lieu of attempting or committing suicide is the existence of suicidal ideation.[8–12] Such ideations can transpire all the way through the lifetime and are the second most prominent reason of death amongst 15-29 year olds worldwide.[3]

For the meantime, loneliness is an associative risk factor along with suicidal ideations for morbidity and mortality. Both non-case-control and case-control designs studies where relatives of persons who committed suicide depicted loneliness as often one of the major factor leading to suicidal death.[13,14] Meanwhile, previous studies also revealed the existence of an association among feelings of being alone and involving in suicidal activities. For instance, greater levels of loneliness were assessed, amongst under treatment suicide attempters.[15] Certainly, more or less evidence recommends that loneliness can remain a significant risk element for suicidal behavior throughout the lifespan as research amongst adolescents, middle-aged, and aging adults have altogether interconnected it to be a

National Institute of Psychology,
Quaid-i-Azam University, Islamabad

Correspondence:
Meh Para Sidddique
PhD Schalor
National Institute of Psychology,
Quaid-i-Azam University, Islamabad
E-mail: mehpara1612@gmail.com

Funding Source: NIL; Conflict of Interest: NIL
Received: January 01, 2019; Revised: February 01, 2019
Accepted: June 15, 2019

contributing risk for suicidal ideation in addition to suicide attempts.[16-18,33] While evidence on countless features of the relationship between loneliness and suicidal ideations nonetheless leftovers is limited. In specific, most of the empirical studies carried out up till now were accompanied within precise sub-populations like high school students, indoor patients, and the aging individuals, whereas little focus was found to assess this specific association in the general young adult population. Although young adults are more prone to mental illness.[19]

This is an essential research gap as previous research data provide an indication that the frequency of loneliness among adults can be elevating in few countries probably as a consequence of fluctuations in lifestyles resultant of greater divorce rates, inhabitants aging, along with smaller-sized families.[20,21] Therefore research is required to fill this gap as establishing this association between loneliness and suicidal ideations can lay an evidence-based foundation to address preventive measures to minimize the loneliness as well the suicidal ideations. Simultaneously, this research will provide an enhanced understanding of the psychological phenomenon that subsidies to suicidal behavior, and will manage for mental health experts with clear criteria for classifying those at risk, then contribute to the establishment of in effect suicide prevention and intervention approaches.

Taken together, the main aims of the current study was to assess the experience of loneliness and suicidal ideations among young adults. Furthermore, the foremost objectives of study were: (1) to address the association between loneliness and suicidal ideation in general young adult population; (2) to scrutinize the level of loneliness among suicidal ideators and non-ideators; and (3) to examine the moderation role of gender in association of suicidal ideations and loneliness.

Materials and Methods

The present cross sectional study was conducted from March 2015 to February 2016 across the young adults residing in Rawalpindi and Islamabad. The study protocol for current research was being approved from the ethical board of National Institute of Psychology, Quaid-i-Azam University Islamabad. Sample to address study objectives comprising of 308 young adults (126 male & 182 female) within an age range of > 18 and < 25 years was obtained by means of purposive sampling. They were all Pakistani nationals and native Urdu speakers having no problem with Urdu language (talking, reading, understanding, and writing) respectively. Individuals at current or previously diagnosed with any psychiatric ailments were instantly excluded from the study sample. If the inclusion and exclusion criteria were met, then each participant was being tested individually in two steps. During step I, the informed consent was signed from the participant. After rapport building, the researcher filled the demographic sheet while questioning the participant. Next, the participants were requested to fill the set of questionnaires by providing their genuine response. Finally, participants were thanked for their participation.

This set of questionnaires consisted of self-report measures. In order to measure the level of loneliness the De Jong Gierveld Loneliness scale was utilized whereas, the Suicidal Ideation Scale was used to examine the suicidal ideations.[1,2] The Loneliness Scale is grounded on a cognitive theoretical characterization of loneliness, which highlights the incongruity among what person desires in positions of interpersonal liking and intimacy, and what person actually has; the more the difference, the more the loneliness. Thus, loneliness is understood as an individual experience which is not openly linked to situational aspects.[1] It is a 06-item instrument to be scored on a 4-point scale ranging from “no” to “yes”. It has two subfactors, the emotional loneliness scale, and the social loneliness scale, and the sum of their scores provides the total loneliness score. Instrument reliability ranges from .70 to .74 (Cronbach's α).[1] The Suicidal Ideation Scale was designed to screen individuals in the community for presence of suicidal thoughts and assess the severity of these thoughts. It targets an attribute of suicidal thoughts: frequency, controllability, closeness to attempt, level of distress associated with the thoughts and impact on daily functioning. The instrument had high internal consistency (Cronbach's $\alpha = 0.91$).[2]

The parametric data was analyzed with the help of SPSS 24.[22] At first, we calculated descriptive statistics Cronbach's alpha reliability's followed by inferential statistical analysis i.e., pearson bivariate correlation

(p < .01; p < .05), independendent sample "t" test (*p* < .001; p < .01; p < .05) and moderation analysis (p < .01) . Moreover, Pearson Bivariate correlation coefficients were calculated to address the relationship between suicidal ideation and loneliness. At the same time, individuals were categorized into two groups that are, suicide ideator and non-ideators, based on their score on the The Suicidal Ideation Scale. Furthermore, differences were explored on emotional and social loneliness across two groups of suicide ideators and non-ideators via computation of independent sample *t*-test, and Cohen's *d* were calculated to examine the strength of the group differences.[23] Finally, the moderating part of gender was measured by using process macro version 2.16 for the effect of suicidal ideations on emotional loneliness.[24] Given that majority of participants are middle born, and belonging to middle socioeconomic status (SES) in our sample, so birth order and SES was used as a control in the moderation analysis to counterweight the gender groups through birth order and socioeconomic status.

Results

Taken together, first of all, Cronbach's reliabilities, mean values, standard deviation, and Pearson bivariate correlation amongst study variables are grouped together in table I. Afterward, in table II differences of social and emotional loneliness among suicide ideators and non-ideators are presented. Finally, table III and figure 1. explain the moderating role of gender across the relationship between emotional loneliness and suicidal ideations.

At first, results from the table I depicted that there is a significant positive correlation between emotional loneliness and social loneliness (r = .67, p < .01) as well as the emotional loneliness and that of suicidal ideations (r = .49, p < .05). Meanwhile, in alliance with our predictions, social loneliness is also positively associated with the suicidal ideations (r = .38, p < .01). As expected, results from an independent samples *t*-test showed that participants clustered as suicide ideators (M = 7.62, SD = 2.29, N = 86) scored significantly higher on the emotional loneliness as compared to that of non-ideators (M = 6.71, SD = 1.99, N = 222), t (306) = 3.43, p < .001, two-tailed. The change of .91 scale points was large (d = .43), and the 95% confidence interval around difference between the group means was relatively precise (.39 to 1.43). Similarly, on loneliness suicide ideators (M = 8.73, SD = 2.21, N = 86) had elevated scored than that of non-ideators (M = 8.14, SD = 2.06, N = 222), t (306) = 2.15, p < .05, two-tailed.

Finally, the results of the moderation analyses showed that after controlling the effect of birth order and socioeconomic status, gender moderated the effect of emotional loneliness on suicidal ideations. The results presented in Table III show a significant interaction effect (B interaction = 1.23, p < .01) explaining 12% additional and 57% total variance in emotional loneliness. The moderating effect of gender is additionally explained in Figure 1. The figure demonstrates that emotional loneliness increases suicidal ideations amongst both men and women young adults, yet the slope for the females is much steeper than for males, suggesting that females are more prone to develop suicidal ideations as a consequence of emotional loneliness. Additionally, a fan effect appearing approximately in the center of the figure suggests a reversal role of low versus high suicidal ideations. The fan effect suggests that while facing low levels of emotional loneliness, male become more suicidal. Contrary to that while facing high levels of emotional loneliness, females are more prone to develop suicidal ideations.

Table I: Cronbach's Reliabilities, Mean, Standard Deviation, and Pearson Bivariate Correlation Among Study Variables (N=308).

		Items	A	1	2	3	4
1	Age	-	-	-	-.24	-.07	-.09
2	Emotional Loneliness	3			-	.67**	.49*
3	Social Loneliness	3				-	.38**
4	Suicidal Ideations	19					-
	Mean	-	-	19.57	6.96	8.81	13.45
	SD	-	-	1.87	2.12	2.21	10.15

*p < .05, **p < .01.

Table II: Differences in Social and Emotional Loneliness Among Suicide Ideators and Non-Ideators (N=308).

	Ideators (n = 86)		Non-Ideators (n = 222)					
Variables	M	SD	M	SD	T	LL	UL	Cohen's d
Emotional Loneliness	7.62	2.29	6.71	1.99	3.43**	.39	1.43	.43
Social Loneliness	8.73	2.21	8.14	2.06	2.15*	-1.14	-0.50	.28

*p < .05, **p < .001.

Table III: Moderating Effect of Gender for the Relationship between Emotional Loneliness and Suicidal Ideations (N=308).

	Suicidal Ideation				
Predictors		B	*SE* β	T	95% CI
(Constant)		12.56**	8.45	1.49	[4.04, 29.18]
BO		.82*	.81	.32	[-.79, 2.43]
SES		4.67	4.21	.05	[-.07, 9.41]
EL		-1.04*	.95	-1.11	[-2.91, .82]
Gender		-10.33***	4.18	- 2.47	[-18.56, -2.11]
EL x Gender		1.23**	.57	2.17	[.12, 2.35]
R^2	.08***				
F	4.72**				
ΔR^2	.02**				

Note: EL= Emotional Loneliness
*p < .05, **p < .01, ***p < .001.

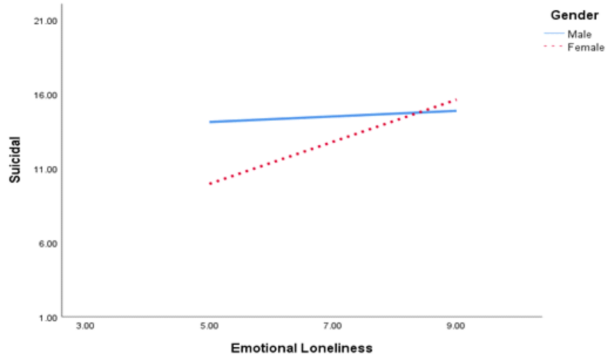

Fig 1: Graph Demonstrating The Moderating Role of Gender for the Relationship between Emotional Loneliness and Suicidal Ideations

Discussion

Regardless of the emergent body of research on suicidal ideations and loneliness, as such, slight far-scale research is present in the general young sample that focused on this relationship. The current study has addressed this research gap after considering the emerging young adult population.

At first, our results depicts a relationship between suicidal ideations and loneliness. In an alliance, both forms of the loneliness that is., social and emotional loneliness significantly positively correlates with suicidal ideations. This association laids the foundation that more the person feels lonely more s/he is susceptible to develop the suicidal ideations. In the same way, as predicted suicide ideators are high on social and emotional loneliness as compare to that of non-ideators. This is in alliance with previous research findings that loneliness predicts suicide ideations.[14,17,19,25-29] Finally, after controlling a few probable confounders that are, birth order, and socio-economic status it is establised that the gender is moderating the relationship between the suicidal ideations and emotional loneliness. This association is suggestive of the fact emotionally lonely girls are more susceptible to develop suicidal ideation.[30,31] Thus based on these findings it is necessary to discuss that the prevention and intervention techniques are need to be designed to restrict the suicidal behavior. Meanwhile, establishment of the crises management cells, and personal skills grooming units are desired in a way to accomplish a mandate in healthcare-associated with suicidal ideation, along with other mental health concerns.

Despite many efforts, this study has few limitations. All the participants were non-clinical young adults, so in the future patient population can also be tested. Meanwhile, sample from different span of life, other than young adulthood that is., adolescents, older adults, and elderly aged people can also be assessed to explore the association of loneliness and suicidal ideations. Finally, as this was a cross-sectional study causality cannot be inferred for the associations that were observed. Thus, the longitudinal pattern needs to be explored in future studies.

Conclusion

The current study indicated that young adults with loneliness manifested suicidal ideations more intensely. This occurred for the whole sample, in which both dimensions (that is., emotional and social loneliness) are equally evaluated. Explicitly, females with emotional loneliness are more prone to develop suicidal ideations.

REFERENCES

1. Gierveld JD, Tilburg TV. A 6-item scale for overall, emotional, and social loneliness: Confirmatory tests on survey data. Research on aging. 2006; 28(5):582-98.
2. Van Spijker BA, Batterham PJ, Calear AL, Farrer L, Christensen H, Reynolds J, et al. The Suicidal Ideation Scale: Community-based validation study of a new scale for the measurement of suicidal ideation. Suicide and Life-Threatening Behavior. 2014; 44(4):408-419.
3. World Health Organization. Preventing Suicide: A Global Imperative. Geneva: WHO. 2014.
4. Jordan JR, McIntosh JL, editors. Grief after suicide: Understanding the consequences and caring for the

survivors. Routledge; 2011.

5. Borges G, Nock MK, Abad JM, Hwang I, Sampson NA, Alonso J, et al. Twelve-month prevalence of and risk factors for suicide attempts in the WHO World Mental Health Surveys. The Journal of clinical psychiatry. 2010; 71(12):1617.
6. Brodsky BS, Stanley B. Adverse childhood experiences and suicidal behavior. Psychiat Clin N Am. 2008; 31:223–35.
7. Nock MK, Borges G, Bromet EJ, Alonso J, Angermeyer M, Beautrais A, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. Brit J Psychiat. 2008; 192:98–105.
8. Nock MK, Borges G, Bromet EJ, Cha CB, Kessler RC, Lee S. Suicide and suicidal behavior. Epidemiol. 2008; 30:133–54.
9. Wenzel A, Brown GK, Beck AT. Cognitive therapy for suicidal patients: scientific and clinical applications. Washington: American Psychological Association; 2009.
10. Bebbington P, Minot S, Cooper C, Dennis M, Meltzer H, Jenkins R, et al. Suicidal ideation, self-harm and attempted suicide: results from the British psychiatric morbidity survey 2000. Eur Psychiat. 2010; 25:427–31.
11. Kessler RC, Borges G, Walters EE. Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. Arch Gen Psychiat. 1999; 56:617–626.
12. Wenzel A, Beck AT. A cognitive model of suicidal behavior: theory and treatment. Appl Prev Psychol. 2008; 12:189–201.
13. Heikkinen M, Aro H, Lonnqvist J. Recent life events, social support and suicide. Acta Psychiatrica Scandinavica. 1994; 89:65-72.
14. Waern M, Rubenowitz E, Wilhelmson K. Predictors of suicide in the old elderly. Gerontology. 2003; 49(5):328-34.
15. Wiktorsson S, Runeson B, Skoog I, Östling S, Waern M. Attempted suicide in the elderly: characteristics of suicide attempters 70 years and older and a general population comparison group. The American Journal of Geriatric Psychiatry. 2010; 18(1):57-67.
16. Garnefski N, Diekstra RF, Heus PD. A population-based survey of the characteristics of high school students with and without a history of suicidal behavior. Acta Psychiatrica Scandinavica. 1992 86(3): 189-96.
17. Li H, Xu L, Chi I. Factors related to Chinese older adults' suicidal thoughts and attempts. Aging & mental health. 2016; 20(7):752-61.
18. Miret M, Caballero FF, Huerta-Ramírez R, Moneta MV, Olaya B, Chatterji S, et al. Factors associated with suicidal ideation and attempts in Spain for different age groups. Prevalence before and after the onset of the economic crisis. Journal of affective disorders. 2014; 163:1-9.
19. Richardson T, Elliott P, Roberts R, Jansen M. A longitudinal study of financial difficulties and mental health in a national sample of British undergraduate students. Community mental health journal. 2017; 53(3):344-52.
20. Cacioppo S, Grippo AJ, London S, Goossens L, Cacioppo JT. Loneliness: Clinical import and interventions. Perspectives on Psychological Science. 2015; 10(2):238-49.
21. Griffin J. The lonely society. Mental Health Foundation. Cacioppo, JT and Patrick, W. (2008) 'Loneliness: Human nature and the need for social connection'. London: WW Norton & Company. 2010.
22. Ho R. Handbook of univariate and multivariate data analysis with IBM SPSS. Chapman and Hall/CRC; 2013.
23. Cohen J. Statistical power analysis for the social sciences, 1988.
24. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford Publications; 2013.
25. Lasgaard M, Goossens L, Elklit A. Loneliness, depressive symptomatology, and suicide ideation in adolescence: Cross-sectional and longitudinal analyses. Journal of abnormal child psychology. 2011; 39(1):137-50.
26. Jones AC, Schinka KC, van Dulmen MH, Bossarte RM, Swahn MH. Changes in loneliness during middle childhood predict risk for adolescent suicidality indirectly through mental health problems. Journal of Clinical Child & Adolescent Psychology. 2011; 40(6):818-24.
27. Husky M, Swendsen J, Ionita A, Jaussent I, Genty C, Courtet P. Predictors of daily life suicidal ideation in adults recently discharged after a serious suicide attempt: a pilot study. Psychiatry research. 2017 Oct 1; 256:79-84.
28. Niu L, Jia C, Ma Z, Wang G, Yu Z, Zhou L. The validity of proxy-based data on loneliness in suicide research: a case-control psychological autopsy study in rural China. BMC psychiatry. 2018 Dec;18(1):116.
29. Dahlberg L, Andersson L, Lennartsson C. Long-term predictors of loneliness in old age: results of a 20-year national study. Aging & mental health. 2018 Feb 1;22(2):190-6.
30. Chang EC, Wan L, Li P, Guo Y, He J, Gu Y, Wang Y, Li X, Zhang Z, Sun Y, Batterbee CN. Loneliness and suicidal risk in young adults: does believing in a changeable future help minimize suicidal risk among the lonely?. The Journal of psychology. 2017 Jul 4;151(5):453-63.
31. Sharma B, Lee T, Nam E. Loneliness, insomnia and suicidal behavior among school-going adolescents in western Pacific Island countries: role of violence and injury. International journal of environmental research and public health. 2017 Jul;14(7):791.

ORIGINAL ARTICLE

Comparison of Day Case Laparoscopic Cholecystectomy Versus Conventional Laparoscopic Cholecystectomy

Muhammad Asad[1], Aatif Inam[2], Muhammad Burhan Ul Haq[3], Zafar Iqbal Malik[4]

ABSTRACT

Objective: To compare the day case Laparoscopic cholecystectomy with conventional Laparoscopic cholecystectomy in terms of early return to activities and intensity of postoperative pain.

Study Design: Randomized control trial (Parallel).

Place and Duration of Study: Department of Surgery Pakistan Institute of Medical Sciences/ Shaheed Zulfiqar Ali Bhutto Medical University Islamabad. Study was conducted from 1st Nov 2014 to 30th April 2015.

Materials and Methods: After approval of hospital ethical committee, patients who were fulfilling the inclusion criteria were included in study after taking informed and written consent. Sample size was calculated using WHO sample size calculator, which turned out to be 42 for each group. Patients were divided into two groups, group A and group B by lottery method. Patients in group A had undergone Day case Laparoscopic cholecystectomy and patients in group B had undergone Conventional Laparoscopic cholecystectomy. Data was collected and recorded on purposively designed Performa. Data was analyzed using SPSS 17; paired t test was used to calculate p-value.

Results: In group A, among 42 patients 13(31%) were on VAS 4, 13(31%), on VAS 5, 8(19%), in VAS 3, 6(14.3%), in VAS 2 and 2(4.8%), in VAS 6. The minimum and maximum "number of days to return to activities" was 3 and 7 days respectively. Among 42 patients, 20(47.6%) patients had returned to their home activities in 3 days, 13(31%) in 4 days, 5(11.9%) in 5 days, 2(4.8%) in 6 days and 2(4.8%) in 7 days. In group B the minimum and maximum intensity of pain on Visual Analogue Scale was 2 and 6 respectively. Among 42 patients 15(35.7%) were on VAS 5, 14(33.3%) were on VAS 3, 8(19%), in VAS 4, 4(9.5%), in VAS 6 and 1(2.4%), in VAS 2. The minimum and maximum "number of days to return to activities" was 6 and 10 days respectively. Out of 42 patients 17(40.5%) had returned to their home activities in 9 days, 17(40.5%) in 8 days, 4(9.5%) in 7 days, 3(7.1%) in 10 days and 1(2.4%) in 6 days.

Conclusion: Patients undergoing day case LC do return to their routine activities earlier than those who undergo conventional LC, but there is no difference in terms of intensity of post-operative pain as measured on Visual analogue scale.

Key Words: *Cholelithiasis, Day Case Surgery, Laparoscopic, Day Case Laparoscopic Cholecystectomy, Laparoscopic Cholecystectomy.*

Introduction

Cholecystectomy is the commonest surgical intervention in hepatobilliary system.[1] Stal Pert Von Der Weil was the first surgeon who found gall stone during surgery while operating upon a patient with peritonitis in 1687.[1] Ever since the operative management of gall stones is in process of continuous evolution. It was Carl Johann Langenbuch, who performed the first ever open cholecystectomy in Germany.[2] Later open cholecystectomy became the gold standard treatment for the management of symptomatic gall stone disease.[3]

Surgeons around the globe were trying to make the procedure as less invasive as possible. The technique of SILS was introduced in which a single umbilical incision was used to insert three small ports. Recently NOTES (Natural Orifices Transluminal Endo Surgery) has been introduced[4], in which natural

[1]*Department of General Surgery*
Islamic International Medical College
Riphah International University, Islamabad
[2,3,4]*Department of General Surgery*
Pakistan Institute of Medical Sciences, Islamabad

Correspondence:
Dr. Muhamnmad Asad
Senior Registrar
Department of General Surgery
Islamic International Medical College
Riphah International University, Islamabad
E-mail: tfortipu@gmail.com

Funding Source: NIL; Conflict of Interest: NIL
Received: May 16, 2019; Revised: August 13, 2019
Accepted: August 15, 2019

orifices are used to gain access to the cavity. First NOTES was performed on a 43 years female with symptomatic gall stones in 2007.[5]

Evolution in surgery has led to the concept of day case surgery, which means patient is discharged on same day after surgery. Day surgery is also called outpatient surgery or ambulatory surgery.[6] Invention of laparoscopic surgery has made it possible to do number of procedure on day case basis, because of the small incision and less pain postoperatively. Now a day's number of conventional procedures like laparoscopic hernia repair and laparoscopic cholecystectomy are being performed on day case basis worldwide. With the passage of time acceptability of day case surgery has increased among clinicians, patients, families and also insurance agencies.[7] Shortage of medical services in most part of world and financial problems has made space for day case surgery, because of lowering the treatment cost to less than 50%.[8] Study in Pakistan showed reduction in treatment cost of PKR 6200 to 22800 in day case laparoscopic cholecystectomy (LC).[9] That is why day case surgery has gained worldwide acceptance.

Day case laparoscopic cholecystectomy is being extensively performed in developed countries[5], but its scope in developing countries is still less. Laparoscopic cholecystectomy has progressively shortened the hospital stay from 2 to 4 days to 6-8 hours.[9,10] Studies have also shown early return to home activities in Day Case LC was 22 days.[11] Safety profile and technique of LC is making it an "ideal" for day case surgery.[12,13] Recent literature review has shown Laparoscopic cholecystectomy as safe as conventional laparoscopic cholecystectomy.[10] Up to 70% of patients with symptomatic disease are ideal for day case LC.[14] While there is reasonable volume of data is available from developed world on safety and feasibility of day case LC, Pakistan is lacking behind on this subject and more and more research work is required to establish the safety and feasibility of this procedure in our country. In developing countries like Pakistan Day case LC is still in eggshell. One of the most important reasons for this is inadequate published data on safety and feasibility of procedure. It is the need of hour to collect and publish data on safety and feasibility of day case surgery in our part of world. Surgeons are very reluctant to offer day case LC to their patients in our part of world. Quality local research data will give surgeons confidence in decision making for day case laparoscopic cholecystectomy.

A study was planned to compare the day case LC with conventional LC in terms of mean of number of days of early return to activities and means of intensity of postoperative pain on VAS.

Materials and Methods

Study design was Randomized Controlled Trial (Parallel) with allocation ration of 1:1. Study was conducted at department of General Surgery, PIMS, Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU) Islamabad from 1st Nov 2014 to 30th April 2015. Sample size was calculated using WHO sample size calculator. Taking 18(2-52) days as population mean+/-SD and 14(2-32) days as test value of population mean+/- SD for early return to activities from previous literature.[15] Level of significance was taken 5%. From given values 42 sample size was calculated for each group. Consecutive sampling was done as per inclusion and exclusion criteria. Operating surgeons were blinded and sampling was done by on floor post graduate trainee. Permission was taken from hospital ethical review board after detailed discussion and defense before the ethical committee.

Inclusion criteria was to include all patients with un-complicated Cholelithiasis undergoing Laparoscopic cholecystectomy in study from 14 years to 60 years of age, both female and male patients and patients in ASA grade 1 and 2. Patients with known complications of Cholelithiasis like acute cholecystitis and acute pancreatitis, patients with known IHD, uncontrolled DM and uncontrolled HTN, any bleeding disorder and patients who are unfit for GA, or in ASA grade 3 and 4 were excluded from study.

Day case LC was defined as discharge from hospital within 12 hours of admission while conventional LC was defined as discharge from hospital after 24 hours of admission. Return to home activities was calculated in days, from the time of admission to the time of return to routine home activities. Patient was allowed to return to home activities if he was not having any surgical complications, able to move independently for eating, drinking and toilet, has no drain placed, was pain free and tolerating oral diet.

Intensity Postoperative pain was assessed after 6 hours using Visual Analogue scale (VAS).

Study population was all patients, who were booked for Laparoscopic cholecystectomy during the period of study at Surgical Unit 3 of PIMS, SZABMU. Patients who were fulfilling the inclusion criteria were included in study after taking informed and written consent. Patients were divided into two groups, group A and group B by lottery method. Randomization was done by assigned on floor post graduate trainee. Operating surgeons were blinded about group allocation of participants. Patients in group A had undergone Day case laparoscopic cholecystectomy and patients in group B had undergone Conventional Laparoscopic cholecystectomy. Pain was measured by VAS (Visual analogue score) at 6 hours postoperatively and number of days to return to home activities was asked to patient on follow up. For follow up contact numbers and addresses were recorded.

Data was collected and recorded on purposively designed Performa. SPSS 17 was used for data entry and analysis. Mean and standard deviation was calculated for numerical data (parametric) like age, number of days of return to activities and intensity of postoperative pain and frequencies were calculated for categorical data like sex. Unpaired T test was used for numerical data like mean of no of days to return to home activities and mean of postoperative pain. P value <0.05 was considered significant.

Results

Total of 84 patients were included in study. In Group A there were 42 patients who underwent Day Case Laparoscopic Cholecystectomy and in Group B there were 42 patients who underwent conventional Laparoscopic Cholecystectomy. In group A, total number of female patients was 32(76.2%) and male were 10(23.8%). Mean age was 38.95 years with SD of ±9.798. All the patients in group A underwent successful laparoscopic cholecystectomy without any major complications. Out of 42 patients 40(95%) were discharged successfully on same day of admission, fulfilling the Day case Laparoscopic Cholecystectomy Criteria. Rest of the two patients was discharged on second day of surgery. The reason for failure to discharge on same day of surgery was pain and nausea in both patients. The minimum and maximum intensity of pain on Visual Analogue Scale was 2 and 6 respectively with mean of 3.93 and SD of ±1.135. Among 42 patients 13(31%) were on VAS 4, 13(31%) were on VAS 5, 8(19%) were in VAS 3, 6(14.3%) were in VAS 2 and 2(4.8%) were in VAS 6. The minimum and maximum "number of days to return to activities" was 3 and 7 days respectively, with mean of 3.88 and SD of ±1.109. Out of 42 patients 20(47.6%) had returned to their home activities in 3 days, 13(31%) in 4 days, 5(11.9%) in 5 days, 2(4.8%) in 6 days and 2(4.8%) in 7 days.

In group B, total number of female patients was 32(76.2%) and male were 10(23.8%). Mean age was 44.83 years with SD of ±14.553. All the patients in group B underwent successful laparoscopic cholecystectomy without any major complication. All patients were discharged successfully on second day of admission. The minimum and maximum intensity of pain on Visual Analogue Scale was 2 and 6 respectively with mean of 4.17 and SD of ±1.080. Among 42 patients 15(35.7%) were on VAS 5, 14(33.3%) were on VAS 3, 8(19%) were in VAS 4, 4(9.5%) were in VAS 6 and 1(2.4%) were in VAS 2. The minimum and maximum "number of days to return to activities" was 6 and 10 days respectively, with mean of 8.4 and SD of ±0.857. Out of 42 patients 17(40.5%) had returned to their home activities in 9 days, 17(40.5%) in 8 days, 4(9.5%) in 7 days, 3(7.1%) in 10 days and 1(2.4%) in 6 days.

There was no statistically significant difference between the two groups in terms of intensity of pain on VAS, as P value was greater than 0.05 (P-value:

Table I: No of Days to Return to Activities

Group A			Group B		
No of Days	No of Patients	Percentage (%)	No of Days	No of Patients	Percentage (%)
3	20	47.6	6	1	2.4
4	13	31.0	7	4	9.5
5	5	11.9	8	17	40.5
6	2	4.8	9	17	40.5
7	2	4.8	10	2	7.1
Total	42	100	Total	42	100

Table II: Intensity of Post-Operative Pain in Both Groups on VAS

Group A			Group B		
Intensity of Pain on VAS	No of Patients	Percentage (%)	Intensity of Pain on VAS	No of Patients	Percentage (%)
2	6	14.3	6	1	2.4
3	8	19.0	7	4	9.5
4	13	31.0	8	17	40.5
5	13	31.0	9	17	40.5
6	2	4.8	10	3	7.1
Total	42	100	Total	42	100

0.359 using paired t-test), while there was statistically significance difference in two groups in terms of no of days to return to routine activity as p value was less than 0.05 (P-value: 0.000 using paired t-test)

Discussion

Our study has demonstrated success rate of 92.5%, which is fairly consistent with the international reported figures, which is 95% as reported by Hamad et al.[16] Success rate is quite lower if proper patient selection is not done. Careful patient selection base on the inclusion and exclusion criteria should significantly reduce the number of failed day case surgeries, as patient unfit for day case surgery was identified as leading cause of day case surgery failure in literature.[17] In Our study, which has demonstrated success rate almost comparable to international literature, careful patient selection was done using preset inclusion and exclusion criteria.

In our study we studied the two factors, one is postoperative pain and other one is the early return to home activities. Postoperative pain is one of the most important reasons for failure to discharge patient on same day of surgery. Literature has reported that postoperative pain and nausea is the reason for failure to discharge and even readmission majority of patients undergoing day case surgery.[18] As in our study, minimal post-operative pain has been included in criteria for discharge along with other parameters in almost all of the reported literature on day case surgery.[19] In our study failure to discharge rate after day case surgery was 5%. In all 5% of patients, reasons for delayed discharge was nausea and vomiting, which is again consistent with reported literature.[18] In our study Visual analogue scale (VAS) was used to assess the intensity of post-operative pain. VAS is easy to record and easy to understand scale, which is being used by most of the researcher around the globe.[20] Requirement for analgesics in both groups could have been a good variable to record, which our study lacks. Our study also did not find any significant difference between the two groups in term of postoperative pain intensity as P value was more than 0.05, which translates into the fact that patients who are being discharged home on same day will not need extra care for pain management as compared to other group.

Early return to routine activities is quite an important factor in comparing the two groups. The more the patient stays in hospital; the delayed will be his return to normal life. Our study has found significant difference between the two groups in term of early return to routine activities as the P value is less than 0.05. Average of 10 days have been reported in literature for no of days to return to routine activities after conventional laparoscopic cholecystectomy.[21] Our study has demonstrated 9 mean days for return to routine activities after conventional LC, while 3.88 mean days for day case LC, which was found to be statistically significant. This single variable shows that number of sick leaves days can be reduced by adopting day case surgery, where feasible, but more studies are warranted to validate and strengthen this claim.

As it is evident from the above literature and from our study, that the LC can be performed with success and with safety on day case basis; as shorter hospital stay did not affect the outcomes and rate of complications after surgery. On the other hand day case surgeries have shortens the waiting list for surgeries and have reduced the total cost of surgery because of shorter hospital stay.[22] Certain principles should be met for the success of day case surgery. Careful selection of patients after setting inclusion and exclusion criteria and vigilant management of postoperative pain are the parameters for the success of day case surgery.

Conclusion

Patients undergoing day case LC do return to their routine activities earlier than those who undergo conventional LC, but there is no difference in terms of intensity of post-operative pain as measured on Visual analogue scale.

REFERENCES

1. Chalkoo M, Ahanger S. The Historical Perspective, Current Advancements and Innovations in Laparoscopic Cholecystectomy. J Pioneer Med Sci. 2012; 2(3):86–7.
2. Beal JM. Historical perspective of gallstone disease. Surg Gynecol Obstet. 1984; 158(3):181–9.
3. Shaikh H, Abbas A, Aleem S, Lakhani M. Is mini-laparoscopic cholecystectomy any better than the gold standard? A comparative study. J Minim Access Surg. 2016; 13(1):42.
4. Khashab MA, Kalloo AN. Natural orifice translumenal endoscopic surgery. Curr Opin Gastroenterol. 2010; 26(5):471–7.

5. Malik A, Mellinger J, Hazey J, Dunkin B, MacFadyen BJ. Endoluminal and transluminal surgery: Current status and future possibilities. Surg Endosc. 2006; 20(8):1179–92.
6. Jiang H, Han J, Lu A, Liu X. Day surgery management model in China: Practical experience and initial evaluation. Int J Clin Exp Med. 2014; 7(11):4471–4.
7. An Y, Wang Z. Concept and basic problems of day surgery. Chinese J Pract Surg. 2007; 27:38–40.
8. Zhang Z, Yu T, Li H. Study on medical expenses and bed usage under day surgery model. Hebei Med J. 2007; 13:398–402.
9. Chawla T, Ali A, Jamal A. Ambulatory laparoscopic cholecystectomy: Is it safe and cost effective? J Minim Access Surg. 2009; 5(1):8.
10. Briggs CD, Irving GB, Mann CD, Cresswell A, Englert L, Peterson M, et al. Introduction of a day-case laparoscopic cholecystectomy service in the UK: A critical analysis of factors influencing same-day discharge and contact with primary care providers. Ann R Coll Surg Engl. 2009; 91(7):583–90.
11. Tamhankar AP, Mazari F, Olubaniyi J, Everitt N, Ravi K. Postoperative Symptoms, After-Care, and Return to Routine Activity After Laparoscopic Cholecystectomy. JSLS J Soc Laparoendosc Surg. 2011; 14(4):484–9.
12. Ahn Y, Woods J, Connor S. A systematic review of interventions to facilitate ambulatory laparoscopic cholecystectomy. Hpb. 2011; 13(10):677–86.
13. Mehraj A, Naqvi MA, Feroz SH, ur Rasheed H. Laparoscopic cholecystectomy: an audit of 500 patients. J Ayub Med Coll Abbottabad. 2011; 23(4):88–90.
14. Sato A. Ambulatory laparoscopic cholecystectomy: An audit of day case vs overnight surgery at a community hospital in Japan. World J Gastrointest Surg. 2013; 4(12):296.
15. Sharma A, Hayden JD, Reese RA, Sedman PC, Royston CMS, O'Boyle CJ. Prospective comparison of ambulatory with inpatient laparoscopic cholecystectomy: Outcome, patient preference and satisfaction. Ambul Surg. 2004; 11(1–2):23–6.
16. Al-Qahtani HH, Alam MK, Asalamah S, Akeely M, Ibrar M. Day-case laparoscopic cholecystectomy. Saudi Med J. 2015; 36(1):46–51.
17. Dimitriadis PA, Iyer S, Evgeniou E. The challenge of cancellations on the day of surgery. Int J Surg [Internet]. 2013; 11(10):1126–30.
18. Al-Omani S, Almodhaiberi H, Ali B, Alballa A, Alsowaina K, Alhasan I, et al. Feasibility and safety of day-surgery laparoscopic cholecystectomy: a single-institution 5-year experience of 1140 cases. Korean J Hepato-Biliary-Pancreatic Surg [Internet]. 2015; 19(3):109.
19. Hamid R, Hakeem W, Naiko Z, Malik M, Resident S. Annals of Surgery: International Feasibility of Day Care Laparoscopic Cholecystectomy in District Hospital Married doctors hostel room no= S2, A Block, SKIMS. Ann Surg Int. 2016; 2(2):6–10.
20. Tiryaki C, Bayhan Z, Ertugrul E, Alponat A. Ambulatory laparoscopic cholecystectomy: A single center experience. J Minim Access Surg. 2016; 12(1):47–53.
21. Ito E, Takai A, Imai Y, Otani H, Onishi Y, Yamamoto Y, et al. Quality of life after single-incision laparoscopic cholecystectomy : A randomized , clinical trial. Surgery [Internet]. 2019; 165(2):353–9.
22. Ji W, Ding K, Li L, Wang D, Li J. Outpatient versus inpatient laparoscopic cholecystectomy: a single center clinical analysis. Hepatobiliary Pancreat Dis Int. 2010; 9:60–4.

ORIGINAL ARTICLE

Correlation of BMI Variation with Tidal Function in Healthy Young Adults

Ayesha Sadiqa, Farida Munawar

ABSTRACT

Objective: To observe the effect of Body Mass Index (BMI) on Tidal volume and its rate of air flow in healthy young adults.

Study Design: Cross-sectional study

Place and Duration of Study: Department of Physiology at Shalamar Medical and Dental College, Lahore, from 14th April to 20th August 2018.

Materials and Methods: Thirty students with fifteen boys and fifteen girls were involved in the study. Convenience sampling technique was used for First year Medical Undergraduate students, aged 19–21 years; also consent was taken each participant. All the subjects were healthy and not on any medication or involved in endurance training program. Power Lab with spirometer pod and pneumotacho meter was used to measure Tidal volume and its air flow rate. Data was collected through application namely "Respiratory Airflow & Volume" in Lab Tutor software. BMI values were taken in kg/cm via "Adult weighing scale". Linear regression analysis was performed to see the effect of BMI on tidal volume and its rate of air flow.

Results: In both genders BMI was not proved a predictor of Tidal volume (L) nor it was proved a predictor of Tidal air flow rate (L/min) in healthy young adults resulted through regression analysis. Where Tidal volume and its rate of flow were taken as dependent variables and BMI was considered as independent variable, however the results proved statistically insignificant p-value (>0.05).

Conclusion: BMI has no correlation with Tidal volume and its air flow rate in healthy young adults.

Key Words: *Tidal Volume, Young Adults, Tidal Function, BMI Variation.*

Introduction

Spirometry is meant for the measurement of lung volumes and capacities in order to examine the efficiency of lungs.[1] Lung volumes are further divided into: dynamic and static physiological classes; where static lung volumes are again classified into: tidal, inspiratory reserve, expiratory reserve, and residual volume.[2]

Tidal volume is defined as the amount of air, transported into and out of the lungs with each respiratory breath, which is significant for natural respiratory cycle. Its value in a healthy adult male and female is approximately 500 and 400 mL respectively, but can also be transformed according to the variation in physiological needs.[1]

Department of Physiology
Shalamar Medical and Dental College, Lahore

Correspondence:
Dr. Ayesha Sadiqa
Assistant Professor
Department of Physiology
Shalamar Medical and Dental College, Lahore
E-mail: ayeshaias@yahoo.com

Funding Source: NIL; Conflict of Interest: NIL
Received: December 20, 2018; Revised: July 31, 2019
Accepted: August 10, 2019

Many factors influence tidal volume; obesity is one of those, on which time to time many studies do their best in order to observe the relation of obesity with the pulmonary functions. The association of obesity with reduced pulmonary performance has received considerable attention.[3] So role of BMI cannot be neglected while assessing the lung function tests. Also a study confirmed that even shape and position of the diaphragm is related with the rate of tidal air flow in humans, especially in those having airflow limitation. In the same study it is also claimed that in obese individuals, the tidal volume is declined due to relative increase in dead space. Obesity is defined in terms of body mass index (BMI), which is calculated by dividing weight on height square of the subject, where weight is measured in kilograms and height in meters. World Health Organization (WHO) has declared a BMI of 25 - 29.9 kg/m^2 as overweight and BMI of ≥ 30 kg/m^2 as obese.[4] On the other side numerous cross-sectional researches found improved lung functions due to decrease in BMI, especially in asthmatic patients.[5,6] The effects of obesity (high BMI) on lung volumes have been explained in literature.[7] But there is found paucity on the effect of BMI (physiological variations) in healthy

individuals with respect to respiratory tidal function of lungs. The aim of the present study was to observe the effect of Body Mass Index (BMI) on Tidal volume and its rate of air flow in healthy young adults.

Materials and Methods

Present cross sectional study has been performed on First year Medical Undergraduate students, aged 19–21 years, at Shalamar Medical and Dental College, Lahore, in May 2017. A total of 30 students have been involved with 15 boys and 15 girls by using convenience sampling technique. The study was approved by Ethical Review Board of the Institute. All the participants involved in this research were consented in writing on the written consent forms, before the initiation of this research project. Also all the participants were ensured regarding their personal biological data in connection to their individual privacy concerns. All the students who were physically healthy and without any medication or with present illness were included in the study and those who were involved in any physical training program or on medication were excluded from the study. The data was collected by a professional medical physiologist with the help of a laboratory technician in Physiology Research Laboratory of the department of Physiology. The data type was parametric.

On one side, spirometer pod was connected to "Power Lab 2005-07, Model 26T", within in its Input 1 and on the other side spirometer pod was also connected to pneumotachometer Fig. 1, with its two plastic tubes. Clean bore tubing, filter and mouthpiece was also attached to the flow head of pneumotachometer as shown in Fig. 2. Software Lab Tutor was opened with its related application "Respiratory Airflow & Volume" and a calibration window was appeared on the screen of Laptop linked to Power Lab Data Acquisition Unit. Following the given instructions in the application, each subject was connected to the spirometer as shown in the Fig. 3. The guidelines were given to each subject to take three normal breathes via mouth (to make this sure, a nose clip was also used to avoid air passage through nose). Tidal Volume of each candidate was represented in a digital graph on the calibration window as shown in the Fig. 4. Values were directly obtained through Spiro metric analysis on Power Lab. Tidal Volumes was measured in Liters and Rates of Tidal Air Flow were measured in Liters per minute. Height in centimeters and weight in kilograms (along with wore shoes) were recorded through "Adult Weighing Scale ZT-160" and BMI calculations were taken finally in kg/cm.

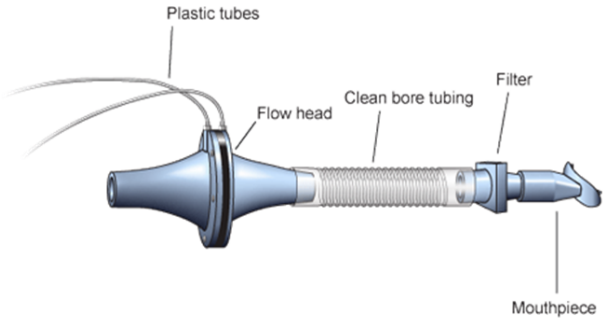

Fig 1: Pneumotachometer of Power Lab

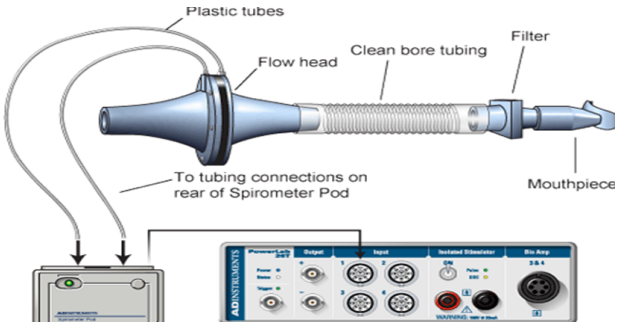

Fig 2: Spirometer Equipment Setup for Power Lab

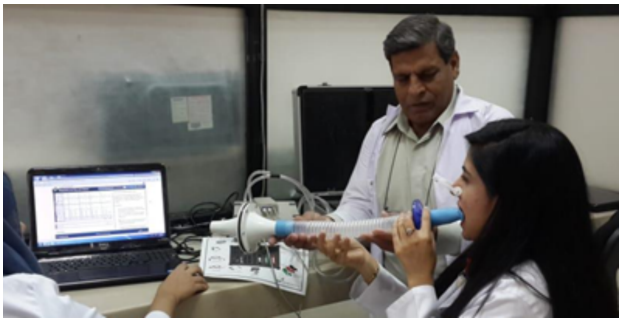

Fig 3: Subject Positioning with Pneumotacho Meter

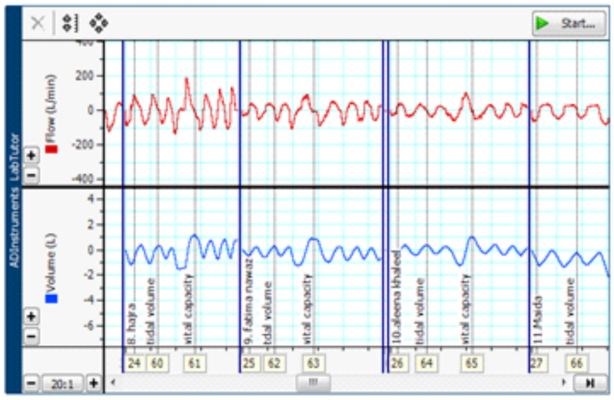

Fig 4: Digital Graph showing Spirogram on Clibration Window

Data was tabulated on Microsoft Excel and linear regression models were used along with one line fit graphs with BMI was taken as independent variable, while Tidal Volume/Air Flow rate were taken as dependent variable for all categories. Alpha was considered as 0.05 and statistical significance was interpreted accordingly on the basis of obtained p-value of x-variable in each linear regression pattern.

Results

Regression study of linear pattern is showed a non-significant correlation between values of Tidal Volume (total boys and girls in the study) as dependent variable and BMI of the same sample group as independent predictor of expected Tidal volume by any change in BMI (Table II). With 1 unit change in BMI only 0.03 unit changes in predicted Tidal volume of both genders (Fig. 5). Similar negligible change is detected when same regression variables are plotted for boys (Fig. 6) and girls (Fig. 7) separately. Henceforth BMI is not correlated with Tidal Volume in healthy young adults.

Linear regression analysis is indicated a non-significant association between values of Rate of Air Flow in Tidal Volume (both boys and girls) as dependent variable, and BMI of the same sample group as independent predictor of expected Tidal Air Flow with any change in BMI (Table I). A decrease of 0.67 units in predicted value of Tidal Air Flow in both genders is observed, with 1 unit increase in their respective values of BMI (Fig. 8). While a decrease of 1.11 unit in Tidal Air Flow is noticed with 1 unit increase in BMI, when regression plot is taken only for the boys (Fig. 9). Though a direct non-significant correlation is perceived when same regression variables are plotted only for the girls i.e. an increase of 0.23 unit in rate of Tidal Air Flow, is displayed with 1 unit rise in their BMI (Fig. 10). Therefore BMI is only a minor predictor for Rate of Tidal Air Flow in young adults, as with its rise Tidal Air Flow is slightly decrease in the boys and in both genders collectively, while with increase in BMI increase is observed in tidal Air Flow in the girls.

Table I: Averages of each Studied Group with Standard Error of Mean (SEM)

Sr. No.	Groups	BMI (kg/cm)	Tidal Volume (L)	Tidal Air Flow Rate (L/min)
		Mean ± SEM	Mean ± SEM	Mean ± SEM
1	All Males	25.87± 1.78	0.42 ± 0.07	33.89 ± 5.53
2	All Females	24.15 ± 0.64	0.36 ± 0.06	22.92 ± 5.079
3	All Males and Females	24.97 ± 0.92	0.39 ± 0.047	28.18 ± 3.83

Table II: Regression Sets of Each Line Fit Plot, along with Their P – Values and Deduced Effects

Sr. No.	Regression Groups		Interpreted Results	P - Values
	Y-Axis Variables	X-axis Variables		
1	Tidal Volume of both males and females	BMI of both males and females	With 1 unit increase in BMI, the predicted value of Tidal Volume would increase by 0.003 units in both genders* (Fig.5).	0.78
2	Tidal Volume of the males subjects	BMI of the males subjects	With 1 unit increase in BMI, the predicted value of Tidal Volume would decrease by 0.003 units in the males* (Fig. 6).	0.82
3	Tidal Volume of the females subjects	BMI of the females subjects	With 1 unit increase in BMI, the predicted value of Tidal Volume would increase by 0.035 units in the females* (Fig. 7).	0.20
4	Tidal Air Flow of both males and females	BMI of both males and females	With 1 unit increase in BMI, the predicted value of Air Flow would decrease by 0.67 units in both genders* (Fig. 8).	0.44
5	Tidal Air Flow of the males subjects	BMI of the males subjects	With 1 unit increase in BMI, the predicted value of Air Flow would decrease by 1.11 units in the males* (Fig. 9).	0.25
6	Tidal Air Flow of the males subjects	BMI of the males subjects	With 1 unit increase in BMI, the predicted value of Air Flow would increase by 0.23 units in the females* (Fig. 10).	0.25

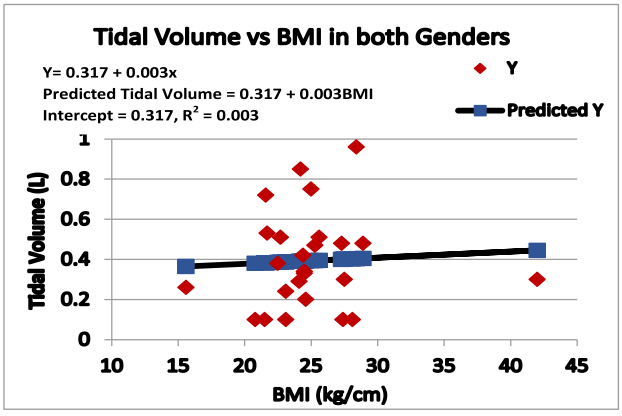

Fig 5: Scatter Diagram Showing Linear Regression Plot Between Tidal Volume As Dependent Variable And BMI As Independent Variable, In Both Genders (P=0.78).

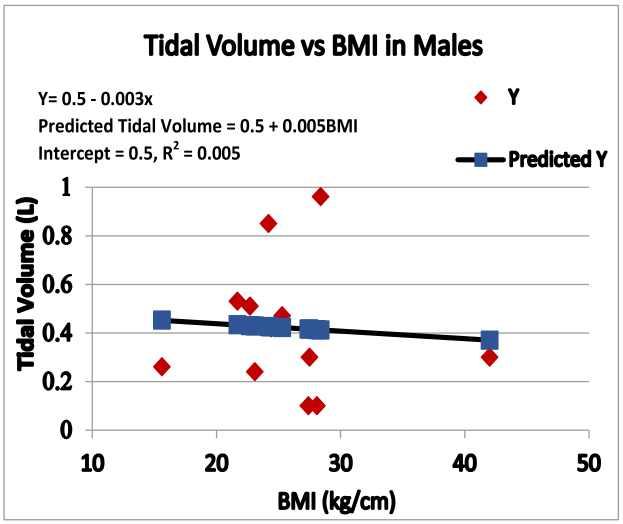

Fig 6: Scatter Diagram Showing Linear Regression Plot between Tidal Volume as Dependent Variable and BMI as Independent Variable, in Males (P=0.82).

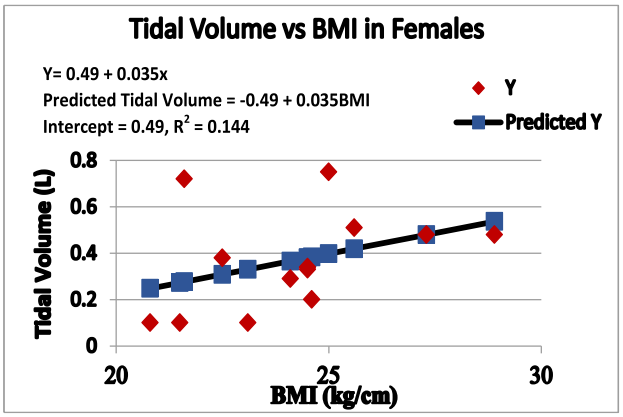

Fig 7: Scatter Diagram Showing Linear Regression Plot Between Tidal Volume as Dependent Variable and BMI as Independent Variable, in Females (P=0.20).

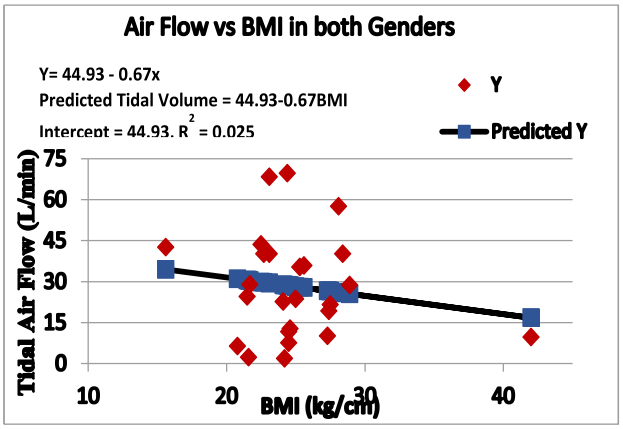

Fig 8: Scatter Diagram Showing Linear Regression Plot between Air Flow as Dependent Variable and BMI as Independent Variable, in both the Genders (P=0.44).

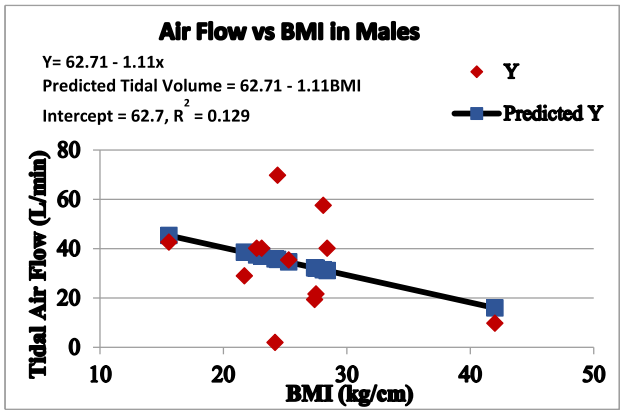

Fig. 9: Scatter Diagram Showing Linear Regression Plot between Air Flow as Dependent Variable and BMI as Independent Variable, in Males (P=0.25).

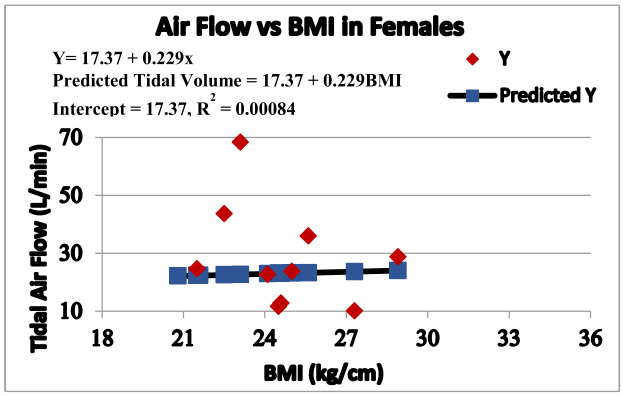

Fig. 10: Scatter Diagram Showing Linear Regression Plot between Air Flow as Dependent Variable and BMI as Independent Variable, in Females (P=0.93).

Discussion

The present study exhibited no significant relation of BMI with tidal volume and tidal air flow rate in both male and female young adults. As minor variations in the BMI within normal physiological range are not the main influencers of usual pulmonary functions. Although previous standard morphometric procedures confirm that males have larger lung size, more bronchioles and wider diameter of airway passages compare to females of same age and stature. These anatomical differences between male and female are the real basis of variations in static lung volumes and capacities in both genders.[8] To explore the effect of BMI on prime lung functions i.e. Tidal functions are the main purpose of our study as static lung volumes and capacities can be forecasted on several physiological basis like gender, age, weight, height and even ethnicity of that population.[6]

Other influencing factors on lung volumes and

capacities are physical activity (like exercise and endurance training), high altitude and most significantly the position of the individual; all must be in consideration while doing spirometry. However alongside, the quality and accuracy of the apparatus in use and its technique for estimation of the lung volumes/capacities is also a considerable factor. On high altitude, lung volumes usually decline because of increased pulmonary blood flow, edema and obliteration of premature narrow airways. Although these alterations resolve after returning back to sea level. Postural changes also affect tidal volume, as in sitting or supine position, the effect of gravity on abdominal cavity is quite less in comparison to standing posture.[8] In our study all the subjects are in sitting posture that eliminates the effect of posture among the subjects.

It is also evident that the height of the diaphragm has an inverse relation with subject's age, meaning size of the chest is also one of the major determinants in lung function tests.[6] Tall stature is classically associated with increased static lung volumes/ capacities, while increased body weight is linked with lesser lung volumes especially in obese people. In the same context Lutfi *et al.,* explained the role of ethnicity in this regard as it is also considered one of the prime contributor to lung functions, e.g. European white Americans descent have longer chest/leg ratio, and subsequently have more values for lung volumes, compared to African black American's ancestors. That's why Global Lung Initiative (GLI) announces spirometric predicted calculations with careful ethnic variations, which can be used as a universal standard across the World.[8] In our scenario ethnicity also is a non-variable factor in terms of BMI association with Tidal lung function.

Obesity is also regarded as a negative factor in relation to physiological lung volumes. Many studies represent the association of restrictive respiratory pattern obese individuals and not with healthy individuals[9] similar to our findings. Obesity has numerous effects on pulmonary efficiency, such as in obese persons ventilation has to be raised in order to compensate the depressed tidal volumes in them.[10] Total compliance of whole respiratory system is reduced in massively obese individuals, but here the distribution of fat account more as compared to increased BMI.[7] Even previous studies also prove normal spirometric measurements in mildly obese individuals. More than that latest researches conclude that even in massively obese individuals, the restrictive pulmonary effects are found modest. Only with very high BMI increases i.e. morbidly obese persons, a reduction in expiratory flow, FEV_1 and forced vital capacity (FVC) has been observed.[4,12] Another study also exhibits high tidal volume in obese women.[10] Whereas restrictive lung diseases have an association with reduced pulmonary compliance that interfere with lung expansion and resultantly diminishes static lung volumes/ capacities.[3,14]

National Institutes of Health declares subsequent scheme of BMI grading: underweight <18.5; normal 18.5 – 25; overweight 25 - 30; obese 30 - 40; severely obese ≥40, all values are taken in kg/m^2.[11,15] Studies based on four categories male and female college students' i.e. Underweight, normal BMI, overweight and obese, also shows no significant difference in all groups with respect to their vital capacities.[3,13] Other studies also observe no significant gender based difference between BMI and vital capacity as lung function.[16,17] So our results are very much consistent with this previous study; there is no evidence that BMI changes in healthy young adults have an association with tidal lung function and thus BMI cannot predict the variations in tidal volume and its air flow rate in healthy young adults without gender discrimination.

The present study has small sample size; with larger sample size the results would be more significant. Moreover the study comprised only young adults, so results only reflect the respective age group.

In future a study with large sample size, varied ethnicity and wide range of age can explore the BMI correlation with Tidal function in a more elaborated way.

Conclusion

BMI variation has no correlation with Tidal Volume and tidal air flow rate in healthy young adults including both males and females.

REFERENCES

1. Sasha Hallett, John V. Ashurst. Physiology, Tidal Volume. Book Stat Pearls Publishing LLC. 2018.
2. Lutfi MF. The physiological basis and clinical significance of lung volume measurements. Multidiscip Respir Med. 2017; 12: 3.

3. Peng Liu, Ziliang Ye, Haili Lu, Jingjing Lu, Liqian Huang, Jiangu Gong, Qiongying Deng and Lin Xu. Association between body mass index (BMI) and vital capacity of college students of Zhuang nationality in China: a cross-section study. Oncotarget. 2017; 8(46): 80923–33.
4. Parameswaran K, Todd DC, Soth M. Altered respiratory physiology in obesity. Can Respir J. 2006; 13(4): 203-10.
5. Cibella F, Bruno A, Cuttitta G, Bucchieri S, Melis MR, De Cantis S, La Grutta S, Viegi G. An elevated body mass index increases lung volume but reduces airflow in Italian schoolchildren. PLoS One. 2015; 10(5): e0127154.
6. Hellebrandová L, Chlumský J, Vostatek P, Novák D, Rýznarová Z, Bunc V. Airflow limitation is accompanied by diaphragm dysfunction. Physiol Res. 2016; 65(3): 469-79.
7. Littleton SW. Impact of obesity on respiratory function. Respirology. 2012; 17(1): 43-9.
8. Lutfi MF. The physiological basis and clinical significance of lung volume measurements. Multidiscip Respir Med. 2017; 12:3.
9. Steier J, Lunt A, Hart N, Polkey MI, Moxham J. Observational study of the effect of obesity on lung volumes. Thorax. 2014; 69(8):752-9.
10. Salome CM, King GG, Berend N. Physiology of obesity and effects on lung function. Journal of applied physiology. 2009; 29; 108(1):206-11.
11. O'Brien JM Jr, Phillips GS, Ali NA, Lucarelli M, Marsh CB, Lemeshow S. Body mass index is independently associated with hospital mortality in mechanically ventilated adults with acute lung injury. Crit Care Med. 2006; 34(3): 738-44.
12. Fukahori S, Matsuse H, Takamura N, Tsuchida T, Kawano T, Fukushima C, Hideaki S, Kohno S. Body mass index correlated with forced expiratory volume in 1 second/forced vital capacity in a population with a relatively low prevalence of obesity. Chin Med J (Engl). 2010; 123(20):2792-6.
13. Aggarwal T, Singh D, Sharma B, Siddique SS, Agarwal S. Correlation of gender and body mass index with pulmonary function tests in medical and paramedical students of Muzaffarnagar Medical College. Natl J Physiol Pharm Pharmacol 2017; 7(11):1155-1158.
14. Jaber S, Coisel Y, Chanques G, Futier E, Constantin JM, Michelet P, Beaussier M, Lefrant JY, Allaouchiche B, Capdevila X, Marret E. A multicentre observational study of intra-operative ventilatory management during general anaesthesia: tidal volumes and relation to body weight. Anaesthesia. 2012; 67(9): 999-1008.
15. Medarov, Boris I., et al. EFFECT OF BODY MASS INDEX ON PULMONARY FUNCTION TESTS, CHEST, 2005; 128(4), 171S
16. Jones RL, Nzekwu MM. The effects of body mass index on lung volumes. Chest. 2006; 1; 130(3):827-33.
17. Banerjee J, Roy A, Singhamahapatra A, Dey PK, Ghosal A, Das A. Association of Body Mass Index (BMI) with Lung Function Parameters in Non-asthmatics Identified by Spirometric Protocols. J Clin Diagn Res. 2014; 8(2):12-4.

ORIGINAL ARTICLE

Prevalence of Ponticulus Posticus in Orthodontic Patients of the Local Population of Islamabad, Pakistan

Qurat Ul Ain, Saqlain Bin Syed Gilani, Muhammad Aamir Ghafoor Choudry, Bakhtawar Yaqoob Awan

ABSTRACT

Objective: To determine the prevalence and association of Ponticulus Posticus with dental and skeletal malocclusions in our local population.

Study Design: Cross sectional, observational study

Place and Duration of Study: Orthodontics department of a tertiary care hospital based in Islamabad using records between the duration of 1st March, 2014 – 31st February 2018.

Materials and Methods: The study was conducted using lateral cephalograms of the patients visiting the Orthodontic department which were analysed against age, gender, skeletal and dental malocclusions of the patients obtained from the patient records. For the incidence of Ponticulus Posticus a total of 1194 radiographs were obtained using convenience sampling and analysed using SPSS version 17 and Pearson's Chi-Square test was applied.

Results: A combined frequency of PP was found to be 18.1% (181/817). A higher frequency in males 22.6% (77/264) as compared to females 15.8% (104/553) exhibited a significant difference ($p < 0.05$).

Partial type of Ponticulus Posticus was more frequent (61.3%) as compared to Full (38.7%). Partial variant expressed a higher frequency in skeletal (49.5%) and dental (48%) class II malocclusion. Whereas, the full variant of Ponticulus Posticus exhibited a higher frequency in Dental Class II (48.6%) and skeletal Class I (55.7%) respectively.

Conclusion: Our data suggests that frequency of Ponticulus Posticus in our local population shows male preponderance in dental class II malocclusion, however, no significance was established in relation to its association with skeletal or dental malocclusions.

Key Words: *Arcuate Foramen, Atlas, Dental and Skeletal Malocclusion, Kimmerle Anomaly , Ponticulus Posticus.*

Introduction

Ponticulus Positicus (PP) is a morphological variation of the ATLAS/C1 (the first cervical vertebra), famous for anatomical disparity leading to various clinical manifestations such as; migraine, neck pain, hearing loss and most importantly, incorrect assessment during orthopaedic surgery for atlanto-axial fixation causing vertebral artery damage.[1] Ponticulus posticus is a Latin word meaning "LITTLE POSTERIOR BRIDGE".[1,2] It is a membranous ossification found between the posterior portion of the superior articular process and posterolateral portion of superior margin of the posterior arch of Atlas.[3] This anatomical anomaly has been termed in the literature using various terminologies such as Arcuate Foramen, Kimmerle anomaly, Foramen Atlantoideum being a few of them.[4,5] Origin of PP with clinical implications is not yet fully understood[6] and subjected to ongoing research with endochondral origin from the dorsal arch of atlas proposed in the literature.[7]

PP has prevalence ranging from 1.3% - 60%[3] with ethnic variation.[8] There is a lack of data on the Asian population,[9] no such study is yet reportedly conducted in Pakistan. Recent meta-analysis shows preponderance in female gender (18.5%) as compared to males (16.7%).[8] The analysis is commonly done using various assessing/ investigating tools such as CBCT,[2] dried specimens of C1 (Atlas)[10,11] and most commonly employed method comprising lateral cephalograms.[12-14] Using these investigative techniques, the establishment of presence of PP and types can be assessed which can

Department of Dentistry
Islamic International Dental College
Riphah International University, Islamabad
Correspondence:
Dr. Saqlain Bin Syed Gilani
Assistant Professor
Department of Dentistry
Islamic International Dental College
Riphah International University, Islamabad
E-mail: saqlain.syed@riphah.edu.pk

Funding Source: NIL; Conflict of Interest: NIL
Received: October 23, 2018; Revised: August 20, 2019
Accepted: August 27, 2019

be Partial (incomplete) and Full (complete).[15-19] Skeletal deformities, head, neck, cervical posture and morphological deviation along with variable orthopaedic findings are believed to have an association with malocclusion.[20,21] Studies have also reported a relationship between mandibular positioning and cervical vertebral morphology.[22] D'Attilio et al presented a statistically significant correlation between mandibular plane angle, position, length and overjet to the cervical curvature.[23] All these studies showing an association of orthopaedic findings with certain orthodontic findings led us to investigate the prevalence and association of Ponticulus Posticus with dental and skeletal malocclusions in our local population.

Materials and Methods

A cross-sectional study was undertaken at the Islamic Interational Dental Hospital, using the records from the archives of the Orthodontics department of patients who had undergone orthodontic treatment/consultation during a period of March 01, 2014 – February 31, 2018. A total of 1194 lateral cephalograms were acquired using non-probability convenience sampling. The ethical approval was obtained from the Institutional Ethical Review Committee. A total of 196 radiographs were excluded, the exclusion criteria comprised of poor visualization of posterior arch of atlas and patients with congenital facial abnormalities and/or syndromes. Radiographs were recorded using ART PLUS Dental X-Ray - FIN-02150 and examined by direct visualization under adequate illumination for the presence of the anomaly, and if present whether complete or partial. Gender, age, dental and skeletal malocclusions were noted.

Radiographs were examined by two observers twice on different occasions to reduce intra operative error. In case of a disagreement, a third observer from the radiology department was consulted. The observers followed the classification by Miki et al which radiographically classifies the Ponticulus posticus into three types:[24]

"Full type: it forms a complete bony ring.

Incomplete type: some portions of the bony ring are defective.

Calcified type: there is a linear or amorphous calcification."

Due to many intermediate forms of partial (PP) which may range from a spicule to some being ossified but not completely encircling the posterior arch, the variations were dichotomized to Complete and Partial for this study.

All data was entered and subjected to statistical analysis using SPSS version 17. Using Pearson's Chi-square test, data was analysed to establish any association between occurrence, gender, age and malocclusions (skeletal & dental).

Results

The mean age of the subjects was 17.76 ± 5.41 years (range 7 – 51 years) and catogarized into three groups, Group I (7-14 years), Group II (15-20 years) & Group III (21 and above). Highest prevalence of PP was found in Group II, Partial form of PP was 44.1% and full form of PP was 37.1%. Total number of PP detected were 181 with a prevalence of 18.1% out of 998 radiographs (Partial: 61.3%, Full: 38.7%). Male patients showed a preponderance of PP n=77 (22.6%) as compared to females n=104 (15.8%) with significant difference ($p<0.05$) however, no significant difference ($p>0.05$) was observed between partial and full form of PP, age, skeletal & dental malocclusions.

With the analysis of malocclusion groups, partial PP showed a relative predominance of dental 49 (48%) and skeletal 52 (49.5%) Class II malocclusions and conversely cases of complete/full PP showed a relative predominance of dental 32 (48.6%) Class II and skeletal 39 (55.7%) Class I malocclusion. However, there was no significant difference between different malocclusion groups (skeletal or dental) ($p>0.05$). Detail description available in Table I & II.

Table I: Frequency of PP Based on Gender in Local Population, P < 0.05

	Ponticulus Posticus Absent	Ponticulus Posticus Present
Male	264 (77.4%)	77 (22.6%)
Female	553 (84.2%)	104 (15.8%)
Total	**817 (81.9%)**	**181 (18.1%)**

Table II: Frequency of PP Based on Dental and Skeletal Malocclusions, P > 0.05

	Dental		Skeletal	
	Partial	Full	Partial	Full
Class I	36.3%	36.8%	38.1%	55.7%
Class II	48%	48.6%	49.5%	38.6%
Class III	15.7%	12.9%	12.4%	5.7%

Discussion

The cross-sectional study comprises of cephalograms of the Orthodontically treated patients, as shown in figures 1(A) & (B), of our local population, the evaluation showed a prevalence of 18.1% with partial 61.3% & full 38.7%. The analysis of malocclusion groups showed a predominance of partial type PP in Dental Class II malocclusion and full type PP in Skeletal Class I.

Different methods have been used to investigate PP, that entail plain radiography, CBCT, CT-scans and examination of dried specimens of Atlas. Various studies have been undertaken in different populations with highly variable results (1.3% – 60% prevalence), reported prevalences consist of a meta-analysis conducted by Przemyslaw A. et al which states that the least amount of cases of PP were reported in Asia as opposed to North America where the frequency of PP was highest.[8]

Compared to our population, similar prevalences were reported by Jae Taek Hong (15.6%),[25] Young et al, (15.5%).[26] Kyeong Hwan Kim et al, Elliot & Tanweer (16.6%)[27] and Yong Jae (14%) and (15.5%) respectively.[4,28] However, V Sharma et al. (4.3%),[29] Chitrodka PK et al. (60%)[9] showed contrasting results. A significant male predominance was observed in our local population ($p < 0.05$) which is in coherence with a study conducted by Adisen and Misirlioglu.[3] Though a female predominance was also reported in a study with no significant difference established between the genders ($p>0.05$).[9] Whereas, some studies also suggested that there is no significant difference in the prevalence of the PP among the two genders.[7,27] Adisen and Misirlioglu, in their attempt to study the relationship between mandibular position and cervical vertebra morphology, no association could be established but it was recommended to investigate the presence of PP in different dentoskeletal patterns in future studies. Middle Anatolian population had a higher frequency of the anomaly (PP) detected in Angle class III patients (22.2 %). Although no significant difference was observed between malocclusion groups ($p > 0.05$)[3] which is in coherence with the results of this study.[2] According to Sevki et al 2017 in Turkish population PP was most frequently detected in class III patients (13.8%) followed by class II (12.2%) and class I patients (10.5%). Statistically significant differences between the different sagittal skeletal groups were observed ($p = < 0.05$). In the Turkish population, highest frequency of PP was found in Angle class III patients. Both these findings are in accordance with the study conducted by Sonnesen et al 2007 which showed significant ($p = <0.001$) relationship with mandibular overjet and cervical column morphological deviations as compared to the control group.[30]

Many studies have tried to find any association with age, but none has been able to do so, while some studies have gone as far as to negate any such association.[29] Some claim it to be congenital, citing cadaveric and radiologic studies that have shown its presence in fetuses and children, with some still in the cartilaginous stage yet to ossify which supports the study conducted by Geist whose findings oppose the theory of it being a degenerative phenomenon which occurs as a result of aging.[18] Some studies have shown that in some cases it is able to ossify over the years[31] while in others it remains in a spicule/partial form throughout life, which suggests no association of the bridging process with life.

One of the limitations in the study design was that the lack of extensive Computated Tomography which could have revealed the frequency more accurately by determining if the anomaly was bilaterally present or unilaterally. The observers were not trained radiologists and a trained radiologist was only consulted in cases where both the observers opinions differed.

Conclusion

Our data suggests that frequency of Ponticulus Posticus in our local population shows male preponderance in dental class II malocclusion, however, no significance was established in relation to its association with skeletal or dental malocclusions. A larger sample should be taken in future studies conducted, CBCT or CT scans are recommended to find the full extent of PP including unilaterally and bilaterally present variants.

REFERENCES

1. Tassoker M, Necmettin Erbakan University K, Turkey, Kok H, Necmettin Erbakan University K, Turkey, Ozcan S, Necmettin Erbakan University K, Turkey. Investigation of the relationship between "Sella Turcica Bridge" and "Ponticulus Posticus": A Lateral Cephalometric Study. International Journal of Morphology. 2017;35(1):337-44.

2. Bayrakdar IS, Miloglu O, Altun O, Gumussoy I, Durna D, Yilmaz AB. Cone beam computed tomography imaging of ponticulus posticus: prevalence, characteristics, and a review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol. 2014;118(6):e210-9.
3. Adisen MZ, Misirlioglu M. Prevalence of ponticulus posticus among patients with different dental malocclusions by digital lateral cephalogram: a comparative study. Surgical and Radiologic Anatomy. 2017;39(3):293-7.
4. Kim KH, Park KW, Manh TH, Yeom JS, Chang B-S, Lee C-K. Prevalence and Morphologic Features of Ponticulus Posticus in Koreans: Analysis of 312 Radiographs and 225 Three-dimensional CT Scans. Asian Spine Journal. 2007;1(1):27-31.
5. Taşsöker M, Özcan S. Ponticulus Posticus: Is It Important for a Dentist as an Radiological Finding? Yeditepe J Dent. 2017;13(2):35-41.
6. Bayrakdar İŞ, Miloğlu Ö, Yeşiltepe S, Yılmaz AB. Ponticulus posticus in a cohort of orthodontic children and adolescent patients with different sagittal skeletal anomalies: a comparative cone beam computed tomography investigation. 77. 2018.
7. Gibelli D, Cappella A, Cerutti E, Spagnoli L, Dolci C, Sforza C. Prevalence of ponticulus posticus in a Northern Italian orthodontic population: a lateral cephalometric study. Surgical and Radiologic Anatomy. 2016;38(3):309-12.
8. Pękala PA, Henry BM, Pękala JR, Hsieh WC, Vikse J, Sanna B, et al. Prevalence of foramen arcuale and its clinical significance: a meta-analysis of 55,985 subjects. Journal of Neurosurgery: Spine.0(0):1-15.
9. Chitroda PK, Katti G, Baba IA, Najmudin M, Ghali SR, Kalmath B, et al. Ponticulus Posticus on the Posterior Arch of Atlas, Prevalence Analysis in Symptomatic and Asymptomatic Patients of Gulbarga Population. J Clin Diagn Res. 2013;7(12):3044-7.
10. Gupta C, Radhakrishnan P, Palimar V, D'souza AS, Kiruba N. A quantitative analysis of atlas vertebrae and its abnormalities. J Morphol Sci. 2013;30(2):77-81.
11. Patel Dinesh K. SAA, Roy Nilanjan, Manvikar Purushottam R., Bharambe Vaishaly. A STUDY OF FORAMEN OF ARCUALE IN ATLAS VERTEBRA: INCIDENCE AND CLINICAL CORRELATIONS -. International Journal of Current Research and Review. 2017;7(20):09-11.
12. Hoenig JF, Schoener WF. Radiological survey of the cervical spine in cleft lip and palate. Dentomaxillofac Radiol. 1992;21(1):36-9.
13. Haji Ghadimi M, Amini F, Hamedi S, Rakhshan V. Associations among sella turcica bridging, atlas arcuate foramen (ponticulus posticus) development, atlas posterior arch deficiency, and the occurrence of palatally displaced canine impaction. Am J Orthod Dentofacial Orthop. 2017;151(3):513-20.
14. Friedrich RE. Ponticulus posticus is a frequent radiographic finding on lateral cephalograms in nevoid basal cell carcinoma syndrome (Gorlin-Goltz syndrome). Anticancer Res. 2014;34(12):7395-9.
15. Krishnamurthy A, Nayak S, Khan S, Prabhu LV, Ramanathan LA, Ganesh Kumar C, et al. Arcuate foramen of atlas: incidence, phylogenetic and clinical significance. Rom J Morphol Embryol. 2007;48(3):263-6.
16. Baeesa SS, Bokhari RF, Bajunaid KM, Al-Sayyad MJ. Prevalence of the foramen arcuale of the atlas in a Saudi population. Neurosciences (Riyadh). 2012;17:345-51.
17. Rajani S. Is variant anatomy of atlas clinically important? A review. Basic Sciences of Medicine. 2014;3(1):1-7.
18. Geist JR, Geist SM, Lin LM. A cone beam CT investigation of ponticulus posticus and lateralis in children and adolescents. Dentomaxillofac Radiol. 2014;43(5):20130451.
19. Calin A, editor Ponticulus posticus-not such a rare finding on lateral cervical spine radiographs2013: European Congress of Radiology 2014.
20. Bui C, King T, Proffit W, Frazier-Bowers S. Phenotypic Characterization of Class III Patients. http://dxdoiorg/101043/0003-3219(2006)076[0564:PCOCIP]20CO;2. 2009.
21. Singh GD, Dundee Dental Hospital and School UoD, Dundee, Scotland, UK, Dundee Dental Hospital and School UoD, Park Place, Dundee DD1 4HR, Scotland, UK. Morphologic determinants in the etiology of class III malocclusions: A review. Clinical Anatomy. 2017;12(5):382-405.
22. Festa F, Tecco S, Dolci M, Ciufolo F, Meo SD, Filippi MR, et al. Relationship Between Cervical Lordosis and Facial Morphology in Caucasian Women with a Skeletal Class II Malocclusion: A Cross-Sectional Study. http://dxdoiorg/101080/08869634200311746240. 2016.
23. D'Attilio M, Epifania E, Ciuffolo F, Salini V, Filippi MR, Dolci M, et al. Cervical lordosis angle measured on lateral cephalograms; findings in skeletal class II female subjects with and without TMD: a cross sectional study. Cranio. 2004;22(1):27-44.
24. Miki T, Oka M, Urushidani H, Hirofuji E, Tanaka S, Iwamoto S. <Originals>Ponticulus Posticus : Its Clinical Significance.
25. Jae Taek Hong, Sang Won Lee, Byung Chul Son, Jae Hoon Sung, Seung Ho Yang, Il Sub Kim, et al. Analysis of anatomical variations of bone and vascular structures around the posterior atlantal arch using three-dimensional computed tomography angiography. http://dxdoiorg/103171/SPI/2008/8/3/230. 2008.
26. Young JP, Young PH, Ackermann MJ, Anderson PA, Riew KD. The ponticulus posticus: implications for screw insertion into the first cervical lateral mass. JBJS. 2005;87(11):2495-8.
27. Elliott RE, Tanweer O. The Prevalence of the Ponticulus Posticus (Arcuate Foramen) and Its Importance in the Goel-Harms Procedure: Meta-Analysis and Review of the Literature. World Neurosurgery. 2014;82(1).
28. Cho YJ. Radiological analysis of ponticulus posticus in Koreans. Yonsei medical journal. 2009;50(1):45-9.
29. Sharma V, Chaudhary D, Mitra R. Prevalence of ponticulus posticus in Indian orthodontic patients. Dentomaxillofac Radiol. 2010;39(5):277-83.
30. Sonnesen L, Kjaer I. Cervical column morphology in patients with skeletal Class III malocclusion and mandibular overjet. Am J Orthod Dentofacial Orthop. 2007;132(4):427.e7-12.
31. Paraskevas G, Papaziogas B, Tsonidis C, Kapetanos G. Gross morphology of the bridges over the vertebral artery groove on the atlas. Surg Radiol Anat. 2005;27(2):129-36.

ORIGINAL ARTICLE

Dyslipidemia Among Patients of Rheumatoid Arthritis

Naseeb ur Rehman Shah[1], Mohammad Sajjad Khattak[2], Sami Ullah[3], Asim Muhammad[4]

ABSTRACT

Objective: To determine the frequency of dyslipidemia among patients suffering from Rheumatoid Arthritis.

Study Design: Descriptive study.

Place and Duration of Study: The study was conducted in Medicine Department in collaboration with Pathology Department of Khalifa Gul Nawaz Teaching Hospital Bannu, Khyber Pakhtunkhwa. The duration of study was two years from January 2016 to December 2017.

Materials and Methods: A total of 187 cases were included. Inclusion criteria were all diagnosed patient of rheumatoid arthritis of any age and sex. Exclusion criteria were patients with history of diabetes mellitus, hypertension, endocrinopathies, alcohol intake and use of oral contraceptive. Fasting blood samples were analyzed to measure various fractions of lipids, blood sugar, cholesterol, thyroid hormones, and liver and kidney functions. The data collected was analyzed in SPSS version 20 for various variables. The results were presented in tables and graphs where required.

Results: In this study male to female ratio was 0.5:1. The age range was from 22 to 60 years. Average age was 43.49 years $\pm$ 10.94. Dyslipidemia was present in 48(25.67%) patients of Rheumatoid Arthritis; whereas 139(74.33%) patients didn't have dyslipidemia.

Conclusion: Rheumatoid Arthritis patients have significant dyslipidemias which may leads to increased risk of cardiovascular diseases. Early diagnosis and treatment is mandatory to reduce morbidity and mortality. Dyslipidemia must be considered an essential part of RA and may be managed appropriately and in time to avoid/ minimize complications of cardiovascular diseases.

Key Words: *Cholesterol, Dylipidemia, High density lipoprotein, Low density lipoprotein, Rheumatoid Arthritis, Triglycerides.*

Introduction

Rheumatoid arthritis is a chronic systemic inflammatory disease which mainly manifest as synovitis of multiple joints. It has prevalence of 1% with females more affected than males in 3:1 ratio.[1] Peak age of onset is between 3rd to 5th decade.[2] The frequency of dyslipidemia in general population is variable in different age groups, more in adults as compared to young. Rheumatoid arthritis patients are at 2-3 fold higher risk of atherosclerosis leading to cardiovascular diseases (CVD). As high as 50% deaths in rheumatoid arthritis are due to cardiovascular diseases.[3] The pattern of CVD in RA is different from general population. They usually have silent ischemic heart disease, sudden death and heart failure. The inflammation of rheumatoid arthritis is associated with accelerated atherosclerosis. Recent evidences show that high inflammatory status of RA is associated with lipid paradox especially serum cholesterol, inversely related to risk of CVD in untreated patients of RA. It is noted that inflammation influences lipid profile in RA patients and have a complex relationship between inflammatory burden of RA and CVD risk.[4,5]

In general population evidences show that inflammation contributes to the onset and pathogenesis of atherosclerosis leading to CVD, where as inflammation underlies progression of atherosclerosis in RA. The impact of inflammation on dyslipidemia in RA is associated with inverse relationship between CVD risk and lipids levels. A similar relation is observed in other chronic inflammatory diseases like malignancy, sepsis and post myocardial infarction cases. The mechanisms

[1,3]*Department of Medicine*
Khalifa Gul Nawaz Teaching Hospital, Bannu
[2,4]*Department of Pathology*
Bannu Medical College, Bannu

Correspondence:
Mohammad Sajjad Khattak
Associate Professor
Department of Pathology
Bannu Medical College, Bannu
E-mail: sajjadkhattak66@gmail.com

Funding Source: NIL; Conflict of Interest: NIL
Received: January 15, 2019; Revised: August 10, 2019
Accepted: August 12, 2019

involved in lipid changes in this inflammatory process are not yet clear.[6-9]

The inflammation of RA is also associated with qualitative and quantitative changes of lipids profile. The HDL-C which is having a high protective role in CVD in general population is impaired in RA, leading to accentuation of CVD. Genetic studies show that fractional composition of HDL-C isolated from RA reveals significant changes.[10] These findings regarding lipid paradox and qualitative and quantitative changes in RA needs further assessment to be addressed in future. In our country we have limited research in this field, and are lacking national consensus regarding lipid monitoring in rheumatoid patients. This study will provide us with local statistics of dyslipidemias in patients of rheumatoid arthritis. The objective of the study was to determine the frequency of dyslipidemia in patients suffering from rheumatoid arthritis patients in southern region of Khyber Pakhtunkhwa Pakistan.

Materials and Methods:

This descriptive study was conducted in department of Medicine in collaboration with Pathology department of Khalifa Gul Nawaz Teaching Hospital Bannu Pakistan. The duration of study was two years from January, 2016 to December, 2017. A total of 187 cases were included. Inclusion criteria was all patients of rheumatoid arthritis both males and females of any age of more than five years disease duration as per ACR criteria 2010 were included. Exclusion criteria was patients with history of diabetes mellitus, hypertension, endocrinopathies, chronic kidney diseases, alcohol intake and use of oral contraceptive. All these diseases were excluded either by clinical manifestation or by performing relevant laboratory tests. Data was collected after approval from hospitals ethical and research committee. All patients meeting the inclusion criteria were enrolled in the study after their written informed consent from the in and out patient department. Aseptic blood sampling was performed from all patients after overnight fasting to measure total cholesterol, high density lipoprotein (HDL-C), low density lipoprotein (LDL-C) and triglyceride to confirm dyslipidemia. All these investigations were performed by a single laboratory under supervision of pathologist. All the relevant information was recorded in a pre designed proforma. The data collected was analysed for frequency with percentages and mean with standard deviation for different variables like age, total cholesterol, HDL-C, LDL-C and triglycerides. The results were presented in tables and graphs where required.

Operational definition:

Rheumatoid Arthritis: American College of Rheumatology (ACR) criteria was used for diagnosis.

1. Number and types of joints involvement.
2. Serological tests like rheumatoid factor and anti citrulinated cyclic protein antibody (anti ccp antibody).
3. Acute phase reactants i.e. Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP).
4. Duration of arthritis lasting six weeks or longer.

Dyslipidemia is defined as marked abnormal concentration of lipoproteins or lipids in the blood.[11]

1. Total cholesterol >200 mg/dl
2. High density lipoprotein (HDL) cholesterol <40mg/dl
3. Low density lipoprotein (LDL) cholesterol >130mg/dl
4. Triglycerides >150mg/dl

Results

In this study the age range of patients was from 21 to 60 years with mean age 43.49± 10.94 years. Male were 66 (35.29%) and female 121 (64.71%) with male to female ratio was 0.5:1. (Table 1) The disease was more common in age group of more than 50 years 57(30.5%) followed by age group of 41 -50 years 55(29.4%), 31-40 years 48 (25.7%) and 27 (14.4%) in age group of less than 30 years. (Table II). Dyslipidemia was present in 48 (25.67%) patients of rheumatoid arthritis, where as 139(74.33%) RA patients were free of dyslipidemia. (Fig: 1).Total cholesterol was ranged from 168-330 mg/dl with mean 212±34.96 mg/dl, HDL- C was from 23-60 mg/dl with mean 39.9±12.57 mg/dl, LDL- C was from 76-156 mg/dl with mean 99.2± 29.60 mg/dl and Triglycerides was 158-285 with mean 196± 30.64 md/dl.(Table III). Male suffered dyslipidemia relatively more common as compared to female. In male 21(31.8%) patients were suffering from dyslipidemia and in females 27(22.3%) patients were suffering from dyslipidemia and 94(77.7%) didn't have dyslipidemia.

Table I: Gender Distribution of Dyslipidemic Patients suffering from Rheumatoid Arthritis (n=48)

Gender of Patient	No. of Patients.	Percentages
Male	21	43.75%
Female	27	56.25%

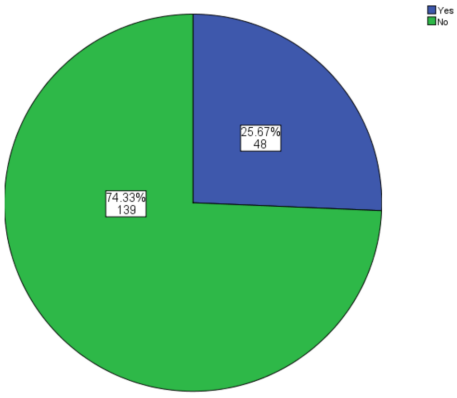

Fig 1: Frequency of Dyslipidemia in Patients suffering from Rheumatoid Arthritis

Table II: Different Age Groups of Rheumatoid Arthritis Patients Suffering From Dyslipidemia (n=48)

Age Groups In Years	No. Of Patients.	Percentages
21-30	02	4.16%
31-40	13	27.08%
41-50	13	27.08%
51-60	20	41.66%
Total	48	100%

Table III: Lipid Profile of Dyslipidemic Patients suffering from Rheumatoid Arthritis (n=48)

Lipid profile	Range mg/dl	Mean 1 SD
Total cholesterol	168-330	
HDL-cholesterol	23-60	39.9±12.57
LDL-cholesterol	76-156	92.2±29.60
Triglyceride	158-285	196±30.64

Discussion:

Dyslipidemia is frequently associated with rheumatoid arthritis. In general, in inflammation including active RA have a lipid lowering effect on blood lipid level.[12] Also RA patients have increased risk of CVD in relatively low blood cholesterol level in contrast to general population. Rheumatoid arthritis increases mortality primarily due to CVD and can reduce life expectancy by about 8-15 years. This increase mortality is mainly due to atherosclerosis and dyslipidemia is a well major recognized risk factor of atherosclerosis.[13] In this study there is diffuse derangement of lipid levels in 25.67% cases. The most common was total cholesterol in 39.58% patients followed by LDL-C in 22.92% cases and HDL-C and Triglyceride both in 18.75% cases. The age range of patients was from 22 to 60 years with mean age 43.49 years ± 10.94 years. In a study conducted by Erum et al[20] in 2017 in Karachi the age range is from 20-60 years with mean age of 36.31±10.46 years. Another study conducted by Attar et al[21] in 2015 in Saudi Arabia the mean age is 40.49±12.19 years. The common age group was from 51-60 years 57(30.5%) followed by 41 -50 years 55(29.4%), 31-40 years 48 (25.7%) and 27 (14.4%) in age group of less than 30 years. In a study conducted by Erum et al[20] the common age group is 31-40 years 37.5% followed by 20-30 years 32%, 41-50 years 24% and 51-60 years 6.5%. Another study conducted by Hameed et al[19] in 2017 in Iraq the common age group is 50-59 years 345 followed by 40-49 years 22%, 30-39 years 16%, 60-69 years 13% and less than 30 years 12%. Male patients were 66 (35.29%) and female 121(64.71%) and male to female ratio of 0.5:1. In a study conducted by Erum et al[20] male are 11.5% and female 88.5% with male to female ratio of 0.12:1.

Table: IV. Comparison of frequency of Dyslipidemia in Various Studies

Present Study	Willerson et al[14]	Scott et al[15]	Hadda et al[16]	Soubrier et al[17]
25.67%	18%	24%	38.5%	42%
Nisar et al[18]	**Hameed et al[19]**	**Erum et al[20]**	**Attar et al[21]**	**Zrour et al[22]**
45%	47%	53.5%	55%	65.9%

This comparison of dyslipidemia in rheumatoid arthritis show almost same frequency of dyslipidemia in study done by willerson et al[14] and Scott et al.[15] All other studies in above table show high frequency of dyslipidemia as compared to the present study. The reason may be difference in activity of disease during sample collection, different treatment modalities used, patients food habits, epidemiology and life style.

Amongst the dyslipidemic patients the Total Cholesterol was 212.3±34.96 mg/dl, HDL-C was 39.9±12.57 mg/dl, LDL-C was 99.2± 29.60 mg/dl and Triglycerides was 196± 30.64 mg/dl. Erum et al[14] show Total Cholesterol as 169.68±36.68 mg/dl, HDL-C 40.02±10.23 mg/dl and LDL-C 93.28±26.17 mg/dl. In Hammed et al[16] Total Cholesterol is 177.6±39.2 mg/dl, HDL-C 44.6±10.9 mg/dl, LDL-C 101.7±30.9 mg/dl and Triglyceride is 148.8±70.9 mg/dl. These studies like present study show low level of HDL-C amongst the dyslipidemic patients of RA, which in

high level is cardio protective. Also these studies like present study show high level of LDL-C which is associated with increased risk of CVD in RA patients and the same is true for TC and TG in high level. The small sample size, current laboratory assessment tools and lack of causal relationship between lipid level and inflammatory activities of RA are the limitation of this study. It is suggested to incorporate modern laboratory technique in routine practice for assessment of various fractions of lipids. This study confirms dyslipidemia in RA patients, there might be differences in pattern of dyslipidemia amongst different racial and ethnic group as well as from country to country depending on food habits, religious belief and life style.

Conclusion:

Rheumatoid Arthritis patients have significant dyslipidemias which may leads to increased risk of cardiovascular diseases. Early diagnosis and treatment is mandatory to reduce morbidity and mortality. Dyslipidemia must be considered an essential part of RA and may be managed appropriately and in time to avoid/ minimize complications of cardiovascular diseases.

REFERENCES

1. Vinapamula KS, Manohar SM, Bitla AR, Kanduri R, Bhattaram SK, Pemmaraju SR. Evaluation of dyslipidaemia in patients with rheumatoid Arthritis in South Indian population.Indian Journal of Rheumatology 2013; 8 (4):155-60.
2. Bahlas S, Ahmed MM. Lipid levels and association with disease activity in RA and SLE in Saudi Arabia 2013; 11 (7)1-6.
3. Al-Zaidi GH, Abdulsamad T. Serum lipids in patients with active rheumatoid arthritis and its relation to drug therapy: J Fac Med Baghdad 2005; 47(1): 35-9.
4. David B Hellmann, John B, Imboden Jr. Musculoskelatal & Immunologic Disorders. In: Stephen J McPhee, Maxine A. Papadakis. Current Medical Diagnosis & Treatment. 49th Ed. New York: Mc Graw Hill. 2010; 747.
5. Choy E, Ganeshalimgam K, Semb AG, Szekanecz Z, Nurmohamed M. Cardiovascular risk in rheumatoid arthritis: recent advances in the understanding of the pivotal role of inflammation, risk predictors and the impact of treatment. Rheumatology 2014; 53:2143-54.
6. Tracey E, Panoulas VE, Smith JP, Douglas KMJ, Metsios1 GS, Stavropoulos-La;ompg AS et al. Rheumatoid arthritis susceptibility genes associate with lipid levels in patients with rheumatoid arthritis. Ann Rheum Dis. 2011; 70:1025-32.
7. Robert B. Baron. Lipid Abnormalities. In: Stephen J. McPhee, Maxine A. Papadakis. Current Medical Diagnosis & Treatment, 49th Ed. New York: Mc Graw Hill; 2010:
8. Brown T. FDA approves intravenous golimumab (Simponi Aria) for rheumatoid arthritis. Medscape Medical News [serial online]. July 18, 2013; Accessed July 30, 2013. Available at: http://www.medscape.com/viewarticle/807965.
9. Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham CO 3rd, et al. 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. Arthritis Rheum. 2010;62(9):2569-81.
10. Shoenfeld Y, Gerli R, Doria A, Matsuura E, Cerinic MM, Ronda N, et al. Accelerated atherosclerosis in autoimmune rheumatic diseases. Circulation 2005; 112:3337-47.
11. National Cholesterol Education Program (NECP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Panel III). Final Report. Circulation2002; 106:3143-421.
12. Turesson C, Jacobsson LT, Matteson EL. Cardiovascular comorbidity in rheumatic diseases. Vasc Health Risk Manag. 2008; 4:605-14.
13. Toms TE, Symmons DP, Kitas GD. Dyslipidaemia in rheumatoid arthritis: the role of inflammation, drugs, lifestyle and genetic factors. Curr Vasc Pharmacol. 2010a;8(3):301-26.
14. Willerson JT, Ridker PM. Inflammation as a cardiovascular risk factor.Circulation 2004; 109(21suppl 1):112-1110.
15. Scott IC, Ibrahim F, Johnson D, Scott DL, Kingsley GH. Current limitation in the management of cardiovascular risk in rheumatoid arthritis. Clin Exp Rheumatol 2012; 30:228-232.
16. Hadda V, Handa R, Aggrawal P, Lakshmiy R, Umar UK, Pandey RM. Disease activity and lipid in rheumatoid arthritis: Aprospective study. Indian J Rheum 2007;2:137-40
17. Soubrier M, Zerkak D, Dougados M. Indication for lowering LDL cholesterol in rheumatoid arthritis an unrecognized problem. J Rheumatol 2006; 33:1766-69.
18. Nisar A, Rasheed U, Aziz W,Farooqi AZ. Prevalence of Dyslipidemia in Autoimmune Rheumatic Diseases.Journal of the college of Physicians and Surgeons Pakistan 2012;22 (4):235-9.
19. Hameed SB, Barzinjy NJ. Prevalence of dyslipidemia and its association with disease activity in patients with rheumatoid arthritis attending Rizgary Teaching Hospital in Erbil City. Zanco J Med Sci 2017;21(2):1781-88
20. Erum U, Ahsan T, Khowaja D. Lipid abnormalities in patients with rheumatoid arthritis. Pak J Med Sci. 2017; 33(1):227-30.
21. Attar SM. Hyperlipidemia in rheumatoid arthritis patients in Saudi Arabia. Saudi Med J.2015; 36(6):685-90.
22. Zrour SH, Neffeti FH, Sakly N, Saoussen H,Korbaa Y, et al. lipid profile in Tunisian patients with Rheumatoid Arthritis. 2011; 30 (10):1325-31.
23. Toms TE, Panoulas VF, Kitas GD. Dyslipidemia in rheumatological autoimmune diseases.Open Cardiovasc Med J. 2011;5:64-75.
24. Shah SZA, Devrajani BR, Devrajani I, Bibi I. Frequency of dyslipidemia in obese verus non obese in relation to Body Mass Index (BMI) and Waist Hip Ratio (WHR) and Waist Circumference (WC). Pak J Sci.2010; 61(2):27-31.

ORIGINAL ARTICLE

Frequency of Periodontitis in Diabetes Patients. A Hospital Based Study

Samia Kausar[1], Shamaila Burney[2], Khalil Ur Rehman[3], Zunera Jahanzab[4], Asim Zulfiqar[5], Amna Shoaib[6]

ABSTRACT

Objective: To study the frequency of periodontitis in diabetes mellitus patients and the impact of glycaemic control on the severity of periodontitis.

Study Design: A descriptive observational study.

Place and Duration of Study: This study was completed in six months from May2018 to November2018 in Department of Medicine in collaboration with Dental Department of Railway General Hospital, Rawalpindi.

Materials and Methods: This study included 150 participants. Participants were divided in two groups with 75 individuals placed in each group. The study group comprised of well controlled and poorly controlled diabetics referred from medical OPD and medical wards, selected through non-probability consecutive sampling. The control group involved normal healthy individuals. Glycemic control was evaluated by HbA1c level. Community periodontal index (CPI) was recorded to compare the periodontal status of both groups using perioprobe. Confounders like personal and oral hygiene habits along with diabetes profile, treatment and duration were also recorded. Data analysis was done using SPSS, version 21.

Results: The frequency of periodontitis in diabetics and non-diabetics was 87.49 % and 8.51% respectively. Mean-CPI was higher in diabetics (2.76 ± .78) compared to non-diabetics (1.88± .56) and was statistically significant. Tooth loss was 59.8% in diabetics and 15% in non-diabetics. Poorly controlled diabetics had higher mean-CPI (3.23± .38 vs2.24± .45, P <0.001) compared to well controlled diabetics. Mean-CPI score increased with increase in duration of diabetes, 1.89± .51, 3.15± .56 and 3.32± .46 in patients with 1-5, 6-10 and >10 years of diabetes respectively.

Conclusion: Diabetes mellitus patients have higher frequency of periodontitis as compared to non-diabetics. Its severity increases as glycemic control worsens. Moreover, its severity also increases with duration of diabetes.

Key Words: *Community Periodontal Index, Diabetes Mellitus, Hb A1c, Periodontitis.*

Introduction

Periodontitis is the chronic inflammation of periodontium (gingival tissue and its supporting bone).[1] Plaque is a biofilm which accumulate on teeth near and below gums. When plaque is not taken care of by cleaning, it becomes hard tartar (calculus) and leads to gingivitis and periodontitis. Current research has suggested important role of microbes. The exaggerated host immune response in attempt to destroy microbes results in continued destruction.[2]

Periodontitis is most common in elderly.[3] Severe periodontitis affects about 10% to 15% of population mainly adults around the age of 50-60.Periodontitis causes economic burden of about 54 billion US dollars per year.[4]

Diabetes Mellitusa rapidly growing epidemic, is a chronic metabolic disorder characterized by hyperglycemia leading to complications like diabetic nephropathy, retinopathy, and neuropathy.[5] Periodontitis is regarded as sixth complication of diabetes.[6] T1DM previously called IDDM and type 2 diabetes (NIDDM) are associated with increased risk of periodontitis.[7,8,9,10]The risk increases tremendously as glycemic control worsens.[11,12] Each 1% reduction in HbA1c level is associated with significant decline in micro and macro vascular complications of diabetes.[9] Research has shown that reductions in HbA1c of up to 0.40% could be achieved with periodontal treatment.[13]

[1,2,4,5] *Department of Medicine/Dentistry*[3]
Islamic International Medical College
Riphah International University, Islamabad
[6]*Department of Dentistry*
Punjab Dental Hospital, Lahore

Correspondence:
Dr. Samia Kausar
Assistant Professor
Department of Medicine
Islamic International Medical College
Riphah International University, Islamabad
E-mail :samia.kausar@riphah

Funding Source: NIL; Conflict of Interest: NIL
Received: February 01, 2019; Revised: July 18, 2019
Accepted: July 19, 2019

The mechanisms underlying the link between the two diseases involve inflammation. Diabetes mellitus for both type-1 and type-2 were found to have elevated levels IL-6 and TNF-alpha.[14] Serum levels of IL-6 correlate well with severity of periodontitis.[15] Chronic hyperglycemia causes structural and functional damage to blood vessels and tissues.[16] Moreover AGE and RAGE interaction result in local cytokine release.[17] Local cytokine release increases insulin resistance.[7,8] Impaired apoptosis and neutrophil function in diabetes is associated with increase tissue destruction.[7,8] Moreover presence of diabetes enhances the pathogenicity of oral flora.[18] So continued inflammation in periodontitis can adversely affect metabolic control of diabetes, and persistent hyperglycemia in turn potentiates periodontitis suggesting bidirectional relationship.[10]

A large body of evidence is available in current literature which confirms that uncontrolled diabetes worsens periodontitis and vice versa.[7,8,9] Controlling diabetes is likely to improve periodontitis and vice versa.[9,11] Teeuwet al. have suggested periodontitis as a possible early sign of diabetes mellitus.[10] This fact could be exploited for better management of both conditions.

The latest studies suggest that better glycemic control may be achieved by resolution of periodontal inflammation by regular periodontal treatment. Non-surgical treatment of periodontitis reduces insulin requirements, systemic inflammation and leads to better metabolic profile.[13] Although large randomized control studies are required to validate these results.

There is need to further explore the relationship between diabetes mellitus and periodontitis as the prevalence of diabetes is expected to increase in next few decades. The beneficial effect of periodontal management on diabetes and its complications illuminates potential value of enhanced understanding of relation between two conditions.

There is a dearth of community based epidemiological data from Pakistan on this association. No separate guidelines/protocols for screening of diabetes in patients with periodontitis and vice versa exist.

The objective of study was to find the frequency of periodontitis in diabetes mellitus patients and to determine the effect of glycemic control on severity of periodontitis.

Material and Methods

This was a descriptive observational study. It was conducted at department of Medicine and department of Dentistry at Railway General Hospital from May2018 to November2018.

Sample size was 150 patients. Patients with type-2diabetes (duration>1 year) were included into the study group using consecutive non-probability sampling. They were referred to Dental Department for examination from Medical In and Out Patient Department. Non-diabetic patients visiting the Dental Department were randomly selected for the control group while ensuring the age and sex matched the diabetic-study group patients. Inclusion criteria for both groups were individuals having no fewer than 20 teeth. Patients on prophylactic antibiotics for rheumatic fever, drug causing gum hypertrophy (phenytoin, cyclosporine), heart problem, type-1 diabetes mellitus, pregnant and lactating mothers were excluded. The study was initiated after approval from the Institutional Ethical Review Committee of Riphah international university. Informed written consent was taken from all participants.

A brief patient history was taken along with examination. Relevant information about the age, sex, personal habits (pan, chewing tobacco, smoking, naswar, gutka), oral hygiene aids (toothbrush, toothpaste, mouth washes, tooth powder, tongue cleaner) frequency of tooth brushing (occasional, once, twice daily) were recorded. The diabetes status (HbA1c values), diabetes duration (1-5 years, 6-10 years, >10 years) and the detail of diabetes treatment (diet restriction, physical exercise, oral hypoglycemic drugs and or insulin) were entered in specially designed Performa.

Periodontal status was assessed by single trained examiner for both groups. Perioprobe (single ended probe by Marquis dental) with blunt rounded tip and millimeter marking, was used for examination. Ten index teeth (11, 16, 17,26,27,31,36,37,46, and 47) were examined. CPI was applied in each six sextants as per laid down criteria by WHO.[19]

Diagnosis of diabetes was made per WHO criteria.[5] Hemoglobin A1c (Roche-diagnostic, Basel, Switzerland) was checked once in all participant of

study group to assess glycemic control. Diabetic patients were divided based on HbA1c level into two categories :< 7% well controlled, >7% poorlycontrolled.[20]

Data (parametric) was analyzed by SPSS-21. Descriptive statistics including patient's age, gender and admission number were entered. Mean and standard deviation was calculated for age and CPI. Frequency of qualitative variable was expressed as frequencies and percentages. Independent samplet-test was used to compare quantitative data.

Results

One hundred and fifty individuals were selected for study after meeting inclusion and exclusion criteria. 75 (40 females and 35 males) were diabetics and 75 were non-diabetics who were age and sex matched. The mean age was 53.91 ±9.50 in diabetic group and 49.15±8.7 in non-diabetic group. The age range was 18-70 years. The frequency of periodontitis in diabetic was 87.49%.The mean-CPI score was 2.78±.78 in diabetic group and 1.88± .95 in non-diabetic group. Periodontal status of diabetic and non-diabetics is shown in Figure 1 and Table 1.Patients with well controlled and poorly controlled diabetes groups had mean-CPI score of 2.24±.45 and 3.33±.56 respectively. Periodontal status of well controlled vs. poorly controlled was also statistically significant (Table 3, Figure 2).

Most of the patients, 48% had diabetes duration of 1-5 years while26.6% and 25.3% patients had diabetes for 6-10 years and >10 years respectively. CPI score in these groups were, 1.89± .51, 3.15±.56 and 3.32±.46 respectively as shown in Figure 3.

In our study tooth loss was present in 59.5% in diabetic vs. 15% of non-diabetic. There were 12% smokers in diabetic group vs. 11.5% in non-diabetics. None of the study participant used gutka, pan or naswar.

In both groups tooth brush was most frequently practiced for oral hygiene. Fewer participants were finger user. Few patients used tooth powder, miswak and mouthwash. Most of diabetics brushed only once a day 85% compared to 83% non-diabetics. About 8% participants brushed occasionally.

Majority of diabetics, 60%, were on both insulin and oral hypoglycemic drugs. 25% were taking only oral hypoglycemic drugs and rest 15% were using insulin only. Mode of therapy, both insulin and oral hypoglycemic drugs did not affect periodontal status.

Table I: Distribution of Study Population according to Age and Sex. (Patients n=150)

Age in years	diabetics		Non-diabetics		total
	Male	Female	Male	Female	
18-30	9	13	10	14	44
31-50	14	16	13	17	60
51-70	12	11	11	12	40
Total	35	40	35	40	150

Table II: Comparison of Periodontal Status of Diabetic and Non-Diabetic Patients

CPI Score	Non-Diabetics	Diabetics	P value
Male	2.01±.45	2.93±.06	<0.001
female	1.73±.60	2.59±.23	<0.001
Mean	1.88±.56	2.76±.78	<0.001

Table III: Comparison of Periodontal Status of Well Controlled and Poorly Controlled Diabetics

CPI Score	Well controlled diabetics	Poorly controlled diabetics	P value
Male	2.32±.21	3.29±.24	<0.001
female	2.16±.13	3.17±.24	<0.001
Mean	2.24± .45	3.23± .38	<0.001

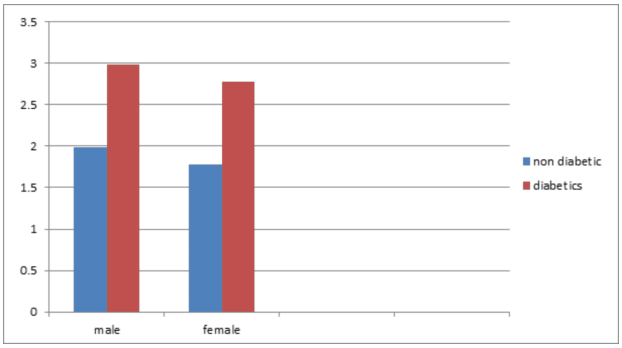

Fig 1: Mean Community Periodontal Index In Diabetics and Non-Diabetics.

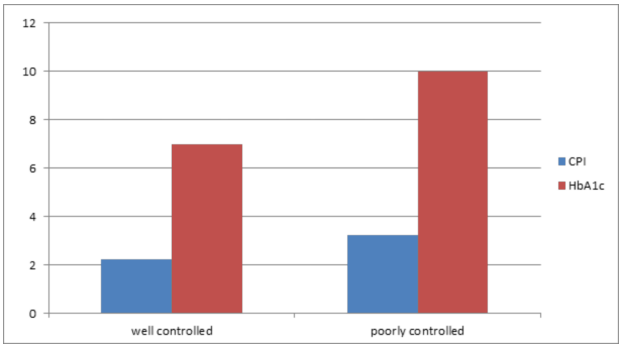

Fig 2: Community Periodontal Index Score with Glycated Haemoglobin

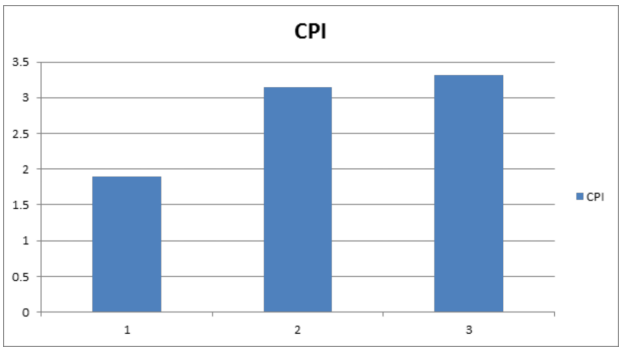

Fig 3: Mean Community Periodontal Index Score against Diabetes Duration

Discussion

Results of our study showed high prevalence of periodontitis (87.49%) in diabetics. Diabetics had higher mean-CPI score (2.76±.78) as compared to non-diabetics (1.88± .95). Poor glycemic control was associated with worse periodontal status as compared to good glycemic control in diabetics.

Worldwide studies have shown that diabetic patients have increased prevalence of periodontal disease. A study from Eastern Mediterranean Region in Lebanon has shown prevalence of 94.5%,[21] while Yeluriet al.[22] and Rajhanset al.[23] have reported from India 84.5% and 86.4% of diabetics had periodontitis respectively. Our study has shown that 87.49% diabetics had periodontits.

The association of diabetes with periodontal inflammation has been subject of various studies. Diabetes has been implicated in initiation, progression as well as severity of periodontitis.[9,10] Diabetes increases the risk of developing periodontitis about three fold. This was demonstrated by Emrich et al. in a study on Pima Indians, who have highest prevalence of type-2 diabetes mellitus in the world. He used probing attachment loss and alveolar bone loss parameters for this purpose. The odd ratio for diabetic subjects was 2.81 when attachment loss was used as parameter and 3.43 when bone loss was used.[24] Studies from Pakistan also confirmed increased frequency of periodontitis in patients with diabetes.[25,26] In study done by Fatima et al., using different parameters for periodontal disease showed higher deposition of plaques (87% vs.13%) and mobility index (85.5% vs.65%) in diabetics as compared to non-diabetics.[25] Approva et al. performed a study in Bangalore involving patients from all ethnic groups and found that diabetics had higher CPI score compared to non-diabetics and the difference was statistically significant.[27] Our results are in agreement with above mentioned studies as mean-CPI scores were higher in diabetics as compared to non-diabetics. Another aspect our study was to observe how severity of periodontitis is related to glycemic control. Many studies have confirmed that periodontal status deteriorates with poor glycemic control.[7,11,28] In this study higher CPI scores were observed with rise in HbA1c levels. A study was done at Services Hospital Lahore by Haseeb et al. where they included study subjects with good oral hygiene only. They analyzed the periodontal status of individual tooth in each study subject, using different parameter like probing depth, gingival recession and attachment loss. Results showed that periodontitis was significantly ($p < 0.001$) more severe in poorly controlled diabetic group compared to well controlled diabetics.[29] Similarly other studies showed glycemic control was significantly related to severity of periodontitis.[23,27] However Basic et al. were unable to confirm this association.[30]

Longer the duration of diabetes greater will be the severity of periodontal inflammation. Possible explanation is long standing hyperglycemia. Rajhans et al. had declared that it was significant factor.[23] Approva et al. observed that CPI score was 2.658±0.635when diabetes duration was less than 5 years, and it rose up to 2.940±0.562 and 3.000±0.576 in patients with diabetes duration of 6-10 and >10 years respectively.[27] We observed high CPI score with longer duration of diabetes, 1.89± .51, 3.15± .56 and 3.32± .46 in patients with diabetes duration of 1-5, 6-10 and >10 years respectively. Contrary to these results Bacic et al. and Yeluri et al. were unable to demonstrate significant effect of diabetes duration on severity of periodontitis.[22,30]

Altered immune response with decreased neutrophil phagocytosis and fibroblast function in diabetes causes enhanced tissue destruction.[7,8] This is stated to be responsible for high frequency of tooth mortality observed in diabetics. In this study, 59.8% diabetics had missing teeth as compared to15% of healthy volunteers. A study from Pakistan reported tooth loss of 58.4% in diabetics and 10.7% became edentulous.[25] Similarly other studies showed

that periodontitis is major cause of tooth loss in diabetics.[22,23,27] Number of missing teeth increased significantly with time in diabetes mellitus patients.[24] It has been demonstrated that infrequent brushing is associated with severity of periodontitis. Higher CPI score was seen in individuals who brushed once daily compared with those who brushed twice daily.[31] Majority of patients in both groups (brushed once a day) had poor oral hygiene so nullifying its confounding effect. Thus diabetes was an added risk for population already at risk for periodontitis.[23] Similar observation was made by Tanweer et al.[26]

The high prevalence 87.49% in this study suggests that there is connection between the two chronic diseases. As both condition aggravate each other, recognition and treatment of periodontitis is essential. Importance of oral health should be emphasized in diabetic patients. It should be an essential element of diabetes management plan. There is a need for in depth patient education and consistent reinforcement by health care professionals.

Limitation of our study was that we possibly overlooked the confounding factors like age and poor oral hygiene as periodontitis severity increases with age and poor oral hygiene.[23] Present study was hospital based study with small sample size. Further large community based studies are required to investigate this important association.

Conclusion

Diabetes Mellitus patients have higher frequency of periodontitis as compared to non-diabetics. Its severity increases as glycemic control worsens. Moreover, its severity increases with duration of diabetes.

REFERENCES

1. William RC. Periodontal disease. N Engl J Med. 1990; 322(6):373.
2. Kinane DF, Stathopoulou PG, Papapanou PN. Periodontal diseases. Nature Reviews Disease Primers. 2017; 3 (1):1703
3. Holm-Pederson P, Müller F, Lang N. Pathology and Treatment of Gingivitis and Periodontitis in the Aging Individual. In: Holm-Pedersen P, Walls A, Ship JA. Textbook of Geriatric Dentistry. 3rd ed. John Wiley & Sons; 2015. p. 211-23
4. Listl S, Galloway J, Mossey PA, MarcenesW. Global Economic Impact of Dental Diseases. Journal of Dental Research. 2015; 94: 1355–61.
5. American Diabetes Association. Classification and diagnosis of Diabetes. Diabetes Care. 2015 ;(Suppl 38):S8–16.
6. Loe, H. Periodontal disease: the sixth complication of diabetes mellitus. Diabetes Care. 1993; 16:329-34.
7. Casanova L, Hughes F. J. Preshaw P. M. Diabetes and periodontal disease: a two-way relationship. British Dental Journal. 2014; 217: 433
8. Taylor J J, Preshaw P M, Lalla E. A review of the evidence for pathogenic mechanisms that may link periodontitis and diabetes.J ClinPeriodontol 2013; 40 (Suppl 14): S113–34.
9. Stratton IM, Adler AI, Neil HA, et al. Association of glycaemia with macro vascular and micro vascular complications of type 2 diabetes (UKPDS 35): prospective observational study. BMJ.2000; 321:405–412.
10. Teeuw WJ, Kosho MX, Poland DC, Gerdes VE, Loos BG. Periodontitis as a possible early sign of d i a b e t e s mellitus. BMJ Open Diabetes Research and Care. 2017; 5(1):e000326.
11. Garcia D, Tarima S, Okunseri C Periodontitis and glycemic control in diabetes: NHANES 2009 to 2012. J Periodontol 2015; 86:499–06
12. Eke PI, Wei L, Thornton-Evans GO, Borrell LN, Borgnakke WS, Dye B,et al. Risk indicators for periodontitis in US adults: NHANES 2009 to 2012. Journal of periodontology.2016; 87(10):1174-85.
13. Borgnakke WS, Chapple IL, Genco RJ, Armitage G, Bartold PM, D'aiuto F, et al.The multi-center randomized controlled trial (RCT) published by the journal of the American Medical Association (JAMA) on the effect of periodontal therapy on glycated hemoglobin (HbA1c) has fundamental problems. Journal of Evidence Based Dental Practice. 2014; 14(3):127-32.
14. Dandona P, Aljada A, BandyopadhyayA. Inflammation: the link between insulin resistance, o besity and diabetes. Trends in Immunology, 2004 1; 25(!): 4-7
15. Paraskevas S, Huizinga JD, Loos BG.Asystematic review and meta-analyses on C-reactive protein in relation to periodontitis. J Clin Periodontol2008; 35:277–90
16. Brownlee M.The pathobiology of diabetic complications: a unifying mechanism. Diabetes. 2005; 54:1615–25
17. Vlassara H the AGE-receptor in the pathogenesis of diabetic complications. Diabetes Metab Res. 2001; 17:436–43
18. Graves D, Corrêa J, Silva T. The Oral Microbiota Is Modified by Systemic Diseases. Journal of Dental Research. 2018; 002203451880573.
19. Ainamo J, Barmes D, Beagrie G, Cutress T, Martin J, Sardo-Infirri J. Development of the world health organization (WHO) community periodontal index of treatment needs (CPITN). Int Dent J 1982;32;281-91.
20. Avuthus S, Mahishale V, Patil B, Eti A. Glycemic control and radiographic manifestations of pulmonary tuberculosis in patients with type 2 diabetes mellitus. Sub-Saharan Afr J Med 2015; 2:5-9
21. Hussein SA, Doumit M, Doughan B, El-Nadeef M. Oral health in Lebanon: a pilot pathfinder survey. East Mediterr Health J. 1996; 2:299-3022. YeluriSeshagiri rao1&Vanamali dharma rao. International Journal of General Medicine and Pharmacy .2016;(3): 15-22
23. Rajhans NS, Kohad RM, Chaudhari VG, Mhaske NH. A clinical study of the relationship between diabetes mellitus and

periodontal disease. J Indian SocPeriodontol 2011;15:388-9224. Emrich LJ, Shlossman M, Genco RJ. J Periodontal disease in non-insulin-dependent diabetes mellitus.JPeriodontol. 1991 Feb; 62(2):123-31.

25. Fatima G, Akhtar MJ, Naveed N, Ahmd M, Tariq M, Khawaja AR. Diabetic patients and periodontitis: a study. Pakistan Oral & Dental Journal. 2017;37(2):290-3.
26. Tanwir F, Altamash M, Gustafsson A. Effect of diabetes onperiodontal status of a population with poor oral health.ActaOdontol Scand2009; 67:129-33.
27. Apoorva SM, Sridhar N, SuchethaA.Prevalence and severity of periodontal disease in type 2 diabetes mellitus (non-insulin-dependent diabetes mellitus) patients in Bangalore city: An epidemiological study. J Indian SocPeriodontol 2013; 17:25-9.
28. Tsai C, Hayes C, Taylor GW.Glycemic control of type 2diabetes and severe periodontal disease in the US adult population.Community Dent Oral Epidemiol . 2002; 30:182–92
29. Haseeb M, Khawaja KI, Ataullah K, Munir MB, Fatima A. Periodontal disease in type 2 diabetes mellitus. J Coll Physicians Surg Pak 2012; 22:514-8.
30. Bacic M, Plancak D, Granic M. CPITN Assessment of periodontaldisease in diabetic patients. J Periodontol 1988; 59:816-22.
31. Akhionbare O, Ojehanon PI. A studyof the effect of frequency of tooth brushing on the prevalence of inflammatory periodontal diseases. Port Harcourt Med J 2016; 10:119-23

ORIGINAL ARTICLE

Depression, Anxiety and Stress in Low and High Achieving Medical Students

Asma Mansoor Mughal[1], Muhammad Masood Khokhar[2], Shafaq Masood Khokhar[3], Hira Basharat Raja[4], Muhammad Umar Raja[5], Azhar Rashid[6]

ABSTRACT

Objective: To compare the levels of depression, anxiety and stress between low and high achieving medical students.

Study Design: A cross-sectional descriptive study

Place and Duration of Study: This research was carried out in Islamic International Medical College, Pakistan, from 11th May to 30th December 2018.

Materials and Methods: The study sample comprised of 160 medical students of 2nd, 3rd, 4th and 5th year MBBS classes. Sampling was done by using purposive sampling technique. For comparison, the students were distributed in two groups depending upon their scores in recent professional examination. Low scoring group comprised of 20 students from each class, who scored lowest marks in the recent professional examination and were placed at the bottom of result sheet, while high scoring group comprised of those 20 students who were placed at the top of result sheet in the same class. Demographic data was obtained on a printed form and the depression anxiety stress scale (DASS-21) was used to record clinical variables. Statistical package for social sciences version 20(SPSS-20) was used for analysis of data. Paired sample T-test was used to find the difference in the mean scores of clinical variables between two groups.

Results: The mean score for stress, anxiety and depression was 10.4, 16 and 15 respectively in low achievers. While the high achievers mean scores were 6.2, 8.7 and 9 on these variables respectively, with p-value below 0.05. The results revealed relatively high psychological morbidity in low achieving medical students.

Conclusion: The level of depression, anxiety and stress is found to be higher in low scoring students as compared to high scoring medical students.

Key Words: *Depression, Anxiety, Stress, DASS-21, Low and High Achieving Medical Students.*

Introduction

For the achievement of academic milestones, the psychological and emotional health of students plays an important role. All over the world, medical colleges offer opportunities for intellectual and professional growth to their students. The intended aim is to prepare them as future healthcare professionals. However, these future health care providers undergo a tough journey, leading to psychological issues, which can affect their health, morale and academic performance.[1,2] All over the world the levels of anxiety, stress and depression are higher in medical students.[1-3] In line with global trends, the prevalence of these issues is also higher in Pakistan.[4-6] Stress leads to physiological changes in the brain and body and can present with changes in behavioral profile, which might come and go initially. However, persistent and severe stress, might lead to depression and anxiety. Clinical depression is characterized by persistent sadness, decreased capacity to enjoy, disturbed sleep impaired concentration, and ideas of suicide. Anxiety produces fear of unknown, restlessness, worrying thoughts and palpitation. Many studies have found that the life in medical colleges is quite stressful and can adversely affect the psychological health of students.[6-9] The stressors of medical college can adversely affect the academic progress of the students[10]. Stressful factors commonly reported by students, are burden of studies, less sleep hours, unpleasant physical and emotional environment, poor learning facilities and financial issues.[11] It was found that student with low grades were having

[1,2,3,4,5] *Department of Psychiatry/Surgery*[6]
Islamic International Medical College
Riphah International University, Islamabad

Correspondence:
Muhammad Masood Khokhar
Associate Professor
Department of Psychiatry
Islamic International Medical College
Riphah International University, Islamabad
E-mail: masoodkhokhar2@yahoo.com

Funding Source: NIL; Conflict of Interest: NIL
Received: June 11, 2019; Revised: September 05, 2019
Accepted: September 06, 2019

severe stress, anxiety and depression.[12] As compared to males the female students were found to have higher level of perceived stress and they attributed it to academic burden.[13-14] Some studies found that the students do not seek professional treatment because of fear of stigma. Thus only a small number of students receive professional care.[15-16] Poor psychological health of students leads to poor performance in academics. Follow up studies found that the level of stress in medical students is associated with academic performance of the medical students.[17-18] However, no published study was found to compare psychiatric morbidity and its impact on academic performance in Pakistan. In the light of this knowledge gap a question arises in the mind of all interested stakeholders, and particularly the faculty members of our medical colleges, whether our medical students; whose academic performance is low are suffering from relatively severe psychological morbidity? If found correct then proper measures can be taken to facilitate and help the student and avoid academic failure and associated complications. The objective of this study was to compare level of depression, anxiety and stress between low and high achieving medical students.

Materials and Methods

This was a cross-sectional descriptive study carried out in Islamic International Medical College, Pakistan, from 11th May to 30th December 2018. The study sample comprised of 160 medical students of 2nd, 3rd, 4th and 5th year MBBS classes. After approval of ethics review committee, data collection was done by using purposive sampling technique, by trained psychologists. Forty students were selected from each of the four MBBS classes based on their marks in respective professional examination. The participants were provided with a consent form informing them about the purpose of study and voluntary participation. Confidentiality and comfort was ensured. For the purpose of comparison, the students were distributed in two groups, the low and high scoring groups, which were operationally considered synonym to low and high achieving students, for the purpose of this study. Low scoring group consisted of 20 students, from each MBBS class; who obtained lowest marks in the recent professional examination and were placed at the bottom of result sheet. While high scoring group consisted of 20 students scoring highest marks in the same professional examination and were placed at the top of score board. The Depression Anxiety Stress Scale (DASS-21) was used to measure the clinical variable .e.g. depression, anxiety, and stress. DASS-21 has 21-items, with seven items for each subscale. Students scored each item from 0-3, where zero meant "did not apply" and three meant "applied strongly". Statistical package for social sciences version-20 (SPSS-20) was used to analyze the data and results were compiled accordingly. Keeping the objectives of the study in mind difference in the mean scores of depression, anxiety and stress was calculated. For this purpose paired sample T-test was used to find the difference in the mean scores of clinical variables between two groups. Statistical significance was based upon *P*-value of less than 0.05.

Results

As shown in table-I, 160 students were divided into two groups, with 80 students in each group i.e. low and high scorning student. Out of 160 students, 56(35%) were males and 104(65%) were females. Regarding age, 104(65%) were below 23 years and 56 (35%) were above 23 years. Majority (97.5%) of the students were unmarried. Most of the students attributed their depression, anxiety and stress to their financial problems (46%), followed by study burden (26%).

Table: I Demographic Characteristics of Participants (N=160)

Variables	Frequency	Percentage (%)
1. Age		
Bleow23	104	65
Above 23	56	35
2. Gender		
Male	56	35
Female	104	65
3. Marital Status		
Single	156	97.5
Married	4	2.5
4. Perceived reason for Depression, Anxiety and Stress		
Financial Issues		
Study Burden: Too many lectures/ assignments/assessments	74 42	46.2 26.1
Infrastructure not comfortable (building design/ space, chairs, class rooms, washrooms etc.	15	9.4
Hostel environment not comfortable		
Not enough time for revision	15	9.3
	14	9

Table II: Differences in the Mean Scores of Clinical Variables between two Groups.

Low Scoring (Achieving) Students			High Scoring (Achieving) Students				
Measures	**Mean**	**SD**	**Mean**	**SD**	**df**	**t**	**p**
Psychological morbidity							
Stress	10.4	7.9	6.2	5.5	158	3.9	.000
Anxiety	16	8.6	8.7	6.8	150	5.9	.000
Depression	15	7.2	9	6.8	157	6.8	.000

The mean scores and standard deviations with regard to Depression, Anxiety, and Stress were obtained for both the groups of medical students. As shown in table II, there is statistically significant difference between the mean scores obtained by high and low achieving medical students on Depression, Anxiety and Stress Scale. It means that the low scoring (achieving) medical students had comparatively severe stress, anxiety and depression as compared to high (scoring) achieving medical students.

Discussion

The finding of this research shows a significant difference in psychological morbidity in low scoring medical students, when compared to the high scoring ones. The findings of this study not only substantiate the previous research evidence on the psychological issues in medical students but it also adds a new dimension that the levels of psychological morbidity are comparatively much higher in low achieving medical students. A previous study done in Malaysia concluded that low achieving students had increased depression, anxiety, and stress than high achieving students.[17] The results of this study and previous studies show the significance of psychological morbidity and its negative influence on academic performance of the medical students and the need for prevention of these issues.[18, 21] The perceived stressful factors, reported by students in this study are mainly socioeconomic, burden of various academic activities and problems in physical environment such as uncomfortable living and learning space. It is possible that students, who are depressed and anxious, perceive things differently than those who are healthy. Moreover, the coping skills and personal resilience may also be different in students in both groups. Previous studies have also identified various factors related to physical, social and psychological environment of medical college; which were reported by the medical students having psychological morbidity.[1,8,14,19-21] However, exact cause and effect relationship of those factors, with psychological morbidity, could not be established because of the descriptive nature of our study.

To the best of our knowledge no published study was found in the national literature, with focus on comparison of psychological morbidity in low and high achievers. Therefore, for better understanding and management of psychological issues we need to explore whether the low achieving medical students are depressed and anxious before the respective professional examination. As psychological issues, may lead to poor concentration and difficulty in scoring better marks in the professional examinations. On the other hand it is possible that poor performance in professional examination may act as a stressful event, leading to anxiety and depression. Moreover, some students may be having psychological morbidity before entering the medical college, which subsequently worsens due to pressure of academic demands and adjustment in the new environment. These questions need further reflection and exploration in order to comprehend the precise dynamics of psychological morbidity in future healthcare providers. Therefore, we need further research with larger sample size, multiple settings and appropriate study designs to find the cause and effects relationship of different demographic and psychological variables.

Conclusion

Based upon our finding we conclude that the levels of depression, anxiety and stress are higher in medical students with poor academic performance. This observation provides a useful insight to better understand the higher prevalence of psychological morbidity in academically low performing medical students. It is possible that provision of appropriate psychological support to these students might improve their psychological well-being and academic performance.

Limitations

A relatively small sample size, cross sectional design and single setting are the main limitations, therefore findings of this study cannot be generalized.

Declaration We declare that there was no conflict of interest involved in this research work and we did not receive any funds for its initiation and completion.

REFERENCES

1. Salam A, Yousuf R, Bakar SM, Haque M. Stress among medical students in Malaysia: a systematic review of literatures. Int Med J. 2013; 20:649-655.
2. Arab M, Rafiei H, Safarizadeh MH, Ahmadi JS, Safarizadeh MM. Stress, anxiety and depression among medical university students and its relationship with their level of happiness. J Nurs Health Sci. 2016; 5:44-47.
3. Menon V, Sarkar S, Kumar S: Barriers to healthcare seeking among medical students: A cross sectional study from South India. Postgrad Med J. 2015; 91:477-482.
4. Rab F, Mamdou D, Nasir S: Rates of depression and anxiety among female medical students in Pakistan. East Mediterr Heal J. 2008; 14:126-33.
5. Inam SN, Saqib A, Alam E: Prevalence of anxiety and depression among medical students of private university. J Pak Med Assoc. 2003; 53(2):44-7.
6. Rehmani N, Khan QA, Fatima SS: Stress, anxiety and depression in students of a private medical school in Karachi, Pakistan. Pak J Med Sci. 2018; 34:696-701.
7. Alvi T, Assad F, Ramzan M, Khan FA: Depression, anxiety and their associated factors among medical students. J Coll Physicians Surg Pak. 2010; 20:122-26.
8. Mahmood K: Time to act-alarming rise in suicides among medical professionals in Pakistan. J Coll Physicians Surg Pak. 2016; 26:947-949.
9. Velayudhan A, Gayatridevi S, Bhattacharjee RR: Efficacy of behavioral intervention in reducing anxiety and depression among medical students. Ind Psychiatry J. 2010; 19:41-46.
10. Mosley TH Jr, Perrin SG, Neral SM, Dubbert PM, Grothues CA, Pinto BM. Stress, coping, and well-being among third year medical students. Acad Med. 1994; 70:152–156.
11. Levey R. Sources of stress for residents and recommendations for programs to assist them. Acad Med. 2001; 76:142–150.
12. Helmers KF, Danoff D, Steinert Y, Leyton M, Young SN. Stress and depressed mood in medical students, law students, and graduate students at McGill University. Academic Medicine. 1997; 72(8):708-14.
13. Dyrbye LN, Thomas MR, Massie FS, Power DV, Eacker A, Harper W, Durning S, Moutier C, Szydlo DW, Novotny PJ, Sloan JA. Burnout and Suicidal Ideation among US Medical StudentsMedical Student Burnout and Suicidal Ideation. Annals of internal medicine. 2008; 149(5):334-41.
14. Tyssen R, Vaglum P, Grønvold NT, Ekeberg Ø. Suicidal ideation among medical students and young physicians: a nationwide and prospective study of prevalence and predictors. Journal of affective disorders. 2001; 64(1):69-79.
15. Stewart SM, Lam TH, Betson CL, Wong CM, Wong AM. A prospective analysis of stress and academic performance in the first two years of medical school. Medical Education-Oxford. 1999; 33(4):243-50.
16. Newbury-Birch D, White M, Kamali F. Factors influencing alcohol and illicit drug use amongst medical students. Drug and alcohol dependence. 2000; 59(2):125-30.
17. Yasin MA, Dzulkifli MA. Differences in depression, anxiety and stress between low-and high-achieving students. Journal of Sustainability Science and Management. 2011; 6(1):169-78.
18. Abdulghani HM, AlKanhal AA, Mahmoud ES, Ponnamperuma GG, Alfaris EA. Stress and its effects on medical students: a cross-sectional study at a college of medicine in Saudi Arabia. Journal of health, population, and nutrition. 2011; 29(5):516-22.
19. Dyrbye, Liselotte N, Thomas, Matthew R, Shanafelt, Tait D. Systematic Review of Depression, Anxiety, and other indicators of psychological distress among U.S. and Canadian Medical Students. 2006; 81(4):354-73
20. Dyrbye LN, Thomas MR, Massie FS, Power DV, Eacker A, Harper W, et al. Burnout and Suicidal Ideation among U.S. Medical Students. Ann Intern Med. 2008; 149:334-41.
21. Suicidal ideation among medical students and young physicians: a nationwide and prospective study of prevalence and predictors. Journal of Affective Disorders. 2001; 64(1):69-79.

ORIGINAL ARTICLE

Effect of Mentoring on Professional Development of Medical Students Medical Students

Shamaila Sharif[1], Abdul Ghani Waseem[2], Wajiha Shadab[3], Rehan Ahmed Khan[4], Saadia Sultana[5]

ABSTRACT

Objective: To determine the perceptions of medical students about the effect of mentoring on professional development and to identify the problems faced during mentoring sessions in a private medical college.

Study Design: It was a qualitative phenomenological study.

Place and Duration of Study: This study was conducted at Islamic International Medical College Rawalpindi. It was completed in 6 months i.e., from Feb. 2016 to 31 July 2016.

Materials and Methods: It was a qualitative phenomenological study. A sum of 32 students were included in this study, 16 from third year MBBS and 16 from final year MBBS. Students from each class were divided into two groups, each group comprising of 08 students. Two Focus Group Discussion were arranged. Focus Group Discussions were audio recorded, transcribed and analyzed by thematic analysis with NVIVO version 11.

Results: Majority of the students found mentoring useful and a supportive program for their professional development, self-grooming, self-confidence and it helped them to increase their knowledge. Students were of the opinion that mentoring sessions had been helpful for improving their behavior with the patients. Students also highlighted that these sessions had positive effects on their professional and religious values. Students identified certain problems faced during these sessions like irregularity in mentoring sessions, frequent change of mentors, lake of advice and guidance on their career development by the mentors.

Conclusion: Medical students observe that mentoring has useful and beneficial effect on their professional development. However, they have highlighted certain shortcomings/problems of mentoring program run in IIMC. These deficiencies include lack of a structured mentoring program, irregularity in mentoring sessions and change of mentors.

Key Words: *Mentor, Mentee, Perceptions, Carrier Planning, Carrier Development, Professionalism, Professional Development.*

Introduction

The conventional characterization of a mentor is a reliable and honest counselor. A mentor has the capability to direct, monitor and provokes his or her mentee by increasing his or her acquaintance, responsiveness, and vision. Mentors are an influential force for developing successful professionals. Medical faculty having mentors often viewed that mentoring positively facilitates the personal development.[1,2,3] Effective mentoring surges carrier contentment in mentees. It reduces the faculty encumbrance, in the meantime enabling professional cooperation and collaboration. It is constructive for academic institutions to introduce formal mentoring program, offer maintenance and organize staff improvement for mentors[4,5,6] Mentoring skill is a respected possession for the faculty of academic medicine. It helps in shaping the professionalism of next group of physicians. Mentors are basically role models acting as directors, in order to help students for their personal development and carrier planning over time.[7,8] Mentors can be contributory in transmission of overt academic understandings necessary to master curriculum content. Essentially, they can improve implied understanding about the "hidden curriculum" of ethics, values and the art of medicine not demonstrated from texts. Mentors also provide affectionate support and reinforcement.[9,10,11] There was a need for formal mentoring program which socializes young doctors to meet their professional needs.[12,13,14,15]

Mentoring at Islamic international medical college,

[1,3,5]*Department of Gynecology/Medicine[2]/Surgery[4]*
Islamic International Medical College
Riphah International University, Islamabad

Correspondence:
Dr. Shamaila Sharif
Associate Professor
Department of Gynecology
Islamic International Medical College
Riphah International University, Islamabad
E-mail: shumaila.sharif@riphah.edu.pk

Funding Source: NIL; Conflict of Interest: NIL
Received: December 10, 2018; Revised: September 04, 2019
Accepted: September 06, 2019

Riphah International University is based on group mentoring where one senior and one or more junior mentors are assigned a group of students. The mentors are selected from the faculty and management staff of Islamic international medical college. Once selected, the mentors were trained and had to undertake special workshops on mentoring. The faculty members who had completed the "Post graduate Diploma in professional ethics and teaching methodology" for faculty members are preferred to take up mentoring. Social sciences department run strategic vision workshop of medical students in the first semester to help understand life vision. This study will help us to explore the usefulness and effectiveness of mentoring program run for undergraduate medical students. The valued responses compiled by this research will help to highlight the importance of mentoring program and the improvements required to make it more useful and effective. A study was planned to determine the perceptions of medical students about the effect of mentoring on professional development and to identify the problems faced during mentoring sessions in a private medical college.

Materials and Methods

A qualitative phenomenological study was conducted at Islamic International Medical College Rawalpindi from Feb. 2016 to 31 July 2016 after an approval from ethical review committee of Riphah International University. Focus group discussion method was used. Students who attended the mentoring classes in their previous sessions were included in the study. Total 32 students were included, 16 from third year MBBS and 16 from final year MBBS. Students from each class were divided into two groups, comprising 08 students in each group. In this study, maximum variation sampling technique was used. Two Focus Group Discussions (FGDs) of MBBS students, were conducted to explore their understanding of the effectiveness, utility and problems of the mentoring sessions conducted in our institution.

Data was collected using questionnaire consisting of leading questions about their perceptions, attitudes and opinions. The group's composition and discussion was carefully planned to create a non-intimidating environment. Data was transcript and coding was done using NVIVO version 11. Themes were selected and subthemes were identified. Six steps were followed for data analysis and interpretation. Transcripts were coded and themes confirmed. After identifying open codes, axial coding performed to find out subthemes. Selective codes were identified, and interpretation of results was done.

Results

Majority of the students found mentoring useful and a supportive program for their professional development, self-grooming, and self-confidence. Students agreed that it helped them to develop vision and increase their knowledge about life and living. Students were of the opinion that mentoring sessions had been helpful for improving their behavior with the patients in the hospital. Students highlighted that these sessions had positive effects on their professional duties and religious obligations and improved behavior towards peers, seniors and patients. They felt self-motivated and amended capabilities of teamwork and tolerance. Students identified certain problems faced during these sessions like irregularity in mentoring sessions, frequent change of mentors, lack of advice and guidance on their career development by the mentors.

The following themes and sub themes were extracted from the group discussion:

Medical Students' Perceptions

Themes and Subthemes

Themes	Subthemes
Structured classes	➢ In sequence for professional development ➢ Practical points
Classes schedule	➢ Regular classes improve its effectiveness ➢ Proper scheduling is required for number of classes ➢ All time mentoring is not good.
Role models	➢ Not role models
Personal grooming of students	➢ Mentoring helped in self-motivation ➢ More knowledgeable ➢ Learn about how to behave ➢ Improved behavior towards peers ➢ Improved behavior with patients ➢ Enhanced team work
Professionalism	➢ Learn to improve attitude towards patients ➢ More responsive for profession ➢ Learn ethical aspect
Islamic values	➢ More knowledge ➢ Improved ethics
Carrier planning	➢ No help

As a result of two focused group discussion among the students, following seven major themes were identified.

Structured Mentoring Program

Students expressed that mentoring classes should be with the same mentor and on regular basis. They claimed that a structured program will ensure continuity and establish secure relationship of mentees with the mentors. Students perceived mentoring as a personal relationship with faculty member engaged in helping the student in order to improve student's personal and professional prophecy.

Respondent 1: I don't feel any improvement but this can be improved by making these sessions more structured.

Respondent 2: Mentoring sessions should be more frequent. May be for a limited time period but if teachers come prepared, it will be motivating.

Respondent 3: For better results, formal mentoring is necessary.

Respondent 4: Only two sessions were conducted last year, which I think are insufficient even if we consulted our senior teachers many times but these were informal meetings and teacher cannot assess us.

Regular Mentoring Classes: Students reflected that mentoring classes were interrupted and insufficient for any impact on them. There is need for regularity and punctuality for these classes so that program implementation is ensured and proper feedback can be taken. Mentors also value the time they spend and mentee achieve guidance in most of the aspects of life through this affiliation.

Respondent 1: These sessions were insufficient. Mentoring sessions should be at least one after every two months.

Respondent 2: Number of sessions during the year was insufficient. We need more sessions with trained mentors for better results.

Respondent 3: Actually, mentoring classes should be in succession and on weekly basis for may be a limited time period.

Respondent 4: We need regular sessions to avail benefits of mentoring.

Mentors as Role Models: Students emphasized that if mentors are role models, it may be a better setting for them. It is evident that mentor's personality has impact on their mentees. As mentors convey wisdom indirectly through their approaches, outlooks and concepts, they have ability to engage with students at all levels and tolerate and guide the emotions of their mentees. On the other hand, it is also important that students make independent decisions and have their own experiences. It fosters their personality development and they work with their personal struggles.

Respondent 1: Mentors were not role models so they did not give us practical points which are impressive enough to improve ourselves.

Respondent 2: We can improve these classes by having role models as mentors.

Respondent 3: These can be further enhanced by providing us with trained mentors' because everyone cannot be a mentor.

Personal Grooming: Students involved in mentoring observed that their mentoring classes improved their tolerance, their understanding of teamwork and vision about life. They were able to formulate and express their vision of life according to their requirements and internal satisfaction. It also increased their interest in research work as they feel it easy and accessible to research on topics of their own interest.

Respondent 1: We discuss different aspects of life and it helps us in improving our attitude towards patients, empathy and awareness about religion.

Respondent 2: We discussed many queries with our teachers and after reading book Adab e zindagi, we feel improved ourselves about daily life activities and attitude towards patients.

Respondent 3: It added a little to our ethics.

Respondent 4: May be we need separate classes on ethics.

Improving Professionalism: Many of the students admitted that mentoring helped them in understanding professionalism and it guided them to act upon its different aspects.

Respondent 1: Mentoring helped us improving ourselves as a good doctor. It told us how we can be a doctor not only concerned about diseases of the patients but also about their psychological issues and social problems.

Respondent 2: It improved our self-motivation and workplace working.

Respondent 3: It increased our knowledge.

Respondent 4: We have better communication with our peers.

Islamic Values: Students reflected that mentoring improved their knowledge about Islamic values. They discussed their queries with the respective mentors and it, in turn had an impact on their daily life activities and now they are more empathetic towards patients.

Respondent 1: It only gave us knowledge about Islamic values and did not give us practical points in team working.

Respondent 2: Yes, it improved our religious and moral values.

Respondent 3:

Respondent 4: But we feel deficient regarding practical points, how to improve our self? And need more guidance in this aspect.

Career Guidance: Students had the opinion that their mentors were not much concerned about their carrier planning and only a short time talk was conducted during their sessions. If their teachers come prepared, they may give them valuable support in this aspect as well and it may become easier for them to choose the carrier according to their aptitude.

Respondent 1: It does increase our confidence and helped us in our future plans.

Respondent 2: It increased our confidence but did not help us in our future plans.

Respondent 3: These classes were not so much concerned about our preparation of our carrier.

Respondent 4: It improved self-motivation but not carrier planning.

Discussion

In this study, conducted at Islamic international medical college, most of the students found mentoring supportive for professional development, self-grooming and confidence. Students reflected that these sessions fostered their professionalism and helped in improving their self-confidence. Mentoring sessions were effective for improving behavior towards patients. However, these sessions did not help them in carrier development. The religious impact of these classes had also been significant. They emphasized that there was effective role of mentors and regular sessions were required for making it more beneficial.

A structured program ensures continuity and establishes secure relationships of mentees with the mentors. In this study, the student expressed that proper structuring of the mentoring program would ensure proper program implementation. Similar results were found in a study that was conducted by Buddeberg Fisher Medteach 2006.[18] The study showed that the majority of the mentoring programs lack a concrete structure, although the results of mentoring are promising, more formal programs with clear setup goals are needed.[18] In this study, student expressed that decrease regularity and punctuality leads to decrease in the impact of mentoring classes on them. Similar suggestions were made in a study done by Boyle Preports on the development and assessment of mentoring programs. The study suggested that the sustained, involving relationships between mentor and mentee for best outcomes.[19] It is evident that mentor's personality has impact on their mentee. In this study, a small number of students emphasized that if mentors are role models, they may guide better for their professional development. In a study by Allen TD, meta-analysis was used to review and synthesize existing empirical research concerning the career benefits associated with mentoring Comparisons of mentored versus non- mentored groups were made, the findings were generally supportive of the benefits associated with mentoring.[20] Students involved in the present study perceived that mentoring sessions helped students in their personal grooming, improving tolerance, understanding of teamwork and vision about life. They were able to formulate and express their vision of life according to their requirements and internal satisfaction. In a study by Ndwiga C, a qualitative assessment was conducted to assess provider experiences and perceptions about mentoring. Mentees reported improved knowledge, skills, self-confidence, and team work.[21,22] Many of the students admit that mentoring helped them in overall understanding of professionalism as well as guided them to act upon its different aspects. Similar results are seen in a study by Sambunjak D, they found that mentorship was reported to have an important influence on personal development, career guidance, career choice, and research productivity, including publication and grant success.[24]

Conclusion

Medical students observe that mentoring has useful and beneficial effect on their professional development. However, they highlighted certain shortcomings/problems of mentoring program being run in IIMC causing hindrance. These deficiencies include lack of a structured mentoring program, irregularity in mentoring sessions and change of mentors.

Mentoring program is being implemented in most of the Universities; there is need for a structured program according to local environment, facilities and social values. So that it fulfills our student's requirements and fosters their capabilities.

Regular classes with timely feedback would be beneficial for student's satisfaction and will make it more practical according to the needs of the students of different classes and gender.

For effective mentoring, faculty development is necessary through workshops and seminars so that they may perform mentoring in appropriate manner, and it will satisfy the students as well.

There should be incentives for faculty so that they do not feel it a burden and able to provide quality time for mentoring. Assessment and evaluation are integral parts of this program. For improvement in future and removing flaws in this program, assessment at regular intervals with involvement of all stakeholders of institution is integral part of this program.

REFERENCES

1. Anderson AJ, Sánchez B, McMahon SD. Natural Mentoring, Academic Motivation, and Values Toward Education Among Latinx Adolescents. Am J Community Psychol. 2019 ;63: 99-109.
2. Emery N, Hund A, Burks R, Duffy M, Scoffoni C, Swei A. Students as ecologists: Strategies for successful mentorship of undergraduate researchers. Ecol Evol. 2019; 9: 4316-26.
3. Boutjdir M , Aromolaran AS, De Las Fuentes L, Boyington JEA , Arteaga SS, Jobe J, Jeffe DB, et al. Research Education and Mentoring Program in Cardiovascular Diseases for Under-Represented Junior Faculty From NHLBI SIPID/PRIDE. J Am Coll Cardiol. 2019; 73: 1861-65.
4. Caruso TJ, Kung T, Piro N, Li J, Katznelson L, Dohn A. A Sustainable and Effective Mentorship Model for Graduate Medical Education Programs. J Grad Med Educ. 2019; 11: 221 - 5.
5. Fagenson-Eland EA, Marks MA, Amendola KL. Perceptions of mentoring relationships J Voc Behav 1997; 51: 29-42
6. Straus SE, Chatur F, Taylor M. Issues in the mentor-mentee relationship in academic medicine: a qualitative study. Acad Med. 2009, 84:135-9.
7. Kram KE. Phases of the mentor relationship, Acad Manage J. 1983; 608 - 26460825
8. Kram K, EIsabella LA. Mentoring alternatives: the role of peer relationships in career development Acad Manage J. 1985:7, 487-503.
9. Rose GL, Rukstalis MR, Schuckit MA. Informal mentoring between faculty and medical students. Acad Med, 2005; 80: 344–8.
10. Connie E.Cell. Evolving as a Scientist and a Mentor. Epub . 2019; 177:510-13.
11. Newburger JW . Reflections on mentoring. Congenit Heart Dis. 2019; 14: 126-7.
12. Milton CL . Ethics with Mentoring. Nurs Sci Q. 2017; 30: 105-6.
13. Block M, Florczak KL.Mentoring: An Evolving Relationship. Nurs Sci Q. 2017; 30: 100-4.
14. Byks-Jazayeri C, Samuels E, Anderson EW, Ellingro VL. Implementing and measuring the impact of a clinical and translational research mentor recognition program. J Clin Transl Sci. 2018; 2: 312-20.
15. Gagliardi AR, Perrier L,WebsterF, Leslie K, Bell ML ,Evinson W. Exploring mentorship as a strategy to build capacity for knowledge translation research and practice: protocol for a qualitative studyImplementSci . 2009; 1:14-98.
16. Jacobi M. Mentoring and undergraduate academic success: a literature review. 1991; 61:505–32.
17. Chao GT, Gardnerb P. Formal and informalmentorship: a comparison on mentoringfunctions and contrast with nonmentoredcounterparts. Pers Psychol. 1992, 45:619 –36.
18. Buddeberg-Fischer B1, Herta KD.Formal mentoring programmes for medical students and doctors--a review of the Medline literature. Med Teach. 2006 May;28 :248-57
19. Boyle P, Boice B.Systematic Mentoring for New Faculty Teachers and Graduate Teaching Assistants.Innovative Higher Education 1998, 22:157-179 .
20. Allen TD, Eby LT, Poteet ML, Lentz E, Lima L. Career benefits associated with mentoring for protégeé: a meta-analysis. J Appl Psychol. 2004; 89:127-36.
21. Thorndyke LE, Gusic ME, Milner RJ. Functional mentoring: a practical approach with multilevel outcomes. J Contin Educ Health Prof. 2008; 28:157-64.
22. Ndwiga C1, Abuya T, Mutemwa R, Kimani JK, Colombini M, Mayhew S, Baird A, Muia RW, Kivunaga J, Warren CE. Exploring experiences in peer mentoring as a strategy for capacity building in sexual reproductive health and HIV service integration in Kenya. BMC Health Serv Res. 2014 1;14-98.
23. Frei E , Barbara M S, Fischerr B. Mentoring programs for medical students - A review of the PubMed literature 2000-2008.BMC Medical Education. 2010: 10 :32.
24. Sambunjak D1, Straus SE, Marusić A. Mentoring in academic medicine: a systematic review.. JAMA. 2006 Sep 6;296(9):1103-15.

LETTER TO EDITOR

Contribution of Emotional Intelligence in Health Professional Education

Kiran Khushnood[1], Nasir Sultan[2]

Dear Sir/Madam

Emotional intelligence (EI) describes a person's ability to assess and respond to emotions of his/ her own or of others.[1] It is a major contributor in daily life as well as health care delivery system. Every person belonging to this sacred domain needs to be compassionate enough to understand the sufferings and should be able to deal and manage the patient's problem effectively. There is no formal system of EI assessment at the time of recruitment in health care profession. The individuals with compassionate attitude, value and behaviors should be given some priority for being selected. They then must be trained for patient interaction and communication using the principles of emotional intelligence. This is necessary to avoid the unpleasant incidents that happen because of improper dealing from the professional that leads to increasing dissatisfaction of patients towards the professionals. Doctors, nurses, physical therapists and all other professionals should be educated for delivering empathetic care. All of them should be good communicators. The General Medical Council (GMC), the body that regulates and controls the medical education standards in the UK, states that doctors in future will commune with patients and their relatives clearly, sensitively and efficiently by listening effectively, sharing and responding.[2] They will keep the ethical and legal principles in their behavior.[2] All these areas are under the umbrella of EI. The UK and other developed countries have taken serious account in incorporating and teaching doctor-patient relationship and communication in all the curricula of health professions and it is taught formally along with feedback system.[3]

It is recommended that the assessment prior to recruitment should be done and merely not the marks or grades of students should be considered for their entry to this sacred profession but also the moral, ethical and behavioral principles of the candidate should be concerned. It is also necessary to incorporate the students with skill to deal the patients with cultural competency in their curricula and then their sensitivity and response according to needs and expectations of patients also taking account of patient's age, culture, gender, lifestyle, beliefs, race, and disability. Therefore, it is the dire need of time to understand and implement the knowledge, practice and realization of emotional intelligence.

1. Cherry MG, Fletcher I, O'Sullivan H, Dornan T. Emotional intelligence in medical education: a critical review. Medical education. 2014;48(5):468-478.
2. Council GM. Tomorrow's Doctors 2003: Recommendations on undergraduate medical education.
3. Hargie O, Boohan M, McCoy M, Murphy P. Current trends in communication skills training in UK schools of medicine. Medical teacher. 2010;32(5):385-391.

[1]Department of Physical Therapy
Shifa Tameer-e-Millat University, Islamabad
Department of Rehabilitation
[2]Shifa International Hospital, Islamabad
Correspondence:
Dr. Kiran Khushnood
Lecturer
Department of Physical Therapy
Shifa Tameer e Milat University, Islamabad
E-mail: kirankhushnood@yahoo.com

INSTRUCTIONS FOR AUTHORS

The 'JIIMC' agrees to accept manuscripts prepared in accordance with the "Uniform Requirements submitted to the Biomedical Journals" published in the British Medical Journal 1991; 302: 334-41.

The material submitted for publication should be sent completely to the Journal of Islamic International Medical College, Pakistan. Research work that has already been reported in a published paper or is described in a paper sent or accepted elsewhere for publication should not be submitted. Duplicate submission of the same research work to other journal should be avoided as this fall into the category of publication misconduct. A complete report following publication of a preliminary report of a preliminary report, usually in the form of an abstract, or a paper that has been presented at a scientific meeting, if not published in a full proceedings, may be submitted.

Manuscripts are submitted online on following link: http://my.ejmanager.com/jiimc/. All authors are supposed to provide their contact details such as institution, cell numbers and E-mail addresses on the title page.

It is mandatory to submit online a duly filled-in copyright, authorship and undertaking proforma along with the manuscript. (https://jiimc.riphah.edu.pk/downloads/). The sequence/ order of name of authors submitted at the time of initial submission of manuscript shall not be changed at any stage.

It is mandatory to submit the institutional ethical review board/committee approval/exemption for all research articles, at the time of online submission of article. Dissertation/ thesis approval letter from relevant authority is also acceptable.

AUTHORSHIP CRITERIA

All those designated as authors should meet all four criteria for authorship as stated in ICMJE recommendations (http://www.icmje.org/icmje-recommendations.pdf). According to ICMJE recommendations authorship is based on the following four criteria: 1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data ; and 2. Have been involved in drafting the work or revising it critically for important intellectual content; and 3. Have given final approval of the version to be published; and 4. Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. We strongly discourage gift or ghost authorship. Mere supervision, collection of data, statistical analysis and language correction do not grant authorship rights.

GENERAL ARCHIVAL INSTRUCTIONS

The manuscript should be typed in MS Word. Each manuscript should include a title page (containing email address, cell numbers, institution and postal address of the corresponding author), abstract, key words, text, acknowledgements (if any), references, tables (each table, complete with title and footnotes) and legends for illustrations and photo-graphs. Each component should begin on a new page. Sub-headings should not be used in any section of the script except in the abstract.

ARTICLE PROCESSING FEE

JIIMC charges PKR 1000/- as processing fee and PKR 4000/-(Riphah Faculty) and PKR 5000/- for others as publication fee on original articles. Case report, review article, and letter to editor are exempt from any charges. Authors of ORIGINAL ARTICLES have to submit bank draft of Rs 1000/- (Non Refundable) at time of submission and a bank draft of PKR 4000/- (For Riphah Faculty) and PKR 5000 for others is submitted once the article is accepted for publication. Article processing fee for authors outside Pakistan is $ 100 (Nonrefundable) and $ 100 publication fee once the article is accepted. Manuscript is processed only after the receipt of processing fee.

Bank draft in favor of "Journal of Islamic International Medical College" may be sent to the address below:

MANAGING EDITOR JIIMC
Westridge-III, Pakistan Railway Hospital
Islamic International Medical College, Rawalpindi-Pakistan
Tel: +92515481828 - Ext 217

MATERIAL FOR PUBLICATION

The material submitted for publication may be in the form of an Original Research(Randomized controlled trial - RCT, Meta-analysis of RCT, Quasi experimental study, Case Control study, Cohort study, Observational Study with statistical support, etc.), a Review Article, a Case Report, Recent Advances, New Techniques, Debates, Book/CDs Review on Clinical/Medical Education, Adverse Drug Reports or a Letter to the Editor. Studies more than five years old at the time of submission are not accepted for publication in JIIMC. Non- English articles are not accepted for publication in JIIMC.

ORIGINAL ARTICLES should report original research of relevance to clinical medicine and may appear either as papers or as short communications. The original paper should be of about 2000-2500 words excluding abstract and references. The abstract should be structured of about 250 words. Three to 10 keywords should be mentioned at the end of abstract as per MeSH (Medical Subject Headings). There should be no more than four tables or illustrations. The data should be supported with 20 to 25 local as well as international references. More than 50% of the references should be from last five years.

SHORT COMMUNICATIONS should be about 1000 words, with a non-structured abstract, two tables or illustrations and 5 references.

CLINICAL CASE REPORT and brief or negative research findings may appear in this section. Clinical Case Reports should be of academic value and provide relevance of the disease being reported as rare or unusual. The word count of case report should not be more than 800 words with 3- 5 key words. The abstract should be non-structured of about 150 words (case specific) with maximum of 5 references. It should not include more than 2 figures and one table.

REVIEW ARTICLE should consist of structured overview of relatively narrow topic providing background and recent development with reference of original literature. An author can write a review article only if he/she has written minimum of three original research articles and some case reports on the same topic. Review article should be of 2500 to 3000 words with non-structured abstract of 150 words and minimum 3 key words.

LETTERS TO THE EDITOR should normally not exceed 400 words, have no more than 05 references and be signed by all the authors-maximum 3 are allowed. Preference is given to those that take up points made in contributions published recently in journal. Letters may be published with a response from the author of the article being discussed. Discussions beyond the initial letter and response will not be entertained for publication.

OBITUARIES should be of about 250 words. Editorials are written by invitation.

DISSERTATION/THESIS BASED ARTICLE

An article based on dissertation/thesis submitted as part of the requirement for a postgraduate degree (M. Phil, FCPS, MS) can be sent for publication after it has been approved by the institution's ethical review board/committee and the college/university evaluation committee/board. The data should not be more than five years old. Thesis/dissertation based article will be assessed by proper review process. Once accepted for publication, then disclosure will be made that 'it is a Dissertation based article'.

MANUSCRIPT EVALUATION/PEER REVIEW

Each manuscript submitted to JIIMC is assessed by an editor for an initial assessment (internal peer review). The article is checked for similarity Index with plagiarism detecting Software, “TURNITIN”. Manuscript suitable for publication is forwarded to two external peer reviewers to evaluate the suitability of the article for publication based on its quality, novelty, and relevance. A time frame of minimum 2 weeks are given to the reviewer to send their suggestions to the editor. If a reviewer is unable to meet the time frame agreed upon or he declines to review the manuscript, the manuscript will be sent to another reviewer. The editor may ask reviewers to make recommendations regarding acceptance or rejection of manuscripts, but the editor must be the one who makes the decisions. The editor may reject manuscripts without outside review, for example if the subject matter is outside the purview of the journal, a manuscript on the same topic is just about to be published, the quality of the manuscript is poor, or criteria for the submission of manuscripts are not met.

ETHICAL CONSIDERATIONS

The Journal of Islamic International Medical College (JIIMC) is committed to achieve and maintain ethical

values at all steps of publication process. We follow the guidelines of International Committee of Medical Journal Editors (ICJME), Committee on Publication Ethics (COPE), World Association of Medical Editors (WAME) and higher Education Commission of Pakistan (HEC) to meet the standards of publication ethics.

JIIMC follows the authorship criteria in compliance to the ICMJE definition of authorship (www.icmje.org). All the four conditions are to be fulfilled. We strongly discourage gift or ghost authorship.

The cases of plagiarism, data manipulation, fabrication, and redundant or duplicate publication will be dealt according to rules and regulations/recommendation of the ICMJE, PMDC and HEC.

Few important responsibilities of authors include:

- To declare about the originality of data submitted for publication.
- To keep the record of all data related to their manuscript and provide the access to it in case of a genuine demand.
- To declare that the submitted manuscript is not under consideration for publication in any other journal.
- Author to submit Undertaking, Authorship and Copyright Performa at the time of submitting the manuscript. This will include the detail of contribution by all the authors.
- To obtain permission to reproduce Photographs, tables or illustrations, from other sources and to acknowledge and cite content reproduced from other sources.
- When reporting experiments on human subjects, declare whether the procedures followed were in accordance with the ethical standards of the committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 1983.
- When reporting experiments on animals, indicate whether the institution's or a national research council's guide for, or any national law on, the care and use of laboratory animals was followed.
- Author of the manuscript is required to submit the copy of the certificate of approval by the Institutional Review Committee (IRC)/Ethical Review Board (ERB).
- Authors should obtain direct permission from human subjects and respect their privacy. Written permission to reproduce photographs of patients, whose identity is not covered, should be sent with the manuscript; otherwise the eyes will be blackened out.
- Authors should declare any probable conflicts of interest and any financial support for the study may be disclosed as well.
- To notify promptly the journal editor if a significant error in their publication is identified.
- To respond appropriately and cooperate with any requests from the journal for data or additional information should questions about the paper arise after publication?
- To cooperate with the editor to publish an erratum, addendum, corrigendum notice, or to retract the paper, where this is considered essential.

DEALING UNETHICAL PRACTICES

- Any complaint related to scientific misconduct or unethical practice of a manuscript; at any stage during or after the publication, brought into the notice of managing editor, will be taken seriously, investigated cautiously but thoroughly.
- Managing editor will collect the evidences and consult the Chief Editor to make initial decision about the investigation for an unethical behavior.
- Minor misconduct will be dealt by the managing editor in consultation with the chief editor.
- In case of serious misconduct, the managing editor, in consultation with the chief editor will make the decision, either by examining the available evidence themselves or after consultation with one or two experts.
- Sufficient opportunity will be provided to the accused author to explain their view point about the accusations of serious misconduct.
- Following steps may be taken depending upon the nature and severity of a misconduct:
  - ✓ A letter will be issued to the author or reviewer in case of a misunderstanding or misapplication of acceptable standards.
  - ✓ A warning letter will be issued to the author or reviewer covering the misconduct and as

a warning to future behaviour.

- ✓ Publication of a formal notice detailing the misconduct.
- ✓ A formal letter to the head of the author's or reviewer's department and Institution.
- ✓ Formal retraction or withdrawal of a publication from the journal.
- ✓ Debarment of the authors(s) from further publication in the JIIMC for one year or permanent depending upon the nature of offence.

TEXT ORGANIZATION

All manuscripts except Short Communication and Letter to the Editor should be divided into the following sections.

ABSTRACT

Abstracts of original article should be in structured with following sub-headings: i. Objective, ii. Study Design, iii. Place & Duration of Study iv. Materials & Methods, v. Results, vi. Conclusion. Four elements should be addressed: why did you start, why did you do, what did you find and what does it mean. Why did you start in the objective. What did you do constitutes the methodology and could include design, setting, patients or other participants, interventions, and outcome measures. What did you find is the results, and what does it mean would constitute; our conclusions. Please label each section clearly with the appropriate sub-headings. Structured abstract for an original article, should not be more than 250 words. At least 3 key words should be written at the end of abstract. Review article, case report and other require a short, unstructured abstract. Commentaries do not require abstract.

INTRODUCTION

Write this section with references as per following instructions:

a. Give background information about the subject matter and the issues your study intends to address. Only strictly pertinent references should be cited and the subject should not be extensively reviewed.
b. Describe what is known (in the literature) and what is not clear about the subject with reference to relevant literature thus identifying the literature gap.
c. You write the rationale (justification) of your study.
d. Finally you mention the objective of your study

MATERIALS AND METHODS

Methodology is written in past tense.

Follow this sequence **without headings:**

- Study design
- Place and Duration of Study
- Sample size
- Sampling technique
- Mention about permission of ethical review board and other ethical issues addressed.
- Inclusion and Exclusion Criteria
- Data collection procedure-
- Type of data: parametric or nonparametric
- Data analysis; including Statistical Software used, and statistical test applied for the calculation of p value and to determine the statistical significance. Exact p-values and 95% confidence interval (CI) limits must be mentioned instead of only stating greater or less than level of significance. All percentages must be accompanied with actual numbers.

RESULTS

These should be presented in logical sequence in the text, tables and illustrations. All the data in the tables or illustrations should not be repeated in the text; only important observations should be emphasized or summarized. No opinion should be given in this portion of the text.

DISCUSSION

This section should include author's comment on the results. Write in present tense, active voice- except for results, which are written in past tense. It should be written in following sequence:

a. First of all very briefly summarize, Interpret and discuss main results and don't merely repeat the results.
b. Discuss key studies relevant to your study.
c. Compare your work with other`s work.
d. Describe limitations of your study.
e. Suggest future work if necessary.

CONCLUSION

Conclusion should be provided under separate heading. It should be in congruence with the objectives. No recommendations are needed under this heading.

REFERENCES

References must be given in the Vancouver Style only. References should be numbered in the order in

which they are superscripted in the text. At the end of the article, the full list of references should give the names and initials of all authors (unless there are more than six when only the first six should be given followed by et al). The author's names are followed by the title of the article; title of the journal abbreviated according to the style of the Index Medicus (see "List of Journals Indexed", printed yearly in the January issue of Index Medicus); year, volume and page number; e.g. Hall, RR. The healing of tissues by C02 laser. Br J. Surg: 1970; 58:222-225. References to books should give the names of editors, place of publication, publisher and year. The author must verify the references against the original documents before the article. References to papers accepted but not yet published should be designated as "in press" or "forthcoming"; authors should obtain written permission to cite such papers as well as verification that they have been accepted for publication.

TABLE AND ILLUSTRATIONS

Tables and illustrations should be merged within the text of the paper, and legends to illustrations should be typed on the same sheet. Table should be simple, and should supplement rather than duplicate information in the text; tables repeating information will be omitted. Each table should have a title and be typed in double space without horizontal and vertical lines on an 8 ½" x 11' paper. Tables should be numbered consecutively with Roman numeral in the order they are mentioned in the text. Page number should be in the upper right corner. If abbreviations are used, they should be explained in foot notes and when they first appear in text. When graphs, scattergrams, or histogram are submitted, the numerical data on which they are based should be supplied. All graphs should be made with MS Excel and be sent as a separate Excel file even if merged in the manuscript. For scanned photographs highest resolution should be used.

S.I. UNITS

System International (SI) Unit measurements should be used. All drugs must be mentioned in their generic form. The commercial name may however be mentioned within brackets, if necessary.

PHOTOGRAPHS AND FIGURES

Figures and Photographs should only be included when data cannot be expressed in any other form. Figures and photographs must be cited in the text in consecutive order. Legends must be typed on the same paper. Legends for photomicrographs should indicate the magnifications, internal scale and method of staining.

PLAGIARISM POLICY

JIIMC follows the guidelines of ICMJE, PMDC and HEC for any kind of plagiarism. These guidelines can be accessed at www.icmje.org, www.pmdc.gov.pk and www.Hec.gov.pk . Author is advised to go through these guidelines before submitting their manuscript with JIIMC. The cases of plagiarism will be dealt according to rules and regulations/recommendation of the ICMJE, PMDC and HEC. The disciplinary committee of JIIMC comprises of the staff, Managing editors and Editor in Chief to deal with cases of plagiarism.

All articles submitted to JIIMC are checked by antiplagiarism software TURNITIN. JIIMC follows the standard definition and description of plagiarism and follow the recommendations by Committee of Publication Ethics (COPE), ICMJE, Pakistan Association of Medical Editors (PAME), Higher Education Commission (HEC) of Pakistan policies about plagiarism available on www.cope.org.

- Logical contribution and originality of every manuscript is to be defined by the authors and it is the responsibility of authors to be mindful about various types of plagiarism like plagiarism of ideas, text, paraphrasing, self plagiarism including redundant/duplicate publication, salami slicing (data fragmentation) and text recycling etc. Unawareness about plagiarism and its various types will not be accepted as an explanation.
- Any manuscript submitted for publication or a manuscript accepted for publication or even an article that has already been published in the journal, if found to be plagiarized, the matter will be dealt with in accordance to COPE guidelines.
- Editorial Board will immediately stop the processing/ publication of he article and will ask for an explanation from the corresponding author. He will be liable to respond with an explanation in 04 weeks.
- In case an satisfactory explanation editorial

board may recommend appropriate changes after which the review process for the submitted manuscript may commence.

- In case of non response in the required time or unsatisfactory explanation, the editorial board will decide about the fate of the article and authors including rejection of the manuscript,
- Withdrawal of already published article (as the case may be).
- Barring the authors(s) from further publication in the JIIMC for one year or permanent depending upon the nature of offence.
- The author will be on watch. HEC, PMDC and author's institute will also be notified for information and possible action.
- In case of multiple submissions, editors of other journals will also be informed. The author(s) will have to provide documentary proof of retraction from publication, if such a defence is pleaded.
- Those claiming intellectual/idea or data theft of an article must provide documentary proof in their claim

CONFLICT OF INTEREST

Any funding source for the research work must be informed at the time of submitting the manuscript for publication in JIIMC. Any associations that might be construed as a conflict of interest (stock ownership, consultancies, etc.) shall be disclosed accordingly.

Examples of financial conflicts include employment, consultancies, stock ownership, honoraria, paid expert testimony, patents or patent applications, and travel grants, all within 3 years of beginning the work submitted. If there are no conflicts of interest, authors should state that. All authors are required to provide a signed statement of their conflicts of interest as part of the author's declaration.

COPYRIGHT

 Instructions to authors appear on the last page of each issue. Prospective authors should consult them before writing their articles and other material for publication. The JIIMC accepts only original material for publication with the understanding that except for abstracts, no part of the data has been published or will be submitted for publication elsewhere before appearing in this journal. The Editorial Board makes every effort to ensure that accuracy and authenticity of material printed in the journal. However, conclusions and statements expressed are views of the authors and do not necessarily reflect the opinions of the Editorial Board of the JIIMC.

REPRINTS

Corresponding authors of the published papers are entitled to receive the maximum of 3 copies of printed issue in which his/her paper is published.