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# TABLE OF CONTENT

## ORIGINAL ARTICLES

<b>Functional Outcomes of Patellar Tendon Bearing Brace in the Management of Tibial Shaft Fractures</b>	<b>197</b>
Benish Ali, Sharia Babar, Bakhtawar Qaiser, Rimsha Rani, Aman Zahra, Sadaqat Ali	
<b>Relationship of Personal and Social Factors with Academic Performance of Undergraduate Nursing Students</b>	<b>201</b>
Jamila Bibi , Gideon Victor , Khairunnisa Dhamani ,Faisal Aziz	
<b>Doomscrolling and Existential Anxiety among Emerging Adults in Pakistan</b>	
<b>Moderating Role of Cognitive Reappraisal</b>	<b>211</b>
Zainab, Zaffar Ahmad, Hamna Rehman Khan	
<b>Association between Level of Physical Activity and Depression in Patients with Obesity Hypoventilation Syndrome. A Cross-Sectional Study</b>	<b>217</b>
Muhammad Taimoor, Ayesha Amin,Sayyed Shawal Shah,Wagma Wajid, Mariyam Kifayat , Nadia Shah	
<b>Relationship Between Communication Skills and Task Load. A Comparative Study of Nurses in Surgical and Medical Wards</b>	<b>224</b>
Rizwan Ullah Shah ,Syeda Fatima Gillani ,Azmat Jadoon ,Umara Hafeez ,Izhar ud Din	
<b>Prevalence of Migraine, Its Related Disabilities and Its Impact On Quality of Life in Undergraduate Students of Private Universities of Peshawar</b>	<b>230</b>
Ibrahim Khan, Saba Amin, Baz Meer Afridi, Khula Fareed, Hadiqa Khan, Syed Wasi Ullah, Shah,Muhammad Irshad, Farhad Ali	
<b>Evaluation of Cardiorespiratory Endurance and Core Endurance among Young Adults of Rawalpindi &amp; Islamabad</b>	<b>236</b>
Zoha Sabir, Mayya Firdous, Hania Tariq, Maria Hussain, Rafia Khawar, Visha Waheed	



## **CASE REPORT**

**Correction of Lateral Trunk Shift in Lumbar Disc Herniation Using Positional      244**

**Opening and McKenzie Lateral Principle. A Case Report**

Naeem Ullah ,Siddra Yasir ,Mahnoor Alam ,Mukhlis Khan, Aizaz Ullah Khan, Hafsa  
Shahzada Khan

## Original Article

# Functional Outcomes of Patellar Tendon Bearing Brace in the Management of Tibial Shaft Fractures

Benish Ali,<sup>1</sup> Sharia Babar,<sup>2</sup> Bakhtawar Qaiser,<sup>3</sup> Rimsha Rani,<sup>4</sup> Aman Zahra,<sup>5</sup> Sadaqat Ali<sup>6</sup>

## Abstract

**Objective:** To evaluate the functional and radiological effectiveness of PTB bracing in closed tibial shaft fractures at National Orthopedic and General Hospital, Bahawalpur.

**Study design:** It was a Single group Pretest-posttest experimental study.

**Place and duration of study:** The study was conducted at National Orthopedic and general hospital of Bahawalpur from February to July 2025.

**Material and Methods:** In this experimental study, 30 participants with closed, minimally displaced injuries of the tibial shaft followed by PTB brace were recruited by using convenience sampling technique. Data was collected by measuring ROM at knee joint and fracture healing with the use of Radiographic Union Scale of Tibial Fractures (RUST). Data was analyzed by using SPSS. Paired t test was used to measure the changes between pre and post-intervention.

**Results:** Among the participants, the highest percentage belonged to the 25–35-year age group (53.3%), while road traffic accidents accounted for 43.3% of all tibial shaft fracture cases. The mean knee flexion showed a significant improvement from a baseline of  $99.33 \pm 14.60^\circ$  to  $106.73 \pm 11.80^\circ$  after one month ( $p < 0.001$ ). Similarly, the mean RUST score increased significantly from  $1.77 \pm 0.62$  to  $3.17 \pm 0.62$  ( $p < 0.001$ ).

**Conclusion:** When bracing is applied, PTB achieves a significant increase in functional mobility as well as faster healing of fractures in stable tibial shaft fractures. It also offers an alternative option to surgical management.

**Keywords:** Patellar tendon bearing brace; Tibial shaft fracture; Functional outcome; Radiographic Union Scale for Tibial fractures (RUST); Knee range of motion; Non-operative treatment

## 1. Introduction

The tibia that is known as the shinbone. It is the largest and strongest of lower leg. It plays a crucial role in weight bearing and mobility.<sup>(1)</sup> It helps as a vital structural link between the knee and ankle joints. Tibia also ensures stability and movement.<sup>(2)</sup> Tibial fractures are the most commonly up fractures which are affecting mobility and function. These fractures can outcome from high energy trauma such as motor vehicle accidents, sports injuries, or falls from major heights.<sup>(3)</sup> On the other hand low energy fractures such as stress fractures are caused by continuous mechanical stress and are commonly observed in athletes, military personnel, and individuals engaged in physically demanding labor.<sup>(4)</sup>

A tibial fracture causes severe pain, swelling and tenderness that are often accompanied by an inability of weight bearing, deformity and bruising. In severe cases, an open fracture may occur where the broken bone pieces within the skin increasing the risk of infection. It is also causes limited range of motion in the knee or ankle joint. The management of fractures depend on the severity and stability of the fracture. The complex and unstable fractures need surgical intervention which includes intramedullary nailing, plating or external fixation.<sup>(5)</sup> However, the stable and minimally displaced fractures can be managed by non-surgical methods that are closed reduction and immobilization.

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The PTB brace is used to reduce the load from tibia by shifting it through patellar tendon. It is composed of lightweight materials like thermoplastics and carbon fiber. It has padded linings to ensure the comfort and long lasting use. PTB is custom fitted in rehabilitation centers. It is used to provide proper support which allows natural knee movement and also maintains the joint alignment. PTB helps patients to walk with confidence.<sup>(7)</sup> The PTB brace is mostly used for tibial fractures, stress fractures, and post-surgical recovery. It also allows the low impact activities like walking. PTB helps in slow weight bearing, provides mobility while reducing the complications. Furthermore, it plays a significant role in post-surgical rehabilitation within trauma units and rehabilitation centers. It helps the patients safely return to their daily routines, including work and sports activities.<sup>(8)</sup>

Tibia shaft fractures are most common and can severely affect the ability to walk. Managing them effectively is important to restore the mobility. Surgical treatment are effective but are costly and are not always easily available in limited resource environment. On the other hand, long term use of casting can cause stiffness, muscle loss, and delayed healing. The Patellar Tendon Bearing (PTB) brace is a non-surgical cost effective option. It reduces the pressure from the tibia, allow early movement and improves comfort during recovery. The purpose of this study is to close that gap. By evaluating real patients in multiple hospitals, this research will provide useful insights for improving rehabilitation strategies. It can also help to tell the importance of PTB braces in both public and private healthcare settings. For orthotics and prosthetics professionals understanding the practical benefits of PTB bracing helps to cover the gap between theory and real world patient care.

## 2. Materials & Methods

This experimental study was performed at the National Orthopedic and General Hospital, Bahawalpur, over a period of six months. A total of 30 participants were selected using convenience sampling at National Orthopedic and General Hospital, Bahawalpur.

**Inclusion Criteria** Patients above 18 years of age, Able to understand and communicate in the local language, Misplaced or minimally displaced tibial shaft fractures, Both males and females **Exclusion Criteria:** Open fractures, Fractures associated with neuro-vascular complications, Patients with poly trauma, chronic illness, those who were bedridden

Ethical approval was obtained from the Departmental Ethical Committee of the Orthotics and Prosthetics Department, Government College University, Faisalabad. Informed written consent was collected from all participants prior to enrollment. Each participant underwent treatment with a Patellar Tendon Bearing (PTB) brace. To assess the effectiveness of the intervention, two follow-up assessments were conducted. The first assessment was conducted at the time of brace application and the second after the one month. The range of motion (ROM) of the knee joint was evaluated using a goniometer which is used to measure functional outcomes, and the Radiographic Union Scale for Tibial Fractures (RUST) was used to measure fracture healing.

Data was analyzed by using SPSS version 23. The demographic data was summarized by using the descriptive statistics. The paired sample t-tests was used to compare ROM and RUST scores before and after the application of brace. Microsoft Word 2007 and Microsoft Excel 2007 was used to present data through charts and graphs. This methodological approach confirm accurate data collection and complete analysis to assess the clinical effectiveness of the PTB brace in rehabilitating tibial shaft fractures.

## 3. Results

This research had a total of thirty participants. Of these, 40% (n = 12) were women and 60% (n = 18) were men. The age range was 25 to 45 years, with the 25–35 age group making up the majority (53.3%, n = 16), followed by the 36–45 age group (46.7%, n = 14). Road traffic accidents accounted for 43.3% of all injuries (n = 13), followed by falls (30%, n = 9), work-related injuries (20%, n = 6), and sports injuries (3.3%, n = 1).

The demographic characteristics of the study participants are presented in Table 1.

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	18	60
	Female	12	40
Cause of Injury	Road Traffic Accident	13	43.3
	Fall	9	30
	Work-related Injury	6	20
	Sports Injury	1	3.3

**Table 1. Demographic Characteristics of Participants (n = 30)**

Knee flexion and RUST scores improved statistically significantly between the pre-test and post-test. After one month, the mean knee flexion increased from 99.33° (SD = 14.60) to 106.73° (SD = 11.80),  $t(29) = -4.45$ ,  $p < 0.001$ . In a similar vein, the mean RUST score increased from 1.77 (SD = 0.62) at baseline to 3.17 (SD = 0.62) at follow-up ( $t(29) = -12.33$ ,  $p < 0.001$ ). These findings are summarized in Table 2.

Variables	Pre-Test	Post-Test	t-value	p-value
Knee Flexion	99.33 ±14.60	106.73 ±11.80	-4.45	<0.001
RUST Score	1.77 ±0.62	3.17 ±0.62	-12.33	<0.001

**Table 2. Comparison of Pre- and Post-Test Outcomes (n = 30)**

#### 4. Discussion

This experimental research is aimed to find out the effectiveness of the Patellar Tendon Bearing (PTB) brace in treating tibial shaft fractures without surgery. It concentrated on how well the bone healed and how much knee movement patients regained by using PTB. Using functional braces like the PTB brace is becoming more popular in those region where the surgery is expensive or hard to access. It showed that PTB is

useful for bone healing and as well for knee ROM in patients with tibial shaft fractures.

In this research the RUST score is used which shows the radiological tracks of bone union of tibia that showed a considerable improvement from the baseline to the follow-up period. It is suggesting that functional bracing for tibial shaft fracture is effectively improved the healing process of the bone. Most patients showed the clear callus formation and visible signs of the bone union within a short time after the application of the PTB brace. These result are also in harmony with Mallik et al. (2021) in Odisha, India, who reported an 83% of healing rate within a similar duration using the same functional PTB bracing technique for tibial shaft fractures.<sup>(9)</sup> Similarly, Rezaie et al. (2019) in Iran also found that the functional PTB bracing worked as a reliable conservative approach for getting satisfactory bone union in patients having tibial shaft fractures. Such similar results from different regions strengthen the theory that when PTB is applied under proper clinical supervision and at the appropriate time so the PTB brace can be an effective alternate to surgery in selected cases.

We also find another important improvement in the knee flexion after the patient used PTB brace. At the last follow up most of patient showed normal knee ROM proved that PTB brace did not limit ROM and cause joint stiffness. PTB brace promotes early walking which supports rehabilitation and maintain the muscle around the knee joint. These results also align with findings of Mallik et al. and Rezaie et al., who also concluded that the use of PTB braces is good for joint flexibility and for their functional performance.<sup>(9)</sup> PTB brace should be applied to patient after the initial swelling phase so that it promotes early mobility which cause patient to do their daily activities with less functional impairment.

The advantages of wearing PTB brace is observed in both radiological and functional outcome which tells us that it provide stability to support bone healing also maintaining the joint mobility. It is provide a stable balance between immobilization and movement which is a key factor that contributes to success of PTB functionality in managing long bone fractures. Furthermore PTB is cost effective with non-invasive

design that makes it practical choice in areas with limited resources.

The results of this research goes well with current researches which conclude that PTB helps to maintain proper alignment and support weight bearing. Both are the main factor in bone healing. This shows the both assessment of radiological union and knee flexion. This increases walking confidence and smooth rehabilitation. Conclusion is that PTB brace is used as better conservative option managing tibial shaft fracture.

Though, it is so difficult to educate the patient and line up their regular follow ups during bracing. Application of brace and how much weight to bear also the maintenance of brace influence on healing outcomes. Wrong use of brace may slow recovery and can cause minor complications. . Previous research by Mallik et al. and Rezaie et al. supports this by highlighting that patient obedience plays a major role in the success of conservative treatment.<sup>(9)</sup>

### Conclusion:

The purpose of the study was to establish whether Patellar Tendon Bearing (PTB) brace was effective in facilitating functional and bone healing recovery in patients with stable and closed tibial shaft fracture. The results are a clear indication that the PTB brace is effective not only during the process of physical recovery, but also during increasing knee mobility under less pain without surgery. The majority of the participants were young men between 21-40 years. A working group with a particular interest in affordable treatment is of the paramount importance. There was a significant improvement in the mobility of the knee joint and bone recovery, which was measured in terms of ROM and RUST scores. During the rehabilitation, patients complained that the pain had decreased and the mobility was gained earlier, which helped to improve the comfort and self-confidence. These findings indicate that the PTB brace does not only assist in bone healing; it also helps in faster and easier recovery to normal life with minimum complications.

Comprehensively, this paper illuminates the PTB brace as a viable, convenient and affordable way of conservatively treating tibia shaft fractures, especially

where surgical services are minimal. In addition to recovery of functionality, it assists patients to recover quickly and move earlier due to increased functionality and autonomy.

### Disclosure /Conflict of interest:

Authors declare no conflict of interest.

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## Original Article

# Relationship of Personal and Social Factors with Academic Performance of Undergraduate Nursing Students

Jamila Bibi,<sup>1</sup> Gideon Victor,<sup>2</sup> Khairunnisa Dhamani,<sup>3</sup> Faisal Aziz<sup>4</sup>

## Abstract

**Objective:** The current study aimed to measure the relationship between baccalaureate nursing students' academic performance, measured in terms of cumulative grade point average (CGPA), and personal and social factors

**Study Design:** A cross-sectional study was conducted.

**Place and duration of study:** A cross-sectional study was conducted on 160 undergraduate baccalaureate nursing students from a private college of nursing, Islamabad, Pakistan

**Material and Methods:** A cross-sectional study was conducted on 160 undergraduate baccalaureate nursing students from a private college of nursing, Islamabad, Pakistan. A stratified random sampling technique was used to select the study participants from each academic year.

**Results:** The CGPA of male nursing students was significantly higher than females (3.36 vs. 3.16,  $p < .001$ ). Family monthly income, friends' gender, father's occupation, and semester significantly affected the academic performance ( $p$ -values  $< .05$ ). In addition, family income above 60,000/- PKR ( $p$ -value 0.017) and father's employment ( $p$ -value 0.069) were positively correlated with academic performance.

**Conclusion:** In conclusion, multifaceted nature of factors are influencing nursing students' academic performance, including gender, socioeconomic status, and peer relationships in this study. These findings emphasise the need for tailored support systems and interventions to address disparities and enhance the academic performance of nursing students.

**Keywords:** Academic performance, academic achievement, nursing students, cumulative grade-point average.

## 1. Introduction

The success of any educational institution is measured by its academic performance or how well students meet the standards set out by it" <sup>(1)</sup>. In every educational institute, students' academic achievement is directly related to their growth and knowledge development <sup>(2)</sup>. Thus, students must work hard to achieve satisfactory grades and prepare themselves to tackle professional challenges <sup>(3)</sup> (Alos et al., 2015), which can only be achieved by monitoring the academic performance of learners and supporting them with remediation plan. Academic performance refers to the capacity of students to accomplish different study-related tasks assigned to them by their teachers <sup>(4)</sup>. Students' progress is monitored through various assessment strategies including written tests, vivas, written assignments,

presentations, objective structured clinical examination (OSCE), small group discussions (SGD), problem-based learning (PBL), portfolios, and other home assignments. The success of the learner has great value for parents, faculty, management, and the country. <sup>(5)</sup>Elsabagh and Elhefnawy (2017) also found that teachers may identify alternative interventions to handle students with unsatisfactory academic results. Oducado and Penuela (2014) proposed a formative assessment to monitor students' progress. With this type of assessment, teachers can monitor learners' performance and improve their progress towards summative assessment which is generally one of the final assessments of the learner. <sup>(6)</sup>

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Various factors can lead to unsatisfactory academic performance, causing demotivation and negative psychological effects. Mthimunya and Daniels (2019) stated that a nursing institute's major goal is to identify leading factors of academic failure among students. By identifying such factors, faculty can assist their students in maintaining their academic performance according to the organizational set standards to decrease the attrition rate among nursing students.<sup>(7)</sup> They further suggested monitoring students' progress continuously to identify underperforming students and implement a remedial action plan as soon as possible to ensure the retention and successful completion of the program. The factors affecting academic achievement are demographic characteristics, student-related factors, teachers' competence, resources at school, classroom, home environment, and parents<sup>(3)</sup>. These similar factors may affect students' learning in our context because all the aforementioned factors are related to the background of our students, teachers, the institutional environment, and parents. Some of these factors include qualification (SSC, HSSC) at admission, teacher-student relationships, academic support services, teachers' ability, language of instruction, adequate learning facilities, teaching strategies, and parental involvement. In addition, a study by Dube and Mlotshwa (2018) highlights multiple interrelated factors that influence the academic performance of nursing students, including poor family background, poor metric results, distance to school, medium of instruction, and negative peer group influences.<sup>(1)</sup> In the same study, 55% of the students responded that literate parent can help in their academic achievement and 84% of students responded that teacher support and guidance improved their academic outcomes.

A study conducted by Olufemioladebinu and Adediran (2018) revealed a significant association between the students' socio-economic characteristics including parental background, home-related factors, and students' academic performance, availability of school facilities also showed a significant correlation with academic success ( $p < 0.05$ ). Furthermore, students' reading habits were significantly linked to their academic outcomes, and the effectiveness of teachers

was also found to have a significant impact on students' academic performance ( $p < 0.05$ )<sup>(8)</sup>.

**Rational for Study:** Analysing various factors to improve performance and overcome academic failure among students is a challenging task for educational institutions. This is because of the numerous leading nonacademic factors of unsatisfactory performance for learners. This leads to unsatisfactory academic performance which has a psychological impact on the students through demotivation. This may further cause anxiety and depression, and if remedial actions are not implemented, students may leave the program. Moreover, it creates a financial impact on parents as well as on the organisation. Multiple personal and social factors can hinder students' learning, and these factors may be related to students' academic performance.

## 2. Materials & Methods

A cross-sectional study was conducted on students enrolled in an undergraduate nursing program at a private nursing college in Islamabad, Pakistan. Write a bit about nursing program and its organization!

The Baccalaureate of Science in Nursing Students from Semesters II to VII were included in this study. Students from semesters I and VIII were excluded because they received GPA once their first-semester exams were conducted. Students who had repeated the semester or year of study during their course were also excluded from the study to ensure that all participants are at the same academic level and have had similar educational progression.

An OpenEpi Online calculator was used to calculate the sample size. The total calculated sample size was 151, based on a 95% confidence level and precision level of 5%. The probability of participants' attrition was 10% means  $151 + 15 = 166$ . Therefore, the total sample size of this study was 166 participants.

A stratified random sampling technique was used based on the proportion of BSN students at a private nursing college in Islamabad. In the stratified sampling



technique, stratification decreases sampling error. The stratum was based on Semesters II–VII. After obtaining written approval from the college, a list of students was obtained from the student affairs office. The participants were selected using a simple random technique from the list provided by the students' affair office. In addition, semester coordinators were contacted regarding the schedule and availability of their students. The data collection tool had two parts: demographic profile and personal and social factors that affect students' academic performance. Demographic information consisted of age, gender, sponsorship, residence, motivation to join nursing, involvement in class activities, class attendance, and previous educational background. Parental background and friends' support were also included. The Cumulative Grade Point Average (CGPA) is used as an independent variable, representing the overall academic performance of students throughout their academic program. The CGPA is used to evaluate student academic achievement in educational Institutions in Pakistan on the scale of 4.0, range from 0.00 to 4.00.

Tool reliability was also assessed by pilot testing on 10% of the study participants, who were selected randomly across the program. The sample size for pilot testing was 15 participants, who were excluded from the final study. The constructed variables and tools were reviewed and deemed feasible and appropriate for data collection. Data were entered, coded and analysed using the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics were used to calculate frequencies and percentages for qualitative variables, and quantitative variables were analysed using means and standard deviations to summarize the demographic characteristics. Inferential statistics such as the independent t-test, chi-square test, and Pearson correlation and Univariable and Multivariable mixed linear regression analyses were performed to examine relationships between variables. A significance level of  $p < 0.05$  was considered.

### 3. Results

A total of 160 students participated in the study. The majority of students were female (77.5%), and the mean age was  $21.3 \pm 1.4$  years.

Table 1 presents the demographic characteristics of the participants ( $N=160$ ). The study sample predominantly 77.5% comprised female nursing students compared to their male counterparts, and their mean age was  $21.33 \pm 1.38$  years. Moreover, most of the students (63.12%) were sponsored by the nursing institution, and 58.13% lived in hostels. Regarding motivation to join nursing, 49.38% of the participants chose nursing on their own, while 42.50% had joined nursing on their parents' choice. Regarding friends' support, the results indicated that 42.50% of the participants' friends were mostly supportive during the studies. Regarding educational background, most of the students had passed their SSC (74.38 %) and HSSC (76.25 %) from private institutions. The educational level of fathers was higher than that of mothers. Most mothers (79.75 %) were housewives, whereas fathers (85.53 %) were employed.

Table – 1: Descriptive analysis of demographic, personal and social information of students ( $n = 160$ ).

Characteristics	N	n	Percent (%)
Age – years, Mean $\pm$ SD	160	21.33	$\pm 1.38$
Gender	160		
Male		36	22.50
Female		124	77.50
Total household monthly income – PKR	160		
$\leq 35,000$		43	26.88
$>35,000 - 50,000$		62	38.75
$>50,000 - 60,000$		17	10.62
$>60,000$		38	23.75
Financial sponsorship for Studies	160		
Family		37	23.12
Institution		101	63.12
Both		22	13.75
Living during study period	160		
Home		57	35.63
Hostel		93	58.13
Relatives		10	6.25

Motivation to join nursing	160		
Self		79	49.38
Parents		68	42.50
Friends		13	8.13
Friends' gender	160		
Male		27	16.88
Female		78	48.75
Both male and female		55	34.38
Friends' support for Study	160		
Never		8	5.00
Sometimes		40	25.00
Most of the times		68	42.50
Always		44	27.50
Type of school at SSC	160		
Public		41	25.62
Private		119	74.38
Type of school at HSSC	160		
Public		38	23.75
Private		122	76.25
Parents living Status	160		
Both alive		138	86.25
Single parent		22	13.75
Mothers' education	160		
No formal education		58	36.25
SSC/Matric		42	26.25
HSSC/Intermediate		28	17.50
Graduation		19	11.88
Masters		8	5.00
Others		4	2.50
Father education	160		
No formal education		20	12.50
SSC/Matric		62	38.75
HSSC/Intermediate		27	16.88
Graduation		23	14.37
Masters		22	13.75
Others		6	3.75
Mother occupation	158		
Housewife		126	79.75
Employed		32	20.25
Fathers' occupation	159		
Unemployed		23	14.47
Employed		136	85.53
Study semester			

2 <sup>nd</sup>		31	19.38
3 <sup>rd</sup>		34	21.25
4 <sup>th</sup>		30	18.75
5 <sup>th</sup>		32	20.0
7 <sup>th</sup>		33	20.62

SSC: Secondary School Certificate, HSSC: Higher Secondary School Certificate, PKR: Pakistan Rupees, SD: Standard Deviation

Qualitative variables are presented as frequencies and percentages. Quantitative variables are presented as Mean  $\pm$ SD.

Table 2 depicts a comparison of students' performance (CGPA) with their demographic characteristics. According to the analysis, the mean CGPA of male students was significantly higher than that of female students (3.36:3.16, P-Value .001). In addition, the income range PKR 35000-50000 was significant (3.22, P-Value .017), followed by gender of friend (3.22, P-Value .001), occupation of father (3.23, P-Value .069), and semester-III (3.38, P = .001).

Table – 2: Comparison of students' characteristics with cumulative GPA

	Variables	Cumulative GPA		
		n (%)	Mean $\pm$ SD	P-value
Age – r		160	-0.17	0.033*
Gender	Male	36 (22.5)	3.36 $\pm$ 0.26	0.001*
	Female	124 (77.5)	3.16 $\pm$ 0.33	
Total household monthly income – PKR	$\leq$ 35,000	43 (26.9)	3.10 $\pm$ 0.34	0.017*
	>35,000 – 50,000	62 (38.8)	3.22 $\pm$ 0.30	
	>50,000 – 60,000	17 (10.6)	3.18 $\pm$ 0.34	
	>60,000	38 (23.8)	3.33 $\pm$ 0.33	
Financial Sponsorship	Family	37 (23.1)	3.26 $\pm$ 0.27	0.168

for studies	Institution	101 (63.1)	3.21 $\pm$ 0.34	
	Both	22 (13.8)	3.10 $\pm$ 0.34	
Living during study period	Home	57 (35.6)	3.21 $\pm$ 0.31	0.456
	Hostel	93 (58.1)	3.19 $\pm$ 0.35	
	Relatives	10 (6.3)	3.33 $\pm$ 0.22	
Motivation to join nursing	Self	79 (49.4)	3.23 $\pm$ 0.32	0.427
	Parents	68 (42.5)	3.20 $\pm$ 0.34	
	Friends	13 (8.1)	3.10 $\pm$ 0.27	
Friend's gender	Male	27 (16.9)	3.40 $\pm$ 0.28	0.001*
	Female	78 (48.8)	3.13 $\pm$ 0.36	
	Both	55 (34.4)	3.22 $\pm$ 0.27	
Friend's support for study	Never	8 (5.0)	3.23 $\pm$ 0.28	0.813
	Sometimes	40 (25.0)	3.24 $\pm$ 0.38	
	Most of the times	68 (42.5)	3.21 $\pm$ 0.33	
	Always	44 (27.5)	3.17 $\pm$ 0.29	
Type of school at SSC	Public	41 (25.6)	3.25 $\pm$ 0.34	0.309
	Private	119 (74.4)	3.19 $\pm$ 0.33	
Type of school at SSC	Public	38 (23.8)	3.18 $\pm$ 0.33	0.500
	Private	122 (76.3)	3.22 $\pm$ 0.33	
Parents' living status	Both alive	138 (86.3)	3.21 $\pm$ 0.33	0.837
	Single parent	22 (13.8)	3.20 $\pm$ 0.31	
Mother' education	No formal education	58 (36.3)	3.22 $\pm$ 0.35	0.698
	SSC	42 (26.3)	3.17 $\pm$ 0.33	

	HSSC	28 (17.5)	3.24 $\pm$ 0.31	
	Graduation	19 (11.9)	3.14 $\pm$ 0.32	
	Masters	8 (5.0)	3.34 $\pm$ 0.19	
	Others	4 (2.5)	3.25 $\pm$ 0.32	
Father's education	No formal education	20 (12.5)	3.12 $\pm$ 0.32	0.430
	SSC	62 (38.8)	3.18 $\pm$ 0.35	
	HSSC	27 (16.9)	3.28 $\pm$ 0.37	
	Graduation	23 (14.4)	3.20 $\pm$ 0.30	
	Masters	22 (13.8)	3.29 $\pm$ 0.27	
	Others	6 (3.8)	3.19 $\pm$ 0.29	
Mother' occupation	Housewife	125 (78.1)	3.19 $\pm$ 0.35	0.116
	Employed	32 (20.0)	3.29 $\pm$ 0.24	
Father's Occupation	Unemployed	22 (13.8)	3.06 $\pm$ 0.40	0.069
	Employed	136 (85.0)	3.23 $\pm$ 0.31	
Semester	2 <sup>nd</sup>		3.33 $\pm$ 0.25	<0.001*
	3 <sup>rd</sup>		3.38 $\pm$ 0.34	
	4 <sup>th</sup>		3.05 $\pm$ 0.34	
	5 <sup>th</sup>		3.12 $\pm$ 0.26	
	7 <sup>th</sup>		3.16 $\pm$ 0.33	

Table 3 depicts a simple linear mixed regression to predict the association between factors (related to students', parents, home) and students' academic performance. Based on the results of the current study, age was not significantly associated with academic performance ( $r = 0.02$ , 95% confidence interval (CI) = -0.06–0.03,  $p$ -value = 0.440). A significant correlation ( $r = -0.17$ , 95% CI -0.28–0.06,  $p$ -value = 0.004) was found between gender and academic performance of the nursing students. Income was significantly ( $r = -0.14$ , 95% CI = 0.02 – 0.25,  $p$ -value = 0.022) correlated with the academic performance of nursing students. Similarly, the employment status of the parents had a significant effect ( $r = -0.17$ , 95% CI = 0.03–0.31,  $p =$

0.015) on learners' grades. Moreover, friends' gender was also correlated with students' academic performance: students who have male friends have greater CGPA ( $r=0.25$ , 95% CI= 0.11 – 0.38,  $p$ -value  $<0.001$ ) along with having both male and female friends ( $r=-0.11$ , 95% CI= 0.01 – 0.21,  $p$ -value= 0.039). In addition, friends' CGPA also correlated with students' academic performance: students who had male friends had greater CGPA ( $r=0.23$ , 95% CI= 0.09 – 0.38,  $p$ -value=  $<0.002$ )

Table 3: Univariable and Multivariable mixed linear regression analyses of cumulative GPA with selected variables.

Factors	Simple regression		Multiple regression	
	Coef. (95% CI)	P-value	Coef. (95% CI)	P-value
Age	0.02 (-0.06 – 0.03)	0.447	-0.02 (-0.06 – 0.02)	0.330
Gender				
Male	Reference		Reference	
Female	-0.17 (-0.28 – -0.06)	0.004*	-0.01 (-0.16 – 0.15)	0.941
Total household monthly income – PKR				
≤35,000	Reference		Reference	
>35,000 – 50,000	0.14 (0.02 – 0.25)	0.022*	0.09 (-0.02 – 0.20)	0.122
>50,000 – 60,000	0.13 (-0.04 – 0.30)	0.136	0.15 (-0.01 – 0.31)	0.076
>60,000	0.24 (0.11 – 0.37)	$<0.001$ *	0.20 (0.07 – 0.33)	0.003*
Fathers' occupation				

Unemployed	Reference		Reference	
Employed	0.17 (0.03 – 0.31)	0.015	0.13 (0.01 – 0.26)	0.041*
Friends' gender				
Female	Reference		Reference	
Male	0.25 (0.11 – 0.38)	$<0.001$ *	0.13 (-0.05 – 0.32)	0.164
Both (male and female friends)	0.11 (0.01 – 0.21)	0.039*	0.06 (-0.05 – 0.16)	0.275
Friend's CGPA	0.23(0.09 – 0.38)	0.002*	0.18(0.03 – 0.32)	0.015*
GPA: Grade Point Average, CI: Confidence Interval				

Multiple mixed linear regression (Table 3) showed that income was not significantly ( $r=-0.15$ , 95% CI= -0.01 – 0.31,  $p$ -value= 0.076) positively correlated with the academic performance of nursing students. Likewise, income greater than PKR 60, 000/- was also significantly correlated with performance ( $r=0.20$ , CI=0.07-0.33),  $p=0.003$ ). Another factor that showed significant results was the employment of the father of a student, where ( $r=0.13$ , CI=0.01-0.26, and  $p$ -value=0.041). Moreover, friends' CGPA was also significant with the performance of nursing students ( $r=0.18$ , CI=0.03-0.32, and  $p$ -value=0.015).

#### 4. Discussion

This study aimed to measure the relationship between personal and social factors affecting the academic performance of generic baccalaureate nursing students at a private nursing college. Associations were measured between students' academic grades and their demographic characteristics, personal habits, parents'

backgrounds, and home-related factors. The findings revealed a correlation between the aforementioned factors and students' academic scores. This correlation was evident between family income, fathers' occupation, and friends' support for students' CGPA.

The main demographic characteristics of the current study revealed that, out of 160 students, most (77.5%) were female. These findings are consistent with those of Khatun et al. (2020), who found that 97.6% of the participants were female <sup>(9)</sup>. In line with these two studies (Alshammari et al., 2017; George et al., 2017), there were more female students (61.7%) in their quantitative-correlational study design with n=201, and 38.3% of male participants. <sup>(10,11)</sup> However, this study found a comparatively higher number of male nursing students. In addition, a correlational study conducted by Elmalky et al. (2019) found a greater number of female participants (82%) <sup>(12)</sup>. Therefore, it is evident that the proportion of women in the nursing profession is greater than male. However, it also depends on the organizational policy that 80% of seats are for female students and only 20% for male students. Less than 10% of male nurses are in the workforce of developing countries; hence, male students should be given more academic support to increase the number of registered male nurses in the nursing profession (Alshammari et al., 2017) <sup>(10)</sup>. Recruitment of more men in nursing is also important to address the shortage and attain a better balance and diversity in the nursing profession, as research indicates a patient demand for male nurses <sup>(13)</sup>. This also highlights that female students are more likely to be enrolled in nursing education than male students. Therefore, the data should be carefully inferred for sex comparisons.

The age at which the initial analysis showed was significantly associated with academic performance; however, further analysis at the level of multiple linear regression showed that age was not significant. This was in agreement with the existing studies conducted by Alshammari et al. (2017) and Kaliyaperumal et al. (2020), who also revealed that age has no significant effect on the academic achievement of learners. <sup>(10,14)</sup> This may be because there was a very small difference

(20–24 years) in the ages of the participants. It is possible that the students shared similar age group characteristics because of the small variation in their age. However, Thomas et al. (2018) disagree with this claim that age is significantly related to students' academic achievement <sup>(15)</sup>. Notably, academic competence was positively linked to the academic performance of nursing students in this study. Cognitive level, understanding of nursing concepts, and appropriate use of learning resources could affect the academic performance of nursing students.

In the context of gender, the findings from the current study revealed that male students' CGPA was significantly higher than that of female students. This finding is also supported by the findings of Alshammari et al. (2017) <sup>(10)</sup>. Being a minority in nursing, male nursing students may put more effort into performing better, become visible, and prove their worth in the nursing profession. However, the current findings contradict those of Khatun et al. (2020), who revealed that female students' academic achievement was significantly higher than that of male students <sup>(9)</sup>. This may be because both males and females have different educational and economic backgrounds, with varied educational resources at home and at institutions. Elmalky et al. (2019) reported that sex was not significantly associated with the academic performance of nursing students. This result may be due to the small number of male participants in the current study (22.5 %).

Moreover, in the current study, parents' monthly income ranged from Rs 35000-50000 and Rs 50000-60000 was significantly correlated with the academic performance of nursing students. These findings are supported by various studies showing that high monthly income has a positive correlation with learners' academic achievements <sup>(1,9)</sup>. The reason for these findings may be that families with a good income may provide their children with facilities for studies. To fulfil educational needs can lead to emotional wellbeing of learner however, financial issues in the family cause distress in learners which effect cognitive abilities and physical health as well <sup>(16)</sup>. The resources needed for

educational achievement are important to obtain good grades, and a lack of resources can have a negative impact on learners' achievement. Elmalky et al. (2019) found no significant relationship between family income and the psychological well-being of nursing students. The study conducted by Alshammari et al. (2017) also reported that the socioeconomic status of learners does not affect their academic achievement. Perhaps, students who receive financial aid and scholarships do not feel stress regarding economic issues. Consequently, they can focus on academic performance. The National Endowment Scholarship for Talent (NEST) is a recent initiative and an example of such financial support programs to support nursing students (Nursing Scholarship Program, 2021).

Similarly, fathers' occupations had a significant effect on students' academic performance. Perhaps fathers' employment leads to good income and the availability of educational resources needed at home. The current study also revealed the higher grades of students who lived near college compared to those who lived far from college. Ease of access to college and learning resources plays an important role in positively impacting academic performance. In addition, it saves time and the cost of travel. Accessibility of students who live far away from the college may be affected by heavy traffic, long distance, and time to political situations and/or protests <sup>(3,1,8)</sup>.

This study found a significant correlation between the CGPA of students and that of their friends. Generally, friends' CGPA scores were higher. This finding is consistent with a number of studies reporting that peer attachment and peer support significantly affect academic performance <sup>(17,18)</sup>. pointed out that peers can negatively influence academic performance. Therefore, the characteristics and roles of peers are important factors in student performance <sup>(1)</sup>. Current research found that the CGPA of students who had male friends was higher, and the CGPA of male nursing students was generally high. Perhaps sociocultural dynamics in Pakistan allow ease of interaction, communication, and friendliness with the same gender. Furthermore, males being a minority in nursing could have developed a

sense of support for their male colleagues. A systematic review of qualitative studies highlighted that peer learning and support enhance cognitive skills, acquire technical skills, enhance confidence, increase communication skills, obtain emotional support, and gain socialisation which in turn contribute to personal and professional development <sup>(19)</sup>. Additionally, Liu et al. reported in their research that male nursing students presented greater critical thinking than their counterparts. Perhaps due to the above-mentioned factors, the academic performance of male students and their peers was high <sup>(20)</sup>.

### Strengths and Limitation of the Study

The current study has some strengths in that there were limited published studies in Pakistan which assessed the factors affecting academic performance of nursing students with a generic bachelor's degree. Therefore, the findings from the current study could help students, parents, teachers, and nursing institution administrators analyse various factors that minimise students' learning. Moreover, the stratified sampling technique was another positive aspect of this study, which prevented selection bias in participant recruitment.

This study had certain limitations. First, the current study was limited to only one setting; therefore, the findings should be generalised with caution. In addition, the study questionnaire was self-administered; therefore, chances of response bias were present. Moreover, the study was conducted at a private nursing college with sufficient resources; therefore, its generalisability is limited to underprivileged colleges of nursing in the public sector.

### Conclusion:

The findings of this study provide valuable insights into the factors that influence the academic performance of nursing students. Male students demonstrated significantly higher CGPA than did female students, highlighting a potential gender disparity in academic achievement. Socioeconomic factors, particularly family income and fathers' occupation, emerged as significant predictors of academic success.

Additionally, the influence of peer relationships, as indicated by friends' gender and progression through semesters, were found to impact academic outcomes. These results underscore the complex interplay between demographic, social, and economic factors in shaping students' academic performance. Further research is warranted to explore the underlying mechanisms of these relationships and develop targeted interventions that can support all nursing students in achieving their full academic potential.

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Authors declare no conflict of interest.

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## Original Article

# Doomscrolling and Existential Anxiety among Emerging Adults in Pakistan: Moderating Role of Cognitive Reappraisal

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## Abstract

**Objective:** This study aimed to examine the moderating role of cognitive reappraisal on the relationship between doomscrolling and existential anxiety among emerging adults in Pakistan.

**Study design:** It was cross-sectional study.

**Place and duration of study:** The study was conducted at National Orthopedic and general hospital of Bahawalpur from February to July 2025.

**Material and Methods:** A cross-sectional research design was employed. A total of 323 participants (125 men, 198 women) aged 18–29 years were recruited from Islamabad and Rawalpindi, Pakistan. Participants completed the Doomscrolling Scale (Sharma et al., 2022), the Emotion Regulation Questionnaire – Cognitive Reappraisal Subscale Short Form (Preece et al., 2023), and the Existential Anxiety Questionnaire (Weems, 2024).

**Results:** Correlational analyses indicated a significant positive relationship between doomscrolling and existential anxiety. However, cognitive reappraisal did not significantly moderate the association between doomscrolling and existential anxiety or its subscales.

**Conclusion:** These findings suggest that the ability to use cognitive reappraisal in response to emotionally challenging situations, such as exposure to negative social media content, may be limited among Pakistani emerging adults. Cultural norms surrounding emotional expression and regulation may influence these outcomes, resulting in inconsistent moderation effects. The study highlights the need to consider cultural and contextual factors when evaluating emotion regulation strategies in digital media contexts.

**Keywords:** Doomscrolling, Existential Anxiety, Cognitive Reappraisal, Emerging Adults

## 1. Introduction

Doomscrolling, a pattern of excessive engagement with negative news that gained prominence during the COVID-19 pandemic, has been linked to heightened anxiety, hopelessness, and rumination as a result of prolonged exposure to distressing, algorithm-driven content on social media <sup>1,2,3</sup>. Despite growing evidence of its adverse mental health effects, the relationship between doomscrolling and existential anxiety remains underexplored, particularly within the cultural context of Pakistan.

Existential anxiety, an in-depth psychological experience involving harsh or threatening information <sup>4</sup>, characterized by death fear, meaninglessness, and guilt was acknowledged. This anxiety leads to higher stress

and lower quality of life <sup>5</sup>. Being a country that suffers from both extreme sociopolitical and global crises that are live on digital platforms, emerging adults in Pakistan may be particularly susceptible to such anxieties.

Cognitive reappraisal is thought of as adaptive, where you reformulate your thoughts to change the emotional impact of them. Emotion regulation is a useful tool to prevent anticipatory anxiety and serves as a shield against emotional exhaustion that eventually decreases in the overall state of well-being <sup>6</sup>. Nevertheless, if maladaptive emotional regulation occurs cognitive strategies are used that negatively affect overall well-

strategies are used that negatively affect overall well-being, which is connected to excessive negative news consumption<sup>7</sup>.

Cognitive Appraisal Theory<sup>8</sup>, which provides a framework for understanding how individuals perceive, evaluate, and respond to stressful or threatening situations. According to this theory, stress arises not solely from the situation itself but from an individual's appraisal of its threat level and their perceived ability to cope with it.

In the context of doomscrolling, repeated exposure to negative news and distressing information magnifies perceived threats, triggering maladaptive cognitive patterns such as rumination, pessimistic thinking, and feelings of hopelessness, which have been linked to adverse psychological outcomes. Doomscrolling has been shown to predict elevated levels of existential anxiety and existential concerns, including worries about life's meaning and mortality, across diverse cultural samples<sup>9</sup>. Although adaptive coping strategies particularly cognitive reappraisal, which involves reinterpreting a situation to reduce its emotional impact can help alleviate some negative psychological effects by reshaping how stressors are perceived, research suggests that the effectiveness of cognitive reappraisal may be limited in counteracting the pervasive and cumulative stress associated with habitual exposure to negative digital content<sup>10,11</sup>. This underscores the complex interplay between individual appraisal processes, coping resources, and the psychological consequences of persistent exposure to adverse information.

## 2. Materials & Methods

### Objective

To explore doom scrolling, existential anxiety, and cognitive reappraisal among emerging adults.

### Hypotheses

1. Doom Scrolling is positively related to existential anxiety among emerging adults.

2. Cognitive reappraisal moderates the relationship between doomscrolling and existential anxiety.

### Participants

The sample comprised 323 emerging adults (125 men, 198 women) aged 18–29 years, recruited from Islamabad and Rawalpindi. Participants were selected from Islamabad and Rawalpindi through non-probability Convenience sampling. An informed consent form was given to participants before data collection. The objectives and procedures of the research were explained, and participants were assured that they could withdraw from the study at any time without consequence. They were informed about the confidentiality and anonymity of their responses. Inclusion criteria required participants to be within the age range and have at least intermediate education; those outside the age range were excluded. All APA guidelines and ethical considerations were kept in mind.

### Instruments

#### Doomscrolling Scale (Sharma et al., 2022)

A Doomscrolling Scale was used to assess the tendency to engage in prolonged exposure to negative online content. The 15-item scale is a self-reported measure, using a 7-point Likert scoring system. Higher scores reflect greater doomscrolling tendencies. Cronbach's  $\alpha$  in this study = .96<sup>12</sup>.

#### Emotion Regulation Questionnaire–Short Form (ERQ–SF) (Preece et al., 2023)

The ERQ-S was developed by Preece et al. (2023) as a 6-item, rated on a 7-point Likert scale, short form of the original Emotion Regulation Questionnaire<sup>10</sup>. Emotional regulation subscale cognitive reappraisal was used to measure cognitive reappraisal. Higher subscale scores indicate greater use of the respective strategy. The ERQ-S demonstrates strong psychometric properties, with Cronbach's alpha of 0.87 for cognitive reappraisal<sup>13</sup>.

#### Existential Anxiety Questionnaire (EAQ) (Weems, 2024)

The Existential Anxiety Questionnaire consists of 13 items and is a binary scale. A multidimensional measure with three subscales: Fate and Death, Emptiness and Meaninglessness, and Guilt and Condemnation. Higher scores indicate greater existential anxiety. EAQ shows internal consistency  $\alpha = 0.71$ <sup>14</sup>.

### 3. Results

*Bivariate Correlation Between Doom Scrolling, Emotional Regulation (Cognitive Reappraisal), and Existential Anxiety (Fate and death, Emptiness and meaninglessness, and Guilt and condemnation) (N = 323)*

Variables	1	2	3	4	5	6	7
<b>1.Doomscrolling</b>	-	.12*	-.54**	.71**	.70**	.66**	.46**
<b>2. Emotional Regulation</b>		-	.49**	.01	.00	.06	-.02
Cognitive Reappraisal			-	-.62**	-.59**	-.51**	-.49**
<b>4. Existential Anxiety</b>				-	.91**	.84**	.79**
Fate and Death					-	.76**	.56**
Emptiness and Meaninglessness						-	.44**
Guilt and Condemnation							-

Table 1 shows that doomscrolling is positively related to existential anxiety and all of its subscales (fate and death, emptiness and meaninglessness, and guilt and condemnation), while being negatively related to cognitive reappraisal, an emotional regulation strategy. Emotional regulation is positively associated with cognitive reappraisal but demonstrates minimal association with existential anxiety, except for a negative relationship with guilt and condemnation. Cognitive reappraisal is negatively associated with existential anxiety and each of its subscales. Moreover, the subscales of existential anxiety exhibit strong positive intercorrelations.

Moderation Analysis Examining the Interaction Effect of Doomscrolling and Existential Anxiety (Fate and Death) (N=323)

Variable	<i>Fate and Death</i>			
	<i>B</i>	<i>t</i>	95% CI	
Constant	3.21	5.13	1.98	4.44
Doomscrolling	.03	3.55	.01	.04
cognitive reappraisal	-.13	-3.24	-.21	-.05
DST x CR	.00	.78	-.00	.00
R <sup>2</sup>	.55			
F	132.89			

Note. CI= Confidence Interval, UL= Upper Limit, LL= Lower Limit

The results indicate the Cognitive Reappraisal does not significantly moderate the relationship between doomscrolling and the existential anxiety subscale, Fate and death.

Table 3

Moderation Analysis Examining the Interaction Effect of Doomscrolling and Existential Anxiety (Emptiness and meaninglessness) (N=323)

Variable	<i>Emptiness and meaninglessness</i>			
	<i>B</i>	<i>t</i>	95% CI	
Constant	1.89	3.58	.85	2.92
Doomscrolling	.02	3.07	.00	.03
cognitive reappraisal	-.09	-2.61	-.16	-.02
DST x CR	.00	.98	-.00	.00
R <sup>2</sup>	.47			
F	96.44			

Note. CI= Confidence Interval, UL= Upper Limit, LL= Lower Limit

The results indicate the Cognitive Reappraisal does not significantly reduce emptiness and meaninglessness.

Table 4

Moderation Analysis Examining the Interaction Effect of Doomscrolling and Existential Anxiety (Guilt and condemnation) (N=323)

Variable	Guilt and condemnation			
	B	T	95% CI	
			LL	UL
Constant	2.23	3.08	.81	3.65
Doomscrolling	.02	2.61	.00	.03
cognitive reappraisal	-.06	-1.42	-.16	.02
DST x CR	-.00	-.87	-.00	.00
R <sup>2</sup>	.29			
F	45.21			

Note. CI= Confidence Interval, UL= Upper Limit, LL= Lower Limit

The results indicate that Cognitive Reappraisal does not significantly moderate the relationship between Doomscrolling and the existential anxiety subscale Guilt and condemnation.

4. Discussion

The present study examined the association between doomscrolling and existential anxiety, including its subdimensions, and further explored whether the emotion regulation strategy of cognitive reappraisal moderated this relationship among emerging adults. Consistent with the first hypothesis, the findings demonstrated a significant positive relationship between doomscrolling and existential anxiety. Specifically, individuals who engaged more frequently in doomscrolling reported elevated levels of existential anxiety. Continuous exposure to distressing global events appears to heighten awareness of pervasive threats and uncertainties, thereby intensifying existential concerns such as fear of death and difficulty in deriving meaning from life. These findings are consistent with prior research by Shabahang et al. (2024), which showed that prolonged exposure to negative news content amplifies existential distress. Moreover, the results align with Terror Management Theory <sup>15</sup>, which posits that repeated reminders of mortality can intensify anxiety related to life’s meaning and future uncertainty. Doomscrolling was also strongly associated with the core dimensions of existential anxiety—namely, emptiness and meaninglessness, fate and death, and guilt and

condemnation—suggesting that the distress linked to doomscrolling reflects profound concerns about purpose, mortality, and personal responsibility rather than transient or superficial worry.

In the context of doomscrolling, this indicates that the way individuals regulate their emotions when encountering online content may be as critical as the frequency of their exposure. This hypothesis was tested by analyzing the moderating role of cognitive reappraisal that is a component of emotional regulation. The results offered partial support for this hypothesis, indicating that the moderating effects varied depending on the specific sub-dimension of existential anxiety.

Cognitive reappraisal served as a moderator; the interaction effects of doomscrolling by existential anxiety were not statistically significant. This implies that the relationship between doomscrolling and existential anxiety has not changed much in terms of cognitive reappraisal. The lack of consistent moderation by cognitive reappraisal suggests that cognitive processes are not adequately engaged or do not provide effective coping for existential concerns in Pakistani society. However, the reappraisal also necessitates metacognitive skills and emotional awareness that are not systematically fostered in Pakistani education or parenting styles. Even when reappraised, such fears (e.g., death, guilt) can be so profound that even the more adaptive strategies may not be strong enough to hold them at bay in the face of powerful cultural messages (e.g., fear of hell, family shame, sin). This type of practice might not be fruitful for many individuals cause most of the time they would try to make sense out of stuff using religious phrases rather than understanding what it really means, which may even increase anxiety.

These findings show the multifaceted cultural processes involving existential concerns in the case of Pakistan <sup>16</sup>. While the ability to change the interpretation of a situation to reduce negative emotions and to increase positive emotions is beneficial, it is usually harder and more mentally demanding to employ this strategy <sup>6</sup>. Within the Pakistani culture, many individuals do not receive training on how to employ these techniques. Unlike in many cultures, the articulation of emotions is not encouraged within families, schools, and more

broadly, society. The absence of this cultural training can make it difficult for individuals to utilize cognitive reappraisal in real-life pressure situations, such as the incessantly negative content portrayed on social media. This could account for the findings on cognitive reappraisal not having a significant effect in the study<sup>17</sup>. The findings of this study are relevant not only in the context of social media but also for vulnerable populations such as emerging adults, as they are more susceptible to emotional stress and social comparisons, and may not have the emotional resources required to manage these stressors effectively. Furthermore, even adaptive strategies may not provide suitable defenses where there is a lack of cultural context, tools, or skills to implement them effectively. So the moderation effects were less consistent, but they still highlight how personal and cultural differences play a role in how people respond to social media use<sup>18</sup>.

The limited availability of emotionally validating support systems in Pakistan, such as access to therapy or opportunities for open family dialogue, often results in reduced reliance on cognitive appraisal as a coping mechanism. This deficit can exacerbate existing mental health difficulties, as supported by prior literature, because cognitive reappraisal is employed less frequently, thereby contributing to poorer mental health outcomes<sup>16</sup>.

Taken together, these findings suggest that emotional regulation serves as a key mechanism linking doomscrolling with existential anxiety. However, its moderating role appears to differ across specific dimensions of existential anxiety under examination<sup>16</sup>.

### **Conclusion:**

Cognitive reappraisal failed to moderate the relationship between doomscrolling and existential anxiety because existential anxiety stems from deep concerns about meaning, mortality, and uncertainty that are not easily altered through cognitive reframing. Doomscrolling is often habitual and compulsive, while reappraisal requires deliberate effort and cognitive resources, making it less effective under conditions of repeated negative exposure and information overload. High cognitive load further limits the real-time use of reappraisal strategies. Cultural context may also reduce

reliance on cognitive reappraisal in favor of other coping mechanisms such as acceptance, religiosity, or social support. Additionally, reappraisal may reduce emotional intensity without changing perceived real-world threats, and trait-level measurement may not capture situational regulation during doomscrolling. Overall, alternative mechanisms such as intolerance of uncertainty, rumination, or meaning-related processes may better explain the link between doomscrolling and existential anxiety.

### **Limitations:**

Self-reported scales cause hindrance to some extent. Differences in the expression of emotions, attitudes toward existence, and social media behavior might have shaped how participants understood and reacted to the items. A cross-sectional survey design does not enable following participants longitudinally, conducting fieldwork, or employing a mixed-methods approach, which would have added depth to the analysis, yielding more comprehensive findings.

### **Future Recommendations:**

Future studies could investigate whether existential anxiety related to doomscrolling contributes to or exacerbates panic-like symptoms in vulnerable individuals, a connection not directly explored in the present research. Additionally, further research studies could explore on the protective and risk elements of resilience, mindfulness, religious and spiritual coping, and cognitive coping styles. More broadly, the literature remains limited on the emotional regulation to doomscrolling, existential anxiety, and psychological distress shaped by cultural frameworks, religious considerations, including Islamic perspectives and practices, fatalistic worldviews, and political climates.

### **Disclosure /Conflict of interest:**

Authors declare no conflict of interest.

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## Original Article

# Association Of Level Of Physical Activity And Depression In Patients Having Obesity Hypoventilation Syndrome: A Cross-Sectional Study

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## Abstract

**Objective:** To determine the association between the level of physical activity and depression among patients with Obesity Hypoventilation Syndrome

**Study Design:** : An analytical cross-sectional study was conducted.

**Place and duration of study:** This cross-sectional analytical study was conducted in the Pulmonology Department, Lady Reading Hospital, Peshawar, from January to June 2024.

**Material and Methods:** This cross-sectional analytical study was conducted in the Pulmonology Department, Lady Reading Hospital, Peshawar, from January to June 2024. A convenience sample of OHS-diagnosed patients was taken, consisting of 197 participants. IPAQ, PHQ-9, and BMI were used for data collection. Data was analyzed using SPSS version 23. Chi-square and multivariable linear regression analysis were applied to explore the association between physical activity and depression.

**Results:** In the study, 121 were females, and 76 were males, with a mean age of  $45.6 \pm 10.3$  years. Regarding physical activity, 45.2% reported lower levels, while 28.9% suffered from moderate to severe depression. By using the chi-square test, it was observed that lower physical activities were significantly related to increased levels of depression ( $p < 0.001$ ). Results were also validated by multiple linear regression analysis, which demonstrated that decreased physical activities significantly predicted increased scores on PHQ-9, adjusting for age, sex, and BMI

**Conclusion:** A lower level of exercise is significantly related to higher levels of depression among OHS patients. Exercise programs should be incorporated as a treatment option to improve functional status and decrease depression.

**Keywords:** Obesity Hypoventilation Syndrome, Physical Activity, Depression, body mass index, patient health questionnaire-9

## 1. Introduction

Obesity has emerged as one of the most pressing public health concerns globally, contributing significantly to morbidity, mortality, and economic burden across healthcare systems. The World Health Organization (WHO) estimates that more than one billion people worldwide are living with obesity, a number expected to rise further by 2030 if current trends persist<sup>(1)</sup>. Among the respiratory complications associated with obesity, Obesity Hypoventilation Syndrome (OHS) represents one of the most severe and underdiagnosed conditions. It is defined by the triad of obesity ( $\text{BMI} \geq 30 \text{ kg/m}^2$ ), daytime hypercapnia ( $\text{PaCO}_2 > 45 \text{ mmHg}$ ), and sleep-disordered breathing, in the absence of alternative causes of alveolar hypoventilation. OHS is

not only a respiratory dysfunction but a complex multisystem disorder that severely impacts physical performance, mental health, and quality of life<sup>(2)</sup>. OHS is frequently associated with Obstructive Sleep Apnea (OSA), with nearly 90% of OHS patients presenting concomitant OSA, while the remaining 10% experience sleep hypoventilation without obstructive events<sup>(3)</sup>. The coexistence of chronic hypoxia, hypercapnia, and sleep fragmentation results in neurocognitive dysfunction, fatigue, daytime somnolence, and psychological disturbances, including depression and anxiety<sup>(4)</sup>. Obstructive Sleep Apnea (OSA) is characterized by recurrent upper airway obstruction during sleep, leading to repeated episodes of apnea and

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hypopnea, intermittent oxygen desaturation, and sleep fragmentation. Ninety percent of patients with OHS will have OSA, while the remaining 10% have sleep hypoventilation <sup>(5)</sup>. The latter represents an elevation in partial pressure of Carbon dioxide (PaCO<sub>2</sub>) during sleep or significantly low oxygen saturation not simplified by obstructive apneas or hypopneas <sup>(6)</sup>.

Depression is one of the most common mental health disorders among obese individuals, affecting up to 43% of patients with chronic respiratory diseases <sup>(7)</sup>. The bidirectional relationship between obesity and depression has been well-documented: obesity can precipitate depressive symptoms, and depression, in turn, exacerbates sedentary behavior, poor diet, and metabolic dysfunction. In patients with OHS, the interaction between disordered breathing, fatigue, and reduced physical activity further compounds this risk <sup>(8)</sup>. Persistent hypoventilation and oxygen desaturation during sleep may alter cerebral neurotransmitter activity, particularly serotonergic and dopaminergic pathways, contributing to mood dysregulation <sup>(9)</sup>. Physical activity has long been recognized as a cornerstone in the prevention and management of obesity-related disorders. It enhances cardiopulmonary function, improves metabolic balance, and positively influences psychological well-being <sup>(10)</sup>. Multiple meta-analyses indicate that regular physical activity significantly reduces depressive symptoms across various populations, including those with chronic diseases. However, despite extensive evidence supporting the role of exercise in improving mental health outcomes, few studies have explored its relationship with depression specifically in OHS patients <sup>(11)</sup>.

Management of OHS primarily involves weight reduction, non-invasive ventilation, and treatment of sleep-disordered breathing. Continuous Positive Airway Pressure (CPAP) or Bi-level Positive Airway Pressure (BiPAP) remains the standard intervention to alleviate hypercapnia and improve oxygenation <sup>(12,13)</sup>. The pathophysiology of OHS extends beyond mechanical restriction of ventilation due to adiposity. It involves impaired central respiratory drive, altered leptin sensitivity, and reduced chemoreceptor

responsiveness to hypercapnia and hypoxia. These physiological alterations contribute to reduced exercise tolerance and chronic fatigue, further discouraging physical activity. Moreover, elevated leptin levels—though typically associated with appetite suppression—become ineffective due to leptin resistance, a phenomenon that may also influence mood regulation <sup>(11)</sup>. Recent findings suggest that targeted exercise interventions, even of moderate intensity, can improve ventilatory efficiency and psychological resilience in obese individuals. Furthermore, physical activity facilitates neuroplastic changes in brain regions associated with emotion regulation, such as the hippocampus and prefrontal cortex, which are often compromised in patients with depression. These findings underscore the therapeutic value of physical activity in mitigating both the physiological and psychological consequences of OHS <sup>(14)</sup>. Despite these insights, the association between physical activity level and depression in OHS remains underexplored. Most existing research has concentrated on sleep apnea, pulmonary rehabilitation, or weight-loss interventions, with limited emphasis on psychosocial outcomes. Therefore, understanding how physical activity influences depressive symptoms in patients with OHS can provide valuable guidance for developing integrated rehabilitation protocols that address both respiratory and mental health needs <sup>(6)</sup>.

The present study was designed to determine the association between the level of physical activity and depression in patients with Obesity Hypoventilation Syndrome. By employing standardized assessment tools such as the International Physical Activity Questionnaire (IPAQ) and the Patient Health Questionnaire-9 (PHQ-9), this study seeks to quantify the relationship between physical inactivity and depressive severity. Establishing this association may contribute to a deeper understanding of the biopsychosocial dimensions of OHS and guide physiotherapists and clinicians in implementing exercise-based mental health interventions as part of comprehensive OHS management strategies.

## 2. Materials & Methods

This cross-sectional study was conducted over six months in Lady Reading Hospital, Peshawar. The duration of the research was 6 months after approval of the Institutional Review Board. Following the approval of the study synopsis by the institutional review board. Then the sample size was calculated using the software “Rao Soft” sample size calculator helped us to get the sample size as 282 participants by keeping Anticipated frequency as 9%, Confidence interval as CI 95% with the margin of error as 5%, which was based on the previous record of the last six months in the OPD. The participants were selected from the hospital using convenience sampling method. Inclusion criteria included participants’ age ranging from 25-65 years and patients who have been previously diagnosed as cases of OHS. The exclusion criteria included patients who are in a deep coma. Patients with hypoventilation syndrome have a kyphoscoliosis deformity. Congenital central hypoventilation syndrome. Patients have neuromuscular disorders like amyotrophic lateral sclerosis and myasthenia gravis. After the ethical clearance from the Ethical Review Committee of City University, Peshawar. After that, the concerned hospital/department was approached to seek approval for the data collection. The selected participants were interviewed personally to collect the data from a selected questionnaire. The data related to Physical Activity was obtained from the International Physical Activity Questionnaire. The Patient Health Questionnaire was used to calculate the value of Depression, and body mass index values were also calculated. This oral explanation was provided to all participants before obtaining their consent. Then the participants were assured that the privacy related to the data would be kept intact. This research work used the SPSS version 23 software to perform the statistical analysis. The graphical representation is related to the quantitative values related to the variables used in the research work. The graphical representation is related to the value related to the qualitative variables. To analyze the relationship among the two or more categories, the Chi-Square test was used. Then, multivariable linear regression was used to analyze the

association related to the value related to Physical Activity and Depression.

The normality of continuous variables, including PHQ-9 score, age, and BMI, was assessed using the Shapiro-Wilk test. All continuous variables were found to be approximately normally distributed, allowing the use of parametric tests.

### 3. Results

The mean age of the participants was  $45.67 \pm 10.3$  years (ranged from 25 to 64 years). Most participants, 121, were females, and male participants were 76. The age groups included eight categories, and the largest number (20.3%) was in the 55 to 59 years age group, followed by the lowest in the 25 to 29 years age group (6.1%).

Table 1. Distribution of Participants based on age Categories (N = 197)

Age Category (years)	Frequency (n)	Percentage (%)
25–29	12	6.1
30–34	20	10.2
35–39	35	17.8
40–44	22	11.2
45–49	23	11.7
50–54	31	15.7
55–59	40	20.3
60–64	14	7.1
<b>Total</b>	<b>197</b>	<b>100.0</b>

Table 2. Cross-tabulation between Physical Activity and Depression Levels (N = 197)

Depression Level (PHQ-9)	Low Activity (n)	Moderate Activity (n)	High Activity (n)	Total (n)
Minimal Depression	1	0	8	9
Mild Depression	3	9	22	34
Moderate Depression	7	27	10	44
Moderately Severe Depression	31	2	4	57
Severe Depression	47	4	2	53
Total	89	62	46	197

Table 2 shows the relationship between physical activity levels and depression severity using the Chi-square test. The association was found to be statistically significant ( $p < 0.001$ ), indicating that lower levels of physical activity were strongly associated with higher levels of depression.

Table 3: Level of Depression & Hypoventilation Syndrome cross-tabulation

Level of depression	Level of Hypoventilation Syndrome			Total	P-Value	$\chi^2$
	Grade 1	Grade 2	Grade 3			
Minimal Depression	8	1	0	9	<.001	105.502
Mild Depression	19	12	3	34		
Moderate Depression	10	29	5	44		
Moderately severe Depression	5	23	29	57		
Severe Depression	8	3	42	53		
Total	50	68	79	197		

Table 3 shows the chi-square test used to determine the relationship between the level of depression and the level of hypoventilation syndrome. It was found to be statistically significant, as the p-value is  $<0.001$

Table 4. Level of hypoventilation syndrome & level of physical activity

Level of hypoventilation syndrome	Level of physical activity			Total	P-Value	$\chi^2$
	Low	Moderate	High			
Grade 1	4	7	39	50	<.001	239.808
Grade 2	8	53	7	68		
Grade 3	77	2	0	79		
Total	89	62	46	197		

Table 4 shows that the chi-square test was used to find the relationship between the level of hypoventilation syndrome and the level of physical activity. P-Value =  $<.001$ . This indicates a highly statistically significant relationship between the level of hypoventilation syndrome and level of physical activity

Table 5: Association Between Physical Activity Level and Depression Severity in Patients with Obesity Hypoventilation Syndrome (N = 197)

Physical Activity Level	N	Mean PHQ-9 Score $\pm$ SD	Regression $\beta$ (Adjusted)	95% Confidence Interval	p-value
Low	89	16.5 $\pm$ 4.2	Reference	—	—
Moderate	62	11.2 $\pm$ 3.8	-0.42	-0.55 to -0.29	<0.001
High	46	8.7 $\pm$ 2.9	-0.42	-0.55 to -0.29	<0.001

Table 5 shows that there was a significant negative relationship between the level of physical activity and the severity of depression in Obesity Hypoventilation Syndrome patients. Patients who showed lower levels of physical activity had higher scores for PHQ-9 (mean  $\pm$  SD) values (16.5  $\pm$  4.2) as compared to those who showed moderate (11.2  $\pm$  3.8) and high levels (8.7  $\pm$  2.9) of physical activity. After performing multivariable linear regression, it was observed that lower levels of physical activity were significantly associated with higher values for depression ( $\beta = -0.42$ , 95% CI -0.55, -0.29,  $p < 0.001$ ), implying that increased physical activity is associated with lower severity of depression. This directly responds to the primary

objective of this investigation focused on evaluating the relationship between the value of physical activity.

#### 4. Discussion

The study seeks to determine the existence or absence of any connection between the level of physical activity and depression in patients with Obesity Hypoventilation Syndrome (OHS). The outcome revealed a strong negative correlation between the level of physical activity and depression, such that those who are less physically active tend to score higher in depression levels.

The findings were significant regardless of the influence of other variables such as age, sex, and body measurement in OHS.

These results are consistent with other studies that have highlighted the importance of physical exercise as a fundamental mediator of psychological well-being in both obese and chronic illness sufferers. Zheng et al. (2023) have noted in their research that exercising significantly helped to improve mood states and alleviate depression in obese patients suffering from respiratory dysfunction<sup>(15)</sup>. Moreover, Bridle et al. in a meta-analysis study in 2022 confirmed in their research that exercising helped to have moderate to large antidepressant properties in chronic illness patients, regardless of weight loss outcomes<sup>(16)</sup>. Moreover, the current research bridges this existing evidence by targeting specifically OHS patients, who have been previously underrepresented in psychological and rehabilitation research. A concerning aspect of depression, as noted in the study, is the sizable number of patients (approximately 76%) suffering from moderate to severe depression. This correlates well with another study conducted by Mandal et al. (2018), which showed that as much as 70% of patients with chronic respiratory diseases experienced depression<sup>(17)</sup>. Moreover, the current research bridges this existing evidence by targeting specifically OHS patients, who have been previously underrepresented in psychological and rehabilitation research.

A concerning aspect of depression, as noted in the study, is the sizable number of patients (approximately 76%) suffering from moderate to severe depression. This correlates well with another study conducted by Mandal et al. (2018), which showed that as much as 70% of patients with chronic respiratory diseases experienced depression<sup>(18)</sup>. Conversely, Dixon et al. have reviewed the evidence related to surgical and traditional weight loss for both patients with OHS and Obstructive Sleep Apnea, giving findings intrinsically related to the advantages/disadvantages in treating both conditions<sup>(19)</sup>. In addition, Berger et al. and Zheng et al. render null facts regarding the effect of respiratory events on sleep structure, as well as the efficacy of various PAP therapy methods<sup>(20)</sup>. These results emphasize the need to target physical inactivity along with its psychological effects in those who have Obesity Hypoventilation Syndrome. Increasing physical activity can reduce depression in this patient population<sup>(21)</sup>.

The final interesting aspect is related to gender representation, with females accounting for 61.4% of participants and slightly scoring higher in their depression levels. Previous studies by Giannotta et al. (2023) and Duan & Jun (2024) have reported a similar phenomenon, which was explained by a set of biological, societal, and psychological aspects such as body image and male-female differences in their coping strategies<sup>(11,22)</sup>. Nonetheless, despite the aforementioned limitations, the present study offers important empirical data, which underscores the fact that physical activity has a significant statistical link with depression in patients with OHS. These observations confirm the burgeoning literature that supports the utilization of physical activity as an additional treatment modality in respiratory problems due to obesity. Furthermore, the observations confirm the importance of emphasizing mental analyses, as well as physical activity, in the comprehensive management of OHS.

#### Conclusion:

This reveals that there is a strong inverse relationship between physical activity level and depression severity among patients with Obesity Hypoventilation Syndrome. Patients with lower levels of physical activity were found to score higher on depression, while those with moderate/high levels recorded lower scores on depression. Adding physical activity interventions to the treatment regimen of patients with OHS could help reduce mental distress and promote ventilation. Physiotherapists and pulmonologists must work together on designing personalized exercise-based rehabilitation programs for patients with OHS. Longitudinal research must be conducted on the role and effects of these interventions.

#### Disclosure /Conflict of interest:

Authors declare no conflict of interest.

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## Original Article

## Relationship between Communication Skills and Task Load: A Comparative Study of Nurses in Surgical and Medical Wards

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### Abstract

**Objective:** To assess communication skills and task load among nurses and compare these variables between medical and surgical wards.

**Study Design:** A descriptive cross-sectional study was conducted.

**Place and duration of study:** An descriptive cross-sectional study was conducted over six month period in major hospitals of Abbottabad (2024). Convenience sampling technique was used and a total of 197 registered nurses were collected. Ethical approval was obtained and consent was taken before data collection. Standardized questionnaires were used including Communication Skills Questionnaire (CSQ), and Task Load Index (TLX). Inferential analyses included chi-square tests, and Spearman's rho correlation.

**Material and Methods:** Convenience sampling technique was used and a total of 197 registered nurses were collected. Ethical approval was obtained and consent was taken before data collection. Standardized questionnaires were used including Communication Skills Questionnaire (CSQ), and Task Load Index (TLX). Inferential analyses included chi-square tests, and Spearman's rho correlation.

**Results:** The mean age of nurses was  $31.88 \pm 7.92$  years; most participants were female (58.88%), and married (61.42%). Most were diploma holders (44.16%), and a significant proportion had 1–5 years of experience (55.33%). Marital status was significantly associated with ward placement, where single nurses were more likely in medical wards and married nurses in surgical wards. Age and experience status showed significant ( $P$  value  $< 0.05$ ) moderate positive correlation ( $\rho = 0.25$ ) with task load, whereas education levels showed weak negative correlation ( $\rho = -0.14$ ) with task load. Regression analysis confirmed that communication skills highly significantly ( $P$  value  $< 0.01$ ,  $OR = 3.77$ , 95%  $CI = 2.27-6.28$ ) predicted increasing task load.

**Conclusion:** Communication skills are significantly associated with nurses' task load. Strengthening communication competencies alongside optimized workload distribution may support effective task management and improve nurses' well-being.

**Keywords:** Nurses; Communication; WorkLoad; Cross-Sectional Studies

### 1. Introduction

Nurses collaborate with doctors and other medical staff, maintain accurate documentation, follow infection control protocols, and respond to medical emergencies to ensure patient safety and recovery<sup>(1)</sup>. Nurses in wards provide comprehensive care for patients with acute and chronic illnesses, including monitoring vital signs, administering medications, and managing symptoms<sup>(2)</sup>. A heavy workload can lead to increased stress, fatigue, and decreased productivity. When employees are overwhelmed with tasks, the quality of their work may suffer, leading to mistakes and

inefficiency<sup>(3)</sup>. Implementing self-care strategies and workplace interventions, such as mindfulness and better scheduling, can help reduce stress and improve job satisfaction<sup>(4)</sup>.

Good communication skills help people express their thoughts clearly and understand others effectively<sup>(5)</sup>. Effective communication in nursing is essential for building trust, ensuring patient safety, and delivering high-quality care<sup>(6)</sup>.

Clear and concise communication prevents mis-

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understandings, reduces errors, and enhances teamwork, ultimately improving efficiency and reducing work-related stress<sup>(7)</sup>.

## 2. Materials & Methods

This study employed a descriptive cross-sectional design. The study was conducted in major hospitals of Abbottabad, including Women and Children Hospital, Ayub Teaching Hospital, District Headquarters (DHQ) Hospital, and Jinnah International Hospital. Using open-source statistics for public health (www.openepi.com), a total of 197 nurses were estimated with margin error of 5%, confidence level of 95%, assuming a population size of 4000 and 50 % response distribution. Data were collected from registered nurses that were actively involved in direct patient care during their shifts. Nurses with less than one year of clinical experience and those who had recently experienced personal or professional trauma were excluded, as these factors could influence perceived workload and communication outcomes. Ethical approval (Ref: 1303) was obtained from the Institutional Ethical Research and study Committee of Women Institute of learning and rehabilitation sciences, Abbottabad. Written informed consent was obtained from all participants prior to data collection. Data were collected using a structured questionnaire comprising three sections: section I included demographic characteristics; Section II consisted of the Communication Skills Questionnaire (CSQ); and Section III included the Task Load Index (TLX). Data were entered and cleaned using Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS), inferential statistics included chi-square, Spearman's rho correlation and binary logistic regression model. Significant level was considered at  $p < 0.05$ .

## 3. Results

Table 1 shows that for gender distribution, female and male nurses comprised 58.88% and 41.12% nurses, respectively. Highest number was recorded for married nurses (61.42%) compared to single nurses (38.58%).

Diploma holders (44.16%) nurses were the highest, followed by post-RN graduates (29.44%) and BSN holders (26.40%). The medium socioeconomic status constitutes the highest number of nurses (69.04%), followed by high at 29.95%, and low at 1.02%.

Nurses in medical and surgical ward were observed 54.31% and 45.69%, respectively. Results showed that females in medical ward (35.03 %) were observed with the highest participants, followed by female nurses in surgical ward (23.86 %). Regarding education, diploma holders had the highest number of participants in medical ward. The majority had 1-5 years of experience (55.33%), followed by 6-10 years (20.30%), 10-20 years (18.27%), and above 21 years (6.09%).

Table 1. Demographic variables distribution of nurses in wards

Demographic characteristics		Medical Ward	Surgical Ward	Total
Gender <sup>+</sup>	Female	69(35.03)	47(23.86)	116 (58.88)
	Male	38(19.29)	43(21.83)	81 (41.12)
Marital status <sup>+</sup>	Married	58(29.44)	63(31.98)	121 (61.42)
	Single	49(24.87)	27(13.71)	76 (38.58)
Education <sup>ns</sup>	Diploma	23(11.68)	29(14.72)	87 (44.16)
	BSN	51(25.89)	36(18.27)	58 (29.44)
	Post RN	33(16.75)	25(12.69)	52 (26.40)
Experience <sup>ns</sup>	1-5	62(31.47)	47(23.86)	109 (55.33)
	6-10	24(12.18)	16(8.12)	40 (20.30)
	11 to 20	15(7.61)	21(10.66)	36 (18.27)
	20 above	6(3.05)	6(3.05)	12 (6.09)
Socioeconomic status <sup>ns</sup>	Low	2(1.02)	0.00	2 (1.02)
	Medium	74(37.56)	62(31.47)	136 (69.04)
	High	31(15.74)	28 (14.21)	59 (29.95)
Total		107 (54.31)	90 (45.69)	

(\*= $p < 0.05$ , ns= $p > 0.05$ )

As shown in table 2, results showed that highest number of participants possess moderate communication skills (62.44%), followed by high (23.35%) and low (14.21%) communication skills. Similarly, highest number of participants were observed for moderate task load (46.19 %), followed by high (42.64 %) and low (11.17 %) task load levels. Medical wards (34.01%) were slightly higher than surgical ward (28.43%) nurses. A low task load was reported by 6.60% of

medical ward nurses and 4.57% of surgical ward nurses. The majority of nurses in both wards fell into the moderate task load category, with 26.40% in the medical ward and 19.80% in the surgical ward.

Table 2. Distribution of communication skills and task load among medical and surgical wards

Dependent Variables		Medical ward	Surgical ward	Total
Communication Skills <sup>ns</sup>	Low	14 (7.11)	14(7.11)	28 (14.21)
	Moderate	67 (34.01)	56(28.43)	123 (62.44)
	High	26 (13.20)	20(10.15)	46 (23.35)
Task load <sup>ns</sup>	Low	13(6.60)	9(4.57)	22 (11.17)
	Moderate	52(26.40)	39(19.80)	91 (46.19)
	High	42(21.32)	42 (21.32)	84 (42.64)

(ns=p>0.05)

Table 3 presents the association between demographic variables and main variables. Results showed that gender and marital showed significant ( $P<0.05$ ) weak positive correlation ( $\rho = 0.124$  and  $0.162$ , respectively) with wards, indicating that male and married nurses were more likely in surgical wards, whereas female and single nurses were more likely in medical wards. No significant ( $P>0.05$ ) relationship was found between demographic variables and communication skills. As for task load index, age and experience status showed significant ( $P<0.05$ ) moderate positive correlation ( $\rho=0.257$  and  $0.254$ , respectively), whereas education levels showed significant ( $P<0.05$ ) weak negative correlation ( $\rho=-0.147$ ) with task load. It indicates that with increase in age and experience status, nurses' task loads increases, but with increase education status the task load decreases.

Table 3. Spearman's correlation of demographic characteristics with nurses wards, communication skills and task load index.

Demographic characteristics	Wards	Communication Skills	Task load index
Age	0.132 <sup>ns</sup>	-0.024 <sup>ns</sup>	.257**
Gender	0.124*	0.065 <sup>ns</sup>	-0.079 <sup>ns</sup>
Marital status	.162*	-0.089 <sup>ns</sup>	0.024 <sup>ns</sup>
Education levels	0.108 <sup>ns</sup>	0.082 <sup>ns</sup>	-.147*
Socioeconomic status	0.037 <sup>ns</sup>	-0.097 <sup>ns</sup>	0.11 <sup>ns</sup>
Experience status	0.082 <sup>ns</sup>	-0.057 <sup>ns</sup>	.254**

(\*\*=p<0.01, \*=p<0.05, ns=p>0.05)

The odds ratio (table 4) showed that improved communication skills highly significantly ( $P$  value<0.01, OR=3.77, 95% CI=2.271-6.282) increase task load, confirming a strong effect of communication skills in managing task load.

Table 4. Odds ratio of communication skills with task load

Variables		Odds ratios	95% Confidence level	
Independent V	Dependent V		Lower	Upper
Communication skills	Task load	3.77**	2.271	6.282

#### 4. Discussion

Literature suggests that while both wards present unique challenges, surgical ward nurses may experience higher workload and stress due to fast-paced environments and complex perioperative care responsibilities<sup>(8,9)</sup>. This difference may be attributed to the nature of medical ward duties, where patient interactions and chronic disease management require extensive communication<sup>(10,11)</sup>. A study showed that surgical nurses face slightly higher task demands than medical nurses, likely due to perioperative care responsibilities<sup>(12)</sup>. Recent study findings indicate that younger nurses often experience higher levels of workplace stress due to inexperience and adaptation challenges. However, they also exhibit a greater ability to adapt to evolving healthcare environments and technology integration<sup>(13)</sup>. In terms of gender, the study highlights a female predominance (58.88%) compared to males (41.12%). According to the World Health Organization, women constitute the majority of the global nursing workforce, reflecting long-standing gender imbalances within the profession<sup>(14)</sup>. Studies have shown that female nurses report greater work-family conflict and emotional exhaustion compared to their male counterparts, which may influence occupational well-being and job performance<sup>(15,16)</sup>. The predominance of female nurses is clinically and

socially relevant, as evidence suggests that women in nursing roles often experience higher levels of emotional and psychological stress due to dual caregiving responsibilities at work and within the household. Additionally, local evidence from Pakistan highlights increased psycho-emotional challenges among female nurses, further supporting the impact of gender-related role burdens in healthcare settings <sup>(17)</sup>. This present study finding on education level distribution suggests that while a significant proportion of nurses pursue higher education; diploma programs still form the primary entry pathway into nursing. Studies indicate that higher education levels correlate with improved communication skills and patient outcomes, as BSN and post-RN graduates receive more training in critical thinking and patient-centered care <sup>(18)</sup>. Studies emphasize BSN education for improved communication, critical thinking, and quality of care <sup>(19)</sup>. Higher education levels contribute to improved clinical decision-making and leadership skills, especially in high-stakes surgical environments. In our study, most participants belong to the middle socioeconomic class (69.04%), with a smaller percentage in the high (29.95%) and low (1.02%) categories. Among the nurses, most had low experience (1 to 5 years). Nursing is a salaried profession that offers financial stability without placing practitioners at socioeconomic extremes. The higher proportion of nurses with 1–5 years of experience aligns with workforce trends indicating that hospital settings frequently employ early-career nurses, influenced by recent graduation rates, workforce turnover, and migration of more experienced staff. Previous studies have also documented a concentration of nurses in the early stages of their professional careers, particularly in clinical service roles <sup>(20)</sup>. Regarding task load, moderate task load (46.19%) was most common, followed by high task load (42.64%). Studies confirm that excessive task load negatively impacts nurses' mental health, ultimately increasing burnout risks <sup>(21)</sup>. Effective communication and task management are especially vital for nurses in medical and surgical wards because of the complexity and intensity of care in these settings <sup>(22)</sup>. Nurses in medical wards care for patients with

chronic and multiple comorbidities, requiring frequent communication for education, symptom monitoring, and long-term care coordination. In contrast, surgical ward nurses face intensive task demands involving perioperative preparation, postoperative monitoring, wound care, and rapid patient turnover <sup>(8,23)</sup>. Previous research indicates that both medical and surgical nurses face significant workload pressures. Surgical wards often involve higher task intensity, whereas medical wards require sustained communication and emotional engagement with patients. Inadequate communication and excessive workloads are associated with higher stress, missed nursing care, and reduced patient safety <sup>(24)</sup>. This highlights the need for strong communication skills and effective workload management in clinical settings.

### Conclusion:

Single nurses were more likely to work in medical wards, while married nurses were more likely to be in surgical wards. Improved communication skills enable nurses to manage higher task loads more effectively. Skill development programs are recommended to enhance nurses' communication skills. Strategies such as optimized shift scheduling, clear role assignments, and workload distribution should be adopted to support nurses in managing task load efficiently. Future studies should explore other potential factors, such as stress, leadership support, work environment, and emotional resilience, to understand and develop projects in improving nurses wellbeing.

### Disclosure /Conflict of interest:

Authors declare no conflict of interest.

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## Original Article

# Prevalence Of Migraine, Its Related Disabilities And Its Impact On Quality Of Life In Undergraduate Students Of Private Sector Universities Of Peshawar

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## Abstract

**Objective:** This study aimed to assess the prevalence of migraine, determine the associated disabilities, and evaluate the impact of migraine on the quality of life among students in private sector universities in Peshawar.

**Study Design:** A cross-sectional study was conducted.

**Place and duration of study:** A cross-sectional study was conducted from January to June 2023, involving 226 students 122 males and 104 females, aged 19 to 24 years, attending private universities in Peshawar.

**Material and Methods:** A cross-sectional study was conducted from January to June 2023, involving 226 students 122 males and 104 females, aged 19 to 24 years, attending private universities in Peshawar.

**Results:** Among the male participants, 33.6% reported experiencing migraine, while 66.4% did not. In contrast, 38.5% female participants experienced migraine, and 61.5% did not. According to the migraine disability assessment, 145 participants 64.5% reported no disability, 2.7% had minimal or no disability, 9.7% had moderate disability, 19.9% had severe disability, and 3.5% experienced extreme disability.

**Conclusion:** The prevalence of migraine was slightly higher among females than males. Significant risk factors associated with migraine included head injury, poor neck posture, nerve tension from accidents, and cervicogenic pain.

**Keywords:** Disability, Migraine, Migraine, Quality of Life, Undergraduate students

## 1. Introduction

Migraines are one of the most prevalent and debilitating neurological conditions that affect a significant portion of the global population. Approximately 12% of people worldwide suffer from migraines, with women being disproportionately affected. The condition is characterized by recurrent, severe, and pulsating migraine attacks that can last anywhere from a few hours to several days. These attacks are often accompanied by debilitating symptoms such as nausea, vomiting, and heightened sensitivity to light and sound. Migraines can severely impair an individual's quality of life and pose a significant burden on both their physical and mental well-being (1). The challenges of managing migraines are compounded by the variability in their frequency and intensity, as well as the unpredictable nature of their onset, which can severely

disrupt daily life. Effective diagnosis, treatment, and management are essential to alleviating the impact of migraines on those who suffer from them (10). This article explores the pathophysiology, diagnostic challenges, and treatment options for migraines, along with an overview of the different types of migraine and the factors that contribute to their onset and progression (2).

In addition to the classic migraine, other types of migraine disorders also exhibit unique clinical features. Tension-type migraine, for example, are characterized by mild to moderate bilateral pain, often described as a dull, pressing, or tightening sensation (3). The exact cause of tension-type migraine remains

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poorly understood but is believed to involve a combination of genetic, environmental, and psychological factors (4). Another severe primary migraine disorder is cluster migraine, characterized by excruciating pain around the eye or temple, often accompanied by autonomic symptoms such as lacrimation and nasal congestion. Cluster migraine are notable for their circadian and seasonal patterns, with recent studies suggesting that dysregulation of the hypothalamus plays a central role in their onset (5, 6). The International Classification of Migraine Disorders (ICHD) plays a crucial role in diagnosing migraines by providing specific criteria for different types of migraines, including migraine without aura and migraine with aura (11). To diagnose migraine without aura, patients must experience at least five migraine attacks lasting between four and seventy-two hours, with specific characteristics such as unilateral location, pulsating quality, and moderate to severe intensity. For migraine with aura, at least two attacks with transient neurological disturbances, such as visual, sensory, or speech symptoms that resolve within one hour, must accompany the migraine (7).

A comprehensive differential diagnosis is necessary to exclude other conditions that may present with similar symptoms, such as tension-type migraine, cluster migraine, or sinusitis. In some cases, imaging studies like magnetic resonance imaging (MRI) or computed tomography (CT) scans are recommended to rule out secondary causes of migraine, particularly when the clinical presentation is atypical or when there are additional neurological concerns (9). In addition to clinical evaluation and imaging, tracking migraine frequency and symptoms through migraine diaries is a useful tool in identifying patterns, triggers, and responses to treatment, which can ultimately guide therapeutic decisions (10).

In conclusion, migraines remain a multifaceted disorder requiring a nuanced understanding of their pathophysiology, classification, and treatment. With continued advancements in research and the development of new therapies, migraine management has become more effective, offering hope for improved quality of life for those affected by this debilitating

condition. As further studies uncover the genetic, neurovascular, and environmental factors that contribute to migraine onset, targeted therapies will continue to evolve, providing better outcomes for migraine sufferers globally. understandings , reduces errors, and enhances teamwork, ultimately improving efficiency and reducing work-related stress <sup>(7)</sup> .

## 2. Materials & Methods

This study employed convenience sampling, which may have introduced selection bias and limits the generalizability of the findings to all undergraduate students in Peshawar. Migraine diagnosis was based on self-reported data rather than clinical evaluation; however, standardized criteria based on the International Classification of Headache Disorders (ICHD) were used within the questionnaire to improve diagnostic accuracy. Despite this, recall bias and misclassification cannot be completely ruled out. Additionally, the cross-sectional design restricts causal inferences between migraine, related disability, and quality of life was utilized to select participants based on accessibility and predefined eligibility criteria, with a calculated sample size of 226 determined using the OpenEpi statistical calculator at a 95% confidence interval and a 5% margin of error, assuming a migraine prevalence of 17.9% as reported in previous literature. The study was conducted over six months, from January to June 2023, and included students aged 18 years or older currently enrolled in private sector universities who experienced migraine-related symptoms, while excluding students from health sciences disciplines, individuals with non-migraine migraine, and those who did not provide written consent. Outcome measures included the Migraine Disability Assessment Questionnaire (MIDAS), the Migraine-Specific Quality of Life (MQoL) Scale, and the Numeric Pain Rating Scale (NPRS), selected for their reliability and validity in assessing functional disability, quality of life, and pain severity. Data collection was carried out with ethical approval from the research ethics committee of City University Peshawar, and both verbal and written consent were



obtained from participants while maintaining confidentiality. The data was analysis to explore relationships between migraine characteristics and socio-demographic factors, thereby providing a comprehensive evaluation of the impact of migraines on the student population .

### 3. Results

A total of 226 participants were enrolled, including 122 (54.0%) males and 104 (46.0%) females, with a mean age of  $22.46 \pm 2.22$  years for males and  $21.75 \pm 1.91$  years for females. Among male participants, 41 (33.6%) reported migraine compared to 81 (66.4%) without migraine, while 40 (38.5%) of female participants reported migraine and 64 (61.5%) did not. Overall, migraine was reported by 81 participants (35.8%), with 145 (64.2%) reporting no migraine. Analysis by institution revealed that at Iqra University, 15 out of 25 participants (60.0%) experienced migraine, while City University, Fast University, Abasyn University, and CECOS University reported migraine prevalences of 31.0%, 35.1%, 37.5%, and 29.7%, respectively. According to the MIDAS questionnaire, 145 participants (64.2%) demonstrated no significant disability, 6 (2.7%) had minimal disability (score 0–5), 22 (9.7%) had mild disability (score 6–10), 45 (19.9%) had moderate disability (score 11–20), and 8 (3.5%) experienced severe disability (score  $\geq 21$ ). Assessment using the Migraine-Specific Quality of Life Scale indicated that 145 participants (64.2%) experienced no impact, 49 (21.7%) experienced a mild impact (score  $< 41$ ), 26 (11.5%) experienced a moderate impact (score 41–60), and 6 (2.7%) experienced a severe impact (score  $> 60$ ). Furthermore, pain intensity measured by the Numeric Pain Rating Scale revealed that 13 participants (5.8%) reported no pain, 54 (23.9%) reported mild pain (score 1–3), 78 (34.5%) reported moderate pain (score 4–6), and 81 (35.8%) reported severe pain (score 7–10).

Inferential analysis was performed using the Pearson chi-square test to examine associations between migraine status and selected demographic and clinical variables. The association between gender and migraine was not statistically significant ( $\chi^2 = 0.62$ ,  $df = 1$ ,  $p =$

0.43), indicating that migraine prevalence did not differ significantly between male and female participants. However, a statistically significant association was observed between migraine status and migraine-related disability measured by the MIDAS questionnaire ( $\chi^2 = 48.31$ ,  $df = 4$ ,  $p < 0.001$ ), with higher levels of disability observed among participants reporting migraine. Similarly, migraine status was significantly associated with impairment in migraine-specific quality of life ( $\chi^2 = 41.76$ ,  $df = 3$ ,  $p < 0.001$ ), demonstrating greater quality-of-life impact among migraine sufferers. Pain severity assessed using the Numerical Pain Rating Scale also showed a significant association with migraine status ( $\chi^2 = 36.92$ ,  $df = 3$ ,  $p < 0.001$ ), with a higher proportion of migraine participants reporting moderate to severe pain. These findings indicate that while migraine occurrence was not influenced by gender, it was strongly associated with increased disability, poorer quality of life, and greater pain intensity.

Participants:	Age $\pm$ Standard Deviation
Male	22.46 $\pm$ 2.22
Female	21.75 $\pm$ 1.91

Have you ever experienced Migraine?	
Yes/No	Frequency (%)
No	145 (64.2)
Yes	81 (35.8)
Total	226 (100)

How severe is your Disability on MIDAS?	
Range:	Frequency (%)
Minimal Disability 0-5	06 (2.7)
Mild Disability 6-10	22 (9.7)
Moderate Disability 11-20	45 (19.9)
Severe Disability $\geq 21$	8 (3.5)
No Disability	145 (64.2)
Total	226 (100)

How severely Impact Migraine-Specific Quality of Life Scale?	
Range:	Frequency (%)
No impact	145 (64.2)
Mild Impact (score <41)	49 (21.7)
Moderate Impact (score 41-60)	26 (11.5)
Severe Impact (score >60)	06 (2.7)
Total	226 (100)

How severe is your pain on Numerical Pain Rating Scale (NPRS)?	
Range:	Frequency (%)
No Pain	13 (5.8)
Low Pain 0-3	54 (23.9)
Moderate Pain 4-6	78 (34.5)
High Pain 7-10	81 (35.8)
Total	226 (100)

Table: Association between Migraine Status and Gender, Disability, Quality of Life, and Pain Severity (n = 226)		$\chi^2$	df	p-value
Gender $\times$ Migraine	0.62	1	0.43	
MIDAS Disability $\times$ Migraine	48.31	4	<0.001	
MSQ Quality of Life Impact $\times$ Migraine	41.76	3	<0.001	
NPRS Pain Severity $\times$ Migraine	36.92	3	<0.001	

#### 4. Discussion

This ongoing study aimed to evaluate the prevalence of migraine, their associated disabilities, and the impact on quality of life among college students in private sector universities in Peshawar. The study sample consisted of 226 participants. Several other studies have investigated similar topics related to migraine and their consequences.

In contrast to our study, which was conducted in 2023 with a sample size of 226, a study by Justo et al. (2017)

focused on the impact of migraines on quality of life in a sample of migraine sufferers (14). Justo's study was also cross-sectional, and it involved examining the triggers, clinical features, and factors related to migraines. However, there are differences between the two studies in terms of sample size, time frame, and focus on specific aspects of migraine (14).

Our study found a higher prevalence of migraine, particularly among male students, which is consistent with some previous studies. For example, Justo et al. in 2017 found that migraine prevalence was 16.1%, with 11.3% of male students and 21.7% of female students suffering from migraines (12). In contrast, our study primarily focused on a younger age group, with participants aged 18 to 23. In one previous study, however, participants included older individuals, aged 60 and above, where hormonal factors related to menopause might have contributed to higher migraine prevalence (13). This difference in age demographics could account for some of the variations observed in prevalence rates between studies.

The MIDAS (Migraine Disability Assessment) survey, used in our study, measures the level of disability caused by migraines in three areas: work, family, and non-work activities. The MIDAS scale helps assess both missed workdays and reduced productivity, offering a useful tool to quantify migraine-related disability. Shaik et al. in 2014 highlighted that the MIDAS survey is easy to administer and reliable, providing valuable insights for clinical practice (15). The results of our study, based on the MIDAS scale, revealed varying levels of disability among students, with 7.4% reporting no disability, 27.1% reporting mild disability, 55.5% reporting moderate disability, and 9.8% reporting severe disability.

The study by Leigh Blizzard and Bruce V. Taylor (2018) also supports the high prevalence of migraines found in our study. Their research examined the prevalence of migraines among neurologists and found that neurologists had a higher proportion of migraine sufferers. While this study focused on healthcare professionals, it demonstrates that the prevalence of

migraines is not limited to a specific demographic but is widespread across various professions (16).

Further, the study by Terwindt et al. in 2000 explored the impact of migraines on quality of life in the general population, revealing that migraineurs had significantly higher rates of asthma and chronic musculoskeletal pain compared to non-migraineurs. This finding aligns with our research, which emphasizes the broader impact of migraines on students' quality of life, including physical and mental health (17).

Lastly, a study by Adnan Khan et al. (2022) on the prevalence of migraines among medical students in Peshawar found a prevalence of 38.3% (18). This is quite similar to our findings, where the prevalence was 35.8%. Both studies used cross-sectional designs and reported high migraine prevalence among students, further supporting the findings of the current research.

### Conclusion:

In conclusion, the findings reveal that migraines affect a substantial proportion of the university student population, with 35.8% reporting migraines and a slightly higher prevalence among females. While most participants exhibited minimal or no disability based on MIDAS scores, a noteworthy fraction experienced varying degrees of impairment, accompanied by significant impacts on quality of life and pain intensity as measured by the respective scales. The observed variations in migraine prevalence across different institutions further underscore the potential influence of environmental or demographic factors, suggesting avenues for future research.

### Future Recommendations

Raising awareness about migraine among students and staff is essential. Targeted support such as physiotherapy, psychological counseling, and appropriate medical treatment can help reduce migraine-related disability. Strengthening wellness and mental health services within university health systems may further improve students' quality of life.

### Disclosure /Conflict of interest:

Authors declare no conflict of interest.

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## Original Article

# Evaluation of Cardiorespiratory Fitness and Core Endurance Among Young Adults of Rawalpindi & Islamabad

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## Abstract

**Objective:** The objective of this study is to evaluate the core endurance and cardiorespiratory fitness among the young adults of Rawalpindi and Islamabad.

**Study Design:** : A descriptive cross-sectional study was conducted.

**Place and duration of study:** The study design of this study was descriptive cross sectional which was done in community of Rawalpindi & Islamabad from February 2024 to January 2025.

**Material and Methods:** The study design of this study was descriptive cross sectional which was done in community of Rawalpindi & Islamabad from February 2024 to January 2025. Non probability purposive sampling technique was done on young adults of age 20-35 years. Core endurance was evaluated using Mc Gills test while cardiorespiratory fitness was determined through YMCA 3 minute step test and physical activity levels via IPAQ. SPSS v.21 was used data analysis. Mean $\pm$ SD was used to express the quantitative variables while to compare the groups Kruskal Wallis test was applied.

**Results:** The study recruited 450 young adults which were equally distributed (n=150) among three activity levels (mild, moderate and vigorous). The score (19.53  $\pm$  1.95) of Trunk Flexor Endurance Test was less in the mild physical activity category, contrary to the vigorous physical activity category which demonstrated the greatest score of (30.21  $\pm$  1.69). Correspondingly, mild physical activity group had lowest value (8.25  $\pm$  1.29) and vigorous physical activity group had a peak value (19.13  $\pm$  1.72). Similar trend was seen in mild physical activity group with regard to the Left Sided Trunk Lateral Endurance Test which experienced the lowest score (8.17  $\pm$  1.39) than vigorous physical activity group having the highest one (18.85  $\pm$  1.77). The mild group attain the low value (4.53  $\pm$  1.13) for Test of Trunk Extensor Endurance while the highest score (15.05  $\pm$  1.44) was exhibited by vigorous physical activity group. The trend present in the mild physical activity group with regard to VO2max was lowest (46.23  $\pm$  6.55) and in the vigorous physical activity group it was highest (74.23  $\pm$  3.73). Moreover, the heart rate found to be highest (139.96  $\pm$  3.09) in the mild physical activity group whereas the lowest heart rate (119.53  $\pm$  5.05) was present in the moderate physical activity category.

**Conclusion:** The study concluded that the physical activity impact on young adults demonstrated that individuals involved in vigorous activity have improved cardiorespiratory fitness along with good core endurance than those involved in mild activity and moderate activity category.

**Keywords:** Core endurance, cardiorespiratory fitness, Physical activity

## 1. Introduction

Physical activity (PA) refers to any kind of movement produced by skeletal muscles resulting in the exertion of force. It differs among young adults.<sup>(1)</sup>

Numerous other factors including sedentary behavior which is specified by prolonged sitting inversely corresponds with participation in PA. It consecutively can also affect the core endurance and CRF.<sup>(2)</sup> The ability of the trunk muscles is indicated by the core endurance bringing about and maintaining force that is

supported by the diaphragm, gluteal, paraspinal, hip girdle, pelvic floor, and abdominal muscles.<sup>(3)</sup> Certain characteristics such as spinal alignment, neural control, exercise intensity, training, and existing lower back pain put a major impact on core strength and endurance. Spine can be safeguarded from extreme loads and enables force transfer between the upper and lower body by the collaboration of core muscles which is significant for spinal stability.<sup>(4)</sup> Medium to high

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intensity dynamic large muscle exercises performed for extended periods essential for physical well-being of the body is referred as Cardio respiratory fitness (CRF).

<sup>(5)</sup> VO2 max, the maximum oxygen consumption is a principally accepted measure of CRF providing approximate value of heart and lung capacity for observing daily physical exertion. <sup>(6)</sup>

Endurance training strengthens VO2 max which is an important factor VO2 max strengthened by endurance training enhances endurance performance and requires a constant or decreased maximal heart rate. VO2 max increases as stroke volume rises due to higher preload and lower afterload together with an increase in the systemic arteriovenous oxygen difference. <sup>(7)</sup>

The diaphragm plays a significant role in respiration and core stability. Core endurance and stability during movements is built up by training the diaphragm. It also enhances respiratory function which is necessary for aerobic activities and cardiovascular fitness (CRF). Overall fitness can be improved focusing on both core strength and cardiovascular training by participating in a training regimen. <sup>(8)</sup>

A cross sectional study in healthy adults was conducted by Okada et al. (2011) which founds a connection among trunk stability, biomechanical movement and performance. Only weak to moderate connections among functional assessment and trunk stability in healthy adults was gathered by the study. <sup>(9)</sup>

In a onetime reflection, the relationship between trunk stability and physical exertion was intended by Dr Prachi kapdule et al. (2019). The recruitment involved 110 young adults in total among which 67 were females and 43 were males. A positive association between trunk stability and physical exertion levels is shown in individuals who participate in more physical activity and those with increased levels of trunk stability as proposed by the results. <sup>(10)</sup>

A Pioreschi et al. (2017) performed an observational study which evaluates cardio respiratory fitness levels and its association with the body composition and physical activity in young South African adults. In accordance to the results ( $p < 0.001$ ), a comparison was made between the females and males which shows greater generality of overweight and obesity observed

in females contrast to males. Furthermore, males who are generally more involved in medium to high intensity physical activity verified remarkably elevated VO2 max in comparison to females. The study brings forward a positive correlation between MVPA and VO2 max ( $P > 0.001$ ). In contrast, sedentary time showed no correlation with VO2max while BMI demonstrated a converse relationship. <sup>(11)</sup>

The connection of physical exertion and sedentary behavior on cardio respiratory fitness in healthy adults-adolescents was found in a cross sectional study carried out by Rute Santos et al. (2014). Categorization of participants was done as low active/low sedentary and those as high active/low sedentary. Those classified as low active/low sedentary, exhibits superior chances of having fitness in contrast to those in low active/high sedentary group. Factors such as sedentary behavior and physical activity regulates Cardio respiratory fitness as indicated by the study. A negative correlation was observed between sedentary behavior and CRF. <sup>(12)</sup> An interventional study proposed by Alireza Shamsoddini et al. (2018) examined CVS risk factor in elderly and cardio respiratory fitness. The study established the impact of Thera band strength training exercises and core stability on cardio respiratory fitness. Significant improvement in FBS and lipid profiles was revealed following the intervention. Additionally, progression was noticed in BMI, blood pressure and VO2 max post exercise. No notable differentiation was found in blood pressure, BMI, lipid profile and VO2 max. However, considerable depletion in the group that took part in Theraband resistance training was displayed by FBS only. There was a positive impact of Theraband strength training and core stability on cardiovascular risk factor and cardio respiratory fitness among elder people. The outcome shows reduced BP, cholesterol levels and BMI along with advancement in VO2 max and exercise tolerance. <sup>(13)</sup>

## 2. Materials & Methods

The study was structured as descriptive cross-sectional observational study. The research was completed in one year after approval from ERC, from February 2024 to January 2025. The data was gathered from the

community of Rawalpindi and Islamabad. Non-probability Purposive sampling was chosen as a sampling technique. As indicated by Worldometer, the combined population of Rawalpindi and Islamabad is reported to be 2,344,701 in the year 2023. A sample count of 385 was computed using OpenEpi, at 95% confidence interval with a 5% margin of error, and having a response distribution of 50%. Participants of age range 20-35 years, both genders; female and male, and BMI 18.5-24.9 were included. Participants were excluded on the basis of Physical Activity Readiness Questionnaire (PAR-Q) and any participant having a history or a current diagnosis of the following pathologies were excluded from the study; cardiovascular, respiratory, neurological, musculoskeletal, pregnancy, and BMI more than 24.9.

Following the initial demographic survey, participant body weight and height were assessed to determine their Body Mass Index (BMI). Weight was measured in kilograms using a standard digital scale, with participants standing barefoot. Height was measured in inches with participants standing against a wall in the anatomical position. These height measurements were later converted to meters. BMI was then calculated for each participant using the standard Quetelet index protocol:  $BMI = \text{weight (kg)} / \text{height (m)}^2$ .

The PAR-Q is a seven-step questionnaire that was administered to identify risk factors during moderate physical activity and evaluate family medical history and disease severity.

Physical activity was assessed by the self-administered short version of IPAQ, covering the previous 7 days. Results were reported in categories such as mild, moderate and vigorous based upon activity level or in MET minutes a week as a continuous parameter. MET minutes represent the amount of energy expended performing a physical activity. To get a score from the IPAQ of MET minutes a week, take into consideration a walking to be 3.3 METS for mild, moderate physical activity to be 4 METS and vigorous physical activity to be 8 METS. Results will be reported in different ways; (I) HIGH Level- Vigorous intensity activity on at least

3 days achieving a minimum total physical activity of at least 1500 MET minutes a week OR 7 or more days of any combination of walking, moderate intensity or vigorous intensity activities achieving a minimum total physical activity of at least 3000 MET minutes a week. II) MODERATE Level- 3 or more days of high intensity activity and/or walking of at least 30 minutes daily achieving a minimum total physical activity of at least 600 MET minutes a week. III) LOW Level- individual is not fulfilling any requirement of either MODERATE or HIGH levels of physical activity.

The McGill test was employed to evaluate core muscle endurance, encompassing assessments of trunk flexors (maintaining a sit-up position with the back inclined at 60° from the floor), trunk extensors (adopting a prone position with upper limbs positioned above the Anterior Iliac Spines (ASIS) while hanging off the table), and lateral trunk musculature (assuming a left or right side-lying position on the floor with a 90° bent elbow and alignment under the shoulder, with the pelvis raised). Participants were instructed to sustain each isometric posture for as long as possible, as directed by the examiner, and performed the test only once. The duration each participant maintained the correct position for each posture was recorded, and the cumulative results from the four subtests were aggregated to derive an overall score.

The Three minute step test was employed to assess cardiorespiratory or aerobic fitness. In sync with the beat, participant step up on the bench (1st beat), then followed by the second foot (2nd beat), subsequently step down with one foot (3rd beat), and lastly step down with the other foot (4th beat). The participant practice stepping to the 12 inch bench, with a stepping rate of 24 steps per minute for 3 minutes. After completion of the test, participant heart rate was counted within 5 seconds and continue for one minute using pulse oximeter.

VO<sub>2</sub>max was then calculated by the following prediction equation: Males:  $VO_{2\max} = 111.33 - 0.42 H$ , Females:  $VO_{2\max} = 65.81 - 0.1847 H$ , where H = Heart rate (in beats/min) after completion of test. Data of 450 participants were analyzed using SPSS version 21.

### 3. Results

#### 5.1 IPAQ CATEGORIZATION:

In consistent with the IPAQ: mild, moderate, and vigorous a total of 450 participants were included in the study which was further classified within the three categories on the basis of their physical activity levels. There were equal number of participants in each of the group, with 150 individuals in each activity level.

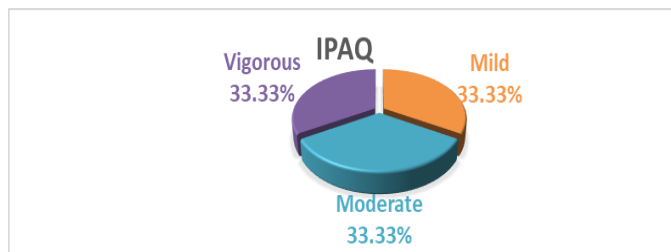


Figure 1 IPAQ Categorization

#### 5.2 DESCRIPTIVE STATISTICS:

##### 5.2.1 Age Distribution:

In contrary to mean age of moderate physical activity group which was  $29.37 \pm 3.03$  years, mean age of mild physical activity group was  $28.27 \pm 3.86$  years. However, mean age of  $25.41 \pm 4.65$  years was exhibited by the participants of vigorous physical activity group.

IPAQ	Age Years (Mean $\pm$ S.D)
Mild	28.27 $\pm$ 3.86
Moderate	29.37 $\pm$ 3.03
Vigorous	25.41 $\pm$ 4.65

Table 1 Mean of Participants According to Age

##### 5.2.2 Gender Distribution:

Total number of participants included in the study were 319 males and 131 females. In accordance with physical activity categories the gender distribution is shown in the table below.

IPAQ	Gender	Frequency (%)
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Mild	Male	74 (49.3)
	Female	76 (50.7)
	Total	150 (100)
Moderate	Male	95 (63.3)
	Female	55 (36.7)
	Total	150 (100)
Vigorous	Male	150 (100)

Table 2 Percentage of Participants in Gender Categorization

##### 5.2.3 BMI Distribution:

Across numerous activity levels the distribution of BMI categories are demonstrated in table. In mild activity category 149 participants was being in the normal BMI range, while 1 of the individual was overweight. In moderate and vigorous activity groups, all participants had BMIs which falls in between the normal range.

IPAQ	BMI (kg/m <sup>2</sup> )	Frequency (%)
Mild	Normal (18.5-24.9)	149 (99.3)
	Overweight (25-29.9)	1 (0.7)
Moderate	Normal (18.5-24.9)	150 (100)
Vigorous	Normal (18.5-24.9)	150 (100)

Table 3 Percentage of Participants in BMI Categories

##### 5.2.4 Heart Rate Distribution:



The heart rate distribution in the three different activity

Table 4 Mean of Participants Heart Rate

The heart rate distribution in the three different activity levels is illustrated above

### 5.3 INFERENTIAL STATISTICS:

#### 5.3.1 Graphical Representation of Core Endurance & Cardiorespiratory Fitness:

The median of core endurance components and cardiorespiratory fitness is represented in the graph below. Mild activity group had the least values of components of core endurance whereas high values of median was present in vigorous activity group. Similarly the mild activity group had poor cardiorespiratory fitness than vigorous activity group which showed greater values.

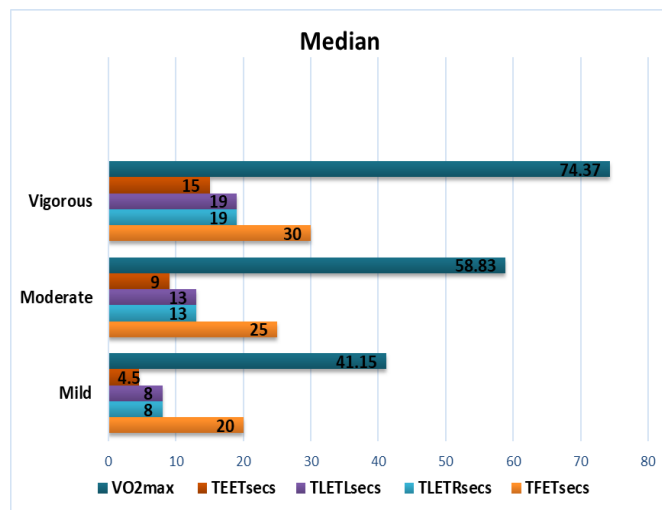


Figure 2 Median for Core Endurance & Cardiorespiratory Fitness

#### 5.3.2 Checking the Normality of Data:

The normality of data was tested by Kolmogorov-Smirnov test due to the assumption that sample size was more than 50. All the variables of this study that includes; Trunk Flexor Endurance Test, Right sided Trunk Lateral Endurance Test, Left sided Trunk Lateral Endurance Test, Trunk Extensor Endurance Test, and

VO2max were significant statistically i.e. ( $p < 0.05$ )

IPAQ	Heart Rate bpm (Mean±S.D)
Mild	139.96±3.09
Moderate	119.93±5.05
Vigorous	88.32±8.89

among all the activity levels.

IPAQ	Variables	p-Value
Mild	TFETsecs	0.000
	TLETRsecs	0.000
	TLETLsecs	0.000
	TEETsecs	0.000
	VO2max	0.000
Moderate	TFETsecs	0.000
	TLETRsecs	0.000
	TLETLsecs	0.000
	TEETsecs	0.000
	VO2max	0.000
Vigorous	TFETsecs	0.000
	TLETRsecs	0.000
	TLETLsecs	0.000
	TEETsecs	0.000

	<b>VO2max</b>	<b>0.002</b>
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TFET: Trunk Flexor Endurance Test, TLETR: Trunk Lateral Endurance Test (Right), TLETL: Trunk Lateral Endurance Test (Left), TEET: Trunk Extensor Endurance Test

Table 5: Normality of Data

### 5.3.3 Group Distribution of Core Endurance and Cardiorespiratory Fitness

As the data was not normally distributed so Kruskal Wallis Test was employed to compare the medians among the groups. The table shows the median value with Inter Quartile Range for Trunk Flexor Endurance Test, Trunk Lateral Endurance Test (Right side), Trunk Lateral Endurance Test (Left side), Trunk Extensor Endurance Test and VO2max across three physical activity categories.

IPAQ	TFETsecs	TLETR secs	TLE TL secs	TEET secs	VO2max
Median (IQR)					
<b>Mild</b>	<b>20.00</b> (1)	<b>8.00</b> (2)	<b>8.00</b> (2.25)	<b>4.50</b> (1.5)	<b>41.15</b> (12.58)
<b>Moderate</b>	<b>25.00</b> (2)	<b>13.00</b> (2)	<b>13.00</b> (3)	<b>9.00</b> (3)	<b>58.83</b> (18.04)
<b>Vigorous</b>	<b>30.00</b> (2)	<b>19.00</b> (2)	<b>19.00</b> (2)	<b>15.00</b> (2)	<b>74.37</b> (6.72)

Table 6 Core Endurance and Cardiorespiratory Fitness per IPAQ

## 4. Discussion

The young adults of age group 20-35 years having BMI that lies in a normal range were categorized into activity levels of IPAQ to evaluate the cardiorespiratory fitness and core endurance. The findings demonstrated that there was significant difference statistically for the core endurance, heart rate and gold standard of

cardiorespiratory fitness i.e. VO2max across different IPAQ activity groups. Individuals of vigorous activity group showed higher VO2 max values demonstrating improved CRF in contrast to the mild activity level. This finding is consistent with the earlier study done by Dyrstad et al. (2015) found that individuals performing vigorous physical activity exhibit higher values of VO2 max contrary to individuals of mild or moderate activity level. <sup>(15)</sup> In addition to this, another study done by Sajjad et al. (2020) highlighted that higher activity levels correlates with increased CRF. <sup>(16)</sup> Moreover another study done by Hudain et al. (2023) further corroborated our results and found that increased physical activity in athletes positively correlated with the higher values of VO2 max. This underscores the significance of vigorous physical activity with improved aerobic capacity.

<sup>(13)</sup> Beside this, research done by Sonia et al. (2017) concluded that CRF among the physiotherapy students was average, which positive correlation between VO2 max and the physical fitness index underscoring the need for increased physical activity to improve the fitness levels. <sup>(14)</sup>

The observation that the higher heart rates present in mild activity group whereas the vigorous physical activity category in harmony with the physical responses that were established. Regular vigorous physical activity enhance the efficiency of the cardiovascular system that results in often low resting heart rates and submaximal exercise heart rates. The American College of Sports Medicine (ACSM) guidelines supports it, which proposed that people having low heartbeat rates have increased CRF values at various exercise intensities. <sup>(17)</sup> The results also indicated that core endurance was higher in the vigorous activity group than in mild group. This outcome is consistent with the study of Akduman et al. (2019) that shows higher physical activity levels correlates positively with better core endurance in young adults. The study concluded that core muscle strength and endurance can be enhanced by regular physical activity at high intensity. <sup>(18)</sup> Furthermore, Santos et al. (2020) explored that individuals with better

core endurance results from higher activity levels, performing better in athletic and functional tasks.<sup>(3)</sup> Moreover, research done by Lu et al. (2019) observed that individuals with intellectual disabilities, also showed overall poor core endurance with low activity level.<sup>(19)</sup> Beside this, another study by Koju et al. (2017) concluded that medical students performing moderate physical activity have significant improvements in core endurance, although these improvements were markedly less than those engaged in vigorous physical activity.<sup>(20)</sup>

Interestingly, the results showed that trunk flexor endurance was generally good across all activity levels. This collaborates with research done by Bayraktar et al. (2019), who concluded that trunk flexor endurance is well-developed even in individuals who engage in mild physical activity due to the natural engagement of the abdominal muscles in everyday movements and low-intensity exercises. But the study highlights that there is no such significant relationship between improved core endurance with increased physical activity. This result could be due to small sample size of 51 participants.<sup>(21)</sup>

However, our findings suggested that trunk extensor endurance was poor across all activity levels and is notable. This corresponds to the study of Esfahani et al. (2020) demonstrated that sitting posture, lower physical fitness levels, and shorter durations of sitting at home, rather than prolonged sitting at work, may be associated with poor endurance of extensor muscle in individuals having chronic low back pain but nonspecific.<sup>(22)</sup> In addition to this another study by Chan (2019) reported that trunk flexor endurance was well developed in male intercollegiate rowers.

### Conclusion:

The study concluded that the impact of physical activity on young adults demonstrated that individuals involved in vigorous activity have improved cardiorespiratory fitness along with good core endurance than those involved in mild activity and moderate activity category.

### Future Recommendations

Raising awareness about migraine among students and staff is essential. Targeted support such as physiotherapy, psychological counseling, and appropriate medical treatment can help reduce migraine-related disability. Strengthening wellness and mental health services within university health systems may further improve students' quality of life.

### Disclosure /Conflict of interest:

Authors declare no conflict of interest.

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Case Report

## Correction of Lateral Trunk Shift in Lumbar Disc Herniation Using Positional Opening and McKenzie Lateral Principle: A Case Report

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### Abstract

**Background:** Lateral trunk shift is a posture deformity that is often related to lumbar disc herniation (LDH). This deformity will continue to cause pain, functional impairment, or delayed recovery if left untreated. The evidence related to lateral trunk shift using mechanical concepts of diagnosis and conservative treatment is still limited.

**Case Presentation:** A 42-year-old male patient reported with sudden onset pain in the lower back, as well as pain in the left lower extremity, with evident right-sided lateral shift. His condition was confirmed on X-rays and MRI with left posterolateral disc herniation at the L4-L5 level. The treatment plan included a six-week protocol using McKenzie lateral principles and positional opening in physiotherapy.

**Intervention:** The patient underwent physiotherapy according to the principles of Mechanical Diagnosis and Therapy (MDT), specifically McKenzie lateral principles and positional opening techniques, for 6 weeks. The physiotherapy routine was supervised twice a week, in addition to daily home exercises.

**Results:** At the end of 6 weeks, lateral trunk shift resolved, pain intensity reduced from 8/10 to 2/10 (NPRS), pain in the legs reduced from 7/10 to 1/10, Oswestry Disability Index reduced from 48% to 14%, and functional mobility was normalized with no adverse effects.

**Conclusion:** Integrating the positional opening procedure with the McKenzie lateral approach successfully addressed lateral trunk shift in LDH patients, providing relief from pain while maximizing functional outcomes. Such treatments are thus highly beneficial for patients.

**Keywords:** Lumbar disc herniation; lateral trunk shift; McKenzie technique; positional opening; physiotherapy; case report

### 1. Introduction

Lumbar disc herniation is a prevalent musculoskeletal condition and a major contributing factor to the onset of lower back pain and radiculopathy, often resulting in functional impairment, decreased quality of life, and reduced productivity. Lumbar disc herniation develops when weakening or tearing of the anulus fibrosus permits the nucleus pulposus to protrude or extrude beyond the intervertebral disc margin, causing the compression of the adjacent nerve roots, manifesting in pain, neurological deficits, and weakness in the dermatomal distribution. Conservative care, in the form of physiotherapy, is projected as the primary avenue for treatment in the absence of severe neurological deficit and red flags, effectively resolving the pain, restoring

functions, and preventing recurrences [3]. It has been observed that there can be a lateral trunk shift in patients suffering from LDH. It involves the lateral direction of the trunk in the frontal plane. The shift usually occurs away from the affected side. It is thought to alleviate the compression of the nerve roots along with mechanical pains. However, it can further add to the functional impairments. The condition needs to be corrected to bring effective relief. Mechanical Diagnosis and Therapy (MDT) or McKenzie Therapy involves a physiotherapy approach that classifies spine disorders based on their responses to repeated movements and sustained positions. In cases involving shifts to the side, MDT provides corrective strategies that work on the

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frontal plane and may include side glide exercises to relocate the spine and reduce irritation to the nerve root [5]. Alongside lateral correction procedures according to McKenzie, other opening positions involving sustained side-lying positions along with lateral movement of the pelvis and torso are used to reduce mechanical compression forces, enhance alignment, and minimize painful stimuli in the early phase of rehabilitation [6]. Although the existence of lateral trunk shifts in LDH has been acknowledged in literature, evidence is scarce for the practical use of both opening and lateral techniques in LDH. In this case study, the benefit for a patient showing a lateral trunk shift in LDH, confirmed by MRI, treated using specific conservative approaches, is presented.

## **2. Patient Information & History**

The patient was a 42-year-old male office worker.

### **Patient complaint and symptoms**

The patient presented with complaints of low back pain that radiated to the posterior-lateral surface of the left lower limb for the past 3 weeks. The pain has been sharp, constant, worsened by standing, walking, and bending forward, but relieved with sitting.

### **Medical, Family, & Psychosocial History**

The patient had never undergone spinal surgery or had any systemic illness. The patient's family had never had any neurological or musculoskeletal conditions. The psychosocial evaluation indicated some work-related stress, but no signs of fear-avoidant behavior or depression were found.

### **Findings in physical examination**

The postural examination during standing showed a marked right lateral deviation of the spine, with the tops of the shoulders deviated to the right of the pelvis. The lumbar active movements of flexion, extension, rotation, left lateral flexion, and left forward flexion were limited. The neurological examination was noted to have decreased SLR on the left, with reproduction of radicular pain at 35 degrees. The sensory examination

assessed the hypoesthesia of the left L5 dermatome. The muscle strength and reflexes were normal.

### **Relevant past intervention and outcomes**

Before his admission for presentation, he used Non-Steroidal Anti-Inflammatory drugs without significant relief. He has not undergone either formal physiotherapy or surgical procedures.

### **Diagnostic Assessment**

#### **Diagnostic Methods**

Clinical diagnosis was verified through physical examination, neural tension tests, and Magnetic Resonance Imaging (MRI) studies.

#### **Imaging**

The MRI study of the lumbar spine showed a left posterolateral disc herniation at the level of L4–L5 associated with nerve root compression.

#### **Diagnosis**

The diagnosis was left posterolateral herniation of the lumbar disc L4–L5 with associated lateral trunk shift (sciatic scoliosis). toward the right side

#### **Diagnostic Challenges**

Lack of red flags, maintenance of strength, and quick centralization of symptoms suggested favorable outcomes with conservative care.

## **3. Therapeutic Intervention**

### **Overview of Intervention**

The therapeutic intervention was based on the principles of Mechanical Diagnosis and Therapy (MDT). It primarily focused on positional opening techniques to reduce mechanical loading on the involved lumbar structures, followed by the application of lateral corrective strategies, specifically the McKenzie lateral principle, to facilitate correction of the lateral trunk shift and symptom centralization.

### **Positional Traction Techniques**

Positional traction was used during the initial stage of the treatment for the purpose of pain relief and minimizing the mechanical stress on the involved lumbar segments. The patient was positioned on the side with the affected side facing up. This enabled the concerned structures to be relieved because of the pull of gravity. Additionally, a gentle glide of the pelvis laterally away from the painful side was applied by the therapist. Bolster and pillow supports were placed appropriately under the trunk and pelvis to maintain the corrective position comfortably. Supporting bolsters also aided in keeping the lumbar side-gliding position and preventing guarding. The patient was instructed to relax fully in the position, allowing passive decompression without active effort. The corrective posture was maintained for longer periods, beginning with brief intervals and incrementing with advancing symptom tolerance.

#### McKenzie Lateral Principle

Following symptom reduction through positional traction, the McKenzie lateral principle was introduced to address the persistent lateral trunk shift. The McKenzie lateral technique's principle was incorporated to correct the persistent lateral shift of the patient's trunk. Correction of the patient's position was done with the help of the therapist, helping the patient maintain a corrected position when standing and when prone on the side. Force direction was closely observed based on the patient's symptoms. As soon as tolerability increased, the patient was taught self-correction techniques with special emphasis on repeated lumbar side glides towards the direction of symptom centralization. Such exercises should always be done in the patient's pain-free or pain-reducing ranges with special focus on maintaining end-range correction. The patient was educated to avoid movements and postures that increased radiating leg pain, especially sustained flexion or asymmetrical loading. The progression of exercise was done based on MDT concepts that entailed constant assessment of whether lateral correction had led to an improvement in posture and reduction of pain.

#### Administration Details

- Frequency: Twice weekly face-to-face physiotherapy
- Duration: 6 weeks
- Home Exercise Program: Daily lateral glides, positional holds, and core exercises

#### Changes in Therapeutic Interventions

Exercises were progressed from passive positional holds to active self-correction and trunk control as symptoms permitted. Pain intensity guided progression; movements that increased distal leg pain were modified or temporarily suspended.

#### 4. Results

##### Follow-Up and Outcomes

Measure	Baseline	Week 6
<b>NPRS (Back Pain)</b>	8/10	2/10
<b>NPRS (Leg Pain)</b>	7/10	1/10
<b>Lateral Shift</b>	Present	Absent
<b>SLR</b>	45° (positive)	70° (negative)
<b>Oswestry Disability Index</b>	48%	14%

#### Patient-Assessed Outcomes

The patient reported:

- Marked reduction in symptoms
- Improved ability to stand and walk without pain
- Return to normal daily activities and work tasks

#### Intervention Adherence and Tolerability

The patient adhered well to the home exercise program and reported no difficulty tolerating the intervention.

#### 5. Discussion

Lateral trunk shift is a well-recognized but often under-addressed clinical presentation in patients with lumbar disc herniation (LDH). It is commonly interpreted as an antalgic posture adopted to reduce mechanical stress and nerve root compression caused by disc pathology. If left uncorrected, this frontal-plane deformity can perpetuate pain, restrict spinal mobility, delay recovery, and compromise functional outcomes. The present case demonstrates that a structured conservative physiotherapy program integrating positional opening techniques with the McKenzie lateral principle can effectively correct lateral trunk shift, reduce pain, and restore function in a patient with MRI-confirmed LDH.

In this case, the patient presented with a marked right-sided lateral trunk shift associated with left posterolateral L4–L5 disc herniation and radiculopathy. The rapid improvement in posture and symptom centralization following lateral correction supports the concept that the shift was mechanical and antalgic rather than structural. Previous studies have suggested that lateral shifts frequently occur away from the side of disc herniation as a compensatory strategy to unload the affected nerve root, and that correction of this posture is essential for symptom resolution and functional recovery [3].

The Mechanical Diagnosis and Therapy (MDT) approach provided a clear clinical framework for assessment and intervention in this case. MDT emphasizes classification based on symptom behavior and directional preference, allowing targeted correction of mechanical derangements. The McKenzie lateral principle, which involves frontal-plane correction through therapist-assisted and patient-generated side-glide movements, has been shown to promote symptom centralization and postural realignment in patients with LDH and lateral shifts [7]. In the present case, gradual lateral correction resulted in normalization of trunk alignment and substantial reduction in both back and leg pain, consistent with earlier case reports and clinical observations.

Importantly, this case highlights the complementary role of positional opening techniques in the early phase

of rehabilitation. Sustained side-lying positions with controlled pelvic and trunk translation were used to reduce mechanical compression, decrease muscle guarding, and allow symptom relief before progressing to active correction. Emerging evidence suggests that sustained positioning and repeated movement strategies can effectively reduce nerve root irritation and improve outcomes in disc-related radiculopathy when applied in a symptom-guided manner [8] [9]. The use of positional opening likely enhanced patient tolerance to lateral correction and facilitated smoother progression toward active self-management.

The clinical outcomes observed in this case including significant reductions in NPRS scores, improvement in Oswestry Disability Index, normalization of straight leg raise, and resolution of the lateral shift are consistent with contemporary literature supporting conservative management of LDH. Systematic reviews and clinical trials published after 2020 have reported favorable short- and medium-term outcomes with McKenzie-based and exercise-oriented physiotherapy interventions compared with passive or generalized treatment approaches [10, 11]. The absence of adverse effects and high adherence further support the safety and feasibility of this combined approach.

Strengths of this case include the use of MRI confirmation, standardized outcome measures, clear documentation of intervention progression, and integration of patient-reported outcomes. However, limitations include the single-case design, lack of long-term follow-up, and absence of post-intervention imaging to assess structural disc changes. While imaging changes are not always necessary for clinical recovery, future studies incorporating longer follow-up and larger samples would strengthen evidence for this combined intervention strategy.

In summary, this case supports the clinical value of combining positional opening techniques with the McKenzie lateral principle in the conservative management of LDH accompanied by lateral trunk shift. Early identification and correction of the shift, guided by mechanical assessment, can lead to rapid



symptom improvement, postural normalization, and functional restoration without surgical intervention.

### Conclusion:

This case points out the importance of using positional opening approaches in association with the McKenzie lateral principle in the management of LDH with lateral trunk shift. This is supportive evidence in terms of correcting posture, pain relief, and functional recovery.

### Patient Perspective:

The patient was happy to report the correction of his posture alleviated his leg pain and gave him confidence in his movements. He was satisfied with the active approach to his care, which enabled him to return to work without apprehension.

### Informed Consent

Written informed consent for publication was obtained from the patient for publication of this case report and accompanying clinical information.

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