

# AJSMU

**Volume 8**

**Issue 2**

**July - December 2022**



*Progress Through Knowledge*

## **ANNALS of JINNAH SINDH MEDICAL UNIVERSITY**



Indexed and abstracted in Pak Medinet, CAB Abstracts, Global Health UK, Pakistan Science Abstracts and WHO Index Medicus for the Eastern Mediterranean Region (IMEMR)



# A J S M U

Volume 8, Issue 2

July - December 2022



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Published by: The Registrar, Jinnah Sindh Medical University, Rafiqui H.J. Shaheed Road, Karachi.



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# Stem Cell Role in Regenerative Dental Medicine

Robia Ghafoor

**How to cite:** Ghafoor R, Stem cell role in regenerative dental medicine  
Ann Jinnah Sindh Med Uni. 2022; 8(2):45-46  
DOI 10.46663/ajsmu.v8i2.45-46

Regeneration therapies have widely permeated advanced research that aims to reproduce and repair a lost or damaged organ or tissue in order to restore the function and architecture as close to its original state as possible<sup>1,2</sup>. Tissue engineering refers to the process of regeneration using techniques such as scaffold based cell cultures, stem cell therapy, and biomolecular signaling.

Advances in gene-based knowledge on the stem cells within the stomatognathic tissues has contributed to the variety of pioneering treatment modalities<sup>3</sup>. Mesenchymal stem/stromal cells (MSCs) are currently thought to be ideal prospects for tissue replacement therapy and tissue engineering<sup>4</sup>. The clinical success of MSCs treatment is greatly influenced by the donor cells and immune cells<sup>5</sup>. Recent literature highlights the evidence for the regenerative potential of dental stem cells, which has further heightened the curiosity of scientist, researchers, and dental practitioners<sup>6</sup>.

In advanced molecular dentistry, focus has been towards multidisciplinary approaches exploiting combination of advanced tissue engineering, stem cells, scaffolds, biomaterials, and digital technology that exhibit significant potentials for extra-oral and intra-oral regeneration<sup>1</sup>. Stem cells play a vital role in treatment modalities including tissue engineering of hard and soft tissue defects. Currently, substituting lost stomatognathic tissues such as dental pulp, salivary glands, temporomandibular joint and alveolar bone are set to be employed as regenerative medicine<sup>2</sup>. The process of collecting stem cells of dental origin is easy, convenient, and relatively noninvasive, with these cells having a plethora of potential therapeutic and regenerative roles in medicine and dentistry<sup>7</sup>.

Mesenchymal stem cells (MSCs) are undifferentiated cells having potential to regenerate and differentiate into many different cell types<sup>5</sup>. Broadly, these can be classified as Adult Stem Cells (ASCs) and Embryonic Stem Cells (ESCs)<sup>8</sup>. The ASCs are limited in number and have 'multipotent' potential, which allows them to regenerate and convert into certain particular cell varieties, thereby

contributing to the healing and maintenance of tissues. On the contrary, ESCs are considered 'pluripotent' and can differentiate into almost all cell lines, depending on the stimulus. However, ESCs are found in the blastocyst stage embryo, whereas ASCs have been isolated from skin, muscle, nerve, bone, and dental tissues.<sup>8</sup> As a result of the ease of accessibility of ASCs, recent advancements have led to the development of 'cell plasticity', which involves the reprogramming of ASCs to produce pluripotent stem cells, allowing them to develop into any cell lineage, depending on the stimulus<sup>5</sup>. In addition to bone marrow, where unspecialized cells known as 'stem cells' were originally exploited in regenerative medicine applications, it has been shown that they are found in many other sites of the body including dental pulp cells. The bone marrow and non-marrow tissues from extra-oral intra-oral niches are two possible origins of the mesenchymal dental stem cells. The bone marrow-derived stem cells (BMSCs) that are employed to regenerate dental tissues are often extracted from extra-oral sources (such as the iliac crest and femur) or those from the orofacial region including the maxilla and mandible, acquired during dental procedures<sup>9</sup>.

The Bone Marrow Derived Stem Cells (BMSCs) can be acquired from intra-oral sites such as the maxilla or mandible; as well as extra-oral sites including the iliac crest or femur<sup>10</sup>. Although BMSCs have had uneventful outcomes with regeneration, the process of obtaining and isolating these stem cells is invasive. There are various challenges and limitations, such as the invasive process of isolating extra-oral BMSCs and the paucity of other sources of dental stem cells<sup>2,11</sup>.

On the other hand, dental origin stem cells are easier to access, and these include Dental Pulp Stem Cells (DPSC), human exfoliated deciduous teeth (SHED), gingival mesenchymal stem/progenitor cells (GMSCs), stem/progenitor cells from apical papilla (SCAP), periodontal ligament stem cells (PDLSCs), and dental follicle stem/progenitor cells (DFSCs)<sup>7</sup>. Dental tissues are demonstrated to have high numbers of MSCs among the progressively identified niches and tissues holding increased SCs<sup>6,7</sup>. Dental SCs are typically found in the dental pulp, periodontal ligament, and dental follicle tissues<sup>10</sup>. Despite the variety of available sources, it is important to consider that successful tissue regeneration

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is a result of a complex interplay between three main factors: Stem cells, scaffolds, and growth factors, also described as the 'Tissue Engineering Triad'<sup>6</sup>.

Due to the insurmountable hurdles involved with the translation of cell delivery-based tooth regeneration techniques into medicines, cell homing has been suggested as an alternate to cell transplantation for tooth regeneration<sup>12</sup>. Translational challenges are present in all cell-based treatments, including those used for tooth tissue regeneration. Another barrier to considerable clinical translation of tooth regeneration currently is the enormous expense of commercialization and constraints surrounding regulatory approval<sup>8</sup>. As a result, cell homing is becoming increasingly popular among the already accepted techniques for tissue regeneration. Cell homing is more adaptable and has a greater chance of being commercialized for therapeutic applications when the ex-vivo cell manipulation and cell isolation steps are omitted. Therefore, although further investigation is required, cell homing is still a promising substitute to cell delivery-based tooth regeneration. Cell homing has emerged as a promising strategy for tooth regeneration, demonstrating effective recruitment of adequate cells from various lineages into the micro-channels of the scaffold, regeneration of a hypothetical PDL, and formation of new alveolar bone.

Currently, literatures regarding stem cell approaches in dentistry does not present clear guidelines. This needs to be addressed in order to help forge basic understanding of principles, techniques, and application areas. Moreover, the limitations and challenges of stem cell therapy need to be explored further to develop a better understanding of this treatment modality. Modern science utilizes stem cells to cure the diseases labelled as incurable, aiming to increase the health span. This is far from forming a synthetic organ in-vitro. The blooming industry of stem cells have been a topic of public discussion over a wide range of ethical implications. The initial studies surrounding stem cells have many pressing ethical issues. However, all translational studies begin with an ethical question of whether the study answers the scientific question within the social values. It is important to consider the merits and demerits of stem cell therapy.

The mechanisms that govern the outcomes and activities of transplanted stem cells must be investigated. Literature is abundant with stem cell based preclinical studies on dental pulp and periodontal regeneration. However, clinical studies with long term follow-ups are still scarce, which makes it challenging to translate these preclinical studies in terms of host response, ethical concerns, regulation, technology, and ethical considerations. These underlying challenges must be addressed in order for regenerative therapies to be practicable and effective for patients with dental pulp and/or PDL that is diseased or injured.

For the purpose of regenerating these essential components of dental tissues, autologous stem cells have already begun to be utilized in several clinical studies. It is crucial

to note that this modality has not received approval yet, nor have the associated results been disseminated or included in pertinent guidelines. Many individuals suffering from dental disorders across the world may benefit from stem cell-based regenerative techniques, which demand further investigation. Fortunately, advances in nanotechnology, mathematical modelling, and contemporary imaging techniques are paving the way for stem cell-based regeneration trials to produce higher-quality results more efficiently and with more reliability.

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# Knowledge of Diabetes Mellitus Among Undergraduate Clinical Students of Sindh Medical College

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## ABSTRACT

**Objective:** To determine the knowledge of undergraduate students of Sindh Medical College regarding Diabetes Mellitus (DM)

**Methodology:** This cross sectional study was conducted at Sindh Medical College, Jinnah Sindh Medical University (SMC-JSMU). The participants were students of 3rd year, 4th year and 5th year M.B.B.S. The sample size was calculated to be 282, using open EPI software. The data was collected through a scientifically designed questionnaire which included questions about the over all knowledge, risk factors, complications, diagnosis, treatment, methods of prevention, and WHO criteria of Diabetes Mellitus. SPSS version 22.0 was used for data analysis.

**Results:** About 275 (98%) students had knowledge of the site of insulin production and 255 (90%) knew exactly how insulin produces its effects. Regarding the clinical presentation of DM, 262 (93%) of them agreed that hunger, thirst, and urination present as the major symptoms of this disease ( $p=0.005$ ). Family history was considered as the prime risk factor by 93 (98%), 83 (95%) and 86 (86%) of final year, fourth, and third year students respectively ( $p=0.003$ ). Furthermore, 254 (90%) selected retinopathy ( $p=0.00$ ), 239 (85%) preferred nephropathy ( $p=0.003$ ) and 224 (79%) considered neuropathy ( $p=0.024$ ) as the most significant complication of DM. Moreover, the recall of the WHO diagnostic criteria for DM was comparatively lower in final year students ( $p=0.003$ ).

**Conclusion:** The over all knowledge of undergraduate medical students of Sindh Medical College was found to be satisfactory. Most of the students considered medical education as an adequate source of knowledge in this regard. However, capability of diagnosing DM was found to be comparatively low among final year M.B.B.S. students.

**Key words:** Blood glucose levels, diagnostic criteria, diabetes mellitus, metabolic disease, medical students, neuropathy, nephropathy, retinopathy, undergraduates

**How to cite:** Kumar V, Rehman S, Jaffar N, Akram N, Abbas K, Ahmed M. Knowledge of diabetes mellitus among undergraduate clinical students of sindh medical college. *Ann Jinnah Sindh Med Uni.* 2022;8(2):47-53

DOI 10.46663/ajsmu.v8i2.47-53

## INTRODUCTION

Diabetes Mellitus (DM), according to World Health Organization (WHO), is a chronic metabolic disease characterized by elevated levels of blood glucose, which leads to serious damaging effects to the heart, blood vessels, eyes, kidneys, and nerves<sup>1</sup>.

Increasing incidence of diabetes mellitus has proved to be worrisome for health care providers. Around 450

million people are suffering from diabetes mellitus worldwide with Asia being the highest contributor to the burden. Highest incidence of diabetes mellitus has been reported in China followed by India. About 12.13% population of Afghanistan is currently suffering from DM<sup>2-4</sup>. If these trends continue, the estimated frequency may rise to 629 million by the end of 2045. With 79,535 reported deaths, diabetes has acquired 7<sup>th</sup> position in the list of leading causes of death in the US. In Pakistan, currently 7.5 million people are suffering from this disorder which would more likely be increased to 16.1 million if preventive measures will not be taken<sup>5,6</sup>. Furthermore, the prevalence of DM in Pakistan is 11.77% with a distribution of 14.81% in urban and 10.34% in rural areas<sup>7</sup>.

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DM has proved to be a massive economic burden globally due to its rapid spread<sup>8,9</sup>. In 2012, US spent \$245 billion for this purpose. It is postulated that in Pakistan, for treating approximately 6.6 million diabetes patients, the estimated cost may increase up to 36.5 billion PKR per month<sup>6,10,11</sup>.

Trend of urbanization, sedentary lifestyle, inactive routines, and stressful job conditions are important factors contributing to the increased frequency of this disorder<sup>12</sup>. The current WHO diagnostic criteria for diabetes is fasting plasma glucose = 7.0mmol/l (126mg/dl) or 2-h plasma glucose = 11.1mmol/l (200mg/dl)<sup>13</sup>.

Since medical undergraduates are the future primary health care providers of the community, they should have optimal knowledge towards accurate diagnosis and management of DM. Early diagnosis of border line cases can prevent these patients from acquiring the disease in future. The current study was designed to determine the knowledge regarding aetiology, approach to diagnosis, and management of diabetes mellitus among undergraduate MBBS students of Jinnah Sindh Medical University.

## METHODOLOGY

This was a cross-sectional study, conducted at Sindh Medical College, Jinnah Sindh Medical University (SMC-JSMU) from 2017 to 2018. The Institutional Review Board of JSMU approved this study by certifying it with IRB certificate No. JSMU/IRB/2018/107. All students from 3<sup>rd</sup> year to 5<sup>th</sup> year, M.B.B.S, were enrolled in the study. Those who did not consent, were excluded. The sample size of 300 was calculated using Select Statistics Software with the total population of SMC-JSMU to be as 1050 (350 students per batch). For sample size, following formula was applied:

$$n = N \times X / (X + N - 1),$$

where,  $X = Z_{\alpha/2} * p * (1-p) / MOE^2$ , and  $Z_{\alpha/2}$  is the critical value of the Normal distribution at  $\alpha/2$  (e.g. for a confidence level of 95%,  $\alpha$  is 0.05 and the critical value is 1.96), MOE is the margin of error,  $p$  is the sample proportion, and  $N$  is the population size. Prevalence from previous study was 50%<sup>14</sup>. Note that a Finite Population Correction has been applied to the sample size formula. Ethical approval was obtained from the Institutional Review Board of Jinnah Sindh Medical University.

Data were collected using a structured questionnaire which was inspired by a previously published research<sup>14</sup>. The questionnaire was validated by endocrinologist and statisticians. It was a self-

administered pro-forma which was sent to the participants via online portal using social media. The questions were written in very simple language, were easy to understand, and took only four to six minutes to answer. Total 19 questions were divided into four parts, including the following: I. The participant's knowledge regarding DM. II. The participant's knowledge regarding risk factors, complications, diagnosis, treatment and methods of prevention of diabetes mellitus.

SPSS version 22.0 was used for analyzing the data. Descriptive statistics were used to determine the mean, standard deviation, and diagnostic criteria of diabetes mellitus. Categorical variables were explained in frequency and percentages. Chi-square test of independence was applied to assess any statistical difference in the knowledge of clinical students regarding DM. A p-value of less than 0.05 was considered statistically significant.

## RESULTS

A total of 282 students participated in this study with 100 (35.4%) students belonging to third year, 87 (30.8%) to fourth year and 95 (33.6%) to final year respectively. The mean age of participants was  $21.5 \pm 1.87$  years and a range of 19-24 years.

Table 1 demonstrates the general knowledge, physiology, aetiology, and presentation of DM among clinical students. Accurate definition was known by 90 (95%) final year students, 82 (94%) and 85 (85%) fourth and third year students respectively ( $p < 0.005$ ). As many as 96 (96%) respondents from the third year, 86 (99%) from the fourth year, while 93 (98%) from final year batch claimed that insulin is produced by pancreas. Total 255 (90%) acknowledged that they know the mechanism of action of insulin. Regarding the clinical presentation of DM, majority of the students i.e. 262 (93%) of them reported that it manifests as hunger, thirst, and increased urination ( $p = 0.005$ ); 26 (26%) from the third year, 11 (13%) from the fourth year, and 17 (18%) from the final year recognized thirst, vision, and weight loss as presenting symptoms of diabetes ( $p = 0.065$ ).

Majority 258 (91%) of the students acknowledged class room teaching along with clinical rotations as the prime sources of knowledge regarding DM.

## DISCUSSION

Diabetes Mellitus is a metabolic disorder affecting majority of the population of Pakistan.<sup>15</sup> Medical students being the care providers of tomorrow must possess optimal knowledge regarding this disorder,

**Table 1: Knowledge of Medical Students Regarding Physiology, Pathology, Clinical Presentation, and Their Source of Education**

Variables	3rd year n=100 (%)	4th year n=87 (%)	5th year n=95(%)	Total n=282(%)	p-value
Which of the following define diabetes mellitus?					
a. Insufficient production of insulin	3 (3)	1 (1.1)	0	4 (1.5)	*0.025
b. Improper action of insulin	1 (1)	0	2 (2.1)	3 (1)	
c. High blood glucose level	11 (11)	4 (4.6)	3 (3.1)	18 (6.5)	
d. Hyperglycemia resulting from defects in insulin secretion, insulin action or both	85 (85)	82(94.3)	90(94.8)	257 (91)	
In which of the following organ insulin is produced?					
a. stomach	1 (1)	0	0	1 (0.4)	0.515
b. liver	3 (3)	1 (1.1)	2 (2.1)	6 (2.1)	
c. pancreas	96 (96)	86(98.9)	93(97.8)	275(97.5)	
Which parts of the body are the prime target for insulin action?					
a. Adipose tissue, muscle and liver	89 (89)	81 (93)	85 (90)	255(90.4)	0.627
b. Adipose tissue, muscle and brain	5 (5)	3 (3.5)	5 (5)	13 (4.6)	
c. Adipose tissue, liver and kidneys	6 (6)	3 (3.5)	5 (5)	14 (5.0)	
Which gender is most affected by diabetes mellitus?					
a. male	44 (44)	12 (14)	23 (24)	79 (28)	
b. female	14 (14)	31 (36)	21 (22)	66 (23)	
c. both	33 (33)	38 (44)	43 (45)	114 (40)	
d. don't know	9 (9)	6 (7)	8 (8)	23 (8.2)	
What are the most common symptoms of diabetes mellitus?					
a. Feeling very hungry, feeling very thirsty and frequent urination	87 (87)	86 (99)	89 (94)	262 (93)	*0.005
b. Feeling very thirsty, decreased vision and weight loss	26 (26)	11 (13)	17 (18)	54 (19)	0.065
c. Feeling very hungry, extreme fatigue and delayed wound healing	37 (37)	30 (34)	38 (40)	105 (37)	0.732
d. Weight loss, extreme fatigue and numbness	24 (24)	14 (16)	19 (20)	57 (20)	0.405
e. Usually asymptomatic	3 (3)	6 (7)	5 (5)	14 (5)	0.486
The chance of developing diabetes is more in which one of them?					
a. Educated	6 (6)	2 (2)	5 (5)	13 (5)	
b. Uneducated	21 (21)	29 (33)	22 (23)	72 (25)	
c. Both	73 (73)	56 (64)	68 (72)	197 (70)	
From where did you get to know about diabetes mellitus?					
a. Medical Education (class room teaching and clinical rotation)	88 (88)	79 (91)	91 (96)	258 (91)	
b. Research Articles	3 (3)	1 (1)	0 (0)	4 (1)	
c. CME Lectures	0 (0)	0 (0)	0 (0)	0 (0)	
d. Internet	2 (2)	3 (3)	3 (3)	8 (3)	
e. Others	7 (7)	4 (5)	1 (1)	12 (4)	
Do you have a family history of DM?	55 (55)	57 (66)	60 (63)	172 (61)	

\* p-value is significant at <0.05

especially with regards to clinical presentation and investigation, in order to accurately diagnose the disease. Furthermore, the future doctors can also play an important role in the prevention of this highly prevalent syndrome.

The overall knowledge which included the correct definition, presentation, risk factors, complications, treatment, and management of DM was found to be adequate in the third, fourth and final year medical students. A study carried out on the Albaha University medical students showed a similar trend among undergraduate students<sup>16</sup>.

In the current study, 98% of participants were aware that pancreas is the site of insulin production. Two studies conducted among final year students, one at a medical college in Northern Tamil Nadu and the other at Father Muller Medical College Hospital showed 90% and 98.75% respectively, had the correct response to the same question<sup>17,18</sup>. An outstanding percentage, i.e. 93% of medical students, were familiar with the presenting symptoms of the disease. This finding is supported by 91% accurate responses in one of the studies<sup>17</sup>. This shows similarity in the education standards among these universities.

**Table 2: Knowledge of Risk Factors, Complications, Diagnosis and Preventive Measures Among Medical Students**

Variables	3rd year n=100 (%)	4th year n=87 (%)	5th year n=95(%)	Total n=282(%)	p-value
What are the risk factors for developing diabetes mellitus in view of your knowledge?					
a. Family history	86 (86)	83 (95)	93 (98)	262 (93)	0.003
b. Physical Inactivity	37 (37)	61 (70)	55 (58)	153 (54)	0.000
c. Others	5 (5)	7 (8)	3 (3)	15 (5)	0.379
What are the possible complications that are likely to occur in diabetes mellitus?					
a. Cardiovascular diseases	54 (54)	50 (57)	55 (58)	159 (56)	0.847
b. Retinopathy	81 (81)	84 (97)	89 (94)	254 (90)	0.000
c. Neuropathy	71 (71)	71 (82)	82 (86)	224 (79)	0.024
d. Nephropathy	75 (75)	77 (89)	87 (92)	239 (85)	0.003
e. Stroke	30 (30)	36 (41)	41 (43)	107 (38)	0.128
Can Glycated Hemoglobin (HbA1c) be used as the prime marker to diagnose diabetes?	83 (83)	71 (82)	82 (86)	236 (84)	0.683
Which of the following is the correct value of HbA1c to diagnose diabetes?					
a. >6.5%	78 (78)	75 (86)	67 (71)	220 (78)	0.036
b. >5.0%	5 (5)	1 (1.1)	4 (4.2)	10 (3.5)	
c. >7.0%	13 (13)	8 (9.1)	20 (21)	41(14.5)	
d. >6.0%	4 (4)	3 (3.4)	4 (4.2)	11 (4)	
Are you aware of the diagnostic criteria for diabetes mellitus set by the WHO?					
a. Yes	62 (62)	75 (86)	61 (64)	198 (70)	0.003
b. No	19 (19)	5 (5.7)	15(15.7)	39 (24)	
c. Maybe	19 (19)	7 (8)	19 (20)	5 (16)	
If yes, then which of the following is the correct criterion?					
a. Random plasma glucose > 200mg/dl plus classic symptoms of hyperglycemia	58 (58)	64 (74)	60 (63)	182 (64)	0.056
b. Random plasma glucose > 150mg/dl plus classic symptoms of hyperglycemia	0	2 (2.4)	1 (1.0)	3 (1.0)	
c. Random plasma glucose > 180mg/dl plus classic symptoms of hyperglycemia	12 (12)	6 (7.3)	8 (8.4)	26 (9.2)	
d. Random plasma glucose > 120mg/dl plus classic symptoms of hyperglycemia	10 (10)	8 (9.7)	5 (5.2)	23 (8.1)	
e. None of these	1 (1)	2 (2.4)	6 (6.3)	9 (3.1)	
Which of the following is used as the initial test in the evaluation of gestational diabetes mellitus?					
a. Glucose challenge test	14 (14)	19 (22)	28 (29)	61 (22)	0.031
b. HbA1c	10 (10)	7 (8.0)	4 (4.2)	21 (7.5)	
c. Glucose tolerance test	36 (36)	29(33.3)	34(35.8)	99 (35)	
d. Fasting plasma glucose	21 (21)	15(17.2)	14(14.7)	50(17.7)	
e. Random blood glucose	19 (19)	17 (19.5)	15(15.7)	51 (18)	
What minimal workup would you advise for the diagnosis of diabetes mellitus?					
a. FBS, RBS, HbA1c and OGTT	44 (44)	54 (62)	67 (71)	165 (58)	0.001
b. FBS, RBS, HbA1c, urine test and OGTT	44 (44)	26 (29.8)	19 (20)	89 (31.5)	
c. CBC, ESR, FBS, RBS and HbA1c	4 (4)	2 (2.2)	3 (3.1)	9 (3.1)	
d. CBC, ESR, Serum UCE, FBS, RBS, HbA1c and OGTT	7 (7)	5 (5.7)	5 (5.2)	17 (6.0)	
e. None of the above	1 (1)	0	(1.0)	2 (0.7)	

Do you think that your medical education has prepared you adequate enough to diagnose diabetes and other glucose abnormalities?					
a. Yes	39 (39)	52 (60)	59 (62)	150 (53)	0.002
b. No	18 (18)	4 (4.5)	8 (8.4)	30 (10.6)	
c. Maybe	43 (43)	31 (35.6)	28 (29.4)	102 (36.1)	
Do you think every diabetic should be treated with drugs?					
a. Yes	25 (25)	22 (25)	28 (29)	75 (26)	0.172
b. No	60 (60)	49 (56.3)	61 (64)	170(60.3)	
c. Maybe	15 (15)	16 (18.3)	6 (6.3)	37 (13)	
What measures can be taken to prevent diabetes or delay its onset?					
a. Healthy diet	81 (81)	76 (87)	85 (89)	242 (86)	0.205
b. Regular exercise	84 (84)	84 (97)	89 (94)	257 (91)	0.005
c. Weight loss	56 (56)	70 (80)	87 (92)	213 (75)	0.000
d. Quit smoking	39 (39)	52 (60)	56 (59)	147 (52)	0.004
Do you think that your medical education has prepared you sufficiently to optimize treatment of diabetes?					
a. Yes	36 (36)	40 (46)	41 (43)	117 (41)	0.043
b. No	34 (34)	15 (17.2)	17 (17.8)	66 (23.4)	
c. Maybe	30 (30)	32 (36.7)	37 (39)	99 (35.1)	

\* p-value is significant at <0.05

Medical education including classroom lecture, tutorials and ward rotation was considered the prime source of knowledge by 91% participants of the present study. In comparison, a study conducted on the medical students of King Faisal University reported a surprisingly decreased number, 43.8%, of participants who considered medical education as the major source of information<sup>19</sup>. On the contrary, the majority, 75%, of participants of a study from the University of Ajman gave credit of their knowledge to friends, family, and relatives<sup>20</sup>. This difference can be attributed to the fact that this study was conducted on non-medical undergraduate students.

Major risk factor (family history) was correctly identified by most (93%) of the students in our study from all three years of education. Similarly, 94.4% medical students of Albaha University and 71% students of Ajman University selected family history as one of the major risk factors of diabetes mellitus<sup>16,20</sup>. The major complication recalled by a good number (85%) of our participants was renal diseases. However, a similar response by 100% participants of the Albaha University was reported<sup>16</sup>. This disagreement can be attributed to the difference in recalling capacity of participants at the time of filling the questionnaire.

Approximately 90%, 85%, 79%, and 56% of medical students from all batches had proper awareness about ophthalmic, renal, nervous and cardiovascular complications. However, in contrast a low frequency of knowledge 54%, 57%, 48%, and 40% was observed

in a study from Ajman University<sup>20</sup>. Tabuk University students also observed a decreased knowledge, 45%, of the participants in identifying the major risk factors<sup>21</sup>.

Both of the comparative studies were carried out on non-medical undergraduates. Even after extensive literature search, we could not find a comparative study on medical students addressing all risk factors similar to the current study.

Early detection of diabetic patients is not possible if the correct diagnostic criteria is not accurately known. In the current study, in comparison to 78% third year and 86% fourth year students respectively, only 76% of final year students were aware of the correct diagnostic value of HbA1c. Similar results were observed for WHO criteria for diagnosis of DM where fourth year students (74%) were found to be more knowledgeable compared to the final year (63%). A study conducted at Ziauddin Medical University Karachi recorded 55% of clinical students responding with the correct WHO criteria for HbA1c<sup>14</sup>. Our results are also strengthened by studies from Northern Tamil Nadu with 85.7% final year students and Al Balqa University with 42% fourth year students knowing the correct values for fasting blood sugar<sup>17,22</sup>. This variation in the recall knowledge among third, fourth and final year students may be because final year teaching schedules include less number of classroom lectures and more hospital rotation within various disciplines, where they may not frequently come across diabetic patients.

The initial diagnostic test for Gestational DM was known to only 29% of final year students in the current study. Another Father Muller Medical College study reported a slightly higher frequency 55% of final years admitting this knowledge<sup>18</sup>. A low number of medical students identifying the initial diagnostic test for Gestational DM can be explained by a decreased frequency of rotations of final year participants into the Obstetrics unit outpatient department of the teaching hospitals.

Majority of the students i.e. 84%, 97%, and 94% from third, fourth and final year respectively knew the preventive measures for DM (regular exercise). This is comparably higher than 64.1% medical students of Jordan who considered exercise to be a good preventive measure for DM<sup>22</sup>.

Moreover, in the current study, knowledge of DM diagnostics among final year students was comparatively lower than the 3<sup>rd</sup> or 4<sup>th</sup> year participants. This variable clinical knowledge of students, especially final years, may be attributed to gaps in medical education as well as non-revision of clinical literature. The other possible cause could be only one rotation in the diabetic clinic for one-month duration within the span of three clinical years.

To the best of our knowledge, this study is the first effort in a public sector medical university of Karachi to identify undergraduate medical students' knowledge regarding DM. As future house officers or residents, these students will be the earliest caregivers in OPD and emergency units of hospitals. Their adequate knowledge in accurately assessing and managing DM patients will greatly contribute to decrease morbidity and mortality as well as in preventing Diabetes Mellitus.

## CONCLUSION

We conclude that the overall knowledge of undergraduate medical students of Sindh Medical College regarding DM, site of insulin production, its risk factors, complications and prevention was found to be satisfactory. Most of the students considered Medical Education as an adequate source of their knowledge in this regard. However, capability of diagnosing DM was found to be comparatively low among final year M.B.B.S. students.

## Recommendations

The knowledge of final year students regarding DM can be improved by revision of the class room course and practical implication of this knowledge by rotating the students more frequently in a diabetic care clinic.

## Limitations

This was a uni-center analysis. Self-reported responses and questionnaire-based survey also are limitations of the current study.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Authors' Contribution:** VK planned the study, did literature review and made questionnaire of the study, SR did analysis, wrote the manuscript and submitted the study, NJ was the Research Supervisor of this study and proofread the manuscript of the study, NA conducted the whole survey of the study, entered the data in SPSS and helped in analysis of the study. KA and MA proofread the manuscript and made minor changes in it.

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# COVID-19 Inside Out: In-hospital Outcomes at a Public Sector Tertiary Care Hospital in Karachi

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## ABSTRACT

**Objective:** To present in-hospital COVID-19 mortality and the associated factors at a public sector tertiary care hospital in Karachi

**Methodology:** The current prospective, observational study was conducted at Jinnah Postgraduate Medical Center, Karachi, Pakistan from June 1 to August 30, 2021 with the approval of the hospital ethics committee. Data was collected prospectively from patients' medical record files. COVID-19 infection positive cases were diagnosed according to the guidelines of the WHO on laboratory investigation of real time polymerase chain reaction tests on a nasopharyngeal or oropharyngeal swab.

**Result:** Total 143 patients were enrolled in the study with median (IQR) age of 58 (48–69). The majority of the patients were males (n=96, 67.13%) and had moderate to severe disease (n=128, 89.51%). During their hospital stay, patients developed the following complications; pneumonia (n=99, 69.23%), ARDS (n=19, 13.28%), sepsis (n=11, 7.69%), septic shock (n=5, 3.49%) and pedal edema (n=2, 1.39%). As many as 104 (72.72%), 69 (48.25%), and 42(29.37%) patients required pharmacotherapy, non-invasive ventilation, and mechanical ventilation respectively. While 54 (37.76%) patients died during their hospital stay. On multivariable model, pneumonia, use of non-invasive ventilation, and mechanical ventilation, were identified as independent predictors of mortality.

**Conclusion:** Most of the patients in our study had moderate to severe disease. Therefore, the study indicates that timely presentation to the hospital is of great importance to avoid adverse events which are significantly associated with mortality.

**Keywords:** COVID-19 infection, in-hospital outcomes, mortality, SARS-CoV-2, Karachi, Pakistan

**How to cite:** Akhter S, Saifullah N, Hassan B, Jafri S, Ahmed N. Covid-19 inside out: in-hospital outcomes at a public sector tertiary care hospital in Karachi .Jinnah Sindh Med Uni. 2022;8(2):54-58

DOI 10.46663/ajsmu.v8i2.54-58

## INTRODUCTION

In December 2019, the world came across a new challenge for which it was unprepared. China officially declared that a respiratory illness caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2), had begun in the city of Wuhan with an estimated average incubation period of 5.1 days<sup>1,2</sup>. The virus was spreading so dramatically that within a span of a few weeks, it had spread across the world and affected more than 210 countries with a mortality rate of 2.85% when it was declared a global pandemic by the World health Organization (WHO) on March 11, 2020<sup>4,3</sup>.

After the 1918 Influenza pandemic, COVID-19 brought the biggest crises for public health<sup>5</sup>. Although the clinical spectrum of the disease is quite broad, the commonest presentation is flu-like illness. New emerging variants such as alpha, beta, and delta were associated with new waves of COVID-19 across the world<sup>6</sup>. In spring 2020, the first COVID-19 wave occurred which was at its peak in the summer season in Pakistan. Then the second wave emerged in fall 2020 and its intensity was decreased in early 2021<sup>7</sup>. A third wave started with the emergence of a new variant B.1.1.7 from the United Kingdom, detected in Pakistan on 27<sup>th</sup> January, 2021, leading to 100 deaths per day across the country<sup>8</sup>.

Pakistan being a middle-income country with an estimated population of 197 million and having a weaker healthcare system, has been at risk of higher transmission of COVID-19<sup>9</sup>. Moreover, the failure to achieve distancing because of social and economic

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barriers has been encouraging further waves of infection. Therefore, it is of immense importance to examine possible factors at all levels that could worsen the patient outcome, so that it can be managed at the earliest in order to sustain the smooth functioning of healthcare systems in our local settings. We aim to present in-hospital Covid-19 mortality and the associated factors at a public sector tertiary care hospital.

## METHODOLOGY

The current prospective, observational study took place at Jinnah Postgraduate Medical Center, Karachi, Pakistan. The study was conducted from June 1 to August 30, 2021. The Institutional Review Board of JPMC approved this study by certifying it with IRB certificate No. F.2-81/2020-GENL/42869/JPMC. Each COVID-19 positive case was diagnosed according to the guidelines of WHO on laboratory investigation of real time polymerase chain reaction test on a nasopharyngeal or oropharyngeal swab. Records of all admitted patients were reviewed.

Patients' age, gender, comorbidities, presenting symptoms, diseases severity as assessed by Wang criteria, laboratory investigations including haemoglobin, total leukocytes count (TLC), lymphocytes, neutrophils, total bilirubin, urea, creatinine, sodium, potassium, c-reactive protein (CRP), prothrombin time (PT), international normalized ratio (INR), ferritin, d-dimer, procalcitonin levels, other events during hospitalization such as development of pneumonia, sepsis ARDS, septic shock, requirement of non-invasive ventilation (NIV), and mechanical ventilation (MV) were recorded.

The collected data was entered into SPSS version 21 for statistical analysis. Categorical variables were summarized as frequency and percentage. Numerical variables were presented as median with inter-quartile range (IQR) after assessing the assumption of normality with Shapiro-Wilk test. Chi-square or Fisher-Exact test was applied to compare categorical variables among survivors and non-survivors whereas Mann-Whitney U-test was applied to compare numerical variables. Univariable odds ratio with 95% confidence interval were computed using binary logistic regression to assess significant factors associated with mortality. Variables with  $p$ -value  $< 0.25$  on univariate model were taken as candidates to build the final regression model. A  $p$ -value of 0.05 was taken as statistically significant and  $< 0.01$  is highly significant on final regression model.

## RESULTS

Total 143 patients were made part of the study with median (IQR) age of 58 (48–69). Most of the patients

were males ( $n=96$ , 67.13%), non-smokers ( $n=123$ , 86.01%) and had moderate to severe disease ( $n=128$ , 89.51%). The most frequently observed comorbidity was hypertension ( $n=70$ , 48.95%), followed by diabetes ( $n=59$ , 41.25%), ischemic heart disease ( $n=20$ , 13.98%), chronic obstructive pulmonary disease ( $n=8$ , 5.59%), chronic kidney disease ( $n=5$ , 3.49%), chronic liver disease ( $n=3$ , 2.09%), and malignancy ( $n=1$ , 0.69%). Presenting features included fever ( $n=124$ , 86.71%), dyspnea ( $n=99$ , 69.23%), cough ( $n=92$ , 64.34%), fatigue ( $n=36$ , 25.17%), myalgia ( $n=35$ , 24.47%), diarrhoea ( $n=22$ , 15.38%), headache ( $n=11$ , 7.69%), sore throat ( $n=10$ , 6.99%), chest pain ( $n=5$ , 3.49%), haemoptysis ( $n=4$ , 2.79%) and rhinorrhoea ( $n=3$ , 2.09%). During their hospital stay, patients developed the following complications: pneumonia ( $n=99$ , 69.23%), ARDS ( $n=19$ , 13.28%), sepsis ( $n=11$ , 7.69%), septic shock ( $n=5$ , 3.49%), and pedal edema ( $n=2$ , 1.39%). As many as 104 (72.72%), 69 (48.25%), and 42 (29.37%) patients require pharmacotherapy, non-invasive ventilation, and mechanical ventilation respectively. While 54 (37.76%) patients died during their hospital stay, 89 (62.24%) were survivors and were discharged alive.

Table 1 presents the comparison of patients' characteristics among COVID-19 survivors and non-survivors. Survivors were significantly younger than non-survivors ( $p < 0.001$ ). Frequency of diabetes ( $p = 0.007$ ) and hypertension ( $p = 0.009$ ), moderate to severe illness ( $p = 0.001$ ), pharmacotherapy ( $p < 0.001$ ), sepsis ( $p < 0.001$ ), septic shock ( $p < 0.01$ ), ARDS ( $p < 0.01$ ), use of NIV ( $p < 0.001$ ), and the use of MV ( $p < 0.001$ ) were significantly higher in non-survivors than in survivors.

Table 2 shows the comparison of patients' presenting vitals and laboratory investigations among alive and dead patients. Respiratory rate ( $p = 0.001$ ), TLC ( $p = 0.005$ ), lymphocytes count ( $p = 0.003$ ), neutrophils count ( $p < 0.001$ ), urea ( $p < 0.001$ ), creatinine ( $p = 0.002$ ), INR ( $p = 0.021$ ), ferritin levels ( $p = 0.008$ ), d dimer ( $p = 0.006$ ) and procalcitonin levels ( $p = 0.003$ ) were significantly different among alive discharged and non-survivors.

Table 3 presents univariable and multivariable association of variables with mortality. On univariable model, advanced age (OR=1.06, 95% CI: 1.03 - 1.09), presence of diabetes (OR=2.57, 95% CI: 1.29 - 5.19) and hypertension (OR=2.50, 95% CI: 1.25 - 5.01), increasing TLC (OR=1.09, 95% CI: 1.03 - 1.16), neutrophils (OR=1.07, 95% CI: 1.02 - 1.12), ferritin levels (OR=1.01, 95% CI: 1 - 1.01), use of NIV (OR=241.81, 95% CI: 31.09 - 1880-28) and MV (OR=124.86, 95% CI: 26.96 - 572.92) were associated with increased risk of mortality. On multivariable model, when effects were adjusted for other covariates,

**Table 1:** Comparison of Patients' Characteristics Among COVID-19 Survivors and Non-survivors

Variables	Alive n (%)	Dead n (%)	p-value
<b>Socio-demographics</b>			
Age <sup>#</sup>	54 (45 - 61)	65 (54.5 - 73)	**<0.001
Male gender	63 (65.6)	33 (34.4)	0.232
Smoking	10 (50)	10 (50)	0.224
<b>Comorbidity</b>			
Diabetes	29 (49.2)	30 (50.8)	**0.007
Hypertension	36 (51.4)	34 (48.6)	**0.009
IHD	10 (50)	10 (50)	0.224
CKD	2 (40)	3 (60)	†0.366
Malignancy	0 (0)	1 (100)	†0.378
COPD	4 (50)	4 (50)	†0.476
CLD	2 (66.7)	1 (33.3)	†1.000
<b>Presenting features</b>			
Fever	77 (62.1)	47 (37.9)	0.929
Myalgia	23 (65.7)	12 (34.3)	0.625
Fatigue	24 (66.7)	12 (33.3)	0.526
Cough	60 (65.2)	32 (34.8)	0.324
Haemoptysis	4 (100)	0 (0)	†0.297
Headache	6 (54.5)	5 (45.5)	†0.748
Dyspnea	59 (59.6)	40 (40.4)	0.328
Chest Pain	3 (60)	2 (40)	†1.000
Mild illness	15 (100)	0 (0)	**0.001
<b>In-hospital events</b>			
Pharmatherapy	50 (48.1)	54(51.9)	**<0.001
Pneumonia	66 (66.7)	33(33.3)	0.135
Sepsis	0 (0)	11(100)	†**<0.001
Septic shock	0 (0)	5(100)	†**<0.007
ARDS	0 (0)	19(100)	†**<0.001
Use of NIV	16 (23.2)	53(76.8)	**<0.001
Use of MV	2 (4.8)	40(95.2)	**<0.001

CKD: chronic kidney disease, CLD: chronic liver disease, COPD: chronic obstructive pulmonary disease IHD: ischemic heart disease NIV: non-invasive ventilation, MV: mechanical ventilation, #: Age is expressed as median (inter-quartile range), †Fisher-Exact test was reported, \*\*Significant at p<0.01

use of NIV (aOR=1276.53, 95% CI: 15.63-104227.54) and (94.25, 95 CI: 6.44-1378.66) were associated with odds of mortality.

## DISCUSSION

We aimed to ascertain the in-hospital COVID-19 patients' mortality and its associated factors. We observed that around 40% of the patients were non-survivors. A similar mortality rate (39%) was reported in another Pakistani study<sup>10</sup>. In-hospital death rates of 47%, 40.8% and 48.6% were reported from other parts of the world<sup>11-13</sup>. However, a meta-analysis showed a lower in-hospital mortality rate of 24.3%<sup>14</sup>. In our

**Table 2:** Comparison of Vitals and Laboratory Investigations Among Alive and Dead Patients

Variables	Alive Median (IQR)	Death Median (IQR)	p-value
Systolic blood pressure	130 (120-140)	130 (109-140)	0.366
Diastolic blood pressure	80 (74-90)	80 (66.8-90)	0.090
Respiratory rate	22 (20-25)	28 (21.8-32)	**0.001
Pulse rate	96 (89-104)	98.5 (78.8-110)	0.633
Haemoglobin	12.2 (11.15-13.6)	12.3 (10.3-13.8)	0.525
platelets	209 (153-310)	214.5 (127.5-288)	0.376
TLC	10 (7.3-14.1)	13.2 (8.7-22.1)	**0.005
Lymphocytes	15 (9.3-19)	10 (5.5-17)	**0.003
Neutrophils	79 (73.9-85.5)	87.5 (80-91.3)	**<0.001
Total bilirubin	0.52 (0.41-0.7)	0.5 (0.4-0.8)	0.332
Urea	42 (26.5-51.5)	58.5 (37-103.8)	**<0.001
Creatinine	0.89 (0.74-1)	1 (0.8-2.2)	**0.002
Sodium	136 (133-138)	137 (134-140)	0.079
Potassium	3.9 (3.6-4.3)	3.8 (3.5-4)	0.144
CRP	61 (14.8-119)	94.5 (26.8-175)	0.050
PT	10.7 (10.3-12)	10.7 (10.3-11.9)	0.925
INR	0.93 (0.9-1.01)	0.955 (0.9-1)	*0.021
Ferritin	577 (331.5-1135)	792 (577-1365.75)	**0.008
D dimer	0.3 (0.3-0.7)	0.6 (0.3-2.8)	**0.006
Procalcitonin	0.19 (0.12-0.36)	0.7 (0.2-0.7)	**0.003

CRP: C-reactive protein, TLC: total leukocytes count, PT: Prothrombin time, INR: international normalized ratio, \*Significant at p<0.05, \*\*Significant at p<0.01

study, most of the admitted patients were male and majority was admitted in hospital in a moderate to severe condition. In contrast to our findings, another Pakistani study reported a higher proportion of mild disease cases than moderate to severe. However, that study was conducted in one of the biggest free of cost hospitals in Karachi which is easily accessible to patients. Otherwise in our society, usually health seeking behaviour of people is casual with the assumption that they were safe from COVID-19 which was also reported in a survey conducted in Karachi<sup>15</sup>.

Predominance of males among infected patients has also been documented in other studies<sup>16,17</sup>. The most plausible explanation for this is simple that males spend more time outdoors than females in our society hence are more exposed and vulnerable to infections. However, mortality rate among males and females was not significant in the current investigation which is in line with the findings of many other studies<sup>10,16,17</sup>. However, there are some studies that report higher mortality risk in males than females<sup>11,18</sup>. The difference in males and females mortality rates could be due to higher smoking rate among males which has overall influence on the immune system response.

**Table 3:** Univariable and Multivariable Predictors of Mortality

Variables	OR (95% CI)	p-value	aOR (95% CI)	p-value
Age (in years)	1.06 (1.03 - 1.09)	**<0.001	1.04 (0.96-1.13)	0.306
Male gender	0.65 (0.32 - 1.32)	0.234	-	-
Smoking	1.79 (0.69 - 4.64)	0.228	-	-
Diabetes	2.57 (1.29 - 5.19)	**0.007	0.17 (0.01-2.06)	0.162
Hypertension	2.50 (1.25 - 5.01)	*0.010	6.83 (0.62-75.14)	0.116
IHD	1.79 (0.69 - 4.64)	0.228	-	-
Systolic blood pressure	0.99 (0.98 - 1.01)	0.241	1.01 (0.95-1.07)	0.684
Diastolic blood pressure	0.984 (0.96 - 1.01)	0.167	0.91 (0.82-1.02)	0.103
Respiratory rate	0.996 (0.98 - 1.01)	0.600	-	-
Platelets	0.99 (0.99 - 1)	0.135	1 (0.99-1.01)	0.847
TLC	1.09 (1.03 - 1.16)	**0.003	1.03 (0.91-1.16)	0.677
Neutrophils	1.07 (1.02 - 1.12)	**0.003	1 (0.97-1.03)	0.980
Urea	1.01 (1 - 1.02)	**0.004	1.01 (0.99-1.04)	0.345
Creatinine	1.01 (0.99 - 1.03)	0.242	1.01 (0.91-1.12)	0.880
CRP	1 (1 - 1.01)	0.053	1 (0.99-1.01)	0.896
Ferritin	1.01 (1 - 1.01)	*0.032	1 (1-1)	0.769
Use of NIV	241.81 (31.09 - 1880-28)	**<0.001	1276.53 (15.63-104227.54)	**0.001
Use of MV	124.86 (26.96 - 572.92)	**<0.001	94.25 (6.44-1378.66)	**0.001
Pneumonia	0.55 (0.27 - 1.13)	0.103	0.02 (0-0.33)	**0.007

\*Significant at p<0.05, \*\*Significant at p<0.01

In our study, increasing age was observed to be linked with increased mortality risk. Increasing age is a consistent factors that has been reported globally as predictor of death for COVID-19 infection<sup>10,16</sup>. In our study, hypertension was the most frequent comorbidity and was also linked with higher death risk in univariate analysis. Hypertension was also seen as COVID-19 mortality predictor in other studies<sup>19</sup>. Moreover, hypertension is a well-known factor for increased risk of all-cause mortality regardless of age and gender<sup>20</sup>. In present study, diabetic patients were more likely to be non-survivors but there was no association when sample was adjusted for other covariates which could be due to low sample size. However, various studies report that diabetes could worsen the patients' outcome and prolong the recovery time and even cause mortality<sup>21-23</sup>.

We found that neutrophils' counts, urea, creatinine, ferritin levels, CRP levels, d-dimer, and procalcitonin were significantly higher among non-survivors. Wu et al, in their study, also reported higher neutrophils, d-dimer, ferritin levels, and CRP levels among non survivors<sup>24</sup>. Almazeedi et al and Giacomelli et al also reported higher levels of CRP and d-dimer in their studies<sup>16,25</sup>. It is also noticeable that non-survivors in our study developed acute ARDS, sepsis, septic shock which is in line with other studies<sup>11,16</sup>. Interestingly, pneumonia was associated with less risk of mortality in our study which may be taken as patients who were developing pneumonia were surviving, as compared

to patients who were developing any other complications.

The current study presented an experience of public sector tertiary care hospital in Karachi. In our study, antibiotics' impact on mortality was not studied which could further guide the clinicians in management of COVID-19 cases. Secondly, being a single center study, the sample size was not sufficiently large. It might be possible to obtain more possible associated factors with larger sample size. Therefore, a study with larger sample size may be conducted as pandemic is not over yet, to further strengthen the findings.

## CONCLUSION

Most of the patients in our study had moderate to severe disease. Thus the study indicates that timely presentation to the hospital is of great importance to avoid adverse events which are significantly associated with mortality.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Authors' Contribution:** SA proposed study concept and critically revised initial draft, NS prepared study protocol and helped in data collection, BH and NA wrote initial manuscript draft and collected data, SJ performed data entry and data analysis. All authors have proofread and approved the manuscript.

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# Effects of Dynamization on Delayed Union of Tibial Shaft Fractures After Reamed Intramedullary Interlocked Nailing

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## ABSTRACT

**Objective:** To determine the efficacy of dynamization in delayed union of tibia diaphyseal fractures  
**Methodology:** A descriptive cross sectional study was done at the Department of Orthopaedic Surgery, Jinnah Postgraduate Medical Center, Karachi, Pakistan, from July 2020 to April 2021. A total of 97 consenting patients who suffered from delayed union following intramedullary interlocking nailing were included in the study. Dynamization involved removal of proximal or distal locking screws in statically locked intramedullary nail. Patients were followed up for six months to check for delayed bone union. All the collected data were entered into a pro forma and used electronically for research purpose.

**Results:** Over all union was achieved in 72 (74.2%) cases after dynamization. The mean age of our study population was 39.42±13.79 years. Advanced age, smoking, fresh or old fracture, the time of initial intramedullary nailing, and diabetes were associated with decreased efficacy of dynamization, with p-value <0.001, 0.033, 0.007, and <0.001 respectively. While no significant association was found between gender, BMI, hypertension, and union (p-value >0.05).

**Conclusion:** The findings of this study support the idea that dynamization can be an effective method to promote healing in tibia diaphyseal fractures for delayed union. More randomized comparative clinical trials are necessary to evaluate the effectiveness of dynamization.

**Key Words:** Delayed Union, Dynamization, Efficacy, Tibia Diaphyseal Fractures

**How to cite:** Ali P, Mohammad D, Sajjad M, Hussain M, Jatoi F, Matlo E, Khoso RE. Effects of dynamization on delayed union of tibial shaft fractures after reamed intramedullary interlocked nailing. Ann Jinnah Sindh Med Uni. 2022;8(2):59-63

DOI 10.46663/ajsmu.v8i2.59-63

## INTRODUCTION

Tibial shaft fractures are one of the commonest fractures that an orthopedic surgeon sees in his day to day practice. There are several ways to deal with it. Since the introduction of reamed intramedullary nails, they have become the mainstay of treatment for such fractures, because of quick healing, and reduced complications.<sup>1-3</sup> However, complications like delayed union and nonunion have also been reported following insertion of reamed intramedullary nails<sup>4</sup>. Because of these complications, patient may suffer from residual pain, impaired daily functionality and about 12-60% cases may finally need reoperation for correction of delayed union or non union<sup>4</sup>.

The definitions of delayed union and non union are related to the time bone healing takes following the fracture. If there is sluggish or no callus formation and signs of bone healing are absent even after 3 to 6 months of fracture, then it is called delayed healing<sup>5</sup>. The main reasons for delayed union are reduced blood supply, instability, and infections<sup>6</sup>. This delayed union may require exchange nailing, compression plating with bone grafting, distraction osteogenesis and vascularized fibular transfers to promote union in such fractures<sup>7</sup>.

Two of the most common secondary surgical techniques for treatment of delayed union are dynamization and exchange nailing. Exchange nailing consists of the removal of the existing IM nail, debridement of the medullary cavity, followed by insertion of new larger IM nail. This procedure helps to stimulate bone growth and healing<sup>8</sup>. On the other hand, dynamization involves conversion of a static nail into a dynamic nail. The surgeon removes proximal or distal locking screws in a statically locked IM nail allowing weight bearing in order to promote osseous growth at the site of fracture<sup>9</sup>.

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Currently, no research data is available in the region to assess the effects of dynamization on delayed union of tibia fracture. Our study aimed to generate local data on effects of dynamization on healing in tibia fractures and various factors associated with the success of the procedure in our Pakistani population. Our study generated data on benefits of dynamization on healing of delayed union of tibia fractures, keeping in view its simplicity, cost effectiveness, decreased morbidity, and excellent healing rates.

## METHODOLOGY

This cross sectional study was done at the Department of Orthopaedics, JPMC, from July 2020 to April 2021. The Institutional Review Board of JPMC approved this study by certifying it with IRB certificate No. F.2-81/2021-GENL/64328/JPMC. And patients were followed up for nine months for assessing the efficacy of dynamization procedure. The study procedure and purpose was explained and informed consent was taken from each participant.

Our study included 97 patients. Sample size was calculated on the WHO sample size calculator with the following assumptions: efficacy of dynamization =50%<sup>5</sup>, confidence interval=95%, margin of error=10% (because the patient sample size was small). Patients were selected using non-probability, consecutive sampling technique.

Patients of both genders, with ages between 20-60 years who presented with tibial fracture that did not heal within six months after reamed intramedullary interlocked nail, along with persistent pain, tenderness, and inability to bear full weight were included in the study. Patients with associated tibial plateau fracture, vitamin D Deficiency, arthritis, and unwillingness to participate were excluded from the study.

Pre-operative assessment in the form of routine blood, urine, and radiological investigations was performed; additional investigation as per patient's requirements was done. Data on age, sex, height (measured through stadiometer), weight (measured through electronic weight machine), BMI [BMI=weight in kilograms/height in meter<sup>2</sup>], mechanism of trauma, American Society of Anesthesiology (ASA) status for surgery, smoking (more than five cigarettes/day for two years), age of fracture at the time of reamed intramedullary interlocked nailing (fresh <3 weeks or old >3 weeks), diabetes, and hypertension were recorded. Dynamization was done in patients with tibial shaft fractures with transverse or short oblique type. Nail dynamization was done by the removal of interlocking screws either proximal or distal to the fracture site to

permit bony compression at the fracture site. The decision for removal of screw depends upon the distance away from the fracture site, that is, screw will be removed from site farther away from the fracture site. Post dynamization, all patients in our study were managed with physical methods such as early mobilization, manual compression of the calf, and elastic stockings. Patient was followed up for six months. If bone was completely healed (appearance of callus on three cortices on X-ray) within six months of dynamization, then the procedure was considered to have good efficacy. Data was entered and analyzed using SPSS version 21.0. Mean±SD was computed for all the quantitative variables such as age, height, weight, and BMI. Frequency and percentage were computed for all the qualitative variables such as gender, smoking, diabetes, hypertension, fresh or old fracture, and efficacy. Effect modifiers such as age, gender, BMI, smoking, fresh/old fractures, diabetes, and hypertension were controlled through stratification. Post stratification, Chi square test was applied. P-value<0.05 was considered significant.

## RESULTS

In this study, 97 patients were assessed for the efficacy of dynamization in delayed union of tibia diaphyseal fracture. The mean±SD of age, height, weight, and BMI is shown in Table 1. Sixty-four (65.9%) patients were male while the rest were females. Forty-eight (49.5%) were smokers, diabetes mellitus was documented in 20 (20.6%), hypertension was noted in 39 (40.2%) patients, 41 (42.2%) patients had fractures for about less than three weeks, while 56 (57.7%) had more than three weeks old fractures. Mechanism of trauma showed that 70 (72.2%) had trauma by RTA while 27 (27.8%) fell from heights. In classification of ASA status, 45 (46.4%) patients had ASA-1 while 52 (53.6%) patients were with ASA-2 status. Overall union (good efficacy of dynamization) was achieved in 72 (74.2%) cases after dynamization. Mean time for union after dynamization was 21.4±2.5 weeks. Upon further analysis, it was found that advanced age, smoking, freshness or oldness of the fracture, the time of initial intramedullary nailing, and diabetes in the patient were associated with decreased efficacy of dynamization, with p-value <0.001, 0.033, 0.007, and <0.001 respectively as shown in Table 1.

**Table-1: Descriptive statistics of study population**

Variable	Mean+SD	95% CI	Range
Age (years)	39.42+13.79	36.64-42.20	20-70
Height (cm)	163.1+12.3	160.62-165.57	138-186
Weight (kg)	63.4+10.4	61.30- 65.49	45-105
BMI (kg/m <sup>2</sup> )	26.8+6.3	25.53- 28.06	16-34

On the other hand, no significant association was found between gender, BMI, hypertension, and union after dynamization (p-value >0.05) (Table 2).

**Table 2: Association of age, gender, BMI, smoking, freshness/oldness of the fracture, diabetes, and hypertension with efficacy of dynamization of delayed union of tibial shaft fractures after reamed intramedullary interlocked nailing**

Variables	Efficacy of Dynamization		p-Value
	No	Yes	
<b>Age</b>			<0.001
20-40	2 (3.2%)	60 (96.8%)	
>40	23 (65.7%)	12 (34.3%)	
<b>Gender</b>			0.760
Male	34 (51.5%)	32 (48.5%)	
Female	17 (54.8%)	14 (45.2%)	
<b>BMI</b>			0.070
16-24	15 (34.1%)	29 (65.9%)	
>24	10 (18.9%)	43 (81.15%)	
<b>Smoking status</b>			0.033*
Smoker	20 (41.6%)	28 (58.4%)	
Non-smoker	31 (63.2%)	18 (36.7%)	
<b>Fresh/old fracture</b>			0.007*
<3 weeks	5 (12.2%)	36 (87.8%)	
>3 weeks	20 (35.7%)	36 (64.3%)	
<b>Diabetes</b>			<0.001*
Yes	16 (80.0%)	4 (20.0%)	
No	9 (11.7%)	68 (88.3%)	
<b>Hypertension</b>			0.204
Yes	23 (59.0%)	16 (41.0%)	
No	28 (48.3%)	30 (51.7%)	

\* p-value is significant at <0.05

## DISCUSSION

Dynamization is one of the treatment modalities for delayed union and nonunion of the femur or tibia. Although the tibia and femur differ significantly in their healing processes, dynamization is a first line treatment for delayed union or nonunion of both, and dynamization causes increased compression at the fracture site without interrupting the biology of a healing fracture. Dynamization involves removing the proximal or distal interlocking screws. This process has a number of benefits like increased contact area at the fracture site, better osteogenesis, and enhanced transmission of forces around weight-bearing areas. All this result in faster and better fracture healing<sup>10-14</sup>.

The mean age of our study population was 39.42±13.79 years. Another study done by Somani had almost similar age<sup>15</sup>. In the current study, the mean height was 163.1±12.3 cm and the mean BMI was 26.8±6.3 kg/m<sup>2</sup>. Vicenti<sup>16</sup> reported roughly the same BMI as 23.6±2.78

kg/m<sup>2</sup>. More patients were male (n=66, 68.04%) in our sample population, which could be due to the fact that generally more men are involved in outdoor activities making them vulnerable to fractures and thus repair surgeries. Other researchers have also reported a higher proportion of male patients in their studies<sup>15,16</sup>.

Tibial shaft injuries were found to occur more commonly as a result of road traffic accidents (n=70, 70.2%). This observation can be explained by the fact that the majority of the patients in this study are from the younger age group who would require a high energy fall to have tibial fracture, as compared to older people who can have tibial fractures even from low energy falls. Our study statistics are in concordance with other researchers who also found that younger populations were more likely to have tibial fractures after road traffic accidents and older people suffer tibial fractures mostly from falls<sup>15,18</sup>.

The efficacy of dynamization following delayed union of tibial fracture was found to be 74.2%, which is comparable to studies done by Perumal<sup>17</sup>. In order to check the effect of age on the success of dynamization, we divided our patients in two groups: 20-40 years and >40 years. We found that better results were achieved when this procedure is done on younger patients (p-value=<0.001). However, another study has stated otherwise<sup>17</sup>. Confounders like gender, BMI, and hypertension had insignificant effect on efficacy of dynamization with p-values 0.760, 0.070, and 0.204 respectively. Similar findings have been reported by Litrenta<sup>19</sup>.

To further gain an understanding of factors changing the outcome of dynamization procedure, we analyzed the diabetic and non-diabetic patients and found that diabetes mellitus adversely affects the rate of union after dynamization (p-value <0.001). Diabetic patients have been proven to have prolonged healing times of fractures and also poorer outcomes following revision surgeries<sup>20-22</sup>. Poor healing was observed in patients who smoked (p-value 0.033). Smoking has been reported to have deleterious effects on tibial fracture healing<sup>23</sup>. However, another study has reported otherwise<sup>17</sup>.

We acknowledge that our study has some limitations. Firstly, this was a single center study with limited number of patients. Secondly, no control group was created among patients. Limb shortening is considered as one of the main disadvantages of dynamization<sup>24,25</sup>, but our study failed to comment on this aspect of the procedure.

## CONCLUSION

The findings of this study support the idea that dynamization can be an effective method to promote healing in tibia diaphyseal fractures for delayed union. More randomized comparative clinical trials are necessary to evaluate the effectiveness of dynamization. Additional studies are required to confirm our findings probably with a larger sample size and with more parameters in multiple study centers in Pakistan to validate the findings of the present study.

**Acknowledgements:** We are really grateful to Dr. Shazia and Dr. Nayab who helped in literature search and writing.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Authors' Contribution:** PA was the principal investigator, wrote the paper and compiled data, DM worked on data interpretation, MS, MH, FJ, EM and REK collected data. All authors have proofread and approved the manuscript.

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# Contraceptive Usage and Social Barriers During The Covid-19 Pandemic—a Prospective Cross-sectional Study

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## ABSTRACT

**Objective:** To determine the frequency of contraceptive usage, the social barriers affecting their use, and the frequency of unplanned pregnancies during the COVID-19 pandemic

**Methodology:** This is a prospective cross-sectional study carried out at the Department of Obstetrics and Gynaecology, Fazaia Ruth Pfau Medical College & PAF Hospitals from July 2020 to September 2020. All women of reproductive age attending the outpatient department were consecutively included. A pre-structured questionnaire was used for the purpose of collection of data. We obtained information regarding the use of contraception before and during the COVID-19 pandemic and the contraception methods used by these women. Furthermore, reasons for discontinuing contraception amongst those women who were using it earlier. The occurrence of pregnancy during pandemic was also noted.

**Results:** Of the 350 women, 306 (87.4%) women practiced contraception before and 288 (82.3%) practiced it during the lockdown. Of 306 women practicing contraception before the lockdown, 265 (86.6%) continued practicing during the lockdown as well. Condom 145 (50.3%) and withdrawal method 116 (40.3%) were the most used methods amongst the 288 women practicing contraception during the lockdown. The noticeable increase in the number of those using withdrawal method was due to the lack of consultation following the fear of getting COVID (17 women, 41.5%) and no access to the clinic (14 women, 34.1%). These were the most common reasons for not using contraception, amongst the 41 women practicing contraception before the pandemic. Pregnancies were reported by 93 (26.6%) women out of whom 75 (80.6%) reported these to have been unplanned.

**Conclusion:** The COVID pandemic has largely affected the utilization of contraceptives among women who were already practicing different contraceptive methods. Moreover, unplanned pregnancies are increasingly reported by women.

**Keywords:** Contraception, covid-19 pandemic, unplanned pregnancies

**How to cite:** Mustafa R, Munaver SA, Tufail A. Contraceptive usage and social barriers during the covid-19 pandemic—a prospective cross-sectional study. *Ann Jinnah Sindh Med Uni.* 2022;8(2):64-68

DOI 10.46663/ajsmu.v8i2.64-68

## INTRODUCTION

Contraception use and its easy access remains a problem in low and middle income countries<sup>1,2</sup>. Published studies report that despite lots of efforts, half of teen pregnancies in underdeveloped countries are unintended, contributing to four million unsafe teen abortions each year<sup>3</sup>. Furthermore, according to an estimate, Pakistan's population will swell up to 245

million by 2030, making it the fourth most populous nation in the world<sup>4</sup>. According to a recent study from the Pakistan Demographic and Health Survey (PDHS), only 34% of married women are using a contraceptive method<sup>5</sup>. These estimates were reported before the occurrence of the coronavirus (COVID-19) pandemic, which has paralyzed human life for more than a year now.

There is no doubt that lockdown and movement control orders in response to COVID-19 in various countries, particularly in lower- and middle-income countries, have brought major disruptions, not only in the supply of contraceptives but in their utilization as well<sup>6,7</sup>. Delays in the production and delivery of contraceptives at global and national levels has led to shortages of supplies, affecting their utilization. In addition to this,

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not accessing healthcare providers, fear of going outdoors during the outbreak, and movement control orders are some other possible reasons that have affected the utilization of contraceptives during the pandemic<sup>7,8</sup>. Understanding the factors lowering the utilization of contraceptives during the pandemic is of utmost importance for the government and healthcare providers to effectively deal with a similar situation in the future. Since the world has never seen a situation like this in many decades, published literature on this topic is scarce. This study is therefore planned to find out the frequency of contraceptive usage, the social barriers affecting their utilization, and the higher rate of unplanned pregnancies reported during COVID-19 pandemic.

## METHODOLOGY

This prospective cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Fazaia Ruth Pfau Medical College & PAF Hospitals from July to September, 2020. Ethical approval was obtained from Fazaia Ruth Pfau Medical College Karachi, with Reference No. IRB/04. The institute prior to the conducting of the study. Moreover, signed Informed Consent was also obtained from the eligible study participants before enrolment.

All married women, either non- pregnant or pregnant up to 20 weeks of gestation, who presented in the outpatient department, were included in the study after giving informed consent. However, women of more than 45 years of age and known cases of infertility were excluded from the study to mitigate the confounding variables. The questionnaire was filled by health care personnel after interviewing the patient during the study period.

Epi Info sample size calculator was used for the estimation of sample size, taking confidence interval 97%, margin of error 5.4%, and reported frequency of disruption in contraception use during pandemic in a previous study at 68.3%<sup>6</sup>. The estimated sample size came out to be 350.

A pre-structured questionnaire was used for the purpose of collection of data. The questionnaire was divided into four sections. The first section asked for the demographic characteristics of the participants. The second section included questions regarding the use of contraceptives before and during COVID-19 pandemic and the methods used for contraception among those who were practicing. The third section included questions regarding the reasons of not using contraceptives during pandemic lockdown among women who were practicing contraception earlier. The

last section covered pregnancy status and its outcome in terms of termination or continuation.

Statistical analysis was performed using SPSS version 24. Descriptive analyses were explored using mean  $\pm$ SD for quantitative variables and frequency and percentages for qualitative variables. Inferential statistics were explored using independent t-test and chi-square test. The p-value of  $<0.05$  was considered significant.

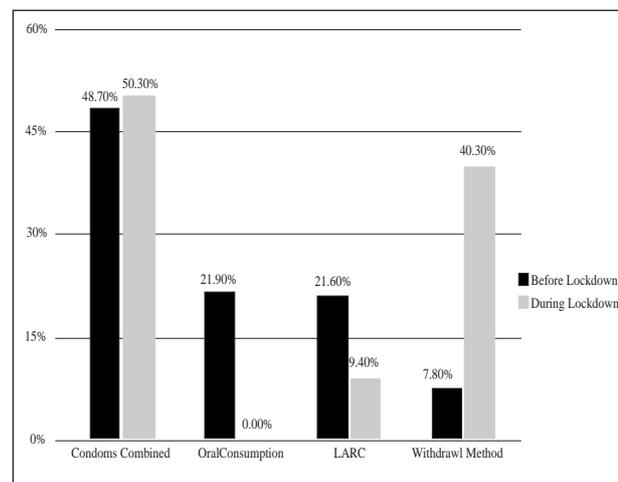
## RESULTS

The mean age of the 350 women was  $30.29 \pm 5.24$  years (minimum 18 and maximum 45 years). Majority of the women’s educational status was less than or equal to matriculation 196 (56.0%), followed by illiterate 83 (23.7%), and more than or equal to intermediate 71 (20.3%). Furthermore, multiparity was observed in most of the women 247 (70.6%), followed by grand multiparity in 55 (15.7%), and primiparity in 48 (13.7%) women.

There were 306 (87.4%) women practicing contraception before the lockdown and 288 (82.3%) practiced during the lockdown.

Of 306 women practicing contraception before the lockdown, 265 (86.6%) continued while 41 discontinued during the lockdown. There were 23 new users.

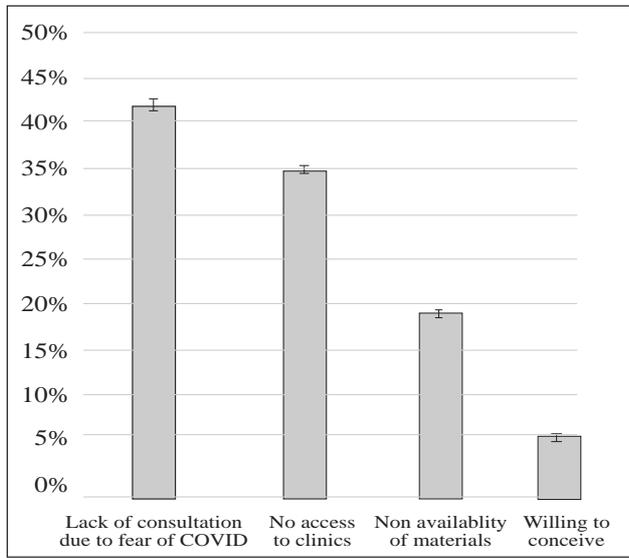
Of 306 women practicing contraception before the lockdown, most of the women were using condoms 149 (48.7%), followed by combined oral contraceptives 67 (22.0%), long acting reversible contraception 66 (21.6%), and withdrawal method 24 (7.8%) (Figure 1).



**Figure 1: Method of Contraception Practiced by Women Before and During Lockdown**

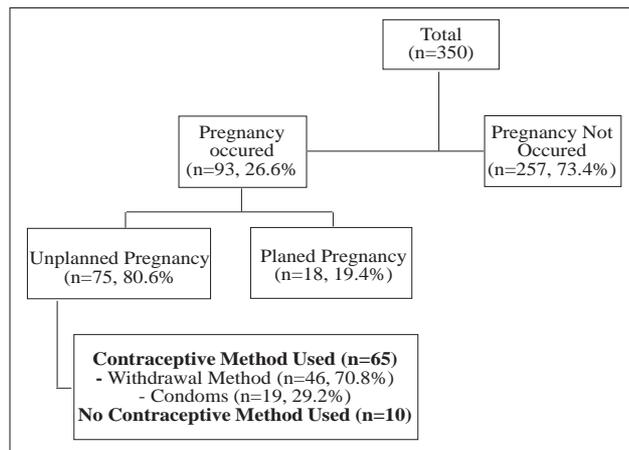
Lack of consultation due to fear of COVID and no access to clinic were the most common reasons of not

using contraception among 41 women who were practicing contraception before, i.e., 17 (41.5%) and 14 (34.1%) respectively (Figure 2).



**Figure 2: Reason for Not Using Contraception During Lockdown Among Women who Practiced Before (n=41)**

Pregnancies were reported by 93 (26.6%) women. Of these 93 pregnant women, 75 (80.6%) had unplanned pregnancies and 18 (19.4%) had planned pregnancies. Out of the 75 women with unplanned pregnancies, 65 (86.7%) had used contraceptives (Figure 3).



**Figure 3: Flowchart Showing Pregnancy Occurrences, Desire for Pregnancy, and Method Used in Unplanned Pregnancies**

The comparison of practicing contraception before and during lockdown with general characteristics showed significantly higher mean age of women using contraception before lockdown (p-value <0.001) and during lockdown (p-value 0.002). While the use of contraception was significantly higher among women with grand multiparity (p-value 0.028) (Table 1).

## DISCUSSION

During the COVID-19 pandemic, many countries implemented tough lockdowns and movement control orders in order to slow down the transmission of the virus. The public health infrastructure shifted focus to support and treat people with COVID-19, therefore essential maternal health services including family planning were neglected<sup>10</sup>. The unmet need for contraception during lockdown was greatly affected<sup>11</sup>. The findings of the current study have reported that the use of contraceptives dropped from 87.4% before lockdown to 82.3% during lockdown in our cohort. Similarly, a study has reported a 10% decline in the use of sexual and reproductive health services and short and long acting reversible contraceptives in developing countries over a period of one year<sup>8</sup>. However, a survey conducted in a developed country reported positive impact on use and easy access to contraceptives during COVID-19 lockdown<sup>9</sup>. The responders could easily order the required contraceptives online to be delivered to their homes, without needing to visit clinics or pharmacies<sup>9</sup>. However, uncertainty about the correct use of contraceptives was reported in this study. The need of mobile and free access to contraceptives during the lockdown was also encouraged in other published literature<sup>12,13</sup>.

According to our study, the most commonly used contraception method before lockdown was using a condom. Moreover, combined oral contraceptives and long acting reversible contraception were also used by 22% and 21% respectively. However, the withdrawal method was reported by a very limited number of women. These findings remarkably changed during the lockdown. Even though the use of condoms was still reported by most of the women during the lockdown, the use of withdrawal method increased and was reported by 40% of the women. Studies report that coitus interruptus is a traditional method of avoiding pregnancy<sup>14-16</sup>. Though, modern contraceptives have largely replaced this technique, but the current study findings are reporting surges in the practice of withdrawal method during the lockdown, probably due to the limited access to contraceptives.

Our findings show that lack of consultation due to fear of getting COVID-19 and no access to clinics, were the most common reasons for not using contraception, among women who were practicing contraception before the lockdown. This finding is supported by various studies as well<sup>10,11,16, and 17</sup>. In the current study, a considerable decline in the use of combined oral contraceptives (22% vs 0 %) and LARCs (21.6 % vs 9.4%) was observed during the lockdown as compared

**Table 1: Comparison of Contraception Practices Before and During Lockdown with General Characteristics (n=350)**

	Practicing Contraception Before Lockdown		p-value	Practicing Contraception During Lockdown		p-value
	Yes n (%)	No n (%)		Yes n (%)	No n (%)	
Mean Age, years	30.81 ±5.14	26.73 ±4.61	<0.001 <sup>α*</sup>	30.70 ±5.33	28.42 ±4.40	0.002 <sup>α*</sup>
<b>Education</b>						
Illiterate	64 (77.1)	19 (22.9)	0.001 <sup>¥*</sup>	73 (88.0)	10 (12.0)	0.096 <sup>¥</sup>
Less than or equal to Matriculation	173 (88.3)	23 (11.7)		162 (82.7)	34 (17.3)	
More than or equal to Intermediate	69 (97.2)	2 (2.8)		53 (74.6)	18 (25.4)	
<b>Parity</b>						
Primiparous	40 (83.3)	8 (16.7)	0.512 <sup>¥</sup>	34 (70.8)	14 (29.2)	0.028 <sup>¥*</sup>
Multiparous	216 (87.4)	31 (12.6)		204 (82.6)	43 (17.4)	
Grand Multiparous	50 (90.9)	5 (9.1)		50 (90.9)	5 (9.1)	

α Independent t-test applied, ¥ Chi-square test applied, \* p-value <0.05

to before the lockdown. However, the use of the withdrawal method increased remarkably during the lockdown (7.8 % to 40.3 %).

According to the current study, pregnancies during lockdown were reported by 26.6% women. Moreover, unplanned pregnancies were reported by 80.6% of the women. In a study conducted in Italy, it was revealed that all married women were using contraception during the lockdown, and none had any unplanned pregnancy<sup>18</sup>. The high prevalence of contraceptive usage in developed countries and improved knowledge about contraception is probably the most common reason behind differences in the unplanned pregnancy occurrences between developed and underdeveloped country.

These findings could be observed in the light of the limitation that this study was carried out during the lockdown period and in one center, and the number of samples recruited in the study was limited. Despite this limitation, this study is of significance as an important issue of reproductive health is highlighted and reported from a low resource region. The findings will surely help the healthcare providers in dealing with the situation more effectively and planning for the future.

### CONCLUSION

A decline in the use of contraceptives was reported in our cohort during the lockdown. The most reported reason for non-compliance among women who were practicing contraception before the lockdown, were lack of consultation due to fear of COVID-19 and no access to clinics. Furthermore, the current study has also highlighted the increased chances of unplanned pregnancies among women who used withdrawal method for contraception.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Authors' Contribution:** RM proposed the study concept, worked on manuscript writing, and synopsis writing. SAM and AT prepared the study protocol and worked on data collection and data analysis. All authors critically reviewed the final manuscript.

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# Correlation of Peak Expiratory Flow Rate and Hand Dynamometry in Chronic Obstructive Pulmonary Disease Patients--A Case Control Study

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Syed Hafeez-ul-Hassan<sup>2</sup>, and Talha Ahmed<sup>5</sup>

## ABSTRACT

**Objectives:** To determine the correlation of peak expiratory flow rate and hand dynamometry in patients with chronic obstructive pulmonary disease and to find out the differences between hand grip in cases and control group

**Methodology:** This study was carried out in the Department of Physiology and Department of Chest Medicine, Liaquat National Hospital and Medical College between July 1<sup>st</sup> 2019 and June 30<sup>th</sup> 2020 after the approval of the research and ethical committee of the same hospital. We used purposive sampling technique. Total 100 consenting individuals were recruited that were equally divided into control group and chronic obstructive pulmonary disease group. Anthropometric measurements alongwith peak expiratory flow rate and hand dynamometry values were measured.

**Results:** We found significant difference in hand grip strength and peak expiratory flow rate between the case and control groups, chronic obstructive pulmonary disease patients have decreased peak expiratory flow rate and handgrip strength. Weak correlation exists between peak expiratory flow rate and hand grip strength with significant p value. No relationship was found between waist hip ratio and hand grip. Also, body mass index showed a weak negative but statistically significant correlation with hand grip strength.

**Conclusion:** In chronic obstructive pulmonary disease patients, hand grip strength is decreased and determining hand grip strength may ensures quick assessment of quality of life.

**Keywords:** chronic obstructive pulmonary disease, Air way Obstruction, Hand grip, Grip strength, hand dynamometry, peak expiratory flow rate, skeletal muscle dysfunction

**How to cite:** Afaq E, Nisar MK, Shoaib N, Irfan M, Hassan SH, Ahmed T. Correlation of peak expiratory flow rate and hand dynamometry in chronic obstructive pulmonary disease patients—a case control study. *Ann Jinnah Sindh Med Uni.* 2022;8(2):69-73

DOI 10.46663/ajsmu.v8i2.69-73

## INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is one of the major health problems faced globally. It is considered as the 4<sup>th</sup> leading cause of death worldwide<sup>1</sup>. COPD is an obstructive lung disease in which air is trapped in the lungs increasing lung compliance, the Residual Volume (RV), Functional Residual Capacity

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(FRC) and Total Lung Capacity (TLC)<sup>2</sup>. Some risk factors for COPD include smoking, alpha1 antitrypsin deficiency, occupational exposure to toxins, and cannabis smoking<sup>3</sup>. COPD can be suspected on history and physical examination. Dyspnea, chronic productive cough, frequent lower respiratory tract infections, family history, smoking, and exposure to industrial dust are key indicators for COPD diagnosis<sup>4</sup>. Spirometry is a prerequisite to make the diagnosis and a post-bronchodilator FEV1/FVC less than 0.70 confirms the presence of persistent airflow obstruction<sup>3</sup>. Peak expiratory flow rate (PEFR) between 450 to 550 l/min is consider normal in males. The value is lower in females<sup>5</sup>. It is used as an alternative way of measuring airway obstruction when FEV1 value is unavailable<sup>6</sup>.

Poor exercise capacity is a major complaint among persons with COPD<sup>7</sup>. In cardiopulmonary disorders, many factors contribute to muscular impairment. These include hypoxia, oxidative stress and atrophy due to

disuse, medication, nutritional depletion, and systemic inflammation<sup>8,9</sup>. Peripheral muscles fatigue is suggested to be an exercise limitation contributor in patients with COPD<sup>10</sup>.

In COPD, a hand dynamometer can be used to measure hand grip strength<sup>11</sup>. It is a device that is used to study muscle fitness and over all the general well-being of a person<sup>12</sup> and it can be used unaccompanied or in arrangement with other sensors like electromyogram (EMG)<sup>13</sup>.

It is valuable to note grip strength because in many illnesses, muscle strength decreases. Kevin J Solverson and others using dynamometric studies, observed the physical functioning of critically ill survivors with diminished muscle strength in various muscle groups<sup>14</sup>. Pierrette Baschung P fister and companions studied hand held dynamometry in patients suffering from inflammatory myopathy<sup>15</sup>. J M Brismee, S Yang and colleagues used hand dynamometry as a tool in their study to observe the musculoskeletal differences between males and females<sup>16</sup>.

Patients suffering from COPD are likely to suffer from skeletal muscle dysfunction. Many articles have been published that mention lower limb muscle groups especially quadriceps being affected the most in COPD patients<sup>17</sup>. On the contrary, fewer studies have been done about involvement of muscles of the upper limb extremities.

## METHODOLOGY

This study was conducted in the Department of Physiology and Department of Chest Medicine, Liaquat National Hospital and Medical College (LNH&MC) after the approval of the research committee and ethical review committee by certifying it with IRB certificate No. Ref:App # 0388-2017- LNH –ERC at LNH. The total duration of the study was one year, from July 1<sup>st</sup> 2019 and June 30<sup>th</sup> 2020. This was a case control study. Purposive sampling technique was used.

Sample size was calculated using Open Epi online software. For sample size estimation mean and standard deviation of handgrip strength in COPD patients (17.4±4.40) and in control group (28.43±8.35) was used from previous study<sup>18</sup>. Two independent sample t-test was applied with 80% power and 95% confidence interval; the calculated sample size was 14 in each group (total 28). However, we recruited total 100 subjects (50 cases and 50 controls). After taking proper written consent, patients diagnosed with COPD within one year were selected in this study. Age and gender of the cases corresponded to that of the healthy control group.

Cases and controls that had known medical illness of osteoarthritis, osteoporosis, any deformity of upper limb, neurological disorders effecting the upper limbs, history of fracture of the dominant upper limb, pain in the dominant upper extremity and history of inflammatory joint disease were excluded from this study. None of the cases were found to be asthmatic.

Detailed history of already diagnosed COPD cases regarding their illness and past medical records were observed. Anthropometric measurements like weight (kg), height (ft.), BMI (kg/m<sup>2</sup>), waist circumference (cm), hip circumference (cm) and WHR were taken for record. PEF (L/min) was noted as a measure of lung function by using Wright's Peak flow meter<sup>19</sup>. Hand grip strength was measured (kg) using Camry digital hand dynamometer (grip strength measurement meter auto capturing electronic hand grip power 198 lbs / 90 kgs). This device is centered on isometric force sensing that is strain gauge based. The instrument augments the force applied and converts it into a voltage that can be monitored by the lab interface. It is the gold standard for measuring hand grip strength in adults. Both the cases and healthy controls were explained about the procedure of measuring hand grip strength. All the subjects were asked to sit on a chair, with a straight back and both feet resting flat on the floor. Subjects were asked to hold the hand dynamometer in their dominant hand, placing their arm on their sides, with flexed elbow at 90 degrees, forearm in proned position and wrist at neutral position. Subjects were asked to squeeze their hand with maximum strength and three readings of grip strength were measured with one minute interval between the readings<sup>18</sup>. Three readings were taken for both the variables and the best one was chosen from them. SPSS 21 was used to analyze the collected data. The socio-demographic details were executed using descriptive statistics. Mean and standard deviation was used for continuous variables like age and gender, and frequencies and percentages were used for categorical variables like diabetes mellitus, coronary heart disease, hypertension, and smoking. Comparison of anthropometric measures was done by Independent t-test. Pearson correlation coefficient was used to find out the linear correlation between quantitative variables. p-value=0.05 was indicated as significant difference.

## RESULTS

Study included 50 COPD cases and 50 healthy controls. Mean ages in cases and controls were 44.46±11.15 and 45.76±9.79 years old, respectively. In case group, 16 percent of people had diabetes, while 14 percent of people in controls had diabetes. Out of 50 cases, nine were current smokers and 32 had left smoking five to

eight years ago. Table 1 lists the baseline descriptive characteristics of COPD patients and controls.

**Table 1: Baseline Descriptive Characteristics of Study Subjects**

Quantitative Variable		Cases (n=50)	Controls (n=50)
Age (years), mean± standard deviation		45.769.79	11.15
Qualitative Variables			
Gender	Male	32 (64)	32 (64)
	Female	18 (36)	18 (36)
Diabetes	Diabetics	8 (16)	7 (14)
	Non diabetics	42 (84)	43 (86)
Coronary Heart Disease	Present	3 (6)	2 (4)
	Absent	47 (94)	48 (96)
Hypertension	Yes	15 (30)	12 (24)
	No	35 (70)	38 (76)
Smokers	Smokers	9 (18)	5 (10)
	Non smokers	41 (82)	45 (90)

We found significant mean difference of peak expiratory flow rate ( $p<0.001$ ) and hand grip/dynamometry ( $p<0.001$ ) as presented in Table-2.

**Table 2: Comparison of Anthropometric Measures Between Two Groups**

	Mean±Standard Deviation		P-value
	Cases (n=50)	Controls (n=50)	
Body Mass Index ( $\text{kg}/\text{m}^2$ )	23.924.44	22.633.67	0.119
Waist Hip Ratio	.83.091	.84.10	0.594
Peak Expiratory Flow Rate (L/min)	251.08 90.33	353.95130.64	<0.001
Hand Grip/ Dynamometry (kg)	23.25±6.43	29.27±10.28	<0.001

n. =number,  $\text{kg}/\text{m}^2$  = kilogram/meter square, L/min=Liters/ min, Kg=kilogram, \* p-value is significant at 0.05

There was a weak positive correlation of hand grip with peak expiratory flow rate ( $r=0.270$ ) while negative weak correlation of hand grip was found with BMI ( $r=-0.246$ ) among cases. We found significant and positive moderate correlation of hand grip with peak expiratory flow rate ( $r=0.574$ ) while significant positive weak correlation of hand grip was found with BMI ( $r=0.312$ ) among controls as shown in Table-3.

**Table 3: Correlation Between PEFR and Grip Strength: Comparison of Grip Strength, WHR and BMI Between COPD Patients and Controls**

Study Variable	Cases		Controls	
	Correlation (r)	P-value	Correlation (r)	P-value
Peak Expiratory Flow Rate	0.270	0.058	0.574	<0.001
Waist Hip Ratio	0.075	0.606	-0.236	0.100
Body Mass Index	-0.246	0.085	0.312	0.028

\* p-value is significant at 0.05

## DISCUSSION

COPD is a type of lung illness which may have extra pulmonary manifestations of fat, bone, and muscle wasting<sup>20</sup>. Muscle strength refers to a muscle's ability to generate maximum force, whereas muscle endurance refers to a muscle's ability to withstand a submaximal force over time. Muscle dysfunction in patients of COPD is regarded as a decrease in either endurance of the affected muscle or strength of that muscle<sup>21</sup>. A reliable tool to measure the strength of the muscle in clinical settings is hand held dynamometer<sup>22</sup>. We observed the values of PEFR and handgrip strength in both control and COPD group, and found that both hand grip strength and PEFR values were lower in the COPD group than in the control group.

In this research, we discovered a weak positive correlation between PEFR and hand grip strength using hand held dynamometer in patients with COPD with a statistically significant p value. Our result is supported by the fact that upper extremity muscles are impaired in patients suffering from COPD as supported by previous research<sup>23</sup>. COPD is a progressive disease, and reduced muscle mass and hand grip strength may be associated with the disease severity. Although the association between low hand grip strength and chronic lung disease is multifactorial<sup>24</sup>.

We found significant and positive moderate correlation of hand grip with peak expiratory flow rate ( $r=0.574$ ) while significant positive weak correlation of hand grip was found with body mass index ( $r=0.312$ ) among controls as shown in Table-3.

We discovered a weak negative but statistically significant relationship between BMI and hand grip strength in cases of our research. Though body weight is low in ten to twenty percent cases of COPD as explained by various researchers<sup>25</sup>. It is independent to the degree of the airflow obstruction and is related to increased gas trapping and decreased diffusion capability.

When compared to COPD patients of normal weight, a low BMI is associated with decreased exercise capacity and a higher risk of mortality<sup>26</sup>. Weight loss is commonly thought to be a sign of illness progression, but according to findings from a population-based study, the prevalence and course of weight loss in COPD patients is similar to that of older people with normal lung function<sup>27</sup>. Low bodyweight can be reversed in individuals with COPD, regardless of the cause, and weight increase is linked to a lower mortality risk in individuals with severe disease<sup>28</sup>. Low body

weight may be attributed to apoptosis of skeletal muscle. COPD patients often have a low fat-free mass, this is linked to a poor quality of life, decreased muscle strength, and a higher chance of mortality. Our study opens doors for carrying out further research on extra pulmonary effects of COPD<sup>29</sup>. We used hand held dynamometer as a tool, more studies should be done using other pressure augmenting instruments for better understanding. We had a small sample size, so more studies with greater sample sizes will help us better understand the effects of COPD for improvement in therapeutic regimes.

## CONCLUSION

Although we found weak positive correlation between PEFr and hand grip strength in COPD patients. This study concludes that patients with COPD have reduced hand grip strength. In clinical settings, frequent monitoring of hand grip strength may appear to be useful in predicting COPD disease progression, determining hand grip strength ensures quick assessment of quality of life.

**Acknowledgement:** We acknowledge the immense help received from the articles that are cited and counted in the references of this manuscript. We would like to thank the faculty of Department of Physiology and Department of Chest Medicine LNH&MC for granting permission to conduct this study in their premises and allowing us access to the instruments needed for our study.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Authors' Contribution:** EA conceived the idea and concept of research, worked on study design, interpretation of results, manuscript writeup, and review. MKN and MI worked on data entry and statistical analysis, and manuscript writeup, NS and TA worked on sample collection and manuscript writeup. SHH critical review of the article and all the authors review and approve the final manuscript.

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# Awareness of HPV Infection and its Relationship to Cervical Cancer in Medical Students of Karachi, Pakistan--A Cross Sectional Study

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## ABSTRACT

**Objective:** To assess the level of awareness among medical students about HPV, its vaccines and its relation to cervical cancer

**Methodology:** This is a cross-sectional, multicenter study conducted at Creek General Hospital, Karachi from March 2020 to November 2021 after IRB approval from United Medical and Dental College. Data was collected from undergraduate MBBS students via an online questionnaire.

**Results:** Total participants in the study were 219. Age range was between 18 and 26 years. A majority (82%) of medical students were aware of the causal relationship between HPV and cervical carcinoma. Only 53% of students had the knowledge for the need for regular pap smear. Students confessed about lack of knowledge regarding HPV and its preventive measures with 82% of students admitting to having gaps in their knowledge.

**Conclusion:** The study brings us to the conclusion that the current medical curriculum is not fortified and hence the medical students are unaware about the diagnostic and preventive strategies of cervical cancer which is a good gap in their clinical career.

**Keywords:** Attitude, cervical cancer, human papilloma virus, knowledge, medical student, vaccine.

**How to cite:** Kumari K, Lari A, Shahid A, Farooqui A, Dhomeja NL, Abbas K, Bashir F. Awareness of HPV infection and its relationship to cervical cancer in medical students of Karachi, Pakistan—a cross sectional study. *Ann Jinnah Sindh Med Uni.* 2022;8(2):74-79

DOI 10.46663/ajsmu.v8i2.74-79

## INTRODUCTION

Cervical cancer is one of the most serious HPV-related diseases<sup>1</sup>. High-risk HPV subtypes are estimated to cause 90-98% of the global burden of cervical cancers. Similarly, these high-risk subtypes are found in 95-100% of women with known cervical carcinoma. Women with normal immune systems take 15-20 years for development of cervical cancer, while in women with weakened immune systems, like those with untreated HIV infection, cervical cancer can develop in 5-10 years<sup>1</sup>.

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If cervical cancer is ranked worldwide, it is the seventh most common cancer among all the groups of cancers and the fourth most common cancer in women<sup>2</sup>. Throughout the world, the incidence of human papilloma virus (HPV) 16 and HPV 18 with Low-grade Squamous Intraepithelial Lesions (LSIL) is 25.8%, High-grade Squamous Intraepithelial Lesions (HSIL) 51.9%, and cervical cancer is 69.4%, respectively<sup>3</sup>.

Human papillomavirus is a DNA virus from the papillomavirus family and causes a viral infection that is passed between people through skin-to-skin contact. Out of the 100 types of HPV present, more than 40 are passed sexually, affecting the genitals, mouth, or throat. HPV types can be found in 95–100% of women with cervical cancer<sup>4</sup>, and those types are estimated to cause 90–98% of cervical cancers worldwide.

The recent global awareness of the role of HPV in relation to primary prevention of cervical cancer and the screening based vaccination process, has decreased the HPV related mortality rate in the urban setup. Still, one of the biggest reasons for the poor acceptance of cervical screening is inadequacy of knowledge on the subject and negative thinking<sup>5</sup>.

Both males and females acquire this infection once they are sexually active and penetrative sex is not required for transmission. Skin-to-skin genital contact is a well-recognized mode of transmission<sup>6</sup>.

In Nepal, cervical cancer is the commonest cancer in women with 2% carrying HPV 16 and 18, and 10.16 million women of reproductive age are at the risk of developing it<sup>1,7</sup>. Approximately, 2% are estimated to carry HPV 16 and 18. Whereas, 80.3% women are diagnosed with invasive cervical cancer<sup>3</sup>, 30.2% women with LSIL, and 63.4% with HSIL. HPV infection has a high prevalence in Nepal than in the general population of the world<sup>8</sup>.

Similar to Nepal, cervical cancer has been observed to be the second most common cancer affecting women of reproductive age in India and Bangladesh<sup>2,3,10</sup>. Cervical HPV-16/18 infection is present in 5% of women in the general population, whereas, 83.2% of invasive cervical cancers are attributed to HPV 16 or 18<sup>2</sup>. In Bangladesh, approximately, 4.4% women are estimated to carry cervical HPV 16/18 infection and 80.3% of advanced cervical cancers are due to HPV 16 or 18<sup>11</sup>.

One of the reasons that has contributed to this lack of awareness among the general population in Pakistan regarding the importance of HPV vaccination, is the paucity of research studies that actually try to investigate public knowledge and understanding of HPV. Moreover, no robust public health initiatives are undertaken to improve education among the young adults about HPV symptoms, causes and prevention. In the current era, Internet is one good source of information about knowledge on HPV infection<sup>12</sup>.

Being a lower-middle-income country with a high burden of cervical cancer, Pakistan lacks an effective nationwide HPV screening and vaccination program. As a result, the Pakistani population may be unaware of there being such a vaccine. About 84.3% of all cervical cancers were reported from developing countries alone; out of cervical cancer patients in Pakistan, 88.3% of women had HPV type 16 or 18 or both. Today, more than 60 million females aged 15 or above are at risk of cervical cancer, with a crude incidence rate of 5.97 per 100,000<sup>13,14</sup>. Medical students (age group: 17–25) have been selected for these awareness studies as these students will be the practicing clinicians, and will be sought by the population as the first line information resources and can play a pivotal role in spreading awareness among a wide range of population. Educational initiatives targeting health care professionals have a definitive role in fostering vaccine acceptance<sup>15</sup>. Due to the lack of research data on this subject in Pakistan, this research has been planned as an eye opener for the future.

In view of the above mentioned information, our objective is to evaluate the current knowledge and beliefs of young medical students regarding the use of the HPV vaccine and its relationship to cervical cancer.

## METHODOLOGY

This cross sectional study was planned at the Creek General Hospital, United Medical and Dental College Karachi from the month of March 2020 till November 2021. The Institutional Review Board of United Medical and Dental College approved this study by certifying it with IRB certificate. (Ref.No:UMDC/Ethics/2021/01/03/290).

It was an online survey conducted among students of UMDC and students from other private and public sector medical colleges of Karachi. Adult undergraduate MBBS students from all years (1-5) from different medical colleges of Karachi including Jinnah Sindh Medical University, Jinnah Medical and Dental College, and Bahria University were included in this research. The sampling technique was non-probability convenience sampling. Students studying Dentistry, Physiotherapy and Pharm D were excluded from the study along with nurses, graduate medical doctors and any non-medical personnel.

A sample size of 219 undergraduate medical students was calculated using Raosoft online sample size calculator with the total students population of 650 students and a response distribution of 50%. The confidence interval was 95% with an error margin of 5%. Undergraduate medical students between the ages of 19 and 26 years who gave Informed Consent, were given the chance to fill a 37-item questionnaire administered electronically. In order to assess the adequacy of knowledge, the median of correct responses was calculated. The participants who had knowledge equal to or more than the median for correct responses were labeled to have adequate knowledge, while those with correct responses less than median were labeled to have inadequate knowledge. The results were then exported to SPSS version 22 for statistical analysis. Frequency and percentages of all variables were derived. Test applied was Chi-square and p-value was calculated. A p-value of <0.05 was considered statistically significant.

## RESULTS

Active participation was observed mostly by female students (74%) out of 219 students. They were 21-22 years of age (55%). The characteristics of the population are listed in Table 1. The data regarding the questions asked is listed in Table 2.

**Table 1: The Characteristics of the Population**

Characteristics	n (%)
Gender	
Female	163 (74.4)
Male	56 (25.6)
Age	
19-22	142(64.8)
23-26	76(34.7)
>26	1(0.4)
Marital status	
Married, single partner	7 (3.2)
Unmarried	209 (95.4)
Married, multiple partners	2 (0.9)
History of genital infections	
Yes	25 (11.4)
No	154 (70.3)
Maybe	40 (18.3)male
HPV vaccination status	
Yes	21 (9.6)
No	164 (74.9)
Maybe	34 (15.5)
Family history of malignancy	
Yes	50 (22.8)
No	168 (76.6)
Maybe	1 (0.5)
Family history of genital malignancy	
Yes	17 (7.8)
No	202 (92.2)

The perception of knowledge of the students and the adequacy of knowledge was assessed by the number of their correct responses and analyzed with Chi-square test.

Perception of knowledge was assessed by asking the participants about their cognizance regarding gaps in their knowledge about HPV and their confidence in dealing with patients' queries related to HPV (Table 3). Both these parameters were significantly related to the adequacy of knowledge (Table 4).

Upon looking at the demographic characteristics of the population, it was found that about 209 (95%) medical students were unmarried while 154 (70.3%) had no history of genital tract infections (Table 1). It was found that 17 (7.8%) participants reported a family history of genital tract malignancy and 164 (74.9%) participants stated that they had not been vaccinated against HPV. The majority of the participants had no family history of malignancy.

A significant number of students (82%) were aware of a link between HPV and its role in causing cervical cancer and genital warts, while only some (36.5%) knew that HPV could be transmitted through skin (Table 2). Only 53% of students were aware of the need for regular Pap smear despite the female being

**Table 2: Knowledge About HPV and HPV Vaccine**

Knowledge About HPV and HPV Vaccine	Correct response	Incorrect response	Unsure response
	Number (%)	Number (%)	Number (%)
Do you know what vaccines are?	209 (95.4)	7 (3.2)	3 (1.4)
What is HPV short for?	209 (95.4)	10 (4.6)	0
What type of organism is HPV?	209 (95.4)	10 (4.6)	0
HPV infection has visible signs always.	88 (40.2)	59 (26.9)	71 (32.5)
HPV can cause cervical cancer and genital warts.	180 (82.2)	1 (.5)	38 (17.4)
Which types of HPV are responsible for genital warts?	98 (44.7)	117 (53.4)	4 (1.8)
Which types of HPV are responsible for cervical cancer?	147 (67.1)	71 (32.4)	1 (.5)
HPV can cause AIDS.	54 (24.7)	107 (48.9)	58 (26.5)
Men cannot get HPV.	11 (.5)	156 (71.2)	52 (23.7)
A person can have HPV infection for years without knowing it	139 (63.5)	17 (7.9)	63 (23.8)
Women positive for HPV will definitely get cervical cancer	80 (36.5)	80 (36.5)	59 (27)
If a woman does not have HPV she has a low risk of cervical cancer	126 (57.5)	37 (16.9)	56 (25.6)
Recommended number of HPV vaccination	69 (31.5)	22 (10)	128 (58.5)
HPV vaccination offers protection against genital warts	144 (65.8)	16 (7.3)	59 (26.9)
HPV can be transmitted through skin.	80 (36.5)	72 (32.9)	67 (30.6)
HPV can be transmitted through sexual intercourse.	192 (87.7)	2 (.9)	25 (11.5)
HPV heals on its own.	21 (9.6)	145 (66.2)	53 (24.2)
HPV vaccination protects against all STI	35 (16)	147 (67.1)	37 (16.9)
HPV test can tell how long the infection has been present?	52 (23.7)	62 (28.3)	105 (47.9)
HPV test can be done at the same time as smear	102 (46.6)	19 (8.7)	98 (44.8)
Women who have had HPV vaccination do not need pap smear.	28 (12.8)	116 (53)	75 (34.3)
Do you favor pediatric vaccination?	202 (92.2)	6 (2.7)	11 (5)
Do you favor adult vaccination?	200 (91.3)	6 (2.7)	13 (5.9)

**Table 3: Relationship of Adequacy of Knowledge with Characteristics of Population**

Variable (Total number=209)		Adequate Knowledge (113-51.6%)	Inadequate Knowledge (106-48.4%)	p-Value
Gender	Female	86	77	0.64
	Male	27	29	
Age	19-22	66	76	0.3
	23-26	46	30	
	>26	1	0	
Marital status	Unmarried	105	104	0.18
	Married, single partner	6	1	
	Married multiple partners	1	1	
History of genital infections	Yes	10	15	0.2
	No	85	68	
	Maybe	18	22	
HPV vaccination status	Yes	8	13	0.004
	No	95	69	
	Maybe	10	24	
Family history of malignancy	Yes	27	23	0.6
	No	85	83	

\* p-value is significant at <0.05

**Table 4: Perception of Adequacy of Knowledge About HPV**

Variable	Yes	No	Maybe
Do you feel there are gaps in your knowledge regarding HPV?	128 (58.4)	40 (18.3)	51 (23.3)
Do you think you know enough about the HPV and its vaccine to confidently answer any questions that a patient might have?	23 (10.5)	78 (53.7)	118 (54.8)

vaccinated against HPV. The majority of the students were in favour of paediatric vaccinations (92.2%) and 91.3% were in favour of adult vaccinations. Only a small proportion of students (10.5%) were confident in the information they had regarding HPV while the majority (82%) admitted to having some or significant gaps in knowledge.

According to this criterion, 113 (51.6%) participants had adequate, while 106 (48.4%) had inadequate knowledge. The adequacy of knowledge was not related significantly to age, gender, year of study, history of genital infection and history of malignancy in family (Table 3). The p value was found to be 0.64.

## DISCUSSION

In our study, we found that students had inadequate attitude, practice, and knowledge on the subject of cervical cancer. Only 53% of the students in our study had adequate knowledge regarding regular Pap smear. As many as 82% of students admitted to have gaps in their knowledge along with a certain lack of confidence in their knowledge about HPV as well as its preventive measures. Chanprasertpinyo et al did a study in Thailand

and found a direct link between the intention to vaccinate against HPV and the knowledge the students had regarding HPV and its vaccine, with students having a better understanding being more willing to get vaccinated<sup>16</sup>. In this study, the percentage of students with adequate knowledge was found to be 51.6%. It was seen that 58.4% of students felt that the knowledge they had regarding HPV was incomplete or inadequate. And only 10.5% students felt that they had enough knowledge to adequately counsel patients regarding HPV and its vaccine. Similarly, Costa, in their study, found a direct correlation between the year of medical study and the knowledge gap present, with greater knowledge gaps in the initial years of study compared with final year medical students<sup>17</sup>. Our study, however, found no significant correlation between the year of medical study and the adequacy of knowledge regarding HPV and its vaccines.

In this study, 31.5% and 65.8% of the students had correct knowledge about the vaccine against HPV including the number of vaccine doses and whether the vaccine offers protection from genital warts, respectively. Poor knowledge regarding the vaccine was also seen in other studies such as Pandey conducted

a study in India, which demonstrated that 38.8% of males and 41.4% of females were aware of the correct number of doses for HPV vaccination, with 44% students being aware of the correct schedule for vaccination<sup>18</sup>. Another study by Borlu demonstrated that 56.3% of students had no knowledge that HPV vaccination offers protection from cancer of cervix<sup>19</sup>. Our study revealed that 65.8% of students had knowledge that HPV vaccination can provide protection against genital warts and cervical cancer. Our study revealed that 9.6% of the medical students had been vaccinated against HPV. This is relatively higher than the 0.3% of students of university who were HPV vaccinated to prevent cancer<sup>19</sup>.

There is a very significant knowledge gap when it comes to awareness regarding the risk HPV poses to men. Our study shows that only 5% of students were aware that HPV could also infect men. While the remaining 95% were either wrong or not sure regarding this fact. Pandey et al. also found 31.4% of the medical students were unable to answer questions regarding the need to vaccinate men against HPV correctly<sup>18</sup>. A study on 3000 Lebanese medical students via a self-administered questionnaire-based survey revealed a significant lack of knowledge and awareness on HPV among medical students in Lebanon, with a strikingly low vaccination rate (16.4%) due to many barriers<sup>20</sup>. This can create a significant impact and help to increase the low levels of HPV vaccinated individuals and further help decrease the cervical cancer incidence.

It is important to recognize that this gap in knowledge is even greater when it comes to students that do not have medical education<sup>21,22</sup>. Shafei discovered that students with a background in health sciences scored more as compared to students with no background in health sciences<sup>21</sup>. This is thought to be due to the notably greater exposure of medical students towards health related subjects. Hirth discussed that medical students that had been vaccinated against HPV themselves, were more likely to be informed of its importance and advantages and were thus much more likely to recommend them to their patients<sup>23</sup>. Furthermore, Berensone highlighted the importance of education regarding HPV, its association to cervical cancer, and noted a positive change in the students' behavior and confidence when counselling patients regarding the vaccine<sup>24</sup>.

There were several limitations in our study. Firstly, a relatively small sample size was collected. A larger sample size would have facilitated a more in depth study of the adequacy of knowledge among medical students. Similarly, the sample obtained was from five medical colleges. Involvement of students from other

medical colleges in Karachi would have helped to diversify and give a more accurate over all picture of the adequacy of knowledge and thus help to assess the need for future educational interventions regarding the subject.

Instead of an electronic survey, an interview based study could have proved to be more interactive and helped to determine the factors that limit the presence of adequate knowledge among medical students. An intervention based study could have helped to determine the effectiveness of any education provided on the subject. Pre and post tests could be used to assess any improvement in the adequacy of knowledge and thus can be used as a guideline for further education pertaining to the subject.

## CONCLUSION

The study concludes that our medical students were inadequately aware about HPV and its vaccine which is thought provoking and worrisome. In future, when they will start their clinical career, they will not be able to guide women about the importance of pap smear and different modalities of prevention from cervical cancer. It is absolutely vital that medical students be provided with adequate knowledge about HPV, its role in causing cervical cancer and vaccination for its prevention. This should be an important part of the medical training because of the future role they are to assume as medical professionals and health care providers.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Authors' Contribution:** KK worked on paper writing and theme of the paper, AL, AS, and AF worked on data collection, KA, and FB reviewed the article and performed data analysis. All authors have proofread and approved the manuscript.

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## CASE REPORT

# Surgical Repair of Nasal Vestibular Stenosis—A Case Report

Beenish Nisar Ahmed<sup>1</sup>, Muhammad Yasir Khan<sup>2</sup>

## ABSTRACT

Vestibular stenosis is an uncommon but debilitating cause of nasal obstruction leading to serious impairment of airway. It is caused by granulation and fibrosis of vestibular lining and there is circumferential scar retraction in the inlet of nasal cavities. Stenosis may be congenital or acquired. Causes of acquired stenosis include burns, trauma, infections, and iatrogenic insult to the lining of vestibule. Surgical correction is usually done by excision of fibrous tissue. A number of studies have been reported on surgical correction but not a single technique is widely accepted due to different diseases and different levels of deformities. Here we are suggesting a technique in which flaps have been raised and scar fibrous tissue is removed. This technique gives a good outcome and satisfactory result in a patient with post traumatic unilateral stenosis.

**Key Words:** Acquired, nasal obstruction, nasal vestibule, stenosis, surgical correction

**How to cite:** Ahmed BN, Khan MY. Surgical repair of nasal vestibular stenosis—a case report. *Ann Jinnah Sindh Med Uni.* 2022;8(2):80-81

DOI 10.46663/ajsmu.v8i2.80-81

## CASE

A six years old child presented with right-sided nasal obstruction, which was there for the last three years. According to the history given by parents, the child had the unusual habit of inducing trauma to the nose with blunt things, and then nose pinching after a history of fall and right sided nasal vestibular wound followed by the development of the closure of right nostril, which was noticed by the mother.

On performance of cold spatula test, minimal fogging was found on the right nostril. The patient was not very cooperative for diagnostic endoscopy, but on anterior rhinoscopy one can appreciate the stenosis. As there was no clear history, computed tomography (CT) scan of nose and paranasal sinuses was done to evaluate further. After all diagnostic investigations, nasal vestibular stenosis was confirmed and patient was prepared for surgical excision of stenotic segment under general anesthesia.

Under general anesthesia, 2% lignocaine was injected and diagnosis was also confirmed by doing diagnostic endoscopy. Vestibular pedicle flaps were raised by giving cross incision and fibrotic segment was excised.

Flaps were then repositioned using vicryl suture and stenting was done with trimmed silastic nasopharyngeal airway for two weeks. After two weeks, nasal stent was removed in general anesthesia and a Mitomycin-C soaked pack was placed for two minutes in the raw area. After regular follow up, the patient was found to have good improvement with the patent nostril.

## DISCUSSION

Stenosis of canal is difficult to treat and needs surgical expertise. Stenosis of tubular canals tends to resist, fibrous tissue contracts concentrically leading to constriction and stenosis<sup>1</sup>. Nasal vestibular stenosis may be acquired or congenital. Trauma caused to nostrils results in the narrowing of vestibules and may lead to stenosis. Vestibular stenosis is uncommon and becomes a difficult problem in children<sup>2</sup>. Taking proper care of children's noses by using saline drops and regular cleaning by otorhinolaryngologist is required to prevent restenosis. Multiple surgical approaches have been described for repair like modified Z-plasty, skin grafts, and intranasal local flaps<sup>3,4</sup>. Raising vestibular pedicle flaps, a technique giving good results, is used in our case report, and has showed satisfactory results<sup>4,5</sup>. This procedure results in improvement of nasal obstruction functionally and aesthetically.

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Figure 1: Preoperative Endoscopic View of Right Vestibular Stenosis



Figure 2: During Operation View of Raising Flap



Figure 3: Schematic Diagram For Surgical Correction. Nasal Vestibular Pedicle Flaps Were Raised, Stenotic Segment Exposed, and Flaps Repositioning Was Done



Figure 4: Computed Tomography Scan Findings of Vestibular Stenosis

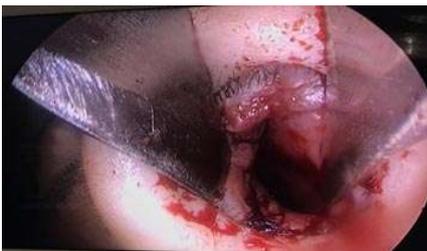


Figure 5: Healing Phase Postoperative Endoscopic View

## CONCLUSION

Stenosis of nasal vestibules is a condition that requires proper surgical expertise to treat successfully. Topical application of Mitomycin-C also helps in improvement. Nasal trauma should be treated carefully in paediatric populations with regular follow-up visits.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Author's Contribution:** BNA surgical procedure, conception of case report, drafting and revising of the manuscript. MYK reviewed the surgical procedure, drafting and the final case report.

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## LETTER TO EDITOR

# Smokeless Tobacco—A Deadly Addiction

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**How to cite:** Zia W, Kashif M. Smokeless tobacco—a deadly addiction. *Ann Jinnah Sindh Med Uni.* 2022;8(2):82  
DOI 10.46663/ajsmu.v8i2.82

### Dear Editor,

We would like to respectfully draw attention to the widespread use of smokeless tobacco (SLT) among young people, through your renowned journal.

Although there are several tobacco products available, smokeless tobacco is the most commonly used<sup>1</sup>. SLT is being used more frequently, which can be attributable to its low price and straightforward accessibility in every other store around. SLTs are oral tobacco products that are non-combustible. It can also be breathed through the nose; however, it is typically inserted under the tongue or in the space between the cheeks and gums. SLTs come in a variety of forms, including as dipping tobacco, snuff, betel-quid, *mawa*, *naswar*, and *gutka*.

In Pakistan, *gutka* looks to be the most popular SLT, both in rural and urban areas. Approximately 15% of men and 10% of women in Pakistan use different types of SLT<sup>2</sup>. Young people and adults use it most frequently. Young adults under the age of 30 have high rates of tobacco use and prevalence, and it may be responsible for 12% of all tobacco-related deaths globally<sup>2</sup>. The prevalence and use of SLT as a substitute source of nicotine addiction has substantially expanded as a result of the tightening regulations against smoking in enclosed areas and public places<sup>2</sup>. Most people choose smokeless tobacco over cigarettes, perhaps because it is portable and simple to use. A sizable portion of smokers have acknowledged utilizing SLT as a method of quitting<sup>3</sup>. However, they largely failed to accomplish it.

The SLT consumers experience a range of health problems. Nicotine, which has negative health effects on users, is the principal component of SLT. Furthermore, it is well-known that nicotine poses a significant danger for a number of disorders. Ash and slaked lime raise the pH of the oral cavity and speed up the process of nicotine absorption via the mucous membrane of the mouth<sup>4</sup>. Smokeless tobacco has a significant role in the high rate of preventable diseases that Pakistan has to deal with<sup>5</sup>. Additionally, use of SLT has been linked to numerous

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illnesses including cardiovascular disease, gum disease, mouth cancer, and oesophageal cancer. Mouth may also develop leukoplakia or erythroplakia, which are white or red areas that have the potential to develop into cancer<sup>6</sup>.

At the moment, there are no laws that can stop the use of SLTs, particularly among those with low income rates. It is suggested that the government should outlaw SLT goods or at the very least make them more expensive. We should launch a campaign and create laws to alert people of their negative impact.

The most effective avenue for reaching the public about quitting smokeless tobacco and promoting a healthy lifestyle is the social media. We ought to stop its promotion and advertising. Government should make effective policies to curtail its use. Use of social media based awareness campaigns must be initiated and publicised in order to deal with this deadly addiction among the masses.

**Authors' Contribution:** WZ drafted the manuscript and did final review. MK reviewed and did the corrections in the manuscript. Both authors searched for literature.

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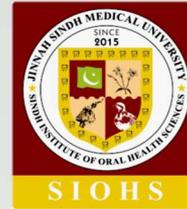
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