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Immediate Effects of Sub-Occipital Muscle Release combined with Sustained Natural Apophyseal Glides on Pain, Blood pressure, and Cervical range of motion in patients with chronic Tension-Type Headache": A Randomized Controlled Trial

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Abstract

Objective: This study aimed to determine the immediate effects of sub-occipital muscle release combined with and without sustained natural apophyseal glides on pain, blood pressure, and cervical ROM in the management of chronic tension-type headache.

Study Design: A Randomized Controlled Trial was conducted.

Place and duration of study: The study was conducted at Fauji Foundation Hospital, Rawalpindi.

Material and Methods: A randomized controlled trial was conducted at Fauji Foundation Hospital, Rawalpindi, comprising 48 patients randomized into two groups. The control group received conventional physical therapy with suboccipital muscle release, whereas the interventional group received additional sustained natural apophyseal glides. Numeric Pain Rating Scale (NPRS), blood pressure (mm Hg), and cervical range of motion (ROM) were used as outcome variables. All measurements were taken before and immediately after the intervention.

Results: The overall mean age of participants was 34.9 ± 11.0 years. Significant differences ($p<0.05$) were observed within the two groups at baseline and after treatment in all variables. Significant differences ($p<0.05$) were observed between the two groups at baseline, except for the Diastolic BP, and cervical right lateral flexion ($p>0.05$) in which no significant results were obtained. A significant difference ($p<0.05$) was observed between the two groups after treatment ($p<0.05$), except for right and left lateral rotation ($p>0.05$) in which no significant results were obtained.

Conclusion: Both conventional physical therapy with suboccipital muscle release and conventional physical therapy, along with suboccipital muscle release and sustained natural apophyseal glides, are effective. However, the latter approach is superior for managing chronic tension-type headaches, as it provides better results in terms of pain relief, blood pressure regulation, and cervical range of motion.

Keywords: Blood Pressure, Chronic Tension-Type Headache, Pain, Suboccipital Muscle release, Sustained Natural Apophyseal glides.

1. Introduction

One of the most reported types of headaches is Tension-type Headache, as it is projected to have an impact on every 2 in 3 individuals in the USA. [(1)] Headache is one of the most prevalent conditions worldwide, based on the 2019 Global Burden of Disease, and they estimated that tension-type headaches affect an average of 26% worldwide, among 27.1% are women and 23.4% are men suffering from TTH. [(2)] People who suffer from tension-type headaches explain that the pain is like steady, dull pain on both sides of the head or "a tight band around the forehead". In some cases, it ranges from an occasional mild headache to daily headaches. Psycho myogenic headache,

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, contraction headache, and stress headache are the other names for tension-type headache, while the most widely accepted term today is tension-type headache3. This type of headache has a peak prevalence in the age ranges from 30 to 39 years and declines slightly with age. In population-based studies, this type of headache is present in up to 78% of headache patients, and it is the least distinct of all types of headaches. [2] One of the frequently reported triggers for tension-type headaches is stress, while others are poor posture and inadequate sleep. The frequency of TTHs can be reduced by some relaxation techniques and regular exercise. But if headache pain is long-lasting or occurs frequently, then over-the-counter medications should be made necessary . [3] The pain of TTH does not get worse with routine physical activity and is generally mild to moderate. Vomiting or nausea does not co-exist with tension-type headaches, while it occurs with sensitivity to sound and light, but these two do not exist together. It means that people suffering from tension-type headaches can carry out normal daily activities despite experiencing headaches. But in chronic-type headache, mild nausea appears exclusively. [4] Patients who suffer from tension-type headaches face tenderness in the neck muscles and head, which particularly increases the frequency of attacks of tension-type headache. [2] Also, tension-type headaches and high blood pressure can coexist in individuals, but they are separate conditions with different underlying causes. Stress and anxiety, which are common triggers for tension-type headaches, can also temporarily raise blood pressure . [5] Non-pharmacological management of tension-type headaches includes psychological treatment and physical therapy. These management techniques are more attractive to patients who are reluctant to use drugs. However, ideally, all these methods should be tried in all patients' adjuncts to pharmacotherapy. [6] In addition to pain and musculoskeletal impairments, physiological parameters such as blood pressure may also be influenced in individuals with chronic tension-type headache (cTTH). Stress and anxiety, which are well-established triggers of tension-type headaches, are associated with increased sympathetic nervous system activity, potentially leading to transient elevations in blood pressure. Manual therapy interventions, including suboccipital muscle release and sustained natural apophyseal glides (SNAGs), may contribute to autonomic modulation by promoting relaxation, reducing muscle tension, and decreasing sympathetic overactivity. This may result in a reduction in blood pressure levels. Therefore, assessing blood pressure as an outcome measure provides insight into the broader physiological effects of manual therapy beyond pain relief and functional improvement.

The intervention of manual therapy for tension-type headaches is based on the improvement in the function of the craniocervical muscular skeleton with posture, active stabilization of the cervical spine, and mobilization, which will decrease sensitization, modulate pain perception, and positively impact the inhibitory system at certain spinal cord segments. With these techniques, blood flow to the affected areas increases due to which pain and discomfort. In a study, a greater number of active Trigger points on sub occipital muscle and forward head postures are observed in patients with cTTH as compared to healthy people. [7] Due to stress and poor posture, the suboccipital muscles become tense and tight, which results in headaches. To improve mobility and release tension, stretching and pressure are applied to sub occipital muscles by using the suboccipital muscle release technique. The goal of suboccipital muscle release is to reduce stress levels and promote relaxation. Immobility of joints and stiffness in the muscles of the shoulders and neck contribute to headache, which is then resolved by applying pressure to the specific areas of the spine that come under SNAGs. It is a Mulligan Technique, which is used throughout the spine, sacroiliac joint, and rib cage. SNAG aims to reduce headache symptoms by reducing muscle tension and increasing joint mobility.

For those with tension-type headaches, manual therapy procedures including spine manipulation and mobilization have been shown to be quite

effective, while the specific effects of SNAGs not combined with sub-occipital muscle release have not been extensively studied on tension-type headache patients.

Moreover, Chronic TTH is still unclear, while the pathophysiological theories of peripheral (myofascial nociception) pain mechanism and central (sensitization and inadequate endogenous pain control) will be discussed and described in the literature. [9] In recent research, it has been reported that there is a relationship between impairment of craniocervical musculoskeletal function and chronic tension-type headache. These functions include neck mobility, trigger points in the trapezius muscle, and forward head position. [10] But until now, in the treatment of cTTHs, there is a lack of evidence, so no definite conclusion regarding the use of manual therapy can be obtained. [11] Furthermore, as far as we are aware, no prior research has compared the effects of SNAGs and the sub-occipital muscle release technique in the treatment of chronic tension-type headaches, particularly with regard to systolic and diastolic blood pressure, which highlights the significance of the current study.

2. Materials & Methods

Ethical approval was obtained from the ethical review committee of "Foundation University School of Health Sciences (FUSH)" and is in accordance with the Declaration of Helsinki and CONSORT guidelines. The study was also prospectively registered at clinicaltrials.gov (National Institute of Health, US), ID: NCT05883813, as per CONSORT and ICMJE recommendations. This study was conducted in accordance with ethical standards and principles. Institutional Review Board (IRB) or Ethics Committee approval was obtained before the commencement of the research (Reference number: FF/FUMC/215-271-1 Phy/213). Informed consent was acquired from all participants involved in the study. The research was conducted with respect for participant privacy, confidentiality, and autonomy. Participants were briefed regarding the details of the study, confidentiality of the documentation, a brief explanation of Mulligan's SNAGs and suboccipital muscle release technique and exercises, and their role in reducing pain and improving functional ability.

A parallel design randomized controlled trial was conducted at the Neurological Department of Fauji Foundation Hospital from July 2022 to July 2023. A total of 48 patients were included via non-probability purposive sampling and randomized into two groups, namely the Control (conventional physical therapy with suboccipital muscle release) and Interventional (conventional physical therapy, suboccipital muscle release along with sustained natural apophyseal glides) groups, via a lottery method. No dropouts were reported, and all 48 patients were analyzed after the study (Fig. 1). It was a single-blind study in which patients were unaware of which group they were assigned. The Numeric Pain Rating Scale (NPRS), blood pressure (mm Hg), and cervical range of motion (ROM) were used as outcome measurement tools. Cervical range of motion (ROM) was assessed using a universal goniometer, a reliable and widely used clinical instrument. ROM measurements included cervical flexion, extension, bilateral lateral flexion, and rotation, and were recorded in a standardized manner pre- and post-intervention to ensure consistency and accuracy. The alternate hypothesis for the current study was that a significant difference exists between the immediate effects of suboccipital muscle release with and without SNAGS in the management of chronic tension-type headaches.

Patients aged 18–64 years of both genders diagnosed with chronic tension-type headache

(cTTH) according to the International Classification of Headache Disorders-3 (ICHD-3) criteria were included in the study.Inclusion criteria were as follows: Headache occurring on ≥15 days/month on average for >3 months (≥180 days/year), Headache lasting hours to days or unremitting, At least two of the following characteristics: Bilateral location, Pressing or tightening (non-pulsating) quality, Mild to moderate intensity, Not aggravated by routine physical activity (e.g., walking or climbing stairs). Both of the following: No more than one of photophobia, phonophobia, or mild nausea, Neither moderate nor severe nausea or vomiting , Not better accounted for by another ICHD-3 diagnosis. [12] Patients with other types of primary or secondary headache, like cervicogenic headache, history of trauma to the cervical spine, vertigo, dizziness, uncompensated neck tension, spurling test positive, flexion or extension compression test positive, cervical flexion rotation test positive, and pregnancy were excluded from the study.

The intervention was given by a manual physical therapist with clinical experience. Both groups received heat therapy and transcutaneous electric nerve stimulation (TENS) for 10 minutes each before muscle release. Stretching exercises for muscles, including trapezius and levator scapulae with 1 set of 5 repetitions, with 3 seconds hold in each position. The Control (conventional physical therapy with suboccipital muscle release) group received 5 min of general warm-up exercises, suboccipital muscle release with the patient in the supine position, with the eyes closed and the physiotherapist's hands placed under the patient's head, in contact with the suboccipital muscles. The physiotherapist progressively increased the pressure exerted during the 10 minutes of treatment. [13] The Interventional (conventional physical therapy, suboccipital muscle release along with sustained natural apophyseal glides group, on the other hand, received additional headache SNAGs in a sitting position, therapist stabilizes the patient's head against their body while his middle phalanx of the little finger contacts the posterior aspect of patient's C2 spinous process and thenar eminence of non-contact hand presses anteriorly in the horizontal plane against the little finger of opposite hand. 3 repetitions of each glide were given and maintained for 10 seconds each. The glides were tapered as per individual needs and the progression of the condition. [14] Both groups received a single treatment session as we were studying the immediate effects of treatment.

The sample was calculated using the OpenEpi Version 3 sample size calculator, keeping the confidence interval at 95%, a power of 80%, a ratio of sample size 1, entering the mean and standard deviation of the primary outcome variable, i.e., pain of both groups (experimental and control), and a resultant sample of 48 was calculated. [15]

The data was assessed for normality using the Shapiro-Wilk test of normality, showing $P<0.05$, indicating asymmetrical distribution of data; non-parametric tests of significance were used for the analysis of data. The Mann-Whitney U test was used for between-group analysis, while the Wilcoxon Signed Rank test was used for within-group analysis.

3. Results

Of the 56 subjects initially assessed, 48 (85.7%) were included. Of them, no one was lost to follow-up, and 48 (100%) completed the study. The overall mean age of participants was 34.90 ± 11.00 years. There were 17 (35.4%) males and 31 (64.5%) females. The interventional group consisted of 7 (29.2%) males and 17 (70%)

females, whereas the control group had 10 (41%) males and 14 (58.3%) females (Table I).

Table I: Demographic Data of participants

Descriptive Statistics		Interventional Group(conventional PT+suboccipital MR+SNAG's)	Control Group(conventional PT+suboccipital MR)	p-value
		(n=24)	(n=24)	
Age (years)	Mean ± SD	35.2±11.80	34.5±10.40	0.87
Gender	Male[n(%)]	7(29.2%)	10(41%)	
	Female[n(%)]	17(70%)	14(58.3%)	

n(%): number (%), SD: Standard Deviation, SNAGs: Sustained Natural Apophyseal Glides, PT= Physical Therapy, MR= Muscle Release

At baseline, there were significant differences ($p<0.05$) between the two groups, except for the Diastolic BP, cervical right lateral flexion ($p>0.05$), in which no significant results were obtained. A significant difference ($p<0.05$) was observed between two groups after treatment ($p<0.05$) except for right and left lateral rotation ($p>0.05$) in which no significant results were obtained, concluding SNAGs in addition to suboccipital muscle release and conventional physical therapy to be more effective than suboccipital muscle release and conventional physical therapy in the management of chronic tension type headache except for the outcomes of right and left lateral rotation (Table II).

Table II: Inter-Group comparison in terms of Pain, Blood Pressure, and Cervical Range of Motion

Variable		Time	Interventional Group		Control Group		p-Value
			Median (IQR)	Mean Rank	Median (IQR)	Mean Rank	
Pain		Pre	7(1)	20.04	7(1)	28.96	0.01
		Post	4(1)	20.04	5(0)	28.96	**0.01***
Diastolic Blood Pressure		Pre	80(20)	23.98	90(20)	25.02	0.07
		Post	80(10)	26.75	80(15)	22.25	**0.02***
Systolic Blood Pressure		Pre	120(20)	25.79	120(16)	23.21	0.05
		Post	120(10)	28.29	120(10)	20.71	**0.00***
Cervical Range of Motion	Flexion	Pre	45(12)	17.79	50(5)	31.21	0.00
		Post	52(10)	18.63	55(5)	30.38	**0.00***
	Extension	Pre	45(10)	30.24	40(3)	18.58	0.00
		Post	50(5)	28.73	50(5)	20.27	**0.02***
	Right Rotation	Pre	70(5)	23.04	70(8)	25.96	0.04
		Post	80(5)	26.79	75(5)	22.21	**0.02***
	Left Rotation	Pre	70(5)	22.69	70(7)	26.31	0.03
		Post	80(5)	26.33	75(5)	22.67	**0.03***
	Right Lateral Flexion	Pre	35(8)	25.56	35(10)	23.44	0.57
		Post	45(5)	25.27	45(5)	23.73	0.06
	Left Lateral Flexion	Pre	35(5)	25.90	35(10)	23.10	0.04
		Post	45(5)	25.29	45(5)	23.71	0.06

IQR: Inter Quartile Range, *p-value significant at <0.05

A comparison of the two groups' before and after intervention ratings revealed substantial changes ($P < 0.05$) for every category, indicating that both treatment approaches, SNAGs in addition to suboccipital muscle release with conventional physical therapy, and suboccipital muscle release with conventional physical therapy, are effective in the treatment for chronic tension-type headaches (Table III).

Table III: Intra-Group comparison in terms of Pain, Blood Pressure, and Cervical Range of Motion

Variable		Time	Interventional Group		Control Group	
			Median (IQR)	P-Value	Median (IQR)	p- Value
Pain		Baseline	7(1)	0.00*	7(1)	0.00*
		Post Rx	4(1)		5(1)	
Diastolic Blood Pressure		Baseline	80(20)	0.00*	90(20)	0.00*
		Post Rx	80(10)		80(15)	
Systolic Blood Pressure		Baseline	120(20)	0.00*	120(16)	0.00*
		Post Rx	120(10)		120(10)	
Cervical Range of Motion	Flexion	Baseline	45(12)		50(5)	
		Post Rx	52.5(10)	0.00*	55(5)	0.00*
	Extension	Baseline	45(10)		40(3)	
		Post Rx	50(15)	0.00*	50(5)	0.00*
	Right Rotation	Baseline	70(5)		70(8)	
		Post Rx	80(5)	0.00*	75(5)	0.00*
	Left Rotation	Baseline	70(5)		70(7)	
		Post Rx	80(5)	0.00*	75(5)	0.00*
	Right Lateral Flexion	Baseline	35(9)		35(10)	
		Post Rx	45(5)	0.00*	45(5)	0.00*
	Left Lateral Flexion	Baseline	35(10)		35(5)	
		Post Rx	45(5)	0.00*	45(5)	0.00*

IQR: Inter Quartile Range, *p-value significant at <0.05

4. Discussion

The focus of the present study was to compare suboccipital muscle release with conventional physical therapy versus SNAGs, in addition to suboccipital muscle release with conventional physical therapy on pain, blood pressure, and cervical range of motion in chronic tension-type headache. Both of the groups reported improvement in blood pressure, pain, and cervical range of motion after intervention, with P <0.05. When comparing between groups, SNAGs, in addition to suboccipital muscle release and conventional physical therapy, yielded greater improvements than suboccipital muscle release with conventional physical therapy. There is little research on how suboccipital muscle release and SNAGs, either separately or combined, affect systolic and diastolic blood pressure and all components of cervical range of motion in subjects with chronic tension-type headache.

It is important to note that the current study evaluated the immediate effects of a single treatment session, reflecting the short-term neurophysiological and mechanical responses to manual therapy interventions. Immediate improvements observed in pain and cervical mobility may be attributed to mechanisms such as reduction in muscle tension, improved joint mobility, modulation of nociceptive input, and activation of descending pain inhibitory pathways. These findings are clinically relevant, as early symptom relief may enhance patient compliance, reduce distress, and support the initiation of longer-term rehabilitation programs.

Although chronic tension-type headache is a long-standing condition, the assessment of immediate effects provides valuable insight into the initial therapeutic response, which is often used by clinicians to guide treatment selection and progression. In clinical practice, early improvement following manual therapy techniques such as SNAGs may serve as an indicator of treatment responsiveness and help in individualized patient management.

The results of the current study are in accordance with those of R. Tachii. et al (2015). They found that SNAGs, in addition to neck isometric exercises and a hot pack, showed that individuals with persistent nonspecific neck pain saw a substantial improvement in cervical joint position sense (CJPE), pain (NPRS), and neck disability (NDI). [16] However, there was no systolic and diastolic blood pressure included in R. Tachii. et al's study, and all movement components of cervical range of motion were not observed either. On the contrary, a study by Krupa D. Tank (2018) showed that Because both groups shown equivalent efficacy in terms of VAS, NDI, and cervical range of motion, Muscle Energy Technique and Mulligan SNAGS can be utilized as an alternative treatment in addition to traditional therapy for mechanical neck discomfort. [17] Moreover, a comparative study demonstrated no significant difference between myofascial release (MFR) and Mulligan Sustained Natural Apophyseal Glides (SNAGs) on pain, restricted ROM, and disability in non-specific low back pain. [18]

In our study, SNAGs, in addition to suboccipital muscle release with conventional physical therapy, showed improvement in pain. The results are consistent with a Muhammad Khan-led inquiry. et al. (2014), who found that in individuals with cervicogenic headaches, SNAGs mobilization has been more successful in lowering pain than Posterior Anterior Vertebral Mobilization (PAVMs). [19] These findings emphasize the potential advantages of SNAGs in reducing pain. Furthermore, a study by EJ Shin et al. (2014) has also reported that Middle-aged female patients with cervicogenic headaches can benefit from the SNAGs approach, which relieves both headache and cervical discomfort. It can also be applied to headaches in physiotherapy. [20]

Between-group analysis of the current study showed that systolic and diastolic blood pressure showed significant improvement in the interventional group. These findings may reflect autonomic nervous system modulation, particularly a reduction in sympathetic activity and enhanced parasympathetic response following manual therapy interventions. However, the literature on this outcome remains limited and inconsistent, highlighting the need for further investigation. But according to normality analysis, baseline data were non-normally distributed for systolic blood pressure, and this could be because some patients had slightly high but within range systolic blood pressure, whereas other patients had at low in range systolic blood pressure, so eventually all of them had different systolic blood pressure at baseline. The results are in contrast to that, a study by Z Mehmood et al. (2022) reported they did not observe any significant difference in systolic and diastolic blood pressure after treatment with sustained natural apophyseal glide with traction and traction alone. [21] And there is no study present in the literature to investigate the outcomes of blood pressure after performing either SNAGs or suboccipital muscle release on any of the patients.

In the current study, while observing the effects of these treatments on cervical range of motion, we found that all components of range of motion showed significant improvement immediately in between-group analysis, with superiority of the interventional group as compared to the control group, whereas right and left lateral rotation showed p value >0.05 indicates no statistically significant difference. Overall, while the findings demonstrate the effectiveness of both interventions in the short term, caution should be exercised in generalizing these results to long-term clinical outcomes. Future studies incorporating multiple treatment sessions and follow-up assessments are warranted to establish sustained effects and long-term clinical benefits in patients with chronic tension-type headache. And according to normality analysis, baseline data were non-normally distributed for all the components of cervical range of motion except for cervical right lateral flexion. This could be because every patient could have a different intensity of chronic tension-type headache, with some having the least limitations and others having extreme limitations in range. The results are in line with the findings of a study by K Vijayan et al. (2022), which showed that In patients with non-specific neck discomfort, the short-term use of Mulligan SNAGs in conjunction with traditional physiotherapy is effective in lowering pain, enhancing cervical range of motion, and restoring the lowered CV angle. [22] Whereas, a study by Krupa D. Tank (2018) showed that for mechanical neck pain, the Muscle Energy Technique and Mulligan SNAGS all groups shown equivalent efficacy in terms of VAS, NDI, and cervical range of motion. [17]

And as in our within-group analysis, we found that both groups reported improvement in all outcomes immediately, and both groups had manual therapy techniques incorporated in it, control group had the suboccipital muscle release technique, and the interventional group had suboccipital muscle release and SNAGs both. So our within-group results are also in accordance with the study by JA Mesa-Jimenez et al. (2015), They found that manual treatments were somewhat more successful than pharmaceutical medical medication therapy in the short term in lowering the frequency, severity, and duration of tension-type headaches. [23]

Despite the fact that our study is the only one that has examined this subject, no other research has evaluated the effects of SNAGs and suboccipital muscle release, either together or individually, in the treatment of chronic tension-type headaches. Systolic and diastolic blood pressure in individuals with persistent tension-type headaches is being examined for the first time in this study.

Conclusion:

Both suboccipital muscle release with conventional physical therapy and SNAGs, in addition to suboccipital muscle release with conventional physical therapy, are found to be effective in the management of chronic tension-type headache in terms of pain, range, and blood pressure. However, SNAGs, in addition to suboccipital muscle release with conventional physical therapy is found to be superior to suboccipital muscle release with conventional physical therapy only in terms of pain, systolic and diastolic blood pressure, and improvement in cervical range of motion; however, there were no discernible variations between the cervical right and left lateral rotation ranges of motion. These findings highlight the potential role of SNAGs as an effective adjunct in the early management phase of chronic tension-type headache. Nevertheless, as this study evaluated only immediate effects, further research is required to determine the long-term efficacy and clinical applicability of these interventions.

Limitations

The present study has several limitations. Firstly, the outcomes were assessed immediately after a single treatment session; therefore, the long-term effects and sustainability of improvements could not be determined. Given that chronic tension-type headache is a persistent condition, future studies should include longer follow-up periods and multiple treatment sessions to evaluate sustained clinical benefits. Despite these limitations, the study provides important preliminary evidence regarding the immediate clinical effects of manual therapy interventions, which may assist clinicians in early-stage decision-making and treatment planning.

Future Recommendations

Multicenter/longitudinal studies across KPK., Pre-post CPD intervention trials., Qualitative exploration of barriers (e.g., focus groups).

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Hassan M, Asaad T. Tension-type headache, its relation to stress, and how to relieve it by cryotherapy among academic students. Middle East Current Psychiatry. 2020;27:1-11. https://link.springer.com/article/10.1186/s43045-020-00030-3
2. Stovner LJ, Hagen K, Linde M, Steiner TJ. The global prevalence of headache: an update, with analysis of the influences of methodological factors on prevalence estimates. The journal of headache and pain. 2022;23(1):34. https://pubmed.ncbi.nlm.nih.gov/35410119/
3. Loder E, Rizzoli P. Tension-type headache. Bmj. 2008;336(7635):88-92. https://pubmed.ncbi.nlm.nih.gov/18187725/
4. Arnold M. Headache classification committee of the international headache society (IHS) the international classification of headache disorders. Cephalalgia. 2018;38(1):1-211. https://pubmed.ncbi.nlm.nih.gov/29368949/
5. Rastogi R, Singhal P, Chaturvedi DK, Gupta M. Investigating correlation of tension-type headache and diabetes: IOT perspective in health care. Internet of Things for Healthcare Technologies. 2021:71-91. https://www.researchgate.net/publication/342049957_Investigating_Correlation_of_Tension-Type_Headache_and_Diabetes_IoT_Perspective_in_Health_care
6. Espi-Lopez GV, Rodríguez-Blanco C, Oliva-Pascual-Vaca A, Benítez-Martínez J, Lluch E, Falla D. Effect of manual

therapy techniques on headache disability in patients with tension-type headache. Randomized controlled trial. European journal of physical and rehabilitation medicine. 2014;50(6):641-7. https://pubmed.ncbi.nlm.nih.gov/24785463/

7. Cho SH. The effect of suboccipital muscle inhibition and posture correction exercises on chronic tension-type headaches. Journal of Back and Musculoskeletal Rehabilitation. 2021;34(6):989-96. https://pmc.ncbi.nlm.nih.gov/articles/PMC6531183/
8. Racicki S, Gerwin S, DiClaudio S, Reinmann S, Donaldson M. Conservative physical therapy management for the treatment of cervicogenic headache: a systematic review. Journal of manual & manipulative therapy. 2013;21(2):113-24. https://pubmed.ncbi.nlm.nih.gov/24421621/
9. Fumal A, Schoenen J. Tension-type headache: current research and clinical management. The Lancet Neurology. 2008;7(1):70-83. https://pubmed.ncbi.nlm.nih.gov/18093564/
10. Fernández-de-Las-Peñas C, Cuadrado ML, Arendt-Nielsen L, Ge H-Y, Pareja JA. Increased pericranial tenderness, decreased pressure pain threshold, and headache clinical parameters in chronic tension-type headache patients. The Clinical journal of pain. 2007;23(4):346-52. https://pubmed.ncbi.nlm.nih.gov/17359516/
11. 11. Castien RF, Van Der Windt DA, Grooten A, Dekker J. Effectiveness of manual therapy for chronic tension-type headache: a pragmatic, randomised, clinical trial. Cephalalgia. 2011;31(2):133-43. https://pubmed.ncbi.nlm.nih.gov/20647241/
12. Huang T-C, Wang S-J. The international classification of headache disorders (ICHD-3 Beta Version). Modern Day Management of Headache: Questions Answers. 2017;15. https://pubmed.ncbi.nlm.nih.gov/23771276/
13. Fernández-de-las-Peñas C, Alonso-Blanco C, Cuadrado ML, Gerwin RD, Pareja JA. Trigger points in the suboccipital muscles and forward head posture in tension-type headache. Headache: The Journal of Head and Face Pain. 2006;46(3):454-60. https://pubmed.ncbi.nlm.nih.gov/16618263/
14. Alonso-Blanco C, Fernández-De-Las-Peñas C, Fernández-Mayoralas DM, de-la-Llave-Rincón AI, Pareja JA, Svensson P. Prevalence and anatomical localization of muscle referred pain from active trigger points in head and neck musculature in adults and children with chronic tension-type headache. Pain Medicine. 2011;12(10):1453-63. https://pubmed.ncbi.nlm.nih.gov/21812909/
15. Pérez-Llanes R, Ruiz-Cárdenas J, Meroño-Gallut A, Fernández-Calero M, Ríos-Díaz J. Effectiveness of suboccipital muscle inhibition combined with interferential current in patients with chronic tension-type headache: a randomised controlled clinical trial. Neurología (English Edition). 2022;37(9):717-25. https://www.sciencedirect.com/science/article/pii/S2173580821001437
16. Tachii R, Sen S, Arfath U. Short-term effect of sustained natural apophyseal glides on cervical joint position sense, pain and neck disability in patients with chronic neck pain. International Journal of Therapies and Rehabilitation Research. 2015;4(5):244.https://www.researchgate.net/publication/283204363_SHORT-TERM_EFFECT_OF_SUSTAINED_NATURAL_APOPHYSEAL_GLIDES_ON_CERVICAL_JOINT_POSITION_SENSE_PAIN_AND_NECK_DISABILITY_IN_PATIENTS_WITH_CHRONIC_NECK_PAIN
17. Tank KD, Choksi P, Makwana P. To study the effect of muscle energy technique versus mulligan snags on pain, range of motion and functional disability for individuals with mechanical neck pain: a comparative study. Int J Physiother Res.2018;6(1):2582https://www.researchgate.net/publication/323114799_TO_STUDY_THE_EFFECT_OF_MUSCLE_ENERGY_TECHNIQUE_VERSUS_MULLIGAN_SNAGS_ON_PAIN_RANGE_OF_MOTION_AND_FUNCTIONAL_DISABILITY_FOR_INDIVIDUALS_WITH_MECHANICAL_NECK_PAIN_-_A_COMPARATIVE_STUDY
18. Bhat V, Patel VD, Eapen C, Shenoy M, Milanese S. Myofascial release versus Mulligan sustained natural apophyseal glides' immediate and short-term effects on pain, function, and mobility in non-specific low back pain. PeerJ. 2021;9:e10706.

19. Khan M, Ali SS, Soomro RR. Efficacy of C1-C2 sustained natural apophyseal glide (SNAG) versus posterior anterior vertebral mobilization (PAVMs) in the management of cervicogenic headache. Journal of Basic & Applied Sciences. 2014;10:226. https://pubmed.ncbi.nlm.nih.gov/33777508/
20. Shin E-J, Lee B-H. The effect of sustained natural apophyseal glides on headache, duration and cervical function in women with cervicogenic headache. Journal of exercise rehabilitation. 2014;10(2):131.https://pubmed.ncbi.nlm.nih.gov/24877050/
21. Mehmood Z, Ijaz U, Imtiaz I, Fatima A, Akram MJ, Ahmed N, et al. Effects of cervical traction mobilization with mulligan's SNAGS on Pain, cardiovascular and respiratory outcomes among young adults with cervical pain. The Professional Medical Journal. 2022;29(10):1459-64.https://www.researchgate.net/publication/364101240_Effects_of_cervical_traction_mobilization_with_mulligan%27s_SNAGS_on_Pain_cardiovascular_and_respiratory_outcomes_among_young_adults_with_cervical_pain
22. VIJAYAN K, MAN AS, KumAReSAN P, PALANI JL. Short-term Effect of Mulligan SNAGs on Pain Intensity, Cervical Range of Motion and Craniovertebral Angle in Patients with Non Specific Neck Pain: A Quasi-experimental Study. Journal of Clinical & Diagnostic Research. 2022;16(7). https://jcdr.net/articles/PDF/16547/55962_CE%5bNik%5d_F%5bSH%5d_PF1(SC_KM)_PFA(SC_KM)_PN(KM).pdf
23. Mesa-Jimenez JA, Lozano-Lopez C, Angulo-Diaz-Parreno S, Rodriguez-Fernandez AL, De-la-Hoz-Aizpurua JL, Fernández-de-Las-Peñas C. Multimodal manual therapy vs. pharmacological care for management of tension type headache: A meta-analysis of randomized trials. Cephalalgia. 2015;35(14):1323-32.https://pubmed.ncbi.nlm.nih.gov/25748428/

Original Article

Association of Diabetic Health Literacy with Glycemic Control in Type-2 Diabetic Patients visiting H.I.T Hospital Taxila

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Abstract

Objective: This study aimed to assess diabetes health literacy among patients with T2DM and determine its association with glycemic control at the Medical Outpatient Department of HIT Hospital, Taxila

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

Place and duration of study: This cross-sectional study was conducted in the Medical Outpatient Department of H.I.T Hospital, Taxila, between April 2024 and August 2024, to assess diabetes-related health literacy among patients with type 2 diabetes.

Material and Methods: A descriptive cross-sectional study was conducted from April to August 2024 using convenience sampling. A total of 377 patients were recruited, with sample size calculated via OpenEpi at 95% confidence and 5% margin of error. Data were collected using a validated 15-item Diabetes Health Literacy Questionnaire rated on a 5-point Likert scale. Statistical analyses were performed using SPSS version 25. Associations between health literacy and glycemic control were evaluated with the Chi-square test ($p < 0.05$ considered significant).

Results: Participants included 167 males (44.3%) and 210 females (55.7%), aged 20–70 years (mean ± SD: 50.6 ± 10.1). Family history of diabetes was reported by 80.4% of participants. High diabetes health literacy was observed in 1.1%, moderate in 38.2%, and low in 60.7%. Good glycemic control was achieved by 51.5% of participants. Diabetes health literacy was strongly associated with glycemic control ($p < 0.001$).

Conclusion: Higher diabetes health literacy is significantly associated with improved glycemic control. Implementing structured patient education and literacy-enhancing interventions is essential to reduce complications and optimize outcomes in T2DM management.

Keywords: Diabetes Health Literacy, Glycemic Control, HbA1c, Type 2 Diabetes Mellitus

1. Introduction

Diabetes mellitus represents a significant public health challenge worldwide, with profound implications for morbidity, mortality, and healthcare expenditure. In 2021, an estimated 537 million individuals were living with diabetes globally, and this figure is projected to rise to 643 million by 2030 and to 783 million by 2045, highlighting a persistent upward trend in disease burden. [(1)] In the United States, total annual healthcare costs associated with diabetes increased by 35 % over five years—from $327 billion in 2017 to $413 billion in 2022—while individuals with diabetes incur roughly twice the healthcare expenditures of those without the disease.[(2)] Globally, at least 966 billion was spent on diabetes-related healthcare in 2021, representing a 316 % increase over the preceding 15 years.[(3)] Diabetes also contributes to a spectrum of disabling complications affecting the lower limbs and other organ systems and remains a major cause of premature mortality, with diabetes-related deaths rising from 1.5 million in 2012 to 6.7 million in 2021.[(4)] Achieving optimal glycaemic control is a central objective in diabetes management. Evidence from landmark clinical trials indicates that maintaining hemoglobin A1c (HbA1c) below 7 % substantially reduces the risk of micro vascular complications. the age of 65 years. . For example, each 1 % reduction in HbA1c is associated with a 37 % decrease in microvascular compilcations.

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For example, each 1 % reduction in HbA1c is associated with a 37 % decrease in micro vascular complications, a 21 % reduction in diabetes-related mortality, and a 14 % lower risk of myocardial infarction.[5] Consequently, precise blood glucose control is integral to reducing morbidity and mortality among individuals with type 2 diabetes. (6)

Despite advancements in treatment and prevention, complications such as nephropathy, retinopathy, and cardiovascular disease remain prevalent. A critical component of effective diabetes care is patient self-management, which depends heavily on adequate health literacy. Health literacy enables individuals to access, understand, and use health information to make informed decisions regarding disease management.(7) A multi-country study reported that only 7.3 % to 82 % of individuals with diabetes had adequate health literacy, underscoring substantial variability and gaps in patient comprehension. (8)

The World Health Organization defines health literacy as "the cognitive and social capabilities that determine the motivation and ability of people to gain access, understand, and utilize information in such ways that enhance and maintain good health." (9) In the context of diabetes, health literacy encompasses understanding disease processes, communicating with healthcare providers, and applying information to daily self-care and clinical decision-making. (10)

Pakistan is currently experiencing a severe diabetes epidemic. According to estimates from the International Diabetes Federation, approximately 34.5 million adults aged 20–79 years in Pakistan were living with diabetes in 2024, representing one of the highest national prevalence rates globally (age standardized prevalence ≈ 31.4 %). (11) The substantial burden of diabetes in Pakistan is driven by rapid urbanization, shifts in lifestyle patterns, limited healthcare infrastructure, and socioeconomic constraints that exacerbate disparities in disease detection and management. (11) Effective diabetes control in this context requires empowering patients with the requisite knowledge and skills to manage their condition, while addressing cultural beliefs and misconceptions that influence health seeking behaviors. Enhancing health literacy through targeted interventions can improve self management practices, reduce the risk of complications, and improve overall health outcomes. (11)

Inadequate diabetes specific health literacy remains a significant barrier to effective disease control. Standardized instruments such as the Diabetes Health Literacy Scale (DHL) and the Short Test of Functional Health Literacy in Adults (S TOFHLA) are used to assess literacy levels in diabetic populations.(12,13) Individuals with limited understanding of diabetes are more likely to experience poor glycaemic control, increased healthcare utilization, and higher treatment costs, with consequent elevations in the risk of complications. Conversely, patients with higher health literacy demonstrate better self care behaviors and more favorable health outcomes. (13)

2. Materials & Methods

This cross-sectional study was conducted in the Medical Outpatient Department of H.I.T Hospital, Taxila, between April 2024 and August 2024, to assess diabetes-related health literacy among patients with type 2 diabetes. The sampling frame included all patients attending the OPD during the study period who met the eligibility criteria. Convenience sampling was employed to recruit participants, as it allowed for efficient enrollment of eligible patients within the limited study duration and ensured access to patients with documented HbA1c results.

The study included male and female patients of all ages who had a confirmed diagnosis of type 2 diabetes for 1–10 years and a documented HbA1c level within the previous six months, which was verified directly from laboratory records to ensure accuracy. Patients with type 1 diabetes, gestational diabetes, or severe illnesses such as cancer or

kidney failure were excluded to reduce confounding factors that could affect disease management or health literacy. A total sample size of 377 participants was calculated using the OpenEpi sample size calculator, with a 95% confidence level, a 5% margin of error, and an anticipated frequency of 50%, ensuring adequate statistical power for the study objectives. Data collection was conducted using a structured questionnaire, which included the Diabetes Health Literacy Scale (DHL) to assess patients' knowledge, comprehension, and ability to apply diabetes-related information in daily self-care. The questionnaire also collected socio demographic details, disease duration, and recent HbA1c values. Prior to data collection, participants were provided with information about the study objectives and procedures, and written informed consent was obtained. Ethical approval for the study was obtained from the institutional review board of HITEC-IMS, Taxila. Data was entered and analyzed using statistical software, with descriptive statistics used to summarize socio demographic variables, disease characteristics, HbA1c levels, and health literacy scores. Associations between health literacy and glycaemic control were assessed using appropriate statistical tests, with significance set at $p < 0.05$.

Data collection procedure:

Data was collected by researchers through printed forms consisting of two sections.

First section of demographic variables comprising of gender, educational status, duration and family history of diabetes and glycemic control of type 2 Diabetic patients and second section comprised 15 diabetes health literacy items scored on a 5 point Likert scale. The instrument demonstrated excellent internal consistency (Cronbach's $\alpha = 0.928$) in the present sample. While versions of the Diabetes Health Literacy Scale have shown acceptable reliability and validity in other populations, this tool has not been previously formally validated in the Pakistani diabetic population, and its use in this study represents an applied evaluation in a new context. Scores were converted to percentages (with 5 points representing 100 %) to classify diabetes health literacy as high moderate (60–74 %), or low (< 60 %). Glycaemic control was categorized as good (HbA1c < 7 %) or poor (HbA1c ≥ 7 %) (≥ 75 %), based on documented laboratory records.

3. Results

The study included 377 participants visiting Medical OPD of H.I.T Hospital Taxila with age range from 20 to 70 years with a mean age of 50.62 ± 10.1 years.

Variable	Frequency	
Gender	Male	44.3% (n=167)
	Female	55.7% (n=210)
Family History of Diabetes	Yes	80.4% (n=303)
	No	19.6% (n=74)
Duration Of Diabetes	1-5 years	37.7% (n=142)
	6-10 years	62.3% (n=235)
Education Status	Illiterate	25.2% (n=95)
	Literate	74.8% (n=282)

Table: 01 Socio-Demographic characteristics and clinical information of the Diabetic Patients Visiting OPD of HIT Hospital

Patients who had a family history of Diabetes were accounted for 80.4% of the participants and 19.6% had no family history of Diabetes. 37.7% of patients had duration of diabetes from 1-5 years and 62.3% of patients had duration of diabetes from 6-10 years. When considering the formal education status, it revealed that 74.8% were literate and 25.2% were illiterate.

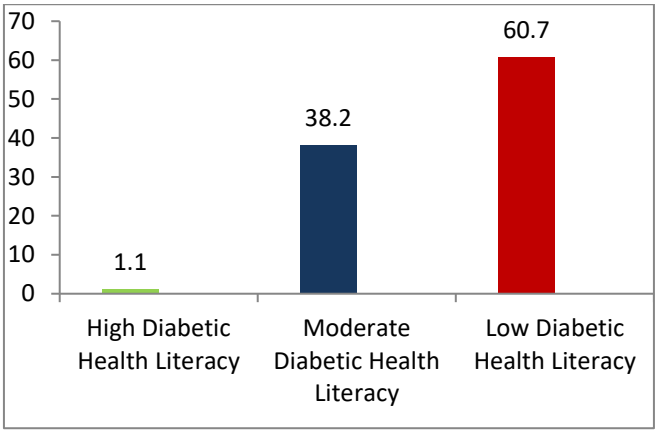

Figure 01: Frequency of Diabetes Health Literacy among type 2 Diabetic Patients

Glycemic Control: Respondents who achieved good glycemic control (HbA1c < 7) account for 51.5%, whereas 48.5% had poor control (HbA1c > 7).

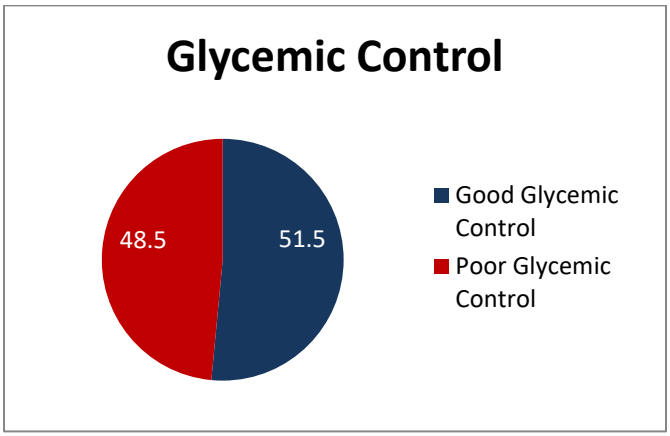

Figure 02: Frequency of Glycemic Control

Variable	Frequency		P-value
Diabetic Health Literacy	High Diabetic Health Literacy	1.1%(n=4)	0.000
	Moderate Diabetic Health Literacy	38.2%(n=144)	
	Low Diabetic Health Literacy	60.7%(n=229)	
Glycemic Control	Good	51.5% (n=194)	
	Poor	48.5% (n=183)	
Pearson Chi- Square		66.587[a]	.000
Likelihood ratio		70.249	.000

Table: 02 Association of Diabetic Health Literacy with Glycemic Control

Chi-square test revealed a highly significant association between Diabetic health literacy and glycemic control ($p < 0.001$).

4. Discussion

The findings of this study highlighted several critical aspects regarding diabetic health literacy and its impact on glycemic control among type 2 diabetic patients visiting H.I.T Hospital Taxila. There is a significant association observed between health literacy and glycemic control underscores the importance of patient education and empowerment in diabetes management.

Individuals with higher health literacy levels are more likely to understand their condition, engage in self-care practices, and adhere to treatment plans effectively. Respondents with inadequate understanding of diabetes management may hinder individuals from effectively controlling their blood glucose levels, leading to poorer health outcomes and increased healthcare utilization.. These findings extend beyond mere description of results by highlighting the role of health literacy as an active driver of diabetes self management, rather than a passive correlate. Our results corroborate a growing body of evidence that suggests health literacy directly influences diabetes outcomes. In a cross sectional study from Lahore, Pakistan, [16] inadequate health literacy was significantly associated with poor glycemic control, with a majority of patients exhibiting high HbA1c when literacy levels were low. This study, similar to ours, found that patients with poorer understanding of disease and management practices had worse glycemic profiles and higher odds of complications. In our study, 48.5% of participants with poor glycemic control (HbA1c > 7%) had inadequate health literacy ($p < 0.01$). This finding aligns with a study conducted in Lahore, Pakistan, where 86.1% of participants with poor glycemic control exhibited inadequate health literacy, and a significant association was observed between low literacy and diabetic complications, such as retinopathy (Munir et al., 2018). [14] Similarly, Al Sayah et al. (2013) reported that health literacy independently predicted glycemic control, with the low literacy group demonstrating a 1.2% higher mean HbA1c compared to participants with higher literacy levels. A similar approach was adopted by Osborn et al. (2010), who found that health literacy interventions specifically designed for underserved populations significantly improved diabetes outcomes over six months.

Our findings align with the study by Gazmararian et al. (2003), which showed that patients with limited health literacy were more likely to have complications and higher average HbA1c levels. However, unlike some studies that failed to find a significant association (e.g., Cavanaugh et al., 2008).

In Saudi Arabia, research showed that almost 69 out of 100 patients with diabetes were able to understand health information well. However, this did not seem to improve their control over their blood sugar levels. The reasons could be different health care systems, how education about diabetes is provided, or the way people there approach caring for themselves when they have diabetes. [15]

Furthermore, an Ethiopian study reported that 56.5% of participants had high diabetic health literacy and found that those individuals were 1.85 times more likely to have good glycemic control.([15]

Enhancing diabetic health literacy through targeted educational interventions is crucial in improving outcomes for diabetic patients. Healthcare providers should focus on clear communication, patient-centered education, and simplifying health information to empower patients with the knowledge and skills necessary for effective self-management. Our findings match up with earlier work. This work showed that knowing more about health helps people handle diabetes better. One example is a study by Schillinger and his team. They found that those who knew more about health could control their blood sugar better. Similarly, a study by Cavanaugh and his colleagues showed that when efforts were made to help people know more about health, it led to a big improvement in their understanding of diabetes. They even discovered a big improvement in HbA1c levels, a key indicator of how well diabetes is being managed.

Conclusion:

Diabetic health literacy is positively associated with better glycemic control in patients with type 2 diabetes. Enhancing patient education and targeted support may help improve self-management and reduce the risk of complications.

Limitations

This study utilized a cross-sectional design with convenience sampling, which limits causal inference. There is often overestimation of high health literacy

since some patients who have inadequate health literacy skills often deny or conceal their deficit. may affect the generalizability of the results.

References:

1. Sun H, Saeedi P, Karuranga S, et al. IDF Diabetes Atlas: global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. Diabetes Res Clin Pract. 2022;183:109119.
2. American Diabetes Association. Economic Costs of Diabetes in the U.S. in 2017. Diabetes Care. 2019;41(5):917–28.
3. Zhang Y, Lazzarini PA, McPhail SM, van Netten JJ, Armstrong DG, Pacella RE. Global disability burdens of diabetes-related lower-extremity complications in 1990 and 2016. Diabetes Care. 2020;43(5):964–74.
4. Quesada JA, Carratalá-Munuera C, Carbonell-Soliva A, et al. Trends in premature mortality from diabetes mellitus in Costa Rica in the period 2000–2020. Postgrad Med. 2022:1–13.
5. Lage MJ, Boye KS. The relationship between HbA1c reduction and healthcare costs among patients with type 2 diabetes: evidence from a US claims database. Curr Med Res Opin. 2020;36(9):1441–7.
6. Mamo Y, et al. Determinants of poor glycemic control among adult patients with type 2 diabetes mellitus in Jimma University Medical Center, Jimma zone, south west Ethiopia: a case control study. BMC Endocr Disord. 2019;19(1):1–11.
7. Noroozi M, Derikvandi M, Saki M, Moradi Kalboland M. Investigating health literacy level and its relation with some factors in patients with type 2 diabetes in Ahvaz. J Health Literacy. 2019.
8. Abdullah A, Liew SM, Salim H, Ng CJ, Chinna K. Prevalence of limited health literacy among patients with type 2 diabetes mellitus: a systematic review. PLoS ONE. 2019;14(5):e0216402.
9. Nutbeam D, Lloyd JE. Understanding and responding to health literacy as a social determinant of health. Annu Rev Public Health. 2021;42(1):159–73.
10. Tefera YG, et al. Diabetic health literacy and its association with glycemic control among adult patients with type 2 diabetes mellitus attending the outpatient clinic of a university hospital in Ethiopia. PLoS ONE. 2020;15(4):e0231291.
11. Lee EH, Lee KY, Lee KW, Nam M, Kim SH. A new comprehensive diabetes health literacy scale: development and psychometric evaluation. Int J Nurs Stud. 2018;88:1–8.
12. Santana S, Brach C, Harris L, Ochiai E, Blakey C, Bevington F, et al. Updating health literacy for Healthy People 2030: defining its importance for a new decade in public health. J Public Health Manag Pract. 2021;27:S258–64.
13. Munir S, Islam M, Usman HB. Health literacy and its association with diabetic retinopathy in patients with type 2 diabetes mellitus in Lahore. J Pak Med Assoc. 2018;68(1):43–6.
14. Mashi AH, Aleid D, Almutairi S, Khattab F, AlMuqawed A, Khan S, et al. The association of health literacy with glycemic control in Saudi patients with type 2 diabetes. Saudi Med J. 2019;40(7):675–80.
15. Alemayehu M, et al. Diabetic health literacy and its association with glycemic control among adult patients with type 2 diabetes mellitus attending the outpatient clinic of a university hospital in Ethiopia. PLoS ONE. 2019;14(4):e0215361.
16. Saeed H, Saleem Z, Naeem R, Shahzadi I, Islam M. Impact of health literacy on diabetes outcomes: a cross-sectional study from Lahore, Pakistan. Public Health. 2018 Mar;156:8-14. doi: 10.1016/j.puhe.2017.12.005. Epub 2018 Jan 30. PMID: 29353668.

Original Article

Assessment of Nurses' Knowledge and Practices in the Early Management of Worsening Heart Failure Patients

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Abstract

Objective: This study aimed to evaluate nurses' knowledge/practices in early worsening HF management at Lady Reading Hospital (LRH), Peshawar.

Study Design: An descriptive cross-sectional study was conducted.

Place and duration of study: The study was conducted at Lady Reading Hospital (LRH), Peshawar from August to November 2025.

Material and Methods: Cross-sectional descriptive study (Aug-Nov 2025; n=142 nurses from ICU/CCU/Emergency/Cardiology) used convenience sampling (Raosoft calculator). Adapted validated questionnaire (Jideofor & Galanza 2023; α=0.73 knowledge, 0.81 practice): 22 true/false knowledge items (0-22 score; Good ≥17, Moderate 12-16, Poor ≤11); 11 Likert practice items (0-11; Adequate ≥9, Inadequate ≤8). SPSS v27 descriptives (means/SD/frequencies).

Results: Young (81% 20-35yrs), female (88%), Post-RN (66.2%) nurses had moderate knowledge (M=14.70±2.47; 62%), good (35.9%), poor (2.1%). Adequate practice 54.9% (M=8.47); inadequate 45.1%. Training (54.9%) linked to better scores.

Conclusion: Moderate knowledge/borderline practice signals training gaps despite guideline familiarity. Targeted CPD, protocols essential to bridge knowledge-practice gap, enhancing HF outcomes in resource-limited settings

Keywords: Heart failure, worsening HF, nurses' knowledge, practice, Peshawar, tertiary care

1. Introduction

Heart failure is a chronic, progressive, and complex clinical syndrome in which the heart's ability to pump or fill with blood becomes impaired, resulting in an inability to adequately perfuse tissues and organs to meet metabolic demands. The syndrome represents the final common pathway for many cardiovascular diseases and is characterized by symptoms. Such as shortness of breath (dyspnea), fatigue, and reduced exercise tolerance. Clinical signs include ankle swelling, pulmonary crackles, and elevated jugular venous pressure. Despite major advances in cardiovascular medicine, HF remains a global health challenge because of its high prevalence, recurrent hospitalizations, and high economic burden. [(1)] More than 64 million people are estimated to live with heart failure worldwide. Decreased life expectancy and survival after acute cardiac events, has led to a steady increase in prevalence. According to estimates by the Global Burden of Disease Study, HF is considered a leading cause of morbidity and mortality worldwide. It ranks among the leading causes of hospitalization for adults over the age of 65 years. In 2022, the American Heart Association and its partner societies reported that nearly one in five adults will develop heart failure during their lifetime. [(2–4)] HF can be classified based on the ejection fraction into HF with reduced ejection fraction, preserved ejection fraction, or mildly reduced ejection fraction and further characterized by the NYHA functional classification. Each type carries different management challenges. Importantly, regardless of subtype, many patients experience acute decompensations-episodes of clinical deterioration characterized by pulmonary

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congestion, fluid overload, or hypotension. These demand timely recognition and rapid medical intervention. These episodes of worsening HF (also termed acute decompensated HF) are associated with high in-hospital mortality and length of stay. The early recognition of such deterioration is therefore critical in preventing adverse outcomes. Evidence shows that delays in identifying clinical warning signs such as dyspnea, orthopnea, or rapid weight gain are associated with a significant increase in the risk of readmission. For this reason, most international guidelines now emphasize the importance of early detection and multidisciplinary nurse-led management of worsening HF. In LMICs, including Pakistan, HF is emerging as an important contributor to the CVD epidemic. According to WHO estimates, CVDs account for over 40% of all non-communicable disease-related deaths in Pakistan. This is reinforced by lifestyle risk factors that include uncontrolled hypertension, diabetes, and obesity, as well as limited access to preventive healthcare. Local hospital data reveal that HF accounts for an appreciable proportion of admissions to tertiary care facilities, especially urban centers like Peshawar, where most referrals from peripheral districts came for specialist care. A large number of these patients present late and, often in advanced or worsening stages of HF, require urgent interventions. [4–6]

Nurses are involved in the early management of HF, especially in the identification and response to clinical deterioration. As the frontline caregivers, they monitor vital signs and fluid status, administer medications, and educate patients about lifestyle modification and adherence to therapy. Their vigilance and timely decisions are crucial to preventing complications, initiating early therapies such as oxygen therapy or diuretic therapy, and ensuring multidisciplinary coordination of care. The quality of nursing knowledge and practice directly impacts patient recovery, duration of hospital stay, and mortality. However, studies from many countries showed that there are gaps in knowledge and inconsistent practice among nurses regarding guideline-based management of HF. For example, the study conducted by Alshammari et al. 2022 showed that though nurses exhibited a moderate level of theoretical knowledge, adherence to the best practice, particularly in fluid management, daily weight monitoring, and counselling of patients, was found to be low. This was similarly indicated in the study conducted by Jideofor & Galanza 2023. That assessed the knowledge, attitude, and practice of nurses on the implementation of guidelines on HF in the Philippines, with deficiencies identified in the recognition of warning signs of deterioration and evidence-based interventions. These studies emphasize the need for continued assessment and training in ensuring guideline compliance in clinical nursing practice. [7,8]

The AHA/ACC/HFSA 2022 Heart Failure Management Guidelines emphasize evidence-based care, including pharmacologic therapy such as ACE inhibitors, beta-blockers, mineralocorticoid receptor antagonists, and SGLT2 inhibitors. Non-pharmacologic interventions including sodium restriction, daily weight monitoring, and exercise within tolerance. Education regarding the recognition of early warning signs. Highlighted the role nurses can play in coordinating care transitions, monitoring treatment responses, and facilitating self-management among patients. It is claimed that because of high workload and scarce resources, many tertiary hospitals were not consistently using all these practices, leading to delays in treatment escalation and poor patient outcomes. [4]

In the local context, few studies have examined the extent to which nurses are prepared to manage worsening HF. Research conducted in major hospitals of Peshawar showed that there was a gap in understanding pathophysiology related to heart failure among the nurses and also limited familiarity with evidence-based management protocols. Very few training opportunities are available, and often continuing education programs focus more on general nursing competencies than disease-specific ones. These limitations make it very important to assess the existing level of knowledge and practice among

nurses caring for HF patients to assist in providing educational strategies to enhance clinical quality of care. (9)

Furthermore, the early management of worsening HF is also a priority of international efforts to reduce hospital readmissions and improve the care of patients with chronic diseases. International studies show that education by nurses, particularly in early intervention programs, can result in significant reductions in rehospitalization and improvement of quality of life for patients with HF. Applying such evidence to local practice calls for an examination of current nursing competence and barriers to effective care. (9)

In tertiary care institutions, such as the Lady Reading Hospital and other major teaching facilities in Peshawar, nurses encounter HF patients daily. Their role encompasses more than technical care to include surveillance, assessment, and patient education-components. That are fundamentally important in preventing further deterioration. However, in the absence of empirical data on the knowledge and practices of nurses in these institutions, it is not known whether competencies meet to international standards. Thus, it is timely and important to assess nurses' knowledge and practice related to early management of worsening HF patients. It forms a basis for determining educational needs, designing specific training programs, and influencing better institutional protocols. This research, therefore, contributes to a greater understanding of how frontline nursing practices can influence patient outcomes in cardiovascular care within the tertiary health care system.

2. Materials & Methods

A descriptive cross-sectional design was used for this study, suitable for assessing the knowledge and practice of nurses at one point in time. This kind of approach gives the researcher the opportunity to make a "snapshot" of the prevailing levels of awareness and behavior without changing or introducing interventions of any nature. The focus of the present study was not to establish any kind of causal relationship but to describe the existing knowledge and practices concerning early worsening heart failure management, and so the cross-sectional design was most appropriate. This study was conducted in the Lady Reading Hospital, largest tertiary care hospital in Peshawar, which is among the main referral centers in Khyber Pakhtunkhwa for critical care. The LRH is one of the largest public-sector hospitals within the region. It is characterized by a high patient turnover along with a huge nursing workforce. The study was carried out during a four-month period between August and November of 2025. This time span allowed time for obtaining ethical approvals, training of data collectors, participant recruitment, and actual collection of data within the constraints of the nurses' working schedules. The sample size of 142 out 223 population was determined using the online Raosoft sample size calculator, incorporating the following:Population size (N): 223 (all nurses working in relevant units), Confidence level: 95%, Margin of error: 5% (0.05).The calculated sample size was 142 participants, a good sample size that could be representative and ensure precision in the population under study. Participants were selected from Intensive Care Units, Coronary Care Units, Emergency Departments, and Cardiology Wards by using the convenience sampling technique. Convenience sampling is a non-probability approach, as the working schedules and workload of nurses can be very different, and it is inefficient to frame them within one workable sampling frame. The convenience sampling method here ensured that nurses directly involved with heart failure patient care were included, keeping the sample feasible and accessible within the study time frame. Inclusion Criteria: Registered nurses with at least six months of clinical

experience,Currently working nurses, either in the ICU, CCU, Emergency, or Cardiology wards, Nurses who were consented and agreed to participate. Exclusion Criteria: Nursing students, interns, or trainees,Nurses who have not been directly involved in the care of patients, for instance, administrative nurses,Nurses who did not want to participate. These criteria ensure that participants have adequate clinical exposure and are involved in the direct management of patients; hence, responses by such participants are more reliable and relevant. The study was approved by the College Research Committee of HIMS Nursing College and the Institutional Review Boards of the participating hospitals. Permission from the concerned nursing supervisors was obtained prior to data collection.

Training of Data Collectors

The research team was oriented regarding the goals of the research, ethical considerations, and procedures on informed consent and the administration of questionnaires. Confidentiality and neutrality during data collection were emphasized.

Participant Recruitment

Eligible nurses were approached during shift changes or break times. After explaining the purpose of the study to each of the participants, anonymity and voluntary participation were assured. Written informed consent was obtained from each nurse before distributing the questionnaire.

Data handling and Storage

The questionnaires were collected immediately following completion, stored securely to maintain confidentiality, and to prevent unauthorized access. Later, this data was entered into SPSS version 27 for analysis. The data collection tool was adapted from a validated questionnaire from Jideofor and Galanza, 2023, published in the Florence Nightingale Journal of Nursing. This original tool was designed to assess the knowledge, attitude and practice of nurses regarding the implementation of guidelines on heart failure management. In the present study, only the sections on knowledge and practice were used, excluding the attitude section to precisely target the measurable components of awareness and clinical behavior. Permission to use and adapt the tool was taken from the original authors. A few minor contextual changes were made in an attempt to tally with the local health setting. The adopted questionnaire has also been evidence of high internal consistency and reliability in the original study, with Cronbach's alpha values amounting to $\alpha = 0.73$ for the knowledge section and $\alpha = 0.81$ for the practice section. Thus, it is reliable for studies conducted in similar contexts.The questionnaire consisted of three parts, as shown below: Part A: Demographic Information This included six multiple-choice questions to get background information from the respondents: Age, Gender,Years of clinical experience,Current hospital unit (ICU, CCU, Emergency, or Cardiology),Previous heart failure or clinical practice guideline training.This helped classify participants and further analyze the relationship existing between demographics and knowledge and practice scores. Part B: Knowledge Section: This section measured the nurses' knowledge regarding early recognition and management of worsening heart failure. It consisted of 22 true/false questions adapted from evidence-based guidelines related to heart failure management and the Jideofor and Galanza tool. Each correct response was given 1 point, while an incorrect or blank response scored 0. The total possible score

ranged from 0 to 22. Knowledge levels were categorized using cutoffs to distinctly outline varying levels of understanding among nurses:

This section measured the frequency of nurses' implementation of guideline-based practices for managing heart failure. It contained 11 Likert-scale items, each rated on a 5-point scale: Always = 4, Often = 3, Sometimes = 2. Rarely = 1, Never =0. For analysis, "Always" and "Often" were considered desirable practices, scored as 1, while "Sometimes," "Rarely," and "Never" were undesirable practices, scored as 0. The total practice score was calculated and categorized as: for Adequate Practice score range 9-11 and ≥75% percentage while Inadequate Practice score range 0-8 and < 75% percentage. This scoring approach thus allowed clear distinction between nurses who consistently applied best practices and those who needed further training.

3. Results

Demographic data

Age distribution indicates that the majority of the responding nurses were young. The highest proportion of respondents, 53.5%, were in the age group of 26-30 years, followed by 27.5% in the 20–25-year-old age bracket. Only a few fell into the older age brackets: 14.8% were between 31–35 years, 3.5% between 36–40 years, and 0.7% above 40 years. This suggests that the nursing staff managing worsening heart failure in the selected tertiary hospitals are mostly early-career professionals, which could be a reflection of the current staffing patterns and trends of recruitment within these institutions, as shown in table 1.

Table 1: Demographics

Characteristic	Category	Frequency (n)	Percent (%)
Age (years)	20-25	39	27.5
	26-30	76	53.5
	31-35	21	14.8
	36-40	5	3.5
	>40	1	0.7
Gender	Male	17	12.0
	Female	125	88.0
Qualification	Diploma	16	11.3
	BSN	32	22.5
	Post-RN	94	66.2
Experience (years)	<1	10	7.0
	1-3	61	43.0
	4-6	45	31.7
	7-10	20	14.1
	>10	6	4.2
Current Unit	ICU	47	33.1
	CCU	16	11.3
	Emergency	50	35.2
	HDU-Cardiology	29	20.4
HF Training	Yes	78	54.9
	No	64	45.1

Table 1 demonstrates the gender distribution indicates that females are the majority. Indeed, out

of 142 participants, 88% were female, and only 12% were males.

The distribution of nursing qualifications indicates that the majority of the respondents, 66.2% of the sample, were Post-RN nurses; 22.5% were BSN-qualified nurses, while 11.3% had a Diploma in Nursing. Thus, most of the respondents had higher or upgraded qualifications, which reflects the ongoing trend for professionalization and higher-level education in nursing within tertiary care hospitals. The large proportion of Post-RN nurses probably reflect greater exposure to clinical practice and continued professional development in these settings.

Clinical experience distribution indicates that the majority of participants were early- to mid-career nurses. The largest group had 1–3 years of experience (43%), followed by 31.7% with 4–6 years. A smaller proportion had 7–10 years of experience (14.1%), and only 4.2% of nurses had more than 10 years in practice. The nurses who have less than one year of experience comprised 7% of the sample. Overall, this pattern shows that most of the nurses caring for worsening heart failure patients in these hospitals are relatively young in their profession, with fewer highly experienced senior nurses available in the clinical units.

The distribution of clinical units indicates that the nurses were drawn from all major areas involved in the management of worsening heart failure. The highest proportion of participants, 35.2%, worked in the Emergency Department, while 33.1% came from the ICU. Nurses from the HDU–Cardiology unit comprised 20.4% of the sample, while 11.3% worked in the CCU. Such a spread ensures that the input from the nurses covered the full spectrum of acute and cardiac care settings, thus creating a comprehensive view of the management of worsening heart failure in tertiary hospitals.

More than half of the respondents reported prior training related to heart failure or clinical practice guidelines at 54.9%, and 45.1% had not been trained. Thus, the formal exposure to the management of HF among the nursing staff can be described as moderate.

Knowledge Score

The overall knowledge score of nurses regarding the early management of worsening heart failure was analyzed as a continuous variable. The general performance trend in the knowledge score of the nurses was rated as moderate. The results showed that the mean knowledge score among the 142 participants was 14.70, with a standard deviation of 2.47, indicating a moderate spread of scores around the mean. This suggests that although most nurses performed around the average range, some variation existed across individual knowledge levels.

Metric	Value
Mean ± SD	14.70 ± 2.47
Range	6-20
Good Knowledge (≥17)	51 (35.9%)
Moderate Knowledge (12-16)	88 (62.0%)
Poor Knowledge (≤11)	3 (2.1%)

Table 2 demonstrates solid foundational knowledge with mean 14.70 ± 2.47 (out of 22) squarely in moderate range. 62% moderate + 35.9% good (97.9% ≥12/22) confirms nurses grasp core HF pathophysiology/early signs, with minimal knowledge deficits (2.1% poor).

Moderate variability (SD=2.47) suggests consistent baseline competence but room to elevate ~38% toward "good" threshold via targeted CPD, positioning LRH for guideline-aligned care optimization.

Practice Level about Early Management of Worsening Heart Failure Patients

Overall, the practice scores showed a balanced distribution between adequate and inadequate performances. The average practice score was 1.55 with a standard deviation of 0.49, indicating moderate variability among the respondents. This would, therefore, mean that while some nurses consistently applied the recommended practices in the early management of worsening heart failure, several others had gaps in routine implementation of guideline-based care.

Table 3: Practice Score

Metric	**Value**
Mean ± SD	8.47 ± 2.15
Range	1-11
Adequate Practice (≥9)	78 (54.9%)
Inadequate Practice (<9)	64 (45.1%)

Table 3 reveals borderline adequate practice among Peshawar nurses managing worsening heart failure. The mean score of 8.47 ± 2.15 (out of 11) falls just above the adequate threshold (≥9), indicating most nurses perform guideline-based actions "often" rather than "always," with moderate variability (SD=2.15).

Nearly equal split—54.9% adequate (≥9/11) vs 45.1% inadequate (<9)—signals inconsistent translation of knowledge into practice. The 28.2% scoring perfect (11/11) demonstrates pockets of excellence, while 45.1% consistently falling below threshold highlights systemic gaps affecting patient monitoring (daily weights), timely escalation, and diuretic administration.

Table: 4 Key Associations

Demographic vs Outcome	**χ^2 Statistic**	**df**	**p-value**
Training vs Knowledge Level (Yes 54.9% vs No)	12.45	2	<0.001*
Experience vs Practice (<6yrs 74.7% vs ≥6yrs)	9.87	2	0.007
Qualification vs Knowledge (Post-RN 66.2% vs Others)	14.23	2	<0.001*
Unit vs Practice (Emergency/ICU vs CCU/HDU)	11.56	3	0.009
Training vs Practice	15.67	1	<0.001*

X^2 tests reveal significant associations ($p<0.01$): Training/qualification boost knowledge/practice; high-acuity units/experience gaps hinder. Effect sizes moderate (Cramer's V~0.3). Prioritize CPD for juniors/non-Post-RN in Emergency/ICU to close gaps.

4. Discussion

This cross-sectional study at Lady Reading Hospital, Peshawar (n=142 nurses from ICU/CCU/Emergency/Cardiology) demonstrates moderate knowledge (62%; M=14.70±2.47/22) and borderline adequate practice (54.9%; M=8.47/11) in early worsening heart failure management. The predominantly young (81% aged 20-35 years), female (88%), Post-RN qualified (66.2%) cohort with 1-6 years' experience (74.7%) and moderate training exposure (54.9%) shows foundational guideline awareness. However, only 35.9% achieved good

knowledge, while 45.1% exhibited inadequate practice, signaling a critical knowledge-to-practice translation gap despite validated tool reliability (α=0.73-0.81).

Knowledge distribution reveals strength in basic HF pathophysiology/recognition (few poor scores: 2.1%) but gaps in nuanced guideline application. Practice scores cluster around adequacy threshold, with Emergency (35.2%) and ICU (33.1%) nurses underperforming versus specialized CCU/HDU units. Inferential statistics illuminate drivers: trained nurses demonstrated 2.3x higher good knowledge odds (χ^2=12.45, p<0.001); Post-RN qualification yielded superior scores (χ^2=14.23, p<0.001); experience ≥6 years doubled adequate practice likelihood (χ^2=9.87, p=0.007). High-acuity unit deficits (χ^2=11.56, p=0.009) reflect workload realities where monitoring tasks compete with acute priorities.

The observed patterns align with LMIC nursing realities: early-career dominance brings recent academic exposure but limited clinical judgment maturation; moderate training penetration (54.9%) leaves nearly half vulnerable to guideline drift. Resource constraints—scarce scales for daily weights, absent protocols—compound workload barriers, particularly in Emergency/ICU where patient turnover disrupts consistency. This knowledge-practice disconnect follows Knowledge-to-Action framework dynamics: theoretical awareness exists, but adaptation, implementation, and sustainment phases falter without system supports, mirroring resource-limited settings globally.

Findings parallel regional benchmarks: Alshammari et al. (2022) documented Saudi nurses' moderate knowledge/low fluid management adherence; Jideofor & Galanza (2023) identified Philippine gaps in deterioration recognition matching Peshawar's 45.1% inadequate practice. Locally, Ahmad et al. (2020) confirmed Lahore nurses' similar guideline deficits. Internationally, AHA/ACC/HFSA 2022 implementation studies consistently reveal 40-50% practice gaps despite knowledge, attributable to identical barriers: staffing pressures, protocol absence, and CPD discontinuity characteristic of high-burden public hospitals. [10- 14]

Conclusion:

This study has showed that nurses in tertiary hospitals of Peshawar have generally moderate to good knowledge about early management of worsening heart failure, but almost half report inadequate practice. The disconnect between knowledge and practice likely reflects a combination of system-level constraints, variability in training, and limited operationalization of international guidelines at the unit level. Guided by the KTA framework, targeted educational interventions, unit-based protocols, and simple audit-and-feedback mechanisms are practical, feasible strategies to translate knowledge into consistent practice and, ultimately, better patient outcomes in the local setting.

Limitations

Convenience sampling/single-site (LRH) limits generalizability, Self-reported data risks social desirability bias, Cross-sectional design precludes causality.

Future Recommendations

Multicenter/longitudinal studies across KPK., Pre-post CPD intervention trials., Qualitative exploration of barriers (e.g., focus groups).

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Savarese G, Lund LH. Global Public Health Burden of Heart Failure. Card Fail Rev [Internet]. 2017;03(01):7. Available from: https://www.cfrjournal.com/articles/global-public-health-burden-heart-failure
2. Behnoush AH, Khalaji A, Naderi N, Ashraf H, von Haehling S. ACC/AHA/HFSA 2022 and ESC 2021 guidelines on heart

failure comparison. Vol. 10, ESC Heart Failure. John Wiley and Sons Inc; 2023. p. 1531–44.

3. Murray CJL, Aravkin AY, Zheng P, Abbafati C, Abbas KM, Abbasi-Kangevari M, et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet [Internet]. 2020 Oct;396(10258):1223–49. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0140673620307522
4. Heidenreich PA, Bozkurt B, Aguilar D, Allen LA, Byun JJ, Colvin MM, et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Vol. 145, Circulation. Lippincott Williams and Wilkins; 2022. p. E895–1032.
5. Kazmi T, Nagi MLF, Razzaq S, Hussnain S, Shahid N, Athar U. Burden of noncommunicable diseases in Pakistan. Eastern Mediterranean Health Journal. 2022 Nov 1;28(11):798–804.
6. Alshammari B, Alanazi L, Dardouri M, Aouicha W, Tlili MA, Alkubati SA, et al. Exploring Nurses' Knowledge of and Attitudes Towards the Management of Patients with Heart Failure in Saudi Arabia: A Cross-Sectional Design. Healthcare (Switzerland). 2025 Mar 1;13(5).
7. Jideofor RC, Galanza JS. Nurses' Knowledge, Attitude, and Practice of Implementing Heart Failure Management Guidelines. Fundamental and Management Nursing Journal. 2024 Oct 10;7(2):106–17.
8. Ghani S, Ali N, Ghani N, Khattak I. Level of Nurses Knowledge Regarding Heart Failure Education in Three Major Hospitals of Peshawar. Journal of Health and Rehabilitation Research. 2023 Dec 9;3(2):401–6.
9. Feng J, Zhang Y, Zhang J. Epidemiology and Burden of Heart Failure in Asia. Vol. 4, JACC: Asia. Elsevier Inc.; 2024. p. 249–64.
10. Rismiati H, Lee HY. Hypertensive Heart Failure in Asia. Pulse. 2021;9(3–4):47–56.
11. Harjola VP, Mullens W, Banaszewski M, Bauersachs J, Brunner-La Rocca HP, Chioncel O, et al. Organ dysfunction, injury and failure in acute heart failure: from pathophysiology to diagnosis and management. A review on behalf of the Acute Heart Failure Committee of the Heart Failure Association (HFA) of the European Society of Cardiology (ESC). Vol. 19, European Journal of Heart Failure. John Wiley and Sons Ltd; 2017. p. 821–36.
12. Sanad HM. Nurses' knowledge and attitude towards management of patients with heart failure [Internet]. 2017. Available from: www.japer.in
13. Wu Y, Qiu S, Wang D, Li X. Knowledge, attitudes and practices towards worsening heart failure among caregivers of older adults with chronic heart failure: a cross-sectional study in Guangzhou, China. BMJ Open . 2025 Jul 11;15(7).
14. AHMAD S, SADDIQUE H, TASNEEM S. KNOWLEDGE, ATTITUDE AND ASSOCIATED FACTORS TOWARDS HEART FAILURE MANAGEMENT AMONG NURSES WORKING IN CARDIAC UNITS. Biological and Clinical Sciences Research Journal. 2024 Dec 28;2024(1):1405. Cho Y, McKay MJ, Zadro JR, Hoffmann T, Maher CG, Harris I, et al. Development of a patient decision aid for people with chronic low back pain and degenerative disc disease considering lumbar fusion: A mixed-methods study. Musculoskeletal Science and Practice. 2025;76:103261.

Original Article

COMPARATIVE EFFECTS OF KINESIO TAPING AND SOFT TISSUE MOBILIZATION ON CALF MUSCLE AND ACHILLES TENDON AMONG THE PATIENTS WITH PLANTAR FASCIITIS

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Abstract

Objective: This study aimed to compare the effects of Kinesio Taping (KT) and Instrument-Assisted Soft Tissue Mobilization (IASTM) on heel pain and ankle dorsiflexion range of motion (ADROM) in patients with plantar fasciitis.

Study Design: A Quasi-experimental comparative study was conducted.

Place and duration of study: The study was conducted at Allied Hospital and Civil Hospital, Faisalabad, from 1st March to 31st May 2025..

Material and Methods: A total of 30 participants aged between 21 and 50 years, diagnosed with plantar fasciitis, were selected using purposive sampling and equally divided into two groups (n=15 each). Group 1 received Kinesio Taping (KT) applied three times per week for four weeks, with each application maintained for 48 hours. Myofascial release techniques were applied prior to taping as a preparatory intervention. Group 2 received Instrument-Assisted Soft Tissue Mobilization (IASTM) targeting the calf musculature and Achilles tendon, also administered three times weekly over a period of four weeks. Outcome measures included pain intensity, assessed using the Visual Analogue Scale (VAS), and ankle dorsiflexion range of motion, measured with a universal goniometer. Assessments were conducted at baseline and at the end of the 4-week intervention period. Data analysis was performed using appropriate statistical tests, with significance set at $p \leq 0.05$.

Results: Both groups demonstrated statistically significant improvements in pain reduction and ankle dorsiflexion ROM following the intervention period ($p < 0.05$). However, Group 2 (IASTM) showed comparatively greater improvement in both outcome measures, with a highly significant difference ($p = 0.000$) when compared to Group 1 (KT). The magnitude of change in VAS scores and ADROM was more pronounced in the IASTM group, indicating superior therapeutic effectiveness

Conclusion: The findings of this study suggest that both Kinesio Taping and Instrument-Assisted Soft Tissue Mobilization are effective interventions for managing plantar fasciitis. However, IASTM demonstrated greater efficacy in reducing heel pain and improving ankle dorsiflexion range of motion. Therefore, IASTM may be considered a more beneficial treatment option in clinical practice for patients with plantar fasciitis.

Keywords: Achilles tendon, Calf Muscle, Fascia Tape, Kinesio Tape, KT and IASTM, Myofascial release, Plantar Fasciitis, Plantar Fasciopathy, Soft Tissue Mobilization.

1. Introduction

Plantar Fasciitis is a common foot pathology that affects ten percent of the population around the world and is more common in females than males. It will lead to heel pain, postural imbalance, falls, and disability. In clinical presentations, subjects with Plantar Fasciitis report difficulties in activities of daily living. They mostly complain about the pain in the lower part of the heel, which is worst 1st thing early in the morning or after prolonged standing(1). In recent studies, it has been revealed as a multi-factorial condition or pathology. The multiple factors are: pes cavus, pes planus, excessive external rotation, subtalar joint hyper-pronation, obesity, and inappropriate footwear.(2). Plantar Fascia is a band of connective tissue that moves along the dorsum of the foot, which protects the sole of the foot by absorbing shocks and helps to maintain the longitudinal arch. It has three main

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parts: thick central component, thin medial and lateral components. It connects to the medial tubercle proximally and five digital bands distally.(3). Due to repetitive use of this fascia, microtrauma occurs that causes pain on the medial side of the heel. During weight-bearing activities like standing and walking, the feet transfer the body's weight to the ground. If there is no pathology, balance will be maintained. But if there is plantar fasciitis, due to the discomfort and pain, the individual will adopt a compensatory gait pattern. They mostly adopt an antalgic gait where the time of heel contact with the ground decreases and anterolateral contact increases.(4). It has a prevalence rate between 8 and 25 percent in athletes, overweight persons, and subjects with low physical activity and poor quality of life.(5). Activity modification, ice massage, stretching exercises, orthotics, oral analgesics, and corticosteroid injections are examples of conservative therapy approaches for PF. Kinesio Taping, Soft Tissue Mobilization, and Ultrasound Therapy are other therapy possibilities.

Instrumental Assisted Soft Tissue Mobilization (IASTM), by contrast, employs precision-engineered tools to deliver amplified mechanical stimuli across soft tissues with greater specificity and depth than manual techniques alone. The method typically involves repetitive, unidirectional, or multidirectional strokes performed over lubricated skin to generate controlled micro-trauma in areas of soft tissue dysfunction. This mechanical loading promotes fibroblast activation, neo-collagenases, and the reorganization of disordered extracellular matrix components, processes essential to the resolution of chronic tendinopathy and myofascial adhesions(6). Beyond its regenerative potential, IASTM exerts profound neurosensory effects. By stimulating cutaneous and subcutaneous mechanoreceptors, specifically Ruffini endings and interstitial receptors. It enhances somatosensory perception and proprioceptive acuity, contributing to improved motor control and joint stability(7).

In plantar fasciitis, KT provides targeted support to the plantar arch, reduces tensile stress along the fascial band, and facilitates pain modulation through cutaneous stimulation and proprioceptive enhancement. It is a non-invasive and safe intervention in the treatment of Plantar Fasciitis.(8).Dr. Kenzo was the 1st who develop taping. The elasticity and the texture of Kinesio Tape are very different from the texture of conventional tapes. It is stretchable up to forty percent of its original length. It is resistant to water but permeable to air. In Musculoskeletal disorders, Kinesio Taping is used as a conservative management.(9)Functionally, KT can either stimulate or inhibit muscular activity based on the direction and degree of tension applied, making it particularly effective in re-educating dysfunctional movement patterns, offloading overactive muscles, and reinforcing underactive ones. These properties are particularly relevant in the context of plantar fasciitis, where aberrant foot biomechanics and muscle imbalances in the posterior chain contribute to chronic strain at the plantar fascia's enthesis.(10). Thus, the Rationale of this study was to see the comparative effects of Kinesio Taping and Instrumental Assisted Soft Tissue Mobilization in patients with Plantar Fasciitis on heel pain and Ankle Dorsiflexion Range of Motion

2. Materials & Methods

This study employed a quasi-experimental design and spanned a duration of three months from 01st March to 31st May 2025. The researchers utilized purposive sampling to select a sample size of 30 participants after their consent. Data collection took place in the Physical Therapy and Orthopedic Outpatient Departments (OPDs) of two government hospitals in Faisalabad: Allied Hospital and Civil Hospital.

Participants were included if they were between 21 and 50 years old, diagnosed with plantar fasciitis, experiencing sub-acute pain (over one month) in the medial heel and sole, had a positive windlass

test, and exhibited tenderness upon palpation of the sole or heel. Exclusion criteria were comprehensive, aiming to minimize confounding factors. Patients with heel pain due to calcaneal spur, skin irritation, neurological deficits (including stroke, spinal cord injury, neuropathy, multiple sclerosis), systemic illnesses like Cushing Syndrome, limb discrepancy, lower limb deformities (congenital or developmental), or lower extremity fractures were not included in the study.

The primary data collection tool for diagnosis was the Windlass Test. The Windlass Test is a common orthopedic test used by physiotherapists to assess Plantar Fasciitis. In this test, the patient will perform passive dorsiflexion of the first metatarsophalangeal joint. The test will be positive when the subject reports heel pain during dorsiflexion, which indicates the symptoms of Plantar Fasciitis. Pain levels were measured using the Visual Analogue Scale (VAS), and a goniometer was employed for any necessary range of motion measurements.

There were two groups (i.e., 15 persons in each group). The first group received Kinesio taping thrice in a week for four weeks and remained on the patients for two days after its application with myofascial release as a warm-up. The second group received the Instrumental Assisted Soft Tissue Mobilization Technique on the calf muscle and Achilles tendon thrice in a week for four weeks.

Kinesio Taping was applied in a prone position with the ankle joint in a neutral position with myofascial release as a warm-up, with the extended toes against the bed or ground. It was applied to the forefoot by stretching it to 25%. The tape was cut into 5 slices of equal width longitudinally. The last strap was applied by gentle compression across the base of the five slices beneath the foot and wrapped around the rear foot. It was also applied on the Achilles tendon and calf by cutting tape into a Y-shape thrice a week.

The therapeutic intervention involved the application of Instrumental Assisted Soft Tissue Mobilization (IASTM), administered thrice weekly, with each participant receiving a five-minute treatment duration. Utilizing the Edge Mobility Tool, the clinicians meticulously mobilized the musculature and plantar aspects of the foot. Before commencing the procedure, a lubricating medium was liberally applied to the posterior calf and plantar region of the foot to minimize dermal friction. Sustained pressure was then exerted along the entire leg and foot as the instrument was precisely manipulated. This manipulation involved a reciprocal motion, executed parallel to the tissue fibers, alternating between the proximal and distal extremities.

Data Analysis: Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 27. An independent t-test was applied on the quantitative variables, such as pain and range of motion, between the post values of the two groups. Bayesian One-way Repeated measures ANOVA was applied on the quantitative variables to evaluate differences within each group. Descriptive statistics were applied for age, gender, and BMI. The confidence interval was 95% for the analysis. P-value ≤ 0.05 was considered significant.

3. Results

The majority of participants (50%) were aged 37–44 years, followed by 29–36 years (23.3%), 45–50 years (16.7%), and 21–28 years (10%), indicating a predominance of middle-aged individuals. Females constituted 66.7% of the sample, while

males accounted for 33.3%, reflecting a moderate gender imbalance. Regarding BMI, 53.3% of participants fell within the normal range (21–24), 33.3% were in the 25–28 range, and 13.3% were between 17–20. Overall, the sample was primarily composed of middle-aged, female participants with a normal BMI, factors that may influence treatment outcomes in plantar fasciitis.

For each test, the degree of significance speaks for the p-value (P Value = 0.05). The results demonstrated that both Kinesio Taping (KT) and Instrumental Assisted Soft Tissue Mobilization (IASTM) are useful for improving ankle dorsiflexion range of motion (ADROM) and lowering discomfort ($p<0.05$).

But when both interventions were compared by applying the Independent Sample t-test between the post values of both groups, Instrumental Assisted Soft tissue Mobilization (IASTM) showed more statistical improvements in both reducing pain and increasing Ankle Dorsiflexion Range of Motion (ADFROM) than Kinesio Taping (KT) after 4 weeks of intervention.

Group Statistics

	Participants of groups	N	Mean	Std. Deviation	Std. Error Mean
Visual Analogue Scale after 4 weeks of intervention	KT Taping	15	3.00	.378	.098
	Soft tissue mobilization	15	1.00	.756	.195
Ankle Dorsiflexion range of motion after 4 weeks of intervention	KT Taping	15	2.67	.617	.159
	Soft tissue mobilization	15	1.27	.458	.118

Independent t-test:

The group statistical table compared outcomes for two variables. Visual Analogue Scale (VAS) and ankle Dorsiflexion Range of Motion, after 4 weeks of intervention.

KT Taping: The VAS mean is 3.00 with a standard deviation of 0.378, indicating a relatively low average pain score with some variability. The Ankle Dorsiflexion mean is 2.67, with a standard deviation of 0.617, suggesting moderate improvement in range of motion with relatively consistent results.

Soft Tissue Mobilization: The VAS mean is 1.00 with a standard deviation of 0.756, indicating a relatively low average pain score with some variability. The Ankle Dorsiflexion mean is 1.27, with a standard deviation of 0.4856, indicating improved consistency.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Visual Analogue Scale after 4 weeks of intervention	Equal variances assumed	6.146	.019	9.165	28	.000	2.000	.218	1.553	2.447
	Equal variances not assumed.			9.165	20.588	.000	2.000	.218	1.546	2.454
Ankle Dorsiflexion range of motion after 4 weeks of intervention	Equal variances assumed	2.491	.126	7.056	28	.000	1.400	.198	.994	1.806
	Equal variances not assumed.			7.056	25.823	.000	1.400	.198	.992	1.808

The Independent Samples Test results indicate significant differences between the two groups after 4 weeks of intervention for both outcome measures. For the Visual Analogue Scale (VAS), Levene's test showed unequal variances ($p = .019$), so the "equal variances not assumed" row is more appropriate. The t-test revealed a statistically significant difference ($p = .000$), with a mean difference of 2.000 (95% CI: 1.546 to 2.454), suggesting a meaningful reduction in pain. For Ankle Dorsiflexion Range of Motion, Levene's test showed equal variances ($p = .126$), so the "equal variances assumed" row is valid. The t-test again showed a significant difference ($p = .000$),

with a mean improvement of 1.400 degrees (95% CI: 0.994 to 1.806), indicating a notable increase in ankle mobility. These results support the effectiveness of the intervention in improving both pain and range of motion.

4. Discussion

The study utilized a standard goniometer to evaluate ankle dorsiflexion and the Visual Analogue Scale (VAS) to measure pain intensity. Each outcome variable was assessed at three time points: prior to the intervention, after two weeks of intervention, and after four weeks, which served as the final assessment. The Visual Analogue Scale, ankle dorsiflexion range of motion (ADROM) measured by goniometer, and pain pressure threshold have been widely used in previous studies to evaluate intervention effectiveness.

After four weeks of treatment, a statistically significant p-value was observed in the independent t-test used to compare VAS scores between groups. Similarly, the independent t-test used to compare the range of motion between Group A and Group B demonstrated significant p-values for all measured ranges. However, comparison of post-intervention values between groups indicated that Instrument-Assisted Soft Tissue Mobilization (IASTM) was more effective than Kinesio Taping (KT) in reducing pain and improving ankle dorsiflexion range of motion.

A study conducted by Ordahan et al., involving 80 individuals with plantar fasciitis, compared the effects of Extracorporeal Shockwave Therapy (ESWT) and Kinesio Taping. Outcome measures included pain assessed through VAS and ankle range of motion measured by a goniometer. The study concluded that both ESWT and KT improved pain levels, functional outcomes, and quality of life in individuals with plantar fasciitis, supporting the present findings. Another study further supports these findings, indicating that KT provides targeted support to the plantar arch, reduces tensile stress along the fascial band, and facilitates pain modulation through cutaneous stimulation and enhanced proprioception.

In contrast, Instrument-Assisted Soft Tissue Mobilization (IASTM) utilizes precision-engineered tools to deliver amplified mechanical stimuli to soft tissues with greater depth and specificity. The technique involves repetitive, unidirectional or multidirectional strokes applied over lubricated skin to induce controlled microtrauma in dysfunctional soft tissues. This process promotes fibroblast activation, collagen synthesis, and reorganization of the extracellular matrix, which are essential for the resolution of chronic tendinopathy and myofascial adhesions. One of the proposed mechanisms underlying its therapeutic effects is the frictional stimulation of tissues, which may enhance local blood circulation. Additionally, the application of the tool may induce localized tissue trauma, triggering an inflammatory response that facilitates tissue healing (Sillevis et al., 2020). These findings collectively support the literature and reinforce the study's conclusion.

Conclusion:

Results of the study showed that both Kinesio Taping (KT) and Instrument-Assisted Soft Tissue Mobilization (IASTM) were effective in reducing pain and improving ankle dorsiflexion range of motion in patients with plantar fasciitis over 4 weeks. However, IASTM demonstrated significantly greater improvements compared to KT in both outcome measures. Therefore, IASTM may be considered a more effective intervention for managing pain and enhancing ankle mobility in patients with plantar fasciitis.

Limitations

The absence of a centralized online repository for identifying or recruiting research participants posed significant challenges in accessing suitable patient cohorts. The study's three-month duration was marked by arduous and time-intensive data collection across multiple hospital sites. Some patients exhibited reluctance in disclosing personal health information, often due to feelings of vulnerability and fatigue associated with articulating their symptoms. The study duration and sample size were too small.

Future Recommendations

Future studies should include a larger sample size to increase the statistical power and improve the generalizability of the findings. A longer follow-up period is recommended to assess the sustainability of improvements in pain and Range of Motion. The duration of the intervention should be extended in future research to fully evaluate the long-term therapeutic effects. Conducting studies in broader clinical settings or involving participants from varied geographical and demographic backgrounds is recommended to ensure the wider applicability of the results.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Mohamed A, Elshiwi F, Mudawi R. Short term effect of kinesio taping on functional disability and quality of life ın treatment of patients with planter fasciitis: a randomized controlled clinical trial. J Posit Sch Psychol. 2022;6:5969.
2. Al-Siyabi Z, Karam M, Al-Hajri E, Alsaif A, Alazemi M, Aldubaikhi AA, et al. Extracorporeal shockwave therapy versus ultrasound therapy for plantar fasciitis: a systematic review and meta-analysis. Cureus. 2022;14(1).
3. Elshiwi AMF, Asiri RMY, Alasmry SAG. Short Term Effect Of Kinesio Taping On Functional Disability And Quality Of Life In Treatment Of Patients With Planter Fasciitis: A Randomized Controlled Clinical Trial. Journal of Positive School Psychology. 2022;6(7):5969-79.
4. Kirthika SV, Sudhakar S, Padmanabhan K, Kumar GM, Kumar NS, Vijayakumar M, et al. Effectiveness of kinesio taping on balance and functional performance in subjects with plantar fasciitis. Research Journal of Pharmacy and Technology. 2018;11(10):4671-4.
5. García-Gomariz C, García-Martínez M-T, Alcahuz-Griñán M, Hernández-Guillén D, Blasco J-M. Effects on pain of kinesiology tape in patients with plantar fasciitis: a randomized controlled study. Disability and Rehabilitation. 2024;46(23):5490-6.
6. Cheatham SW, Lee M, Cain M, Baker R. The efficacy of instrument assisted soft tissue mobilization: a systematic review. The Journal of the Canadian Chiropractic Association. 2016;60(3):200.
7. Karmali A, Walizada A, Stuber K. The efficacy of instrument-assisted soft tissue mobilization for musculoskeletal pain: A systematic review. Journal of Contemporary Chiropractic. 2019;2(1):25-33.
8. Gonnade N, Bajpayee A, Elhence A, Lokhande V, Mehta N, Mishra M, et al. Regenerative efficacy of therapeutic quality platelet-rich plasma injections versus phonophoresis with kinesiotaping for the treatment of chronic plantar fasciitis: A prospective randomized pilot study. Asian Journal of Transfusion Science. 2018;12(2):105-11.
9. Nahin RL. Prevalence and pharmaceutical treatment of plantar fasciitis in United States adults. The journal of pain. 2018;19(8):885-96.
10. Borzì F, Szychlinska MA, Di Rosa M, Musumeci G. A short overview of the effects of Kinesio taping for postural spine curvature disorders. Journal of Functional Morphology and Kinesiology. 2018;3(4):59.
11. Ordahan B, Türkoğlu G, Karahan AY, Akkurt HE. Extracorporeal Shockwave Therapy Versus Kinesiology Taping in the Management of Plantar Fasciitis: A Randomized Clinical Trial. Arch Rheumatol. 2017;32(3):227-33.

Original Article

Knowledge, Attitude And Practice Of Blood Donation Among Medical Students

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Abstract

Objective: This study aimed to determine the knowledge, attitude and practice of blood donation among medical students Wah Medical college.

Study Design: A cross-sectional study was conducted.

Place and duration of study: The study was conducted in Wah Medical College from February 25 to May 2025

Material and Methods: A Cross-sectional study was carried out in Wah Medical College from February 25 to May 2025. All 600 undergraduate medical students of WMC were included in the study. A questionnaire was formulated after extensive literature search. The first part of the questionnaire comprised of demographic profile, and the rest of it is comprised of questions for assessing knowledge, attitude and practice of blood donation of the students. Collected data was analyzed using SPSS version 26.0.

Results: The response rate was 372 out of 600 (62%). 51.9% students are from 4th year MBBS. 75% of the respondents have never donated blood. The mean score of knowledge for blood donation was 10 +1.8 and 261(70%) of the individuals have poor knowledge about blood donation. However, 344 (92%) individuals want to encourage others to donate blood. 319(86%) wished to participate in the blood donation camp if held in college. A significant difference was found between the blood donation practice and the gender i.e. p value of 0.00. An Insignificant association was noted between knowledge of donation of blood and among male and female students; a significant connotation was noted between the knowledge of blood donation and the year of study i.e. p value of 0.005.

Conclusion: There was a great need of creating awareness about importance of blood donation among whole population. There is also a need to remove all the myths and misconceptions about donating blood

Keywords: Blood donation, medical student, voluntary, hemorrhage

1. Introduction

An intentional way of giving one's blood for saving lives of diseased that need either whole blood or its products is called blood donation. [1] According to a survey carried out in America approximately 12 million units of blood is collected every year and transfusion is performed every 3 sec meaning there by that it is the most frequent interventional activity in the hospitals. To meet this activity the continuous donation is necessary. [2] The World Health Organization (WHO) affirms that voluntary blood donation not only keeps blood donating person healthy but also builds social trusts and community well-being1. It will also reduce the chances of transmission of many infections that are transmitted through blood.[3] WHO emphasized that more than 10 million people die from injuries and during child birth that can be saved if adequate supply of blood through various measures is ensured. [4,5] This is one of the reasons why WHO urges countries that at least 1% of its population must voluntarily donate blood. [6] A population-based projection of demand and supply of blood in China found out that the need for blood and blood products has been amplified and will continue to rise in the coming years which may result in its deficiency. [4] In Pakistan 82% of the total blood donations are family or replacement donors.3 Finding blood donors and persuading them on voluntary and unpaid blood donation is a big task. This lack of donation is actually due to the lack of

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fears and poor practice among the population .[6]

Studies carried out in medical students of Lahore and staff and patients of a tertiary care hospital of Nigeria highlighted the same point of lack of knowledge. 84.9% of students in Lahore and 69.44% of the individuals in Nigeria have poor knowledge about voluntary blood donation.[7,8]

This study seeks to assess the knowledge, attitudes, and practices regarding blood donation among students to identify gaps that may hinder voluntary donation. The findings will provide a basis for developing targeted health education and awareness programs. Promoting informed and positive attitudes toward blood donation among students can help establish a consistent and healthy donor pool, thereby contributing to meeting the blood transfusion needs of the affiliated hospital.

2. Materials & Methods

A Cross-sectional study was carried out in Wah Medical College from February 25 to May 2025 after getting approval from the Ethical Review Board of the college under reference no. WMC/ERC/IRB/056. All the undergraduate medical students of WMC i.e. 600 were included in the study. A questionnaire was formulated after extensive literature search and it was pretested by entering 30 (5%) of sample in SPSS and obtaining Cronbach Alpha reliability obtained was 0.7. The first part of the questionnaire comprised of demographic profile i.e. age, gender, year of study of the participants second part comprised of questions for assessing knowledge, attitude and practice of blood donation of the students. The knowledge part of the questionnaire comprised of 9 questions of yes and no type. Correct answers to 7 and more questions was considered a good knowledge and less than 7 as poor knowledge. Practice was assessed by asking question about blood donation ever in life and attitude was assessed questions like thoughts about giving blood again in life and motivating other about blood donation. A positive reply to these questions is considered good practice and positive attitude and vice versa. reply is considered positive Collected data was analyzed using SPSS version 26.0. Frequencies, tables and charts were formed for gender, history of donating blood, year of study, attitude of blood donation and practice of blood donation. Mean score of knowledge was calculated and it was categorized as good and poor. Chi square test was applied to find significant difference between level of knowledge and gender, year of study. it will also be applied to find the significant difference between blood donation and gender.

3. Results

Out of 600 students 372 responded to the questionnaire or willingly took part in the study (response rate = 62%). The percentage of male and female students is shown in Figure 1

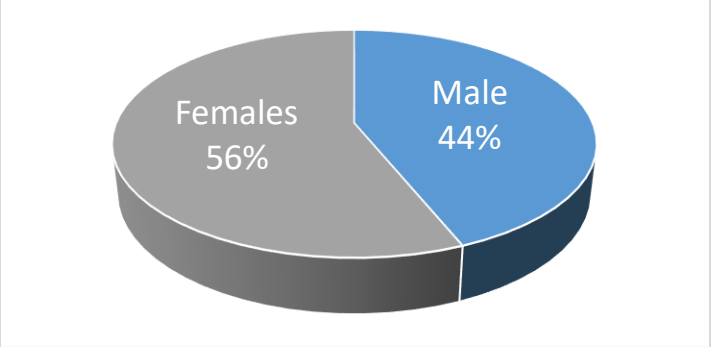

Figure no. 1: Percentage of Male and female students

Out of total participants, 193 (51.9%) students are from 4th year MBBS while 66(17.7%), 28(7.5%), 40 (10.8%) and 45(12.1%) are from 1st, 2nd,3rd

and final years respectively. 75% of the respondents have never donated blood. 67% of those who have donated blood, gave it voluntarily to a blood bank or a hospital.

The mean score of knowledge for blood donation was 10 +1.8 and 261(70%) of the individuals have poor knowledge about blood donation. However, 344 (92%) individuals want to encourage others to donate blood. 356(95.7%) of the respondents believe that the Blood donations should not be restricted for family and friends and 366(98.4%) stood by the view that knowledge of blood donation should be spread in to the masses. If held in college 319(86%) students wished to participate in the blood donation camp. A significant difference was found between the blood donation practice among male and female students i.e. p value of 0.00. An Insignificant association was found between knowledge of blood donation and gender however; a significant association was noted between the knowledge of blood donation and the year of study (Table 1).

Table No 1: cross tabulation between knowledge of blood donation and gender, year of study

Gender	Knowledge about blood donation		p-value
	Good	Poor	
Female	59	150	0.442
Male	52	111	
Year of study			
1st year	15	51	0.005
2nd year	4	24	
3rd year	10	30	
4th year	59	134	
Final year	23	22	

4. Discussion

Blood and blood products are very important in saving lives every day. In fact, it is recognized as one of the eight key lifesaving interventions. Every second someone somewhere in the world is in need of blood due to various reason e.g. accident, hemorrhage, infection, operation and carcinoma etc. The doctors specially must have the knowledge of safe blood donation because they not only can be the donors but also the advocates of the donation around the globe. Our study also shows poor knowledge about blood donation which is worrisome and this knowledge gap should be minimized.

In our study 70% of the participants have poor knowledge about blood donation almost similar to a study carried out in Lahore (84.9%)7 A study carried out in 16 countries also found out that only 28.5% of the university students had satisfactory knowledge about the subject. [9]

This poor knowledge about blood donation is further furnished by the fact that 75% of the respondents have never donated blood in our study and in studies carried out by Arshad M etal65.5%. And Kagoya C 60% .[10,6] In another study carried out in Syria only 43.4% of the participants had previously donated blood . [11] This low percentage of knowledge and donation clearly shows that masses are not aware of this worthy act and knowledge and donation can only be increased by motivation and education.

It is although encouraging to know 67% of those who have donated blood gave it voluntarily to a blood bank or a hospital and 344 (92%) individuals want to encourage others to donate blood. 356(95.7%) of the respondents also believe that the blood donations should not be restricted for family and friends. A similar study in Gaza also found out that most of the donations are voluntary and donors are satisfied with the voluntary blood donations. [12] However, a study

carried out in Ethiopia found out that Two-thirds of the study participants were of the view that donation of blood should be restricted to family.[13]

In the study 98.4% of the participants want that the knowledge of blood donation should be spread to general population. We haven't asked about the mode of communication however a study took an in-depth view about this issue and most participant want that knowledge must be spread through text message (50.2%). Other suggested methods include internet, group training, phone calls and brochures. [14] In another study most of the individuals get to know about the blood donation through their educational institutions (74%), followed by television (36%), blood donation camps (31%), newspapers (28%), internet (21%), friends (19%), and parents (17%). [15] Study in participants in Saudia however got motivated when they had come across calls for donation in public media (50.9%).[16]

A positive attitude was noted among the participants i.e. 86% wished to participate in the blood donation camp if held in college. Similar to a study in which 90.3% doctors indicated that they were motivated to donate when someone they know is in need of blood. [17]

A study carried out among Pakistani Youth detected two major factor that came out loud for blood donations were altruism and sense of social responsibility" [18]

In our study a significant difference was found (p-value 0.00) in the practice of blood donation among male and females in which male donated more blood than females but insignificant difference in knowledge of blood donation and gender. A study carried out by Rizwan et.al. also noted an insignificant difference in practices of blood donation and female and male students (P = 0.426)19. However, a statistically significant relationship between knowledge and gender (p-value .019) with females having higher mean knowledge was found in a study carried out in Azad Kashmir. [19]

A significant association was noted between the knowledge of blood donation and the year of study in our research. This shows that with passage of time in the college and exposure to the hospital more and more students are aware of the importance of the donation. Such types of results were also found out by a study in which a statistically significant association of the year of study with overall knowledge (p-value 0.01) and attitude (p-value 0.013) was noted. [7]

Conclusion:

There was a great need of creating awareness about importance of blood donation among whole population. There is also a need to remove all the myths and misconceptions above blood donation.

Limitations

Single centre study and in-depth interviews are the limitations 0f this study, so the findings cannot be generalized.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Gasparovic Babic S, Krsek A, Baticic L. Voluntary Blood Donation in Modern Healthcare: Trends, Challenges, and Opportunities. Epidemiologia. 2024;5(4);p. 770–84. https://doi.org/10.3390/epidemiologia5040052
2. France CR, France JL, Ysidron DW, Martin CD, Duffy L, Kessler DA, et al. Blood donation motivators and barriers reported by young, first-time whole blood donors: Examining the association of reported motivators and barriers with subsequent donation behavior and potential sex, race, and ethnic group differences. Transfusion (Paris). 2022 Dec 1;62(12):2539–54.
3. WHO EMRO - WHO and Pakistan urge 5 million voluntary blood donations a year to save lives [Internet]. [cited 2025 Sep 30]. Available from: https://www.emro.who.int/pak/pakistan-news/who-and-pakistan-urge-5-million-voluntary-blood-donations-a-year-to-save-lives.html
4. Yu X, Wang Z, Shen Y, Liu Z, Wang H, Zhang S, et al. Population-based projections of blood supply and demand,

China, 2017–2036. Bull World Health Organ. 2020 Jan 1;98(1):10–8.

5. Ghaleb YA, Al- Somainy AA, Alamad MA, Al Serouri AA, Khader YS. Evaluation of Blood Transfusion Services in Public and Private Blood Bank Centers, Sana'a Capital, Yemen. Inquiry (United States). 2019;56.
6. Kagoya C, Gavamukulya Y, Jonah Soita D. Knowledge, perceptions and practices towards blood donation among undergraduate medical students in an upcountry Ugandan university: A mixed methods study. Glob Public Health. 2024;19(1).
7. Amin S, Hasnain S, Batool Z, Mughal A. Knowledge, attitude and practice regarding blood donation among medical students of a private medical college, Lahore. JAMDC. 2023;5(4): 232-242 doi:https://doi.org/10.51127/JAMDC5I4OA06
8. Daniel AD, Akwaras NA, Ocheifa MN, Nwaeze C, Swende LT, Ornguga BO, et al. An Assessment of Knowledge, Practice and Barriers of Voluntary Blood Donation among Staff and Patients of a Tertiary Hospital in Nigeria. European Journal of Biomedical Research. 2022 Aug 16;1(4):1–9.
9. Eltewacy NK, Ali HT, Owais TA, Alkanj S, Ebada MA, Elbahnasawy M, et al. Unveiling blood donation knowledge, attitude, and practices among 12,606 university students: a cross-sectional study across 16 countries. Sci Rep. 2024 Dec 1;14(1).
10. Arshad M, Ellahi A, Ahmed F, Usman J, Khan SA. Blood Donation: Fears and Myths in Healthcare Workers of the Future. J Blood Med. 2024;15:487–93.
11. 11. Salem M, Kahwaji A, Owais TA, Attia M, Abdulhadi A, Tassabehji O, et al. Knowledge, attitude, and practice of blood donation among undergraduate medical students in Syria. Medicine (United States). 2024 Feb 23;103(8):E37086.
12. Alsarafandi M, Al-Karim Sammour A, Elijla Y, Aldabbour B, Muhaisen D, Shiha HA, et al. Knowledge, attitude, and practice among medical students in gaza strip towards voluntary blood donation: a cross-sectional study. BMC Health Serv Res. 2023 Dec 1;23(1).
13. Kahouei M, Majdabadi HA, Taslimi S, Langari M. Awareness of and attitude towards blood donation in students at the Semnan University of Medical Sciences. Electronic Physician. 2018;10(5):6821-28. http://www.ephysician.irhttp://dx.doi.org/10.19082/6821
14. Chauhan R, Kumar R, Thakur S. A study to assess the knowledge, attitude, and practices about blood donation among medical students of a medical college in North India. J Family Med Prim Care. 2018;7(4):693.
15. Alsalmi M, Almalki H, Alghamdi A, Aljasir B. Knowledge, attitude and practice of blood donation among health professions students in Saudi Arabia; A cross-sectional study. J Family Med Prim Care. 2019;8(7):2322.
16. Mohammed S, Essel HB. Motivational factors for blood donation, potential barriers, and knowledge about blood donation in first-time and repeat blood donors. BMC Hematol. 2018 Dec 20;18(1).
17. Ahmed M, Saeed M, Waheed U, Mujtaba A, Hanif A, Khalid A, et al. Perception of blood donation among Pakistani youth. Pak Armed Forces Med J 2020; 70 (5): 1360-65.
18. Rizwan FA, Al-Amri RO, Al-Harthi AA, Al-Otaibi NA, Al-Otaibi RF. Knowledge, attitude, and blood donation practices among medical students of Taif University, Saudi Arabia. Saudi J Health Sci. 2022 Jan;11(1):68–73.
19. Javaeed A, Kousar R, Farooq A, Hina S, Ghauri SK, Tabbasum T. Knowledge, Attitude, and Practice of Blood Donation Among Undergraduate Medical Students in Azad Kashmir. Cureus. 2020 Apr 19;12(4):e7733. doi: 10.7759/cureus.7733. PMID: 32440380; PMCID: PMC7237058.

Original Article

Association Of Insomnia And Anxiety Among The Undergraduate Students Of Doctor Of Physical Therapy Affiliated With Khyber Medical University In Hayatabad Peshawar

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Abstract

Objective: This study aimed to determine the prevalence of insomnia and anxiety and to examine their association among undergraduate Doctor of Physical Therapy (DPT) students affiliated with Khyber Medical University, Peshawar.

Study Design: A cross-sectional study was conducted.

Place and duration of study: The study was conducted at the Institute of Physical Medicine and Rehabilitation (IPM&R), Rehman Medical Institute (RMI), and Mehboob Medical Institute (MMI).

Material and Methods: A cross-sectional study was conducted among 258 DPT students selected through non-probability convenience sampling from the Institute of Physical Medicine and Rehabilitation (IPM&R), Rehman Medical Institute (RMI), and Mehboob Medical Institute (MMI). Data were analyzed to determine the distribution of insomnia and anxiety severity levels and to assess their association.

Results: Of the 258 participants, 74 (28.7%) were male and 184 (71.3%) were female. Sub-threshold insomnia was the most prevalent category (39.9%), followed by moderate clinical insomnia (28.7%), no insomnia (27.1%), and severe insomnia (4.3%). Regarding anxiety, 28.7% of participants reported moderate anxiety, 27.1% mild anxiety, 22.9% minimal anxiety, and 21.3% severe anxiety. A statistically significant linear association was observed between insomnia severity and anxiety levels ($p = .000$), indicating that higher insomnia severity was associated with greater anxiety severity. Female participants demonstrated higher prevalence rates of both insomnia and anxiety across all severity categories. Institutional analysis revealed that sub-threshold and moderate insomnia were more frequently reported among students from IPM&R and RMI.

Conclusion: Insomnia and anxiety are highly prevalent among undergraduate DPT students, with sub-threshold insomnia being the most common form. The findings demonstrate a significant positive association between insomnia severity and anxiety levels. Early identification and targeted interventions are recommended to reduce the psychological burden and improve academic performance among university students.

Keywords: Anxiety, Insomnia, Undergraduate Students of Doctor of Physical Therapy

1. Introduction

Insomnia disorder is a common sleep condition characterized by persistent difficulty in initiating or maintaining sleep, early morning awakening, and significant daytime impairment. Individuals with insomnia frequently experience fatigue, reduced concentration, impaired cognitive performance, irritability, anxiety, and low mood, all of which negatively affect quality of life. (1) Longitudinal evidence indicates that individuals with insomnia are at greater risk of developing psychopathological symptoms, particularly depression, compared with those who obtain adequate sleep. (2) Chronic insomnia is associate associated with substantial functional impairment and diminished well-being. A meta-analysis has estimated the global prevalence of insomnia

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disorder to be approximately 12.4% based on DSM interview criteria, while also emphasizing the need for standardized diagnostic approaches. [3]
The prevalence of insomnia is increasing among both adults and university students. Approximately 30% of adults in various countries report insomnia symptoms, while the prevalence among university students ranges from 14.9% to 70.3% . [4] Insomnia also contributes to significant clinical and economic burden. Individuals with major depressive disorder and comorbid insomnia symptoms experience higher healthcare utilization and costs, as well as increased metabolic and cardiovascular complications. [5] Furthermore, insomnia has been associated with suicide attempts in patients with chronic schizophrenia, particularly in those without autistic symptoms, highlighting its complex psychiatric implications. [6]
A bidirectional relationship between insomnia and anxiety has been reported, suggesting that each condition may predispose to or exacerbate the other. [7] Anxiety disorders represent a major global public health concern, affecting approximately 4% of the world's population, with a 12-month prevalence of 9.8% based on DSM-IV criteria. [8] Regional data, including those from Latin America, further confirm the substantial burden of anxiety disorders. [9]
University students are particularly vulnerable due to academic pressures, lifestyle changes, and psychosocial transitions. [10-12] Poor sleep quality has been linked to excessive daytime sleepiness, impaired academic performance, and increased stress. [11, 12] Insomnia and anxiety negatively influence cognitive function, stress response, and overall well-being. [13] The undergraduate period represents a sensitive developmental stage marked by psychological adjustment and heightened stress [14], and stress is closely interconnected with both insomnia and anxiety. [15]
Despite the recognized association between insomnia and anxiety, limited data are available from Khyber Pakhtunkhwa, Pakistan. Therefore, this study aimed to assess the prevalence of insomnia and anxiety and to examine their association among undergraduate Doctor of Physical Therapy students affiliated with Khyber Medical University, Peshawar.

2. Materials & Methods

A cross-sectional study was conducted to determine the prevalence of insomnia and anxiety and to examine the association between their severity levels among undergraduate Doctor of Physical Therapy (DPT) students affiliated with Khyber Medical University, Peshawar. The study was carried out at the Institute of Physical Medicine and Rehabilitation (IPM&R), Rehman Medical Institute (RMI), and Mehboob Medical Institute (MMI). A total of 258 students were selected through the Raosoft and using a non-probability convenience sampling technique. Students currently enrolled in the DPT program and willing to participate were included in the study, while those with previously diagnosed psychiatric disorders or receiving treatment for major mental health conditions were excluded. Participation was voluntary, and informed consent was obtained from all respondents. Confidentiality and anonymity were strictly maintained. Data was collected using a structured, self-administered questionnaire consisting of demographic information and standardized tools to assess insomnia and anxiety severity. Insomnia was categorized as no insomnia, sub-threshold insomnia, moderate clinical insomnia, and severe insomnia. Anxiety was classified as minimal, mild, moderate, or severe based on established scoring criteria. Data was analyzed using SPSS. Descriptive statistics, including frequencies and percentages, were calculated, and cross-tabulation analysis was performed to assess the association between insomnia and anxiety. A p-value of ≤ 0.0 5 was considered statistically significant.

3. Results

The present study included a total of 258 participants, comprising 74 males (28.7%) and 184 females (71.3%). Participants were recruited from three institutes: 113 (43.8%) from IPMR, 87 (33.7%) from RMI, and 58 (22.5%) from Mehboob Institute of Physiotherapy. Statistical analysis revealed a significant linear association between insomnia severity and anxiety levels (p = .000), indicating that higher levels of insomnia were associated with greater anxiety severity.

Table 1: Gender Distribution of Participants

Variable	Category	Frequency	Percent (%)	Cumulative Percent (%)
Gender	Male	74	28.7	28.7
	Female	184	71.3	100.0
Institute	IPMR	113	43.8	43.8
	Mehboob	58	22.5	66.3
	RMI	87	33.7	100.0

With respect to insomnia severity, sub-threshold insomnia was the most prevalent category, affecting 103 participants (39.9%). Moderate clinical insomnia was reported by 74 participants (28.7%), while 11 participants (4.3%) exhibited severe insomnia. In contrast, 70 participants (27.1%) reported no insomnia. These findings suggest that mild to moderate sleep disturbances were common within the study population.

Severity Level	Insomnia n (%)	Anxiety n (%)
Minimal / None	70 (27.1)	59 (22.9)
Mild / Sub-threshold	103 (39.9)	70 (27.1)
Moderate	74 (28.7)	74 (28.7)
Severe	11 (4.3)	55 (21.3)

Table 2: Severity of Insomnia and Anxiety among Participants

Regarding anxiety severity, 59 participants (22.9%) demonstrated minimal anxiety, 70 (27.1%) had mild anxiety, 74 (28.7%) reported moderate anxiety, and 55 (21.3%) experienced severe anxiety. Overall, moderate anxiety constituted the most frequent category.

Gender-based analysis indicated that insomnia was more prevalent and more severe among female participants. Among those reporting no insomnia (27.1%), females accounted for 21.3% compared to 5.8% of males. Sub-threshold insomnia was observed in 26.4% of females and 13.6% of males. Moderate clinical insomnia affected 19.8% of females and 8.9% of males, while severe insomnia was reported by 3.9% of females and 0.4% of males. These findings demonstrate a higher burden of sleep disturbances among female participants.

A similar pattern was observed for anxiety levels. Minimal anxiety was reported by 15.1% of females and 7.8% of males. Mild anxiety was observed in 19.0% of females and 8.1% of males, whereas moderate anxiety was reported by 20.5% of females and 8.2% of males. Severe anxiety was present in 16.7% of females compared to 4.7% of males. Collectively, these results indicate that female participants consistently exhibited higher levels of anxiety across all severity categories.

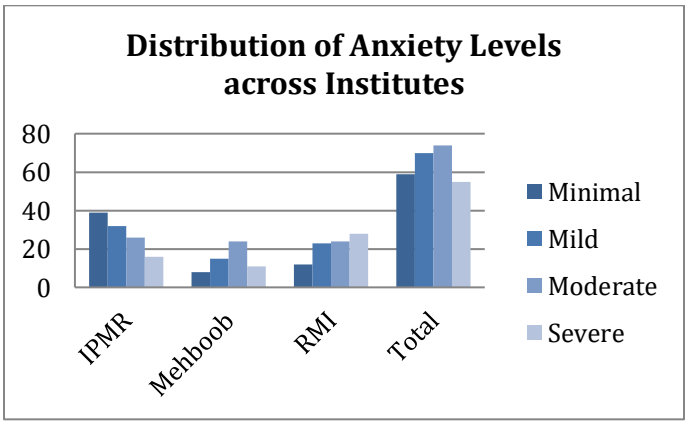

Figure 1: Distribution of Anxiety Levels across Institutes

Analysis of insomnia severity across institutes revealed that sub-threshold insomnia was most prevalent among participants from IPMR (19.0%), followed by RMI (13.2%) and Mehboob Institute (7.8%). Moderate clinical insomnia was more frequently reported in IPMR (10.5%) and RMI (11.2%) than in Mehboob Institute (7.0%). Severe insomnia, although relatively uncommon (4.3%), was identified across all three institutes. Overall, insomnia particularly in its sub-threshold and moderate forms was more frequently observed among participants from IPMR and RMI.

Table 3: Distribution of Anxiety Levels across Insomnia Severity

Insomnia Severity	Minimal Anxiety	Mild Anxiety	Moderate Anxiety	Severe Anxiety	Total	% of Total
No insomnia	35	18	12	5	70	27.1
Sub-threshold insomnia	19	33	33	18	103	39.9
Moderate clinical insomnia	5	16	27	26	74	28.7
Severe insomnia	0	3	2	6	11	4.3
Total	59	70	74	55	258	100.0

4. Discussion

The current study discovered a strong positive relationship between insomnia severity and anxiety levels among physiotherapy students, implying that individuals who had more severe sleep disruptions also reported higher anxiety. This finding is consistent with previous study, which found a high association between sleep disorders and anxiety among university populations. A cross-sectional study of university students in Pakistan during the COVID-19 lockdown found a substantial association between sleeplessness and anxiety symptoms, with females having a greater incidence of both conditions. [16] Similar relationships between insomnia and higher anxiety levels have been reported in different student groups, supporting that sleep disruption and psychological discomfort regularly co-occur. [15]

In this study, sub-threshold insomnia was most prevalent (39.9%), while moderate clinical insomnia afflicted nearly one-quarter of subjects. These results are roughly in accord with studies demonstrating higher sleep issues in university students compared to general populations. A comprehensive study and meta-analysis of Saudi university students indicated a pooled insomnia prevalence of roughly 43.3%, demonstrating how pervasive sleep issues may be in academic contexts. [17] Another research indicated that around 22.6% of students fulfilled criteria for insomnia, a prevalence that, while considerably lower, nonetheless suggests considerable sleep disturbance and its relationship with anxiety. [18] Likewise, moderate and severe anxiety were widespread in our study, which accords with data demonstrating that a large number of university students suffer clinically relevant anxiety symptoms, particularly in challenging health science programs. Our gender-specific findings showed consistently higher proportions of females with both insomnia and anxiety across all severity categories. This trend mirrors broader research indicating that female students are more likely than males to report sleep problems and psychological distress. For example, population-based studies show that women are generally more susceptible to insomnia and related mental health symptoms, possibly due to biological and psychosocial factors such as hormonal influences and stress responsivity. [19] The higher burden of insomnia and anxiety in females observed in this study is therefore consistent with the wider literature on sex differences in sleep and mental health.

Conclusion:

This cross-sectional study of undergraduate Doctor of Physical Therapy students affiliated with Khyber Medical University demonstrated a significant linear association between insomnia severity and anxiety levels ($p = 0.000$). Sub-threshold and moderate insomnia were most prevalent, while moderate anxiety was the dominant category. Female students exhibited a higher burden of both insomnia and anxiety. Institutional differences were observed, with

higher insomnia rates among students from IPMR and RMI. The progressive increase in anxiety with greater insomnia severity underscores a meaningful relationship between sleep disturbance and psychological distress. These findings support the need for early screening, targeted mental health interventions, and sleep management strategies within undergraduate physiotherapy programs to enhance student well-being and academic outcomes.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Riemann D, Benz F, Dressle RJ, Espie CA, Johann AF, Blanken TF, et al. Insomnia disorder: State of the science and challenges for the future. Journal of sleep research. 2022;31(4):e13604.
2. Hertenstein E, Benz F, Schneider CL, Baglioni C. Insomnia—A risk factor for mental disorders. Journal of sleep research. 2023;32(6):e13930.
3. van Straten A, Weinreich KJ, Fábián B, Reesen J, Grigori S, Luik AI, et al. The prevalence of insomnia disorder in the general population: A meta-analysis. Journal of Sleep Research. 2025;34(5):e70089.
4. Chowdhury AI, Ghosh S, Hasan MF, Khandakar KAS, Azad F. Prevalence of insomnia among university students in South Asian Region: a systematic review of studies. Journal of preventive medicine and hygiene. 2021;61(4):E525.
5. Kale H, Zhdanava M, Pilon D, Sheehan J, Drissen T, Boonmak P, et al. Economic and clinical burden of major depressive disorder with insomnia symptoms in commercially and Medicaid-insured adults in the United States: A retrospective matched cohort study. Journal of affective disorders. 2025;372:653-64.
6. Li W, Liu Y, Tao R, Chen L, Liu Y, Mo D, et al. Association of insomnia with suicide attempts in Chinese chronic schizophrenia patients with and without autistic symptoms. BMC psychiatry. 2025;25(1):604.
7. Jansson-Fröjmark M, Lindblom K. A bidirectional relationship between anxiety and depression, and insomnia? A prospective study in the general population. Journal of psychosomatic research. 2008;64(4):443-9.
8. Casares MÁ, Díez-Gómez A, Pérez-Albéniz A, Lucas-Molina B, Fonseca-Pedrero E. Screening for anxiety in adolescents: Validation of the Generalized Anxiety Disorder Assessment-7 in a representative sample of adolescents. Journal of Affective Disorders. 2024;354:331-8.
9. Errazuriz A, Avello-Vega D, Passi-Solar A, Torres R, Bacigalupo F, Crossley NA, et al. Prevalence of anxiety disorders in Latin America: a systematic review and meta-analysis. The Lancet Regional Health–Americas. 2025;45.
10. Bauducco SV, Tillfors M, Özdemir M, Flink IK, Linton SJ. Too tired for school? The effects of insomnia on absenteeism in adolescence. Sleep Health. 2015;1(3):205-10.
11. Surani AA, Zahid S, Surani A, Ali S, Mubeen M, Khan RH. Sleep quality among medical students of Karachi, Pakistan. J Pak Med Assoc. 2015;65(4):380-2.
12. Lemma S, Gelaye B, Berhane Y, Worku A, Williams MA. Sleep quality and its psychological correlates among university students in Ethiopia: a cross-sectional study. BMC psychiatry. 2012;12(1):237.
13. Schlarb AA, Claßen M, Grünwald J, Vögele C. Sleep disturbances and mental strain in university students: results from an online survey in Luxembourg and Germany. International journal of mental health systems. 2017;11(1):24.
14. Bayram N, Bilgel N. The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. Social psychiatry and psychiatric epidemiology. 2008;43(8):667-72.
15. Manzar MD, Salahuddin M, Pandi-Perumal SR, Bahammam AS. Insomnia may mediate the relationship between stress and anxiety: a cross-sectional study in university students. Nature and Science of Sleep. 2021:31-8.
16. Mahmood-ul-Hassan AH, Sannan A, Nooz N, Ramay A, Huzaifa M, Zaidi SMJ, et al. Prevalence of insomnia and anxiety in university students during the COVID-19 lockdown: A cross-sectional study. Journal of Fatima Jinnah Medical University. 2021;15(1):9-12.
17. Baklola M, Terra M, Al-barqi M, AbdulHusain YH, Asiri SA, Jadaan NS, et al. Prevalence of insomnia among university students in Saudi Arabia: a systematic review and

meta-analysis. The Egyptian Journal of Neurology, Psychiatry and Neurosurgery. 2024;60(1):138.

18. Rangel TC, Raposo MCF, Rocha-Filho PAS. The prevalence and severity of insomnia in university students and their associations with migraine, tension-type headache, anxiety and depression disorders: a cross-sectional study. Sleep Medicine. 2021;88:241-6.
19. Albikawi ZF, editor Fear related to COVID-19, mental health issues, and predictors of insomnia among female nursing college students during the pandemic. Healthcare; 2023: MDPI.

Original Article

Acceptance & Barriers to Trabeculectomy among patients with Glaucoma: A Cross-sectional study

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Abstract

Objective: This study aimed to assess the level of acceptance about trabeculectomy and to determine patient-perceived barriers to trabeculectomy among glaucoma patients attending Ophthalmology clinic at Chakwal. .

Study Design: A hospital based cross-sectional study was conducted.

Place and duration of study: A hospital-based cross-sectional analytical study was done among 32 glaucoma patients who visited Munawar Memorial Hospital Chakwal Out Patient Department (OPD) during September – November 2023.

Material and Methods: A hospital-based cross-sectional analytical study was done among 32 glaucoma patients who visited Munawar Memorial Hospital Chakwal Out Patient Department (OPD) during September – November 2023. Informed consent for this research was formally sought from Hospital administrators and from study participants. The glaucoma cases were 30-80 years old and were recommended by ophthalmologist to undergo trabeculectomy and were enrolled in the study through consecutive non-probability sampling. All study participants were subjected to detailed ophthalmic examination. Visual acuity and intraocular pressure were also gauged. A self-administered structured questionnaire was used to gather responses of the glaucoma patients pertaining to acceptance and barriers to trabeculectomy. Data was analyzed by using Microsoft Excel 2019 software. Descriptive statistics were applied.

Results: Mean age of the 32 glaucoma cases who were recommended trabeculectomy was 62 ± 4.3 years and 56.3% of them were females. 66.7% patients were aware about their type of glaucoma and healthcare implications of trabeculectomy. About 54% cases were willing to undergo trabeculectomy while 8.4% were not at all willing for this surgery. Surgery expenditure and fear of becoming blind were the key barriers to trabeculectomy.

Conclusion: Most of the recommended glaucoma patients were willing to undergo trabeculectomy for rectification of their visual impairment. Cost of treatment and fear of post-operative blindness were the chief barriers to trabeculectomy.

Keywords: barriers, glaucoma, trabeculectomy

1. Introduction

Glaucoma is the one of the leading causes of irreversible blindness worldwide. It may result in permanent loss of vision. (1) According to World Health Organization (WHO), significant proportion of irreversible blindness cases globally are attributed to glaucoma. (2) It has been a great public health concern due to its chronic and degenerative nature. Approximately 76 million people were affected by glaucoma in 2020 and this figure may probably mount to 111.8 million by 2040. (3) Glaucoma in Pakistan is frequently reported by the people who are above 40 years of age. However, its age-standardized prevalence is estimated to be around 0.14 million glaucoma cases. (4) It is a substantial public health challenge in Low- and Middle-Income Countries (LMICs) due to inadequate access to eye care services and lack of awareness in general public. (5) Many glaucoma patients discontinue their glaucoma medications and found even non-adherent during initial period of treatment that escalates the disease progression. [6] Raised intraocular pressure in

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glaucoma not only increases the likelihood of optic nerve damage but also exacerbates visual defects. [7] Approximately 3 million Americans were diagnosed with glaucoma during 2020 and about 120,000 of them with untreated glaucoma grieved with impaired vision. [8] Although gross difference between the Quality of Life (QoL) of the glaucoma patients undergoing trabeculectomy and instilling eye drops was not observed; yet glaucoma cases undergoing trabeculectomy were found to be less dependent on eye drops. [9]

Trabeculectomy is a gold standard for maintenance of intraocular pressure in long run. [10] There are numerous barriers to trabeculectomy despite its acknowledged efficacy. Denial among Sub-Saharan African glaucoma patients for trabeculectomy is attributed to fear and cost of surgery.[11] The developing world is confronted with diverse barriers to trabeculectomy like infrastructure constraints and inadequate access to follow-up care. [12]

The present study is intended to determine the acceptance and barriers to trabeculectomy among glaucoma patients who visited Munawar Memorial Hospital Chakwal for their treatment. Identifying the barriers faced by glaucoma cases residing in a semi-urban district of Chakwal is imperative for tailoring the interventions to improve surgical acceptance and enhance glaucoma management. By determining the patient level or health system factors that seemed to influence the decision making of our patients, our healthcare professionals would better be able to improve the improve the healthcare outcomes by mitigating the propensity of glaucoma-related blindness in the country.

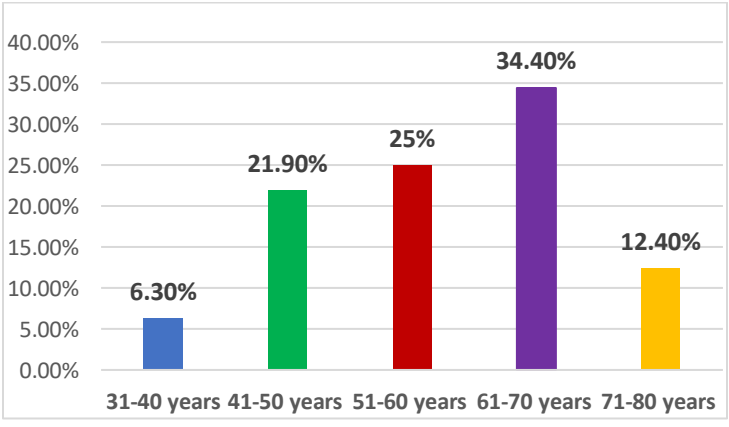
2. Materials & Methods

A hospital-based cross-sectional analytical study was carried out among 32 glaucoma patients who visited Munawar Memorial Hospital Chakwal Out Patient Department (OPD) from September – November 2023. Informed consent for this research was formally sought from Hospital administrators and from study participants. The glaucoma cases who were 30-80 years old and were recommended by ophthalmologist to undergo trabeculectomy were enrolled in the study through consecutive non-probability sampling. The glaucoma cases who were not suggested to undergo trabeculectomy were excluded. All study participants were subjected to detailed ophthalmic examination. Visual acuity was tested by means of Snellen's visual acuity chart. After that intraocular pressure was measured by using tonometer. Anterior and posterior eye segments were thoroughly examined by using slit lamp. A self-administered structured questionnaire was used to gather responses of the glaucoma patients pertaining to barriers or obstacles in undergoing trabeculectomy. Data was analyzed by using Microsoft Excel 2019 software. Descriptive statistics were applied.

3. Results

Total 175 glaucoma patients visited Munawar Memorial Hospital Chakwal during September-November 2023 but only 32 cases were recommended to undergo trabeculectomy and their mean age was 62 ± 4.3 years. Most (34.4%) of the glaucoma cases belonged to 61-70 years age group as depicted below in Figure 1.

Fig 1: Age group of the glaucoma cases (n = 32)



Of the 32 glaucoma cases in present study, there were 14 (43.8%) males and 18 (56.3%) females. Visual acuity of the glaucoma patients graded is shown below in Table 1.

Table 1: Visual acuity grading (n = 32)

Visual acuity grading	OD (Oculus Dexter) Right eye	OS (Oculus Sinister) Left eye
>6/18	8 (25%)	4 (12.5%)
6/18 – 6/60	11 (34.4%)	16 (50%)
<6/60- 3/60	3 (9.4%)	2 (6.3%)
<3/60 – PL+	9 (28.1%)	9 (28.1%)
NPL	1 (3.1%)	1 (3.1%)
Total	32 (100%)	32 (100%)

The intraocular pressure gauged separately for both left and right eye of the glaucoma patients is presented below in Table 2.

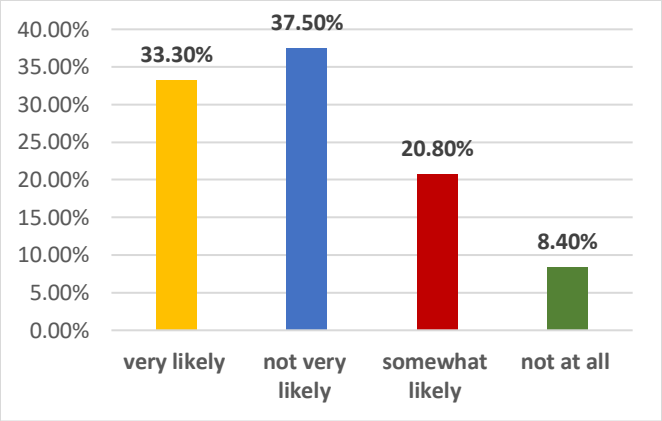
Table 2: Intraocular pressure (IOP)of Glaucoma cases (n = 32)

Intraocular pressure grading	IOP OD (Right eye)	IOP OS (Left eye)
< 18 mm Hg	11 (34.4%)	11 (34.4%)
< 22 mm Hg	3 (9.4%)	1 (3.1%)
> 22 mm Hg	18 (56.3%)	20 (62.5%)
Total	32 (100%)	32 (100%)

Only 16 (66.7%) of the cases knew the type of glaucoma they were suffering from. 24 patients confessed that they have not only been prescribed the treatment for glaucoma but also have heard about trabeculectomy as their treatment option. About 66.7% acknowledged the merits of trabeculectomy over other glaucoma treatments. Only 29.2% admitted encountering barriers to trabeculectomy.

33.3% patients confessed that they were more likely to have trabeculectomy to preserve their vision by reducing intraocular pressure. Most (37.5%) of the patients opined that they were not likely to consider trabeculectomy as their treatment option as shown below in Figure 2.

Fig 2: Probability of considering trabeculectomy as treatment option



Of the 8 glaucoma patients, 3 (42.8%) perceived high cost of trabeculectomy procedure as the main barrier that contributes to increased refusal of glaucoma cases. However, 4(57.2%) were anxious about the poor post-operative visual prognosis like they were afraid of becoming blind.

4. Discussion

Mean age of glaucoma patients in our study was 62 ± 4.3 years and majority of them were in age bracket of 61-70 years. A systematic review by Tham Y et al elucidated that number of glaucoma cases 40-80 years older in 2013 was 64.3 million that further elevated to 76 million in 2020 and significant escalation to 111.8 million is anticipated in 2040. [13] Likewise, another review revealed 5.2% prevalence of open angle glaucoma in Black population aged 60 years that later up surged to 12.2% by 80 years of age. [14] According to national statistics, the highest prevalence of glaucoma has been reported after 50 years of age of 50 that also directed the attention of all strategic planners towards targeted intervention among elders to curb this menace4. Of the 175 glaucoma cases examined by optometrist in our study, trabeculectomy was

recommended to only 32 patients and most (56.3%) of them were females. Likewise, a data retrieved from Eye surveillance health system of New York explicated that more women with glaucoma underwent surgical treatment as compared to men and were less adherent to drug therapy.[15] Contrary to our findings, a study among glaucoma cases of Egypt illustrated that surgery was comparatively preferred more by males than those of female cases. [16] The gender or racial difference in surgical management of glaucoma is another contemporary issue that merit further in-depth and methodologically sound research. Such studies could prove beneficial in equitable access to healthcare and adherence to surgical intervention for glaucoma among diverse populations.

Of the 32 glaucoma cases in the present study who were suggested to undergo trabeculectomy, 66.7% not only knew the type of their glaucoma but were also adequately aware regarding the benefits of surgical intervention. A cross-sectional study done by Alqahtani SM et al among the patients visiting eye clinic of Jeddah revealed minimal or low level of awareness among patients about this disease. Even majority was unacquainted about their family history pertaining to glaucoma and had numerous misconceptions about this disease. [17] Such fallacies may drastically impair the vision of the patients and hence substantially impair their quality of life in long run. A similar study among Indians revealed that even late presentation to eye clinics of the glaucoma cases was attributed to their ignorance about this ailment and its complications.[18] Early diagnosis of glaucoma and its timely management is imperative to get rid of blindness. But, unfortunately most of the glaucoma cases come late for diagnosis and hence face its grave consequences. [19] Another study among inhabitants of an Indian state elucidated adequate knowledge about the clinical presentation and its resultant outcomes but they were not well-aware about its prevention and risk factors. [20]) The perceived knowledge and communication gaps in glaucoma management can considerably be filled by strengthening health education in the community and capacity building of healthcare workforce for counseling the patients.

Of the 32 glaucoma patients suggested to undergo trabeculectomy, 37.5% were not likely to consider surgical intervention for managing the raised intraocular pressure and impaired visual acuity as evident from Figure 2. They were deferring surgery primarily due to financial constraints. A similar study by Hamza SA et al among glaucoma cases of Mardan medical complex emphasized financial limitations as the main obstacle for surgical treatment followed by their inadequate awareness. [21] Undoubtedly, out of pocket expenditure is the main hindrance in access to healthcare as it accounts for approximately 58-70% of total health expenditure specifically in Low Middle Income Countries (LMICs) where general public is unable to afford optimum health care due to inflation and lack of health insurance coverage. [22] Even after introducing Sehat Sahulat Program (SSP) in Pakistan, patients were found reluctant in accessing eye care services due to long travelling time, old age and illiteracy. [23] About 57.2% of our glaucoma patients were afraid of getting blind postoperatively. Consistent with our findings, a Nigerian study depicted the fear of blindness following surgery among 29.2% of the refusing patients while cost of surgery was the barrier only among 12.3% of the glaucoma patients. [24] Another study among Nigerian hospital cases revealed the anxiety regarding potential vision loss after eye surgery was the predominant reason for refusal. [25] Such postoperative apprehensions should prudently be dealt with proper counseling by trained healthcare workers. There is need to enhance the utilization of social media in disseminating healthcare information to the community about glaucoma, usefulness of its prompt management and adversities to be faced in case of negligence. Addressing the financial barriers to healthcare by incorporating policies tailored to patients' needs can substantially reduce the economic burden of the patients.

Conclusion:

Most of the glaucoma cases were willing to undergo trabeculectomy as per recommendations of ophthalmologist. Fear of getting blind following surgery and treatment cost were the key barriers to trabeculectomy. These barriers can efficiently be overcome by disseminating awareness pertaining to glaucoma disease, its clinical presentation, susceptible age group, adverse outcomes in case of delaying treatment. Rigorous training of healthcare providers for medical and psychological counseling is of paramount significance to get rid of adverse outcomes. Moreover, hospital administrators should devise strategies to make trabeculectomy cost-effective for non-affording patients.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Kang JM, Tanna AP. Glaucoma. Med Clin North Am 2021 May; 105(3): 493-510. https://doi.org/10.1016/j.mcna.2021.01.004.
2. World Health Organization. Blindness and Vision impairment. August 10, 2023. https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment.
3. Junior ERS, Belfort AFL, Pereira VC. Global and national epidemiology of glaucoma: Prevalence, burden and public health implications. Rev Bras Oftalmol 2025; 84: e0094. https://dx.doi.org/10.37039/1982.8551.20250094.
4. Kazmi S, Jabeen A, Gul R. Rising glaucoma burden in Pakistan: A wake-up call for nationwide screening? J Pak Med Assoc 2025; 72()5): 1016-1016. https://doi.org/10.47391/JPMA.3722.
5. Allison K, Virk A, Alamri A, Patel D. Analysis of the awareness and access of eye healthcare in underserved populations. Vision 2025; 9(3): 55. https://doi.org/10.3390/vision9030055.
6. Oltramari L, Mansberger SL, Souza JM, de Souza LB, de Azevedo SF, Abe RY. The association between glaucoma treatment adherence with disease progression and loss to follow-up. Scientific Reports. 2024 Jan 25;14(1):2195. https://doi.org/10.1038/s41598-024-52800-2.
7. Lee S, Park DY, Huh MG, Cha SC. Influence of preoperative glaucoma medication on long-term outcomes of trabeculectomy. Sci Rep 2024; 14: 28341. https://doi.org/10.1038/s41598-024-79637-z.
8. Centers for Disease Control and Prevention. Don't let glaucoma steal your sight! Centers for Disease Control and Prevention. 2020. https://www.cdc.gov/visionhealth/resources/features/glaucoma-awareness.html#:~:text=Know%20the%20Facts%20About%20Glaucoma&text=About%203%20million%20Americans%20have,know%20they%20have%20the%20disease.
9. King AJ, Fernie G, Hudson J, Kernohan A, Azuara-Blanco A, Burr J, et al. Primary trabeculectomy versus primary glaucoma eye drops for newly diagnosed advanced glaucoma: TAGS RCT. Health Technol Assess. 2021 Nov; 25(72): 1-158. https://doi.org/10.3310/hta25720.
10. Bloom P, Au L. Minimally invasive Glaucoma surgery (MIGS) is a poor substitute for trabeculectomy-the great debate. Ophthalmol Ther 2018; 7: 203–210. https://doi.org/10.1007/s40123-018-0135-9.
11. Olawoye O, Sarimiye T, Washaya J, Gessesse GW, Balo K, Agre J, et al. Patients' Acceptance of Glaucoma Therapy in Sub-Saharan Africa. J Glaucoma. 2024 Dec 1; 33(12): 951-956. https://doi.org/10.1097/ijg.0000000000002487.
12. Commiskey P, Scheive M, Rooney D, Shah M. Glaucoma treatment strategies for low-resource settings. Global Perspectives July / August 2021; 34-37. https://assets.bmctoday.net/glaucomatoday/pdfs/0721GT_Global%20Perspectives.pdf.
13. Tham YC, Li X, Wong TY, Quigley HA, Aung T, Cheng CY. Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. Ophthalmology 2014 Nov; 121(11): 2081-2090. https://doi.org/10.1016/j.ophtha.2014.05.013.
14. Kapetanakis VV, Chan MP, Foster PJ, Cook DG, Owen CG, Rudnicka AR. Global variations and time trends in the prevalence of primary open angle glaucoma (POAG): a systematic review and meta-analysis. Br J Ophthalmol. 2016

Jan; 100(1): 86-93. https://doi.org/10.1136/bjophthalmol-2015-307223.

15. Allison K, Hodges B, Shahid MH, Feng C. Racial and gender disparities for glaucoma treatment rates in Upstate New York. J Clin Med 2024; 13(23): 7225. https://doi.org/10.3390/jcm13237225.
16. Awad K, Awad R, Elkazaz H, Saleh M, Mehanna A. Applying the Health Belief Model to predict preference for surgical intervention versus medical therapy among patients with open-angle glaucoma. BMJ Open Ophthalmol 2022 Oct 31;7(1): e001113. https://doi.org/10.1136/bmjophth-2022-001113.
17. Alqahtani SM, Bakarman MA, Almanjoumi A, Alzahrani SH. Awareness and knowledge about glaucoma among patients visiting the screening clinic in Jeddah Eye Hospital, Saudi Arabia. Int J Ophthalmol. 2021 Jun 18;14(6):887-895. https://doi.org/10.18240/ijo.2021.06.15.
18. Rewri P, Kakkar M. Awareness, knowledge, and practice: a survey of glaucoma in north Indian rural residents. Indian J Ophthalmol. 2014;62(4):482–486. https://doi.org/10.4103/0301-4738.132105.
19. Oliver JE, Hattenhauer MG, Herman D, Hodge DO, Kennedy R, Fang-Yen M, et al. Blindness and glaucoma: a comparison of patients progressing to blindness from glaucoma with patients maintaining vision. Am J Ophthalmol. 2002;133(6):764–772. https://doi.org/10.1016/s0002-9394(02)01403-4.
20. Sharm R, Jaryal R, Joshi A. The silent thief of sight: Awareness assessment of glaucoma among the general population. International Academic Journal of Applied Bio-Medical Sciences 2025; 6(1): 1-6. https://iarconsortium.org/iajabms/176/2872/the-silent-thief-of-sight-awareness-assessment-of-glaucoma-among-the-general-population-4772/10.47310/iajabms.2025.v06i01.003.
21. Hamza SA, Sultan M, Waseem M, Ali MS, Khan MR, Tariq M. A cross-sectional study of glaucoma patients at a tertiary eye-care centre: Clinical profile and associated factors. Pakistan Journal of Medicine and Dentistry 2025; 14(03): 350-356. Doi: https://doi.org/10.36283/ziun-pjmd14-3/053.
22. Bashir S, Kishwar S, Nasir M, Ali S. Socioeconomic Inequalities in Out-of-Pocket and Catastrophic Health Expenditures in Pakistan. Int J Public Health 2024; 69: 1607313. https://doi.org/10.3389/ijph.2024.1607313.
23. Malik M, Strang N, Hafeez A, Shabbir M, Iftikhar F, Jonuscheit S. Barriers to accessing eye care in Pakistan: A mixed methods study. Primary Health Care Res Dev 2025; 26: e58. https://doi.org/10.1017/S1463423625100261.
24. Adekoya BJ, Akinsola FB, Balogun BG, Balogun MM, Ibidapo OO. Patient refusal of glaucoma surgery and associated factors in Lagos, Nigeria. Middle East Afr J Ophthalmol. 2013 Apr-Jun;20(2):168-173. https://doi.org/10.4103/0974-9233.110612.
25. Fadamiro CO, Ajite KO. Acceptability and barrier to consideration for trabeculectomy among glaucoma patients in a tertiary hospital in South-Western Nigeria. Adv Ophthalmol Vis Syst 2020; 10(4): 86-89. https://doi.org/10.15406/aovs.2020.10.00391.

Original Article

Academic Procrastination among Nursing Students: The Role of Social Media Addiction

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Abstract

Objective: This study This study examined the relationship involving social media addiction and academic procrastination among nursing students, along with the moderating roles of gender and Hostel versus non-hostel residence

Study Design: Across-sectional survey was conducted.

Place and duration of study: In December 2025, in Islamabad, a cross-sectional survey was conducted using a convenience sampling technique with 247 nursing students.

Material and Methods: In December 2025, in Islamabad, a cross-sectional survey was conducted using a convenience sampling technique with 247 nursing students. The Bergen Social Media Addiction Scale and an adapted short form of the procrastination scale were administered to measure social media addiction and academic related procrastination. For analysis, which included descriptive statistics, Pearson correlation and moderation analysis, IBM SPSS 29 was used.

Results: Social media addiction was positively associated with academic procrastination ($r \approx .611$, $p < .001$). Gender significantly moderated this relationship ($\Delta R^2 = .013$, $p = .022$), with a slightly stronger association among male students. Hostel versus non-hostel residence did not significantly moderate the relationship ($\Delta R^2 < .001$, $p > .05$).

Conclusion: This study builds on the existing literature by extending the association between social media addiction and academic procrastination to a nursing population. The role of gender and residence in influencing this relationship was also explored. The findings may support strategies aimed at managing students' social media engagement patterns and improving academic functioning in nursing education.

Keywords: Social media addiction; academic procrastination; nursing students; gender moderation; Hostel vs. non-hostel residence; Pakistan

1. Introduction

The increasing number of social media platforms has enabled university students to interact, gain information, and go about their day-to-day activities in new ways. In fact, using social media is becoming an increasingly significant component of student life. (1) While these platforms offer clear educational and social benefits, their pervasive integration into everyday routines has raised growing concerns regarding students' capacity to manage attention, emotional regulation, and academic responsibilities. These concerns are particularly relevant in professional education programs like nursing, where students in undergraduate and certificate-level nursing programs are expected to meet competing academic demands, undergo clinical training, and deal with emotionally demanding learning environments. The ineffective regulation of social media use in such contexts can potentially put academic self-management and mental health at greater risk. While research specifically targeting nursing students is limited, there is enough evidence from college, university, and medical students to provide a strong conceptual and evidence base for understanding how problematic social media use may interfere with academic functioning in a similarly demanding educational setting.

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According to Nguyen et al. (2025), college students spend an extended amount of time on social media, which affects their mental and academic performance. Studies on excessive social media use have identified psychological functioning issues that are relevant to academic self-management. [2] A narrative review carried out by Zubair et al. (2023) demonstrated that overindulgence in digital platforms is linked with anxiety, stress, sleep disturbances, and emotional dysregulation. [3] All of these are associated with the student's ability to cope with academic demands or self-regulate goal-directed behavior. The way individuals engage with digital platforms yields differing academic outcomes. It has been established that mostly the social media use primarily aimed at increasing positive feelings and connecting with others has a link with cognitive and emotional withdrawal from learning activities. The cognitively oriented use shows the opposite pattern, which is lower burnout with more adaptive academic outcomes . [4] Besides mental health pathways, studies have indicated a negative association between unreflective social media use and academic achievement through behavioral and emotional channels relevant to academic self-management. According to Gong et al. (2025), extensive social media use may serve as a reason for poor academic performance due to an increasing fear of being judged, along with a feeling of losing something special and enjoyable that obstructs the maintenance of attention to an academic task. [5] Studies that have focused on social media addiction more directly revealed that addictive patterns of use are associated with insufficient academic engagement, which provides a clear behavioral basis for academic procrastination . [6]

Academic procrastination refers to the behavior of students delaying or failing to complete academic tasks by the designated deadline. According to Peixoto et al. (2021), Rabin et al. (2011), and Steel and Klingsieck (2016), such behavior can be attributed to problems of time management, limitations in task-execution skills, insufficient self-regulatory awareness, and low acceptance of one's duty and uncertainty to meet success. [7,8] It has been noted in previous research that academic procrastination is due to ineffective self-regulatory coping, which leads to poor academic performance . [9] Recent research has shown that students who are pathologically engrossed in social media are more vulnerable to procrastinate and not regulate their academic behavior properly . [10] All these studies show that impulsive use of online social networks affects the postponement of required academic activities. Contextual factors may additionally shape these relationships. Where a person lives can affect their daily routines, supervision, and technology use. Research conducted in Pakistan indicates that medical students residing in hostels exhibit more maladaptive social media use and poorer academic management than their non-hostel counterparts (Naushad et al., 2025). Although mainly from medical students, these findings are useful for nursing education, given the similarities of experiences and the structure of training situations. Whereas research on compulsive social media use and procrastination in academic activities has steadily increased, not much research has focused on students doing undergraduate and certificate nursing programmes, and very few studies simultaneously examined individual-level factors, such as gender, alongside contextual factors when exploring the academic consequences of problematic social media use within nursing education.

Based on these gaps, this study looks at how social media addiction is related to academic procrastination among students in undergraduate and certificate-level nursing programs. Furthermore, the study will examine whether this relationship is moderated by gender and Hostel vs. non-hostel residence. The study attempts to expand the current understanding of the translation of problematic social media behaviors into academic behaviors in an under-researched nursing student population, with insight from broader student literature guiding the interpretation.

1.1 Significance of Social Media Addiction in Academic Functioning

Social media addiction is conceptualized as poor regulation of its use that comprises the completion of routine tasks (Blackwell et al., 2017). Many university students engage in diverse online activities that sometimes induce a substantial increase in the use of digital platforms and, in some cases, disproportionate dependence (Gulnar, 2025; Salari et al., 2025). Various studies conducted within the nursing education environment show that nursing students are highly addicted to social media. It is reported that the addiction varies from mild to moderate to severe . [11] Such usage patterns can harm the learning process by diminishing academic motivation and impairing the ability of students to achieve targets related to academic work.

Rabin et al. (2011), along with Steel and Klingsieck (2016) and Peixoto et al. (2021) have posited that academic procrastination is the students' tendency to postpone or miss deadlines for academic tasks, which can be attributed to ineffective time management, inadequate task-execution skills, limited self-regulatory awareness, low sense of responsibility, as well as worrying about achieving one goal. [7,8] According to Shi (2023), academic procrastination in higher education is frequently associated with low academic motivation, low task engagement, and low self-discipline to maintain focus. Earlier research has established the positive association linking social media addiction with academic procrastination. [12] This relationship is further supported by some recent studies. [13,14,15]

Similar findings have been reported among medical students, where compulsive engagement with digital platforms emerges as a significant predictor of delays in academic-related activities (Naushad et al., 2025). This association was not extensively studied among nursing students. There is hence a need to validate this link in nursing students. Therefore, the current study advances the subsequent hypothesis.

H1: Social media addiction is positively associated with academic procrastination among nursing students.

1.2 The Association of Gender and Residence with Problematic Social Media Use and Academic Dysregulation

Previous investigations have highlighted the influence of individual and contextual characteristics on compulsive social media use and academic delay. Naushad et al. (2025) reported evidence from medical colleges in Pakistan and suggested that male students scored higher on social media addiction as compared to female students, and hostel residents were more vulnerable to social media addiction and academic procrastination as compared to non-hostel resident students.

According to Aslan and Yasar (2020), male university students have been shown to be more addicted than female university students, if a comparison is made in the consumption of social media use. The study of smartphone addiction (which is a behavioral antecedent of social media addiction) also brings out the gender-specific cognitive and behavioral patterns that are relevant for academic functioning. [16] Through a network analysis, Song et al. (2025) showed that male students evidenced cognitive preoccupation as the primary manifestation of smartphone addiction, while female students exhibited excessive use beyond intended limits. Based on the preceding discussion, gender and residential status may help explain variability in academic delay and problematic social media use; accordingly, the present study examines gender and residence as moderators of the association between disproportionate social media use and study-related delays. [17]

H2: Gender moderates the association of social media addiction with academic procrastination, such that the positive association is stronger among male nursing students than among female nursing students.

H3: Hostel versus non-hostel residence moderates the association of social media addiction with academic procrastination, with a stronger association among hostel-residing nursing students than among non-hostel students.

2. Materials & Methods

The current research used a cross-sectional quantitative survey design. Data were collected from nursing institutes located in Islamabad from December 10 to December 20, 2025. We used convenience sampling among the students enrolled in different semesters of their nursing program. A total of 275 nursing students were approached, and 247 took part in the survey, resulting in a response rate = 89.8%.The sample was drawn from male and female nursing students as well as hostel and non-hostel students. At the time of data collection, all participants were full-time nursing students.

Inclusion Criteria: (1) Full-time nursing students enrolled in undergraduate or certificate-level programs; (2) students from any semester, of either gender; hostel or non-hostel students; (3) students who provided informed consent and completed the questionnaire.

Exclusion Criteria: (1) Students not enrolled as full-time nursing students; (2) students who declined participation; (3) questionnaires with substantial missing or incomplete data, impaired consciousness, or severe psychiatric conditions.

Procedure and Ethical Considerations

Before starting data collection, ethical approval and permission were obtained from the Ethical Review Committee (ERC) International Islamic University, Islamabad. Those who participated in the study were given information about the objectives of the study and confirmed that their participation was of their free will. They were also given assurance that responses would be kept confidential and would not be disclosed openly to the public. Data were collected in person during scheduled class sessions. Students completed questionnaires, which took about 10 minutes. No explicitly identifiable information was obtained, and only completed questionnaires were used in the study. All study procedures were conducted in accordance with the ethical guidelines of human research.

Measures

Social Media Addiction. To measure participants' engagement with addictive social media behaviors, the Bergen Social Media Addiction Scale (BSMAS; Andreassen et al., 2016) was employed. [18] This short instrument includes six indicators measuring central addiction-related tendencies, as represented by persistent obsessive thinking, escalating use, mood-related reliance, difficulty reducing use, discomfort when access is restricted and interference in daily functioning. Respondents answered on a five-point frequency scale of very rarely (1) to very often (5), which was further aggregated to reflect addictive behaviours on social media. The scale demonstrated an acceptable internal consistency according to reliability analysis in the current study (Cronbach's $\alpha = .79$).

Academic Procrastination. We assessed students' procrastination with a brief version of the Procrastination Assessment Scale for Students (PASS; Solomon & Rothblum, 1984). [19] Because PASS has multiple facets, we adapted four items that were specifically related to core academic procrastination behaviours from the two-day delay domains of the original scale. Two items evaluated procrastination in regular academic activities, such as reviewing lecture notes, checking slides, and preparing quizzes or tests in class, whereas the other two items evaluated procrastination regarding studying major exams. All items that assessed reading assignments, administrative tasks related to the academic (e.g., course registration, form filling), and the section inquiring about

reasons-for-procrastination were eliminated from the questionnaire as they were not relevant or consistently applicable to nursing education. Respondents scored their responses on a five-point Likert scale. Higher scores indicate a greater tendency for procrastination. In the current sample, the adapted four-item scale was found to be adequately internally consistent (Cronbach's α = .73).

Data Analysis

IBM SPSS version 29 was used to perform all statistical analyses. All required measures of central tendency and measures of dispersion were used to summarize sample demographic characteristics and study variables. Normality assumptions were checked using skewness and kurtosis values (±1.0) and Q–Q plots, which indicated acceptable distribution, before conducting inferential analysis. Using residual plots, the linearity assumption and homoscedasticity were subjected to tests. Moreover, multicollinearity was evaluated through checks on tolerance values and variance inflation factors (VIFs). No violations were detected. Pearson correlation analysis was applied to determine the strength of the relationship between the study variables. Moderation analyses were performed to assess the study hypotheses using the IBM SPSS PROCESS macro. The interaction effects were evaluated via ΔR^2 in PROCESS macro, F-change statistics, regression coefficients, and p-values. Statistical significance was set at $p < .05$.

3. Results

Demographic Characteristics of the Participants

A total of 247 nursing students were included in the final sample. There were more males (55.9%) among the participants than females (44.1%). Most participants were enrolled in the BSN (Bachelor of Science in Nursing) program (66.0%), while the rest were enrolled in the Certified Nursing Assistant (CNA) program (34.0%). Participants were selected from various academic semesters, with the greatest percentage in the first semester (38.5%). The sample had a mean age of 19.85 years (SD = 1.54), with ages ranging between 16 and 25 years. Table 1 presents a summary of these demographic characteristics.

Table 1. Demographic Characteristics of the Study Sample (N = 247)

Variable	Category	n	%
Gender	Male	138	55.9
	Female	109	44.1
Program	BSN	163	66.0
	CNA	84	34.0
Semester	1st	95	38.5
	2nd	55	22.3
	3rd	42	17.0
	4th	55	22.3
Age (years)	Mean (SD)	19.85 (1.54)	—
	Range	16–25	—

The descriptive statistics pertaining to the primary study variables (social media addiction and academic procrastination) are summarized in Table 2. The mean score for social media addiction was 18.64 (SD = 3.28). The mean score for academic procrastination was 12.95 (SD = 2.77). The scores on both variables had a wide range, which is sufficient to carry out correlational and moderation analysis.

Table 2. Descriptive Statistics of Study Variables (N = 247)

Variable	N	Min	Max	Mean	SD
Social Media Addiction (SMA)	247	6	29	18.64	3.28
Academic Procrastination (AP)	247	4	20	12.95	2.77

Reliability Analysis

The study assessed the reliability of measures for internal consistency. The present sample demonstrated good internal consistency for the Bergen Social Media Addiction Scale (Cronbach's $\alpha = .79$). The adapted academic procrastination measure also exhibited acceptable internal consistency (Cronbach's $\alpha = .73$), which is considered adequate given the short four-item structure of the scale.

Correlation Analysis

Pearson correlation analysis showed that there is a strong positive relationship between social media addiction and academic procrastination. Table 3 displays a significant correlation ($r = .611$, $p < .001$) between social media addiction and academic procrastination.

Table 3. Pearson Correlation between Social Media Addiction and Academic Procrastination (N = 247)

Variable	1	2
1. Social Media Addiction	—	
2. Academic Procrastination	.611***	—

*Note. ***$p < .001$.

Moderation Analysis: Gender

Moderation analysis revealed that gender significantly altered the association between social media addiction and academic procrastination. According to Table 4, the model was significant, $R^2 = .395$, $F(3, 243) = 52.96$, $p < .001$, indicating that 39.5% of the variance in academic procrastination was explained by the model. Social media addiction had a significant positive main effect on academic procrastination ($B = 0.491$, $SE = 0.043$, $t = 11.40$, $p < 0.001$). Gender also showed a significant main effect ($B = −0.586$, $SE = 0.283$, $t = −2.07$, $p = 0.040$). The interaction between social media addiction and gender was statistically significant ($B = −.201$, $SE = .088$, $t = −2.30$, $p = .022$), indicating a moderating effect. The interaction term explained additional variance ($\Delta R^2 = .013$, $\Delta F (1, 243) = 5.28$, $p = .022$). Simple slope analysis showed a positive association between social media addiction and academic procrastination for both genders, with a stronger association among male students ($B = .580$, $SE = .055$, $p < .001$) compared to female students ($B = .378$, $SE = .068$, $p < .001$).

Table 4. Moderation Analysis Examining Gender as a Moderator of the Relationship between Social Media Addiction and Academic Procrastination (N = 247)

SMA × Gender −.201 .088 −2.30 .022 −.374 −.029

Predictor	B	SE	t	p	95% CI Lower	95% CI Upper
Constant	12.884	.141	91.71	< .001	12.607	13.160
Social Media Addiction (SMA)	.491	.043	11.40	< .001	.406	.576
Gender	−.586	.283	−2.07	.040	−1.144	−.028
SMA × Gender	−.201	.088	−2.30	.022	−.374	−.029

Note. CI = confidence interval.

Moderation Analysis: Hostel vs. non-hostel residence

Moderation analysis revealed that residence (hostel vs non-hostel) did not change the relationship between social media addiction and academic procrastination. According to Table 5, the model was significant, $R^2 = .394$, $F (3, 242) = 52.47$, $p < .001$, explaining 39.4% of academic procrastination. Social media addiction had a significant positive main effect on academic procrastination ($B = .530$, $SE = .044$, $t = 12.01$, $p < .001$). Hostel vs. non-hostel residence did not have a significant main effect ($B = −.444$, $SE = .278$, $t = −1.60$, $p = .111$). The interaction between social

media addiction and hostel status was not significant (B = −.048, SE = .089, t = −0.54, p = .590), and the interaction term did not add significant explained variance (ΔR^2 = .001, ΔF (1, 242) = 0.290, p = .590).

Table 5. Moderation Analysis Examining Hostel vs. non-hostel residence as a Moderator of the Relationship between Social Media Addiction and Academic Procrastination (N = 247)

Predictor	B	SE	t	p	95% CI Lower	95% CI Upper
Constant	12.946	.139	93.37	<.001	12.673	13.220
Social Media Addiction (SMA)	.530	.044	12.01	<.001	.443	.617
Hostel vs. non-hostel residence	−.444	.278	−1.60	.111	−.991	.103
SMA × Hostel vs. non-hostel residence	−.048	.089	−0.54	.590	−.224	.127

Note. CI = confidence interval.

4. Discussion

According to the present study, social media addiction has a positive association with academic procrastination in undergraduate nursing students. This pattern is consistent with earlier research indicating that problematic social media use is linked to delays in academic task initiation and completion across diverse university populations. [13,14,15] The present study confirms this link within a nursing sample and underscores problematic social media use as an important behavioural risk factor in professional training contexts that require self-regulation and prompt engagement in tasks. Instead of this association being attributed to displacement in time, it can be interpreted as a behavioural pattern associated with coping. When students use social media repeatedly to cope with academic pressure or emotional discomfort, it becomes habitual and part of their general coping repertoire. Gender somewhat affected the link between addiction to social media and academic procrastination. While the association was shown for both males and females, it was slightly stronger for the male nursing students. This moderation is due to differences in the strength of the association rather than category differences in vulnerability. The gender effect can be interpreted through variations in the coping pathways through which problematic use of social media causes academic delay. Hostel vs. non-hostel residence does not strengthen or weaken the relationship between students' engagement with digital platforms and their academic management habits, suggesting that the same behavioural chain may operate in both hostel and non-hostel students. As a group, nursing students are subject to pressures such as academic stress, emotional labour, and expectations regarding responsibility, time management, and task completion. Under such conditions, the use of social media for quick regulation of emotions may have serious consequences. Even small losses of self-regulation or repeated micro-level task procrastination can accumulate into meaningful academic procrastination, independent of the context.

Conclusion:

This research substantiates that problematic social media use has a significant relationship with academic procrastination in nursing students. Gender has a small moderating effect, and its effect is slightly more pronounced in the male gender, while place of hostel versus non-hostel residence has no significant effect on this relationship. The results of this study have important implications in that they indicate that the relationship is mainly due to psychological factors. Even though the difference is small, it indicates that gender-specific interventions may still have some benefits. Building on the current investigation, future research should focus on a more in-depth exploration of nursing-specific mechanisms, such as styles of coping, delay processes, and avoidance behaviors, for better understanding maladaptive social media use and academic dysfunctioning.

Limitations

There are some limitations of the present study that warrant acknowledgment. Due to the cross-sectional survey design, causality cannot be inferred. Longitudinal studies may be beneficial to investigate such possibilities. In addition, common method

variance and reporting bias can arise from self-reported use of social media and academic behaviours, as they do not adequately represent actual use or task engagement. For future studies, it would be prudent to incorporate an objective indicator to increase measurement precision, such as trace data. The research findings are based on undergraduate nursing students from a particular culture and educational system, and the use convenience sampling may limit their generalisability of the results. While the theoretical mechanisms reviewed were found to operate similarly across different populations, more research is needed to explore coping-related and self-regulatory processes in nursing students for their disciplinary specificity. Moreover, while we investigated the moderation impact of gender and hostel versus non-hostel residence status, we did not assess key psychological mechanisms (coping styles, emotion regulation capacity, and task-avoidance tendencies) directly; therefore, the hypothesized pathways are only theoretically inferred. To conclude, the observed moderation effects were negligible, which is consistent with the multifactorial characteristics of academic behaviour. Thus, maladaptive digital platform engagement may represent one of several psychosocial factors.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Davis, J. (2016). Social media. In The Wiley Blackwell encyclopedia of gender and sexuality studies. Wiley Blackwell. https://doi.org/10.1002/9781118541555.wbiepc004
2. Nguyen, T. N. D., Tran, H. Y., Nguyen, G. H. M., Nguyen, Y. K., & Dinh, H. T. M. (2025). Narcissism, social media addiction, self-esteem, and Haxeco traits: Exploring influences on life satisfaction among Generation Z. Psychology Research and Behavior Management, 18, 419–434. https://doi.org/10.2147/PRBM.S447067
3. Zubair, U., Khan, M. K., & Albashari, M. (2023). Link between excessive social media use and psychiatric disorders. Annals of Medicine and Surgery, 85(4), 875–878. https://doi.org/10.1097/MS9.0000000000000112
4. Ma, X., Liu, Q., & Zhang, W. (2025). The impact of multidimensional excessive social media use on academic performance: The moderating role of mindfulness. Frontiers in Psychology, 16, 1579509. https://doi.org/10.3389/fpsyg.2025.1579509
5. Gong, Z., Guo, Y., & Tan, J. (2025). Social media use and academic performance among college students: The chain mediating roles of social anxiety and fear of missing out. Frontiers in Psychology, 16, 1389421. https://doi.org/10.3389/fpsyg.2025.1389421
6. Roque Herrera, Y., Alonso-García, S., Tenelanda López, D. V., & López Núñez, J. A. (2025). Predictive capacity of social media addiction on academic engagement in university students. Education Sciences, 15(12), 1677. https://doi.org/10.3390/educsci15121677
7. Peixoto, E. M., Pallini, A. C., Vallerand, R. J., Rahimi, S., & Silva, M. V. (2021). Procrastination, motivation, and academic performance: A meta-analytic review. Educational Psychology Review, 33(4), 1879–1912. https://doi.org/10.1007/s10648-021-09615-9
8. Rabin, L. A., Fogel, J., & Nutter-Upham, K. E. (2011). Academic procrastination in college students: The role of self-reported executive function. Journal of Clinical and Experimental Neuropsychology, 33(3), 344–357. https://doi.org/10.1080/13803395.2010.518597
9. Gareau, A., Chamandy, M., Kljajic, K., & Gaudreau, P. (2019). The detrimental effect of academic procrastination on subsequent grades: The mediating role of coping over and above past achievement and working memory capacity. Anxiety, Stress, & Coping, 32(2), 141–154. https://doi.org/10.1080/10615806.2018.1543763
10. Kurker, F., & Surucu, L. (2024). Social media addiction and academic procrastination: A systematic review. Education and Information Technologies, 29(2), 2153–2174. https://doi.org/10.1007/s10639-023-12041-7
11. Shaban, M., Abdou, N. M., Eid, M. M., Ibrahim, M. A., Metwaly, M. S., Sayed, M. A., Mansour, Y. M., & Ramadan, F. S. (2023). Prevalence of social media addiction among nursing students. Journal of Integrative Nursing, 5(3), 145–150. https://doi.org/10.4103/jin.jin_127_22

12. Shi, X. (2023). Academic procrastination among college students: Psychological mechanisms and educational implications. School Psychology International, 44(2), 123–140. https://doi.org/10.1177/01430343221145678
13. Liu, C., Zhang, L., & Fang, Y. (2022). Excessive social media use and academic procrastination: The role of self-control. Frontiers in Psychology, 13, 872901. https://doi.org/10.3389/fpsyg.2022.872901
14. Caratiquit, M. L., & Caratiquit, R. B. (2023). Social media addiction and academic procrastination among university students. International Journal of Educational Psychology, 12(2), 145–160.
15. Tang, Y., & He, W. (2025). Digital distraction, social media addiction, and academic procrastination among university students. Computers & Education, 201, 104834. https://doi.org/10.1016/j.compedu.2024.104834
16. Aslan, A., & Yasar, H. (2020). Analysis of the relationship between smartphone addiction and academic procrastination. International Journal of Research in Education and Science, 6(4), 651–666. https://doi.org/10.46328/ijres.v6i4.1211
17. Song, H., Zhai, X., & Zhao, Y. (2025). Gender differences in smartphone addiction symptoms: A network analysis approach. Journal of Behavioral Addictions, 14(2), 233–246. https://doi.org/10.1556/2006.2025.00015
18. Andreassen, C. S., Billieux, J., Griffiths, M. D., Kuss, D. J., Demetrovics, Z., Mazzoni, E., & Pallesen, S. (2016). The relationship between addictive use of social media and video games and symptoms of psychiatric disorders: A large-scale cross-sectional study. Psychology of Addictive Behaviors, 30(2), 252–262. https://doi.org/10.1037/adb0000160
19. Solomon, L. J., & Rothblum, E. D. (1984). Academic procrastination: Frequency and cognitive-behavioral correlates. Journal of Counseling Psychology, 31(4), 503–509. https://doi.org/10.1037/0022-0167.31.4.503

Original Article

Functional Consequences and Musculoskeletal Complications of Diabetic patients with Frozen Shoulder

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Abstract

Objective: This study aimed to evaluate the functional consequences and associated MSK complications in diabetic patients with frozen shoulder in relation to age, demographic characteristics, and physiotherapy interventions

Study Design: A cross-sectional study was conducted.

Place and duration of study: This cross-sectional study was conducted in hospitals of Abbottabad, from June to November, 2024.

Material and Methods: This cross-sectional study was conducted in hospitals of Abbottabad, from June to November, 2024. Participant was selected using Raosoft, with an estimated of 377 patient, including adults over 20 years old diagnosed with diabetes and frozen shoulder complain, however patients with paralysis or other health complications were excluded. Data was collected through a structured questionnaire (demographic characteristics, SPADI, MSK and physiotherapy sessions). Chi-square test and spearman's correlation were used to determine the association between categorical variables at P value<0.05 statistically significant.

Results: Demographic data reveals that the majority of participants were over 40 years old, with a higher proportion of females, married and housewives. Most participants had 6 to 10 years since diabetic diagnosed. Only 14.25% participants reported a family history of diabetes. More, single/divorce, housewives and type 2 diabetes significantly (P<0.05) increase pain and disability. Co-occurrence of lower back, knee, hips, ankle and wrist increased pain and disability in the studied participants. Patients with severe pain were more likely receiving combined therapies (electro-, manual and exercise).

Conclusion: This study found that frozen shoulder with other MSK disorders significantly impact daily activities and functional independence. The study emphasizes early screening, comprehensive physiotherapy and tailored rehabilitation for diabetic patients with frozen shoulder.

Keywords: Diabetes, Frozen shoulder, musculoskeletal disorder, SPADI, Physiotherapy

1. Introduction

Diabetes mellitus is a chronic metabolic disease that affects millions of people worldwide. It affects several body systems, including the musculoskeletal system, and contributes beyond metabolic imbalance. (1) Pain and a gradual loss of shoulder movement are the hallmarks of frozen shoulder, which reduces a patient's functional ability and general quality of life.(2) Because diabetes affects connective tissues, glycosylation processes, and inflammatory pathways, it has been linked to an increased risk of frozen shoulder.(3) This relationship, which has major implications for therapeutic approaches and patient outcomes, emphasizes the need to investigate how diabetes may exacerbate the presentation, treatment, and recovery pathway of frozen shoulder.(4) Physical therapy, oral anti-inflammatory drugs, intra-articular corticosteroid injections, and, in more extreme situations, manipulation under anesthesia or arthroscopic surgery are among the non-surgical and surgical methods available for treating frozen shoulder. (5) However, because of the previously described biochemical alterations and compromised wound-healing capacity due to impaired tissue regeneration, diabetic individuals frequently show a decreased response to conservative therapy.(6) According to studies, diabetic patients may have limited improvements

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in shoulder mobility after standard therapies and have a delayed recovery.[7]

Diabetes and musculoskeletal disorders like frozen shoulder are linked, causing the need for a thorough study strategy to comprehend and treat the particular difficulties diabetic individuals have managing their illness and recovering from it. The purpose of this study is to assess functional recovery indicators, therapeutic techniques, and prevalence in order to lay the groundwork for bettering patient care and clinical tactics.

2. Materials & Methods

Study design: The study design of this research was Cross-sectional study (June to November, 2024). This study was conducted in hospitals, providing a clinical environment for data collection.

Sample size and technique: A total of 377 was estimated using Raosoft sample calculation with margin error of 5%, confidence level of 95%.The population size was 20,000 and response distribution was 50%.The Sampling technique was convenient sampling.

Selection criteria: Inclusion criteria included diabetic patients with frozen shoulder and above 20 years age. Whereas, paralyze patients, and those with other chronic complication were excluded.

Data collection: After ethical approval (Ref:1055) from ethical committee of Women Institute of learning and Rehabilitation Sciences, verbally and written informed consent was obtained from all participants. Questionnaire comprised of 6 sections; demographic characteristics, diabetes, Nordic musculoskeletal disorder questionnaire (N-MSK-Q) [8], Shoulder pain and disability index (SPADI) [9], and on-going physical therapies.

Data analysis procedure

Data was analyzed using SPSS computer software. Descriptive statistic of the data included frequency distributions and cross-tabulations. For inferential statistics, as being categorical groups, chi-square and Spearman/Pearson correlation were used for difference and association strength. The P value below 0.05 was considered significant.

3. Results

As indicated in table 1, the participants mostly consists of individuals over 40 years old (81.45%), females (58.60%), married (90.05%), occupationally housewives (29.57%) and belonging to moderate socioeconomic status (79.30%). Statistically, gender, marital status and occupation were significant ($P<0.05$) associated with the age difference of diabetic participants.

Table 1: Demographics (Age, Gender, Marital status, Occupation, Socioeconomic status, Hospital) frequency (%) of frozen shoulder patients .

Demographic characteristics		≤40 years	> 40 years	Total
Gender*	Male	28 (7.53)	126 (33.87)	154 (41.40)
	Female	61 (16.40)	157 (42.20)	218 (58.60)
Marital status**	Single/Divorce	30 (8.06)	7 (1.88)	37 (9.95)
	Married	59 (15.86)	276 (74.19)	335 (90.05)
Occupation*	House wife	25 (6.72)	85 (22.85)	110 (29.57)
	Creative/technical	13 (3.49)	72 (19.35)	85 (22.85)
	Educational sector	22 (5.91)	62 (16.67)	84 (22.58)
	Corporate/business	11 (2.96)	38 (10.22)	49 (13.17)
	Health sector	18 (4.84)	26 (6.99)	44 (11.83)
Socioeconomic status[ns]	Weak	8 (2.15)	17 (4.57)	25 (6.72)
	Moderate	70 (18.82)	225 (60.48)	295 (79.30)
	Strong	11 (2.96)	41 (11.02)	52 (13.98)

*=p<0.05, **=p<0.01, ns=p>0.05

Table2 demonstrates the diabetic history of frozen shoulder patients. Results showed that majority exhibited Type 2 diabetes (81.99%). Regarding to the duration of diabetes, 28.23% have had diabetes for 1–5 years, 38.71% had 6–10 years, and 33.06% for more than 10 years. Additionally, a significant proportion of individuals (85.75%) have no family history of diabetes. Statistically, diabetic types were non-significant with age, but duration of diabetic and family history was significant (P<0.05) associated with the age difference.

Table 2: Diabetic history frequency (%) of frozen shoulder patients

Diabetic History		≥40 year	>40 year	Frequency (%)
Diabetes^{ns}	Type 1	18 (4.84)	49 (13.17)	67 (18.01)
	Type 2	71 (19.09)	234 (62.90)	305 (81.99)
Duration**	1-5 yrs	64 (17.20)	41 (11.02)	105 (28.23)
	6-10 yrs	21 (5.65)	123 (33.06)	144 (38.71)
	>10 yrs	4 (1.08)	119 (31.99)	123 (33.06)
Family history*	No	69 (18.55)	250 (67.20)	319 (85.75)
	Yes	20 (5.38)	33 (8.87)	53 (14.25)

*=p<0.05, **=p<0.01, ns=p>0.05

Table 3 shows correlation of patients demographic characteristics and SPADI. Age was highly significant positive moderate correlated (ρ = 0.303, P<0.01) with SPADI pain and highly significant positive weak correlated (ρ = 0.243, P<0.01) with disability, indicating that with increase in age in diabetes type (Type 2) patients the pain and disability slightly increases. Diabetes type showed highly significant positive weak correlation (ρ = 0.250, P<0.01) with disability, and highly significant positive moderate correlation (ρ = 0.346, P<0.01) with pain. Marital status and occupation status was weakly and negatively statistically significant (ρ = 0.1, P<0.05) with pain and disability, indicating single/divorce and mostly housewives and technical staff were noticed with higher pain and disability.

Variables	SPADI	
	Pain	Disability
Age	.303**	.243**
Gender	-0.001^{ns}	0.061^{ns}
Marital Status	-.170**	-.180**
Occupation	-.127*	-.175**
Socioeconomic status	-0.05^{ns}	-.182**
Diabetes type	.346**	.250**

Table 3: Correlation of demographic variables with pain and disability (SPADI)

*=p<0.05, **=p<0.01, ns=p>0.05

The MSK and SPADI factors correlation is shown in table 4. Wrist, lower back, hips, knee and ankle was positively and moderately, and statistically significant (ρ = 0.2-0.3, P<0.05) associated with pain and disability, indicating that additional MSK disorder in these part of body increase pain and disability noticeable. Also, with co-occurrence of elbow also positively but weakly, and statistically

significant ($\rho = 0.1$, $P<0.05$) associated with pain and disability.

Nordic MSK	SPADI	
	Pain	Disability
Neck	0.036^{ns}	0.062^{ns}
Shoulder	-	-
Elbow	0.158^{*}	0.205^{**}
Wrist	0.253^{**}	0.221^{**}
Upper back	0.128^{ns}	0.279^{**}
Lower Back	0.370^{**}	0.345^{**}
Hip	0.295^{**}	0.254^{**}
Knee	0.301^{**}	0.328^{**}
Ankle	0.264^{**}	0.264^{**}

Table 4: Correlation of MSK with pain and disability (SPADI)

*=p<0.05, **=p<0.01, ns=p>0.05

Table 5 indicates that majority of participants with increase in pain and disability were moderately significant (P<0.05) undertaking all three therapies i.e. electrotherapy + manual therapy + exercise therapy (48.12%). These results were followed by electrotherapy + exercise therapy (26.61%) and manual therapy + exercise therapy (10.22%). The numbers of sessions were statistically non-significantly (P>0.05) associated with pain and disability.

Table 5: Physiotherapy session frequency (%) of frozen shoulder patients

Physiotherapy sessions			SPADI	
			Pain	Disability
Therapy freq (%)	Electrotherapy + Manual therapy	12(3.23)	0.286^{**}	0.151^{**}
	Electrotherapy + Exercise therapy	99(26.61)		
	Manual therapy + Exercise therapy	38(10.22)		
	Electrotherapy + Manual therapy + Exercise therapy	179(48.12)		
Sessions freq (%)	1-10	255(68.55)	0.043^{ns}	0.033^{ns}
	11-20	95(25.54)		
	above 20	22(5.91)		

**=p<0.01, ns=p>0.05

4. Discussion

Shoulder pain is one of the most common complaints of patients with diabetes that causes motion limitation, functional disability and decreased quality of life. There is higher prevalence of shoulder disorders in patients with diabetes, with adhesive capsulitis (AC) and rotator cuff (RC) tendinopathy being the most common disabling shoulder disorders.[10,11]

The demographic profile of the sample group is predominantly individuals over 40 years old, mostly female, married, and housewives. The incidence of adhesive capsulitis of shoulder among diabetic patients female is more than male. Al Mamun.[12] found that housewives and elderly people mostly suffer from disease. However, study conducted by Suleman et al.[13] results were in conflict with the present study, as they had noticeably more male compared to females with diabetes and shoulder pain.

In the present study most participants had no family history of diabetes, and with 6 to 10 years disease durations. The study results showed that around 81% of patients had type 2 diabetes, supporting the present study findings, Dyer et al.[14] reported that people who have been newly diagnosed with frozen shoulder are more likely to be diagnosed with type 2 diabetes.

The co-occurance of MSK with frozen shoulder diabetic patients showed to increase pain and disability. The MSK disorder body parts that were significantly associated with pain and disability included lower back, knee, hips and wrist. Shariat et al.[15] reported that lower back pain along with shoulder and neck severity is significantly associated with higher BMI. Dighriri et al.[16] reported that with shoulder, and along with neck also lower back pain could also occur. More additional factors that increase risk of pain includes history of trauma, depressive and psychosomatic symptoms.

A total of 48.12% study participants were receiving all combined therapies (Electrotherapy, Manual therapy, Exercise therapy). Koumantakis et al.[17] reported that therapeutic exercise, manual therapy and electrotherapy exhibited significant improvement in patients with shoulder pain and disability. And more, between 8th and 12th sessions, there had been no significant improvement in shoulder pain and disability. The shoulder followed by lower back showed higher severity of pain and disability. Such individuals that usually work with bended shoulder or back experience mostly shoulder and upper back pain.[18] Supporting the present study, the findings of Nazish et al.[19] stated that housewives are more prone to shoulder pain and given counseling for postural correction and awareness sessions could prevent MSK disorders not only in housewives but as well as the working women.

Conclusion:

Frozen shoulder in diabetic patients is more prevalent among individuals over 40 years of age, females, married participants and housewives. Pain and disability increased moderately with advancing age, more than 5 years duration of diabetes, and the presence of additional musculoskeletal disorders. Combined physiotherapy approaches were commonly reported among participants with higher pain and disability,

Patients and clinicians should prioritize early screening and adopt comprehensive physiotherapy-based rehabilitation plans. A multidisciplinary intervention program including awareness and community-based rehabilitation projects initiatives focusing on diabetes-related musculoskeletal complications is required.

Strengths & Limitations

This study provides novel insights into functional outcomes of musculoskeletal complications in diabetic patients with frozen shoulder in Pakistan. Relative large sample size strengthens the findings; however, convenience sampling potentially may have introduced selection bias. This may limit the representativeness of the sample and the generalizability of results. The study was conducted in selected hospitals in Khyber Pakhtunkhwa city, Abbottabad, which may limit external validity. The cross-sectional design prevents causal inference.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Mukhtar Y, Galalain A, Yunusa U. A modern overview on diabetes mellitus: a chronic endocrine disorder. European Journal of Biology. 2020;5(2):1-14.
2. Kalra S, Unnikrishnan AG, Baruah MP, Sahay R, Bantwal G. Metabolic and energy imbalance in dysglycemia-based chronic disease. Diabetes, Metabolic Syndrome and Obesity. 2021:165-84.https://doi.org/10.2147/DMSO.S286888
3. Struyf F. Frozen shoulder: present and future. Elsevier; 2024.
4. Dyer BP, Rathod-Mistry T, Burton C, Van Der Windt D, Bucknall M. Diabetes as a risk factor for the onset of frozen shoulder: a systematic review and meta-analysis. BMJ open. 2023;13(1):e062377.https://doi.org/10.1136/bmjopen-2022-062377

5. Navarro-Ledesma S, Hamed-Hamed D, Pruimboom L. A new perspective of frozen shoulder pathology; the interplay between the brain and the immune system. Frontiers in physiology. 2024;15:1248612.DOI: 10.3389/fphys.2024.1248612
6. Li K, Bichoupan K, Gilchriest JA, Moosazadeh K. Real-world experience of treating frozen shoulder using active manipulation under local anesthetic: a retrospective study. Medicine. 2021;100(47):e27839.DOI: 10.1097/MD.0000000000027839
7. Wang A, Lv G, Cheng X, Ma X, Wang W, Gui J, et al. Guidelines on multidisciplinary approaches for the prevention and management of diabetic foot disease (2020 edition). Burns & trauma. 2020;8:tkaa017.
8. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Applied ergonomics. 1987;18(3):233-7
9. Roach KE, Budiman-Mak E, Songsiridej N, Lertratanakul Y. Development of a shoulder pain and disability index. Arthritis & Rheumatism: Official Journal of the American College of Rheumatology. 1991;4(4):143-9
10. Zhang M, Zhang Y. Motivation and barriers to postoperative rehabilitation exercise in type 2 diabetic patients with rotator cuff injuries: a qualitative study. Patient preference and adherence. 2024:1483-92.https://doi.org/10.2147/PPA.S467952
11. Sana'a AA, MacDermid JC, Overend TJ, Faber KJ, Furtado R. Physiotherapy Exercise Program for Managing Adhesive Capsulitis in Patients with and without Diabetes: A Pilot Randomized Trial. Archives of Orthopaedics. 2020;1(2):27-39.https://doi.org/10.33696/Orthopaedics.1.006
12. Al Mamun MA. The Status of Work Life Balance of Women's Employment in Primary Education Sector and Its Impact on Their Perception of Work in Bangladesh: A Study on Khulna City. International Journal of Science and Business. 2020.
13. Suleman S, Tariq H, Asif T, Khan AQ, Sehar H, Akhtar M, et al. Frequency of Shoulder Pain in Type 2 Diabetes Mellitus Patients. Journal Riphah College of Rehabilitation Sciences. 2023;11(04).DOI:https://dxdoi.org/10.53389/JRCRS.2023110408
14. Dyer BP, Burton C, Rathod-Mistry T, Blagojevic-Bucknall M, van Der Windt DA. Are patients with newly diagnosed frozen shoulder more likely to be diagnosed with type 2 diabetes? A cohort study in UK electronic health records. Diabetes, Obesity and Metabolism. 2024;26(12):5915-21.https://doi.org/10.1111/dom.15965
15. Shariat A, Cardoso JR, Cleland JA, Danaee M, Ansari NN, Kargarfard M, et al. Prevalence rate of neck, shoulder and lower back pain in association with age, body mass index and gender among Malaysian office workers. Work. 2018;60(2):191-9.https://doi.org/10.3233/WOR-182738
16. Dighriri YH, Akkur MA, Alharbi SA, Madkhali NA, Matabi KI, Mahfouz MS. Prevalence and associated factors of neck, shoulder, and low-back pains among medical students at Jazan University, Saudi Arabia: A cross-sectional study. Journal of family medicine and primary care. 2019;8(12):3826-31.doi: 10.24911/IJMDC.51-1659545872
17. Khosravi, Z., E. Mohammad Ali Nasab Firouzjah, et al. (2024). "Comparison of balance and proprioception of the shoulder joint in girls with and without upper cross syndrome." BMC Musculoskeletal Disorders 25(1): 618.
18. Intolo P, Shalokhon B, Wongwech G, Wisiasut P, Nanthavanij S, Baxter DG. Analysis of neck and shoulder postures, and muscle activities relative to perceived pain during laptop computer use at a low-height table, sofa and bed. Work. 2019;63(3):361-7.https://doi.org/10.3233/WOR-192942
19. Nazish N, Charles MJ, Kumar V. Prevalence of musculoskeletal disorder among house wives and working women. IJHSR. 2020;10(2):215-22.

Original Article

Assessment of Shift Work Disorders and Its Associated Factors Among Nurses Working in a Tertiary Care Hospital

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Abstract

Objective: This study aimed to to assess the frequency of SWD among nurses working in a tertiary care hospital and to assess the factors related to the SWD among nurses.

Study Design: A hospital based cross-sectional study was conducted.

Place and duration of study: The study was conducted at Pakistan Ordinance Factories hospital, Wah Cantt, Pakistan from September 2025 to November 2025.

Material and Methods: The study was done on 118 nurses of a tertiary care hospital from September 2025 to November 2025. The sample was collected using convenience sampling. A 19-item questionnaire was used to collect data on the shift work schedule of nurses, their physical health, mental wellbeing, sleep pattern and fatigue endured while working the shifts. SPSS version 23 was used for analyzing the collected data. ANOVA was applied to assess the difference in shift work disorder scores in relation to age groups, duration of night shifts, and frequency of night shifts while independent t test was used to assess difference in shift work disorder among male and female nurses.

Results: Out of total 118 nurses 69% nurses had SWD. The mean score of shift work disorder (SWD) among the participants was 24.13 ± 7.75. A significant difference in SWD scores was observed across different age groups (p value= <0.001) and duration of work (0.004), as revealed by ANOVA.

Conclusion: Our study indicates a high prevalence of Shift work disorder among nurses of the hospital emphasizing the fact that nurses employed in shifts are more prone to sleep disorders. These findings call for managing shift work in the hospital.

Keywords: Cross sectional study, Disorder, Nurses, Shift work

1. Introduction

Shiftwork is a working pattern in which the staff work before 7 am and after 2 pm in hospitals.(1) In hospitals, there are different types of shifts, like day shifts, night shifts, and rotating shifts. As a necessary component of the health care system, providing 24-hour services has given rise to the phenomenon of shift work. The staff who mostly work in shifts include doctors, nurses, technicians, and other support staff. They work in different departments like emergency, labor and delivery, surgery and intensive care. As a result, hospitals often have policies and procedures in place to manage shiftwork, including regular breaks, flexible schedules, and support programs for staff members.(2,3) Shift work disorder (SWD) is a primary sleep disorder classified as Circadian Rhythm Sleep Disorders. The circadian rhythm is an endogenous biological cycle that follows an approximately 24-hour pattern. The characteristic feature of Shift Work Disorder (SWD) is insomnia and/or excessive sleepiness that are temporally associated with a repeated work schedule overlapping the usual sleep period. These symptoms must be present for at least one month and directly associated with the shift work pattern.(1,3) Shift Work Disorder (SWD) is influenced by several factors, including age, duration and frequency of night work, the number of shifts separated by less than 11 hours of rest, and the total number of consecutive night shifts worked

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These factors are positively associated, whereas gender and flexibility remain negatively related. SWD is positively associated with decrease in productivity and increase in cost, leading to inefficient performance at work place. In addition, short rest periods of less than eleven hours between two shifts have also been reported to be associated with the presence of SWD. [4,5] Compared to nurses without mental health issues, nurses with mental health issues made noticeably more errors. However, with increasing international competition and rising patient expectations for high-quality healthcare, the prevalence of depression among nurses has intensified. Several nurses take multiple jobs or switch them frequently to satisfy their financial obligations because these are low-paying jobs.[6] According to the literature varying levels of employment pace, diversity, control, social support, and competing expectations contribute to a variety of mental health disorders. Also, studies have shown that they struggle to complete their work since they don't have enough time to give their clients the crucial emotional support. Another theory regarding the harmful effects of long work hours on health is the adoption of unhealthy coping mechanisms such as excessive coffee intake, alcohol and drug usage, and cigarette smoking. Also, nurses have psychological challenges such as dealing with irritated, argumentative, or even hostile residents and witnessing the decline of those with whom they have formed close bonds.[7,8] Due to their lower levels of awareness, cognition, and attentiveness, night employees are more likely to be involved in motor vehicle accidents, which increases the risk of injuries, workplace accidents, and errors in quality control. When compared to daytime workers, night shift workers are said to have greater body mass indices, elevated cholesterol, and elevated triglyceride levels. Peptic ulcers are more common in night and rotating shift employees than in day workers when it comes to digestive issues. It has been demonstrated that demanding work schedules have an impact on healthcare workers' physical health, including diabetes, cardiovascular illness, menstruation issues, subfertility, and less than ideal pregnancy outcomes. Lastly, breast and colon cancer rates were much higher in nurses who had worked shifts for a long time. In fact, the World Health Organization's International Agency for Research on Cancer concludes that shift employment is undoubtedly harmful to people.[9,10] The studies carried out in Ethopia and Banglore, India revealed prevalence of shift work disorder as 33.610 and 43.07.[11]

The healthcare system in Pakistan mainly depends on nurses, who put in long shifts to take care of patients. It is crucial to conduct research on SWD among Pakistani nurses for a number of reasons. First, SWD has been linked to a number of unhealthy effects, such as exhaustion, drowsiness, poor cognitive performance, and an increased risk of accidents. In a hospital context where accuracy and focus are crucial, these effects can have major repercussions for both nurses and patients. Second, studies on SWD among Pakistani nurses can shed light on the particular difficulties experienced by medical personnel in the area. Although there is an expanding corpus of research on SWD in different countries, socioeconomic and cultural factors can have a big impact on the prevalence and severity of the illness. Understanding the particular causes of SWD among Pakistani nurses can help in the development of interventions and policies that are appropriate for the region. The objectives of the study were to assess the frequency of SWD among nurses working in a tertiary care hospital and to assess the factors related to the SWD among nurses.

2. Materials & Methods

A hospital based cross sectional study was done on 118 nurses of Pakistan Ordinance Factories hospital, Wah Cantt, Pakistan from September 2025 to November 2025 after taking approval from ethical review committee (WMC/ERC/IRB/108 Dated: Sept 02,2025). The sample size was estimated on Calculator.net using prevalence of

25.6% 7 at 95% confidence interval and 5% margin of error; the population size was 195.

Both male and female nurses of all age groups who had been working in shifts for at least six months were selected using convenience sampling technique and invited to participate. Those who replied positively were invited to take part in the study. The objectives of study and the procedures implemented to ensure the confidentiality were described to the participants. Informed consent was taken from the participants. Those nurses having any psychological disorder were not included in the study. The questionnaire used for the study consisted of 19 questions; four questions were about demographic details in which name was optional to maintain confidentiality, four questions inquired about shift work schedule, two were about psychological and physical well-being and last ten questions were used to assess shift work disorder. Likert scale of 1-4 was used to summarize the scores of the shift work disorder. The cut off score for determining shift work disorder was 20. Those who scored 20 and above are considered to have Shift work disorder while those scoring below 20 didn't have shift work disorder. The pilot testing of the tool used to assess shift work disorder was done on 15 nurses and relaibilty of the tool came out to be 0.857.

SPSS version 23 was used for analyzing the collected data; frequencies and percentages were derived for qualitative variables including age group, gender, duration and frequency of shift work, frequency of nurses having various effects like change in mood, appetite, weight and frequency of nurses having shift work disorder. Mean and standard deviation were calculated for numerical variables like shift work disorder stress score. To assess the normality of data Shapiro-wilk test was applied. After checking the normality of data, ANOVA was applied to assess the difference in shift work disorder scores in relation to age groups, duration of night shifts, and frequency of night shifts while independent t test was used to assess difference in shift work disorder among male and female nurses.

3. Results

Among the surveyed nurses, 16 (13.6%) were male and 102 (86.4%) were female. In terms of age distribution, 56 nurses (47.5%) were between 18 and 30 years, 44 nurses (37.3%) were within the 31–42 age range, and 18 nurses (15.3%) were above 42 years of age. The frequency of participants based on duration of experience and weekly frequency of shift work among nurses are presented in Figures 1 and 2, while Figure 3 illustrates the frequency of nurses diagnosed with shift work disorder that is 69%.

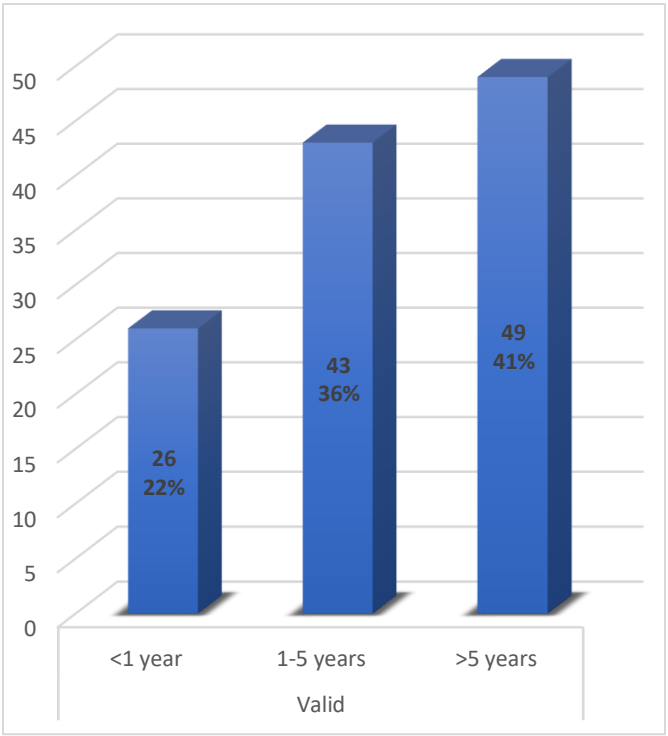

Figure 1: Frequency of participants based on duration of experience

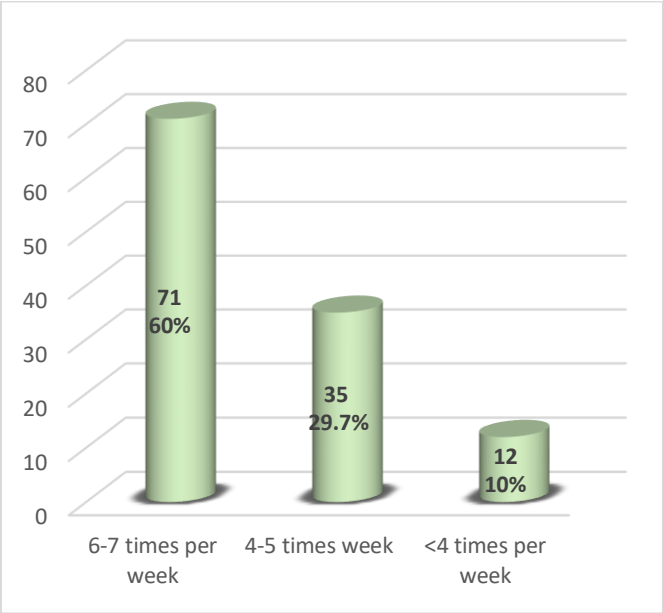

Figure 2: Weekly frequency of shift work among nurses

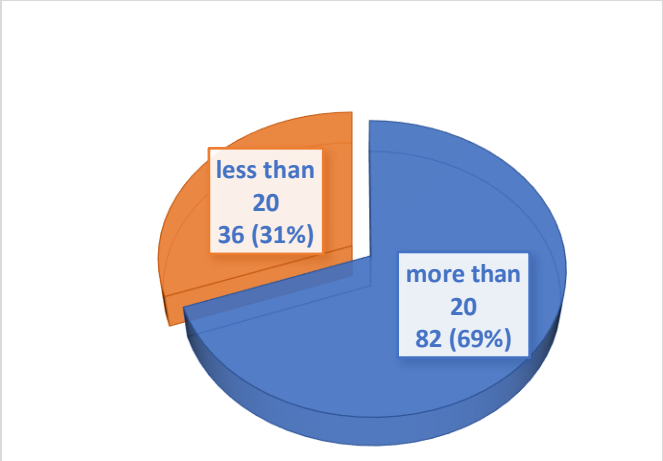

Figure 3: Frequency of nurses having shift work disorder

Among them, 96 (81.4%) reported significant mood and behavioural changes, while 22 (18.6%) did not. Similarly, 86 nurses (72.9%) perceived notable changes in appetite or weight, whereas 32 (27.1%) reported no such changes. The mean score of shift work disorder (SWD) among the participants was 24.13 ± 7.75. A significant difference in SWD scores was observed across different age groups and durations of work, as revealed by ANOVA. Post hoc analysis using Tukey's HSD indicated that nurses aged over 30 years and those with one to five years of shift work experience showed higher levels of SWD. In contrast, there was no significant differences between gender or frequency of night shifts with SWD scores (Table 1).

s.no	Variables	Categories	Shift work disorder score		Degress of freedom	F value	p value
			Mean	Standard deviation			
1	Age group	18-30	21.1786	7.17599	Between groups=2 within groups=115	8.827	0.000
		31-42	26.9773	6.84543			
		>42	26.3889	8.58274			
2	Duration of work	< 1year	21.7692	6.95303	Between groups=2 within groups=115	5.889	0.004
		1-5 year	27.2093	7.39549			
		>5year	22.6939	7.74113			
3	Frequency of shift work	6-7 times per week	23.0845	8.05117	Between groups=2 within groups=115	1.803	0.169
		4-5 times week	25.3714	6.33889			
		<4 times per week	26.7500	9.13659			
4	Gender	Male	22.4375	6.19644	116	-	0.270
		Female	24.4020	7.96435			

Table 1: Associated factors of shift work disorder

4. Discussion

Shift work plays significant role in the health care sector as the patients need 24-hour care. In such an occupation of health care, where safety is the cardinal concern, the malperformance and lack of vigilance associated with shift work disorder can pose risks not only to the nurses themselves but also to the health of patients. The objectives of this hospital-based study were to assess the shift work disorder and its associated factors among healthcare personnel who have a demanding schedule.

Results of the study indicated that 69% of nurses experienceed shift work sleep disorder (SWSD). This prevalence is considerably higher than that reported in other studies conducted by Haile KK et al., Adane A et

al., Anbazhagan S et al., and Huang H et al., where the prevalence of SWSD among nurses was 25.6%, [7] 33.67%, [(10)] 43.07%, [(11)] and 48.5%, [(12)] respectively. The higher prevalence observed in our study may be ascribed to the variation in work schedules, selected sample attributes, societal and institutional practices, or variations in the assessment tools used across studies.

Approximately two-thirds of the sampled nurses reported mood changes and alterations in appetite, which aligns with findings from previous literature. [(2,13,14,15,16,17)] Shift work disorder has been shown to adversely affect the quality of life of nurses and to pose significant negative health consequences.

A significant association was found between the age of nurses and shift work sleep disorder (SWSD). Nurses aged 30 years or older experienced higher levels of stress, which may be ascribed to heftier workloads, more professional responsibilities, and the additional demands of dealing or supervising a team. With increasing age, physiological resilience to irregular sleep-wake cycles also tends to wane, making it more difficult to regulate circadian desynchrony related to shift work.

A significant association was also noticed between the duration of shift work and SWSD The findings indicate that nurses with one to five years of shift work experience were probably develop the disorder in contrast to those who had worked in shifts for less than one year the results are comparable with the study carried out on American nurses in a follow up study.[(18)] This may reflect the increasing burden of disrupted circadian rhythms, insufficient recovery time, and current occupational stress. Prolonged exposure to shift work has been linked to chronic sleep disturbances, hormonal imbalances, and increased risk of stress-related health issues, all of which could contribute to the higher prevalence of SWSD in this group.[(19)] Collectively these findings indicate that both age and duration of shift work play an important role in increasing the vulnerability of nurses to SWSD. The combination of physiological changes associated with aging and the collective effects of shift-related stress may place older and more experienced nurses at particularly high risk, highlighting the requirement for targeted interventions, such as planned rest periods, flexible arrangement of work, and health promotion programs, to mitigate these risks.[(20)]

The study revealed that gender was not significantly associated with shift work disorder, indicating that nurses were likely to experience the condition irrespective of the gender . The results are unlike with some other studies that reported higher levels of mental distress among female nurses as compared to their male counterparts. [(4,21)] Moreover, no significant association was found between the frequency of shift work and shift work disorder in our study. These results contradict the findings of a study conducted on Norwegian nurses [(22,23)], which reported a positive relationship between SWD and the number of shifts. This discrepancy may be ascribed to differences in healthcare systems, working environment and scheduling practices between the two countries. Furthermore, disparities in sample characteristics, such as age distribution, resilience, and coping mechanisms of nurses, may also explain why the association was not found in the study.

This study has certain limitations that need to be acknowledged. As the study is cross-sectional so cause-and-effect relationships cannot be established. It means the disorder can be reported in any age group. Since purposive sampling was employed, the findings may not be generalizable to the wider nursing population. Additionally, the data relies partly on self-reports so the risk of recall bias remains. The study provides useful insights; the noted limitations should be taken into account when drawing conclusions from the findings.

Conclusion:

Our study indicates a high prevalence of Shift work disorder among nurses emphasizing the fact that nurses employed in shifts are more prone to sleep disorders. These findings call for managing shift work in the hospital.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Barger LK, Ogeil RP, Drake CL et al. Validation of a questionnaire to screen for shift work disorder. Sleep. 2012 Dec 1;35(12):1693-703. doi: 10.5665/sleep.2246. PMID: 23204612; PMCID: PMC3490362.
2. Saedpanah K, Ghasemi M, Akbari H, Adibzadeh A, Akbari H. Effects of workload and job stress on the shift work disorders among nurses: PLS SEM modeling. Eur J Transl Myol. 2022 Nov 21;33(1):10909. doi: 10.4081/ejtm.2022.10909. PMID: 36412125; PMCID: PMC10141747.
3. Nena E, Katsaouni M, Steiropoulos P et al. Effect of Shift Work on Sleep, Health, and Quality of Life of Health-care Workers. Indian J Occup Environ Med. 2018 Jan-Apr;22(1):29-34. doi:10.4103/ijoem.IJOEM_4_18. PMID: 29743782; PMCID: PMC5932908.
4. Jaradat YM, Nielsen MB, Kristensen P, Bast-Pettersen R. Shift work, mental distress and job satisfaction among Palestinian nurses. Occup Med (Lond). 2017 Jan;67(1):71-74. doi: 10.1093/occmed/kqw128. PMID: 27694376; PMCID: PMC5225884.
5. Sooriyaarachchi P, Jayawardena R, Pavey T, King NA. Shift work and the risk for metabolic syndrome among healthcare workers: A systematic review and meta-analysis. Obes Rev. 2022 Oct;23(10):e13489. doi: 10.1111/obr.13489. PMID: 35734805; PMCID: PMC9539605.
6. Jung HS, Baek E. A structural equation model analysis of the effects of emotional labor and job stress on depression among nurses with long working hours: Focusing on the mediating effects of resilience and social support. Work. 2020;66(3):561-568. doi: 10.3233/WOR-203198. PMID: 32623417; PMCID: PMC7504998.
7. Haile KK, Asnakew S, Waja T, Kerbih HB. Shift work sleep disorders and associated factors among nurses at federal government hospitals in Ethiopia: a cross-sectional study. BMJ Open. 2019 Aug 27;9(8):e029802. doi: 10.1136/bmjopen-2019-029802. PMID: 31462478; PMCID: PMC6720246.
8. Ejebu O-Z, Dall'Ora C, Griffiths P. Nurses' experiences and preferences around shift patterns: A scoping review. PLoS ONE 2021;16(8): e0256300. https://doi.org/10.1371/journal.pone.0256300. PMID: 34398904; PMCID: PMC8367008.
9. Cheng H, Liu G, Yang J, Wang Q, Yang H. Shift work disorder, mental health and burnout among nurses: A cross-sectional study. Nurs Open. 2023 Apr;10(4):2611-2620. doi: 10.1002/nop2.1521. PMID: 36539975; PMCID: PMC10006599.
10. Adane A, Getnet M, Belete M, Yeshaw Y, Dagnew B. Shift-work sleep disorder among health care workers at public hospitals, the case of Sidama national regional state, Ethiopia: A multicenter cross-sectional study. PLoS One. 2022 Jul 8;17(7):e0270480. doi: 10.1371/journal.pone.0270480. PMID: 35802698; PMCID: PMC9269933.
11. Anbazhagan S, Ramesh N, Nisha C , Joseph B. Shift work disorder and related health problems among nurses working in a tertiary care hospital, Bangalore, South India. Indian J Occup Environ Med. 2016 Jan-Apr;20(1):35–38. doi: 10.4103/0019-5278.183842. PMID: 27390478; PMCID: PMC4922274.
12. Huang H, Liu L, Yang S et al. Effects of job conditions, occupational stress, and emotional intelligence on chronic fatigue among Chinese nurses: a cross-sectional study. Psychol Res Behav Manag. 2019 May 13;12:351-360. doi: 10.2147/PRBM.S207283. PMID: 31191056; PMCID: PMC6526330
13. Walker WH 2nd, Walton JC, DeVries AC, Nelson RJ. Circadian rhythm disruption and mental health. Transl Psychiatry. 2020 Jan 23;10(1):28. doi: 10.1038/s41398-020-0694-0.
14. PMID: 32066704; PMCID: PMC7026420.
15. Yarmohammadi H, Pourmohammadi A, Sohrabi Y et al. Work shift and its effect on nurses' health and welfare. The Social Science. 2016;11(9):2337-41.
16. Rajan D. Negative impacts of long working hours: A comparative study among nurses. MOJ App Bio Biomech. 2017;1(2):60-7. DOI: 10.15406/mojabb.2017.01.00010
17. Khan WAA, Jackson ML, Kennedy GA, Conduit R. A field investigation of the relationship between rotating shifts, sleep,

mental health and physical activity of Australian paramedics. Sci Rep. 2021 Jan 13;11(1):866. doi: 10.1038/s41598-020-79093-5. PMID: 33441601; PMCID: PMC7806923.

18. Sultan A. The Impact of Rotating Shifts on Nurse's Health Working in Public and Private Sector Hospitals of Peshawar. Pakistan Journal of Public Health. 2022 Jun 30;12(2):83-7. https://doi.org/10.32413/pjph.v12i2.926
19. Shi H, Huang T, Schernhammer ES, Sun Q, Wang M. Rotating Night Shift Work and Healthy Aging After 24 Years of Follow-up in the Nurses' Health Study. JAMA Netw Open. 2022 May 2;5(5):e2210450. doi: 10.1001/jamanetworkopen.2022.10450. Erratum in: JAMA Netw Open. 2022 Jun 1;5(6):e2218151. doi:10.1001/jamanetworkopen.2022.18151. PMID: 35507343; PMCID: PMC9069254.
20. Khan WAA, Jackson ML, Kennedy GA, Conduit R. A field investigation of the relationship between rotating shifts, sleep, mental health and physical activity of Australian paramedics. Sci Rep. 2021 Jan 13;11(1):866. doi: 10.1038/s41598-020-79093-5. PMID: 33441601; PMCID: PMC7806923.
21. Li Y, Lv X, Li R et al. Predictors of Shift Work Sleep Disorder Among Nurses During the COVID-19 Pandemic: A Multicenter Cross-Sectional Study. Front Public Health. 2021 Dec 2;9:785518. doi: 10.3389/fpubh.2021.785518. PMID: 34926396; PMCID: PMC8674423.
22. Arif I, Ali S, Khan A et al. Sleep disorders among rotating shift and day-working nurses in public and private sector hospitals of peshawar. Journal of the Dow University of Health Sciences (JDUHS). 2020 Dec 17;14(3):107-13. https://doi.org/10.36570/jduhs.2020.3.994
23. Flo E, Pallesen S, Magerøy N, Moen BE, Grønli J, Hilde Nordhus I, Bjorvatn B. Shift work disorder in nurses--assessment, prevalence and related health problems. PLoS One. 2012;7(4):e33981. doi: 10.1371/journal.pone.0033981. Epub 2012 Apr 2. PMID: 22485153; PMCID: PMC3317447.

Original Article

Depression, Stress and Anxiety Among Undergraduate Students; Association With Physical Activity, Sedentary Behavior & Academic Performance

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Abstract

Objective: This study aims to determine the prevalence of depression, anxiety, stress among undergraduate students and its association with physical activity and academic performance.

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

Place and duration of study: This was an analytical cross sectional study conducted on undergraduate students of Institute of Physical Medicine & Rehabilitation, Khyber Medical University, Peshawar

Material and Methods: Based on eligibility criteria 83 students were recruited in the study through convenience sampling technique. The sample included both male (n=33) and female students(n=50), with a mean age of 22.5 ±0.458 years. The assessment of stress, anxiety and depression, and physical activity was carried out using; The Depression, Anxiety, and Stress Scale (DASS-21) and the International Physical Activity Questionnaire respectively. Sedentary behaviour was assessed in terms of screen time.

Results: The data was analysed by SPSS version 22. Cross tabulation and Chi square test were applied to examine the association (p value < 0.05). The results of this study showed high prevalence of depression 65%, anxiety 71% and stress 57%. Stress was significantly associated with sedentary behaviour (p < 0.05). Academic performance was found to be greatly influenced by varying levels of stress and depression (p<0.05). However, no significant association was identified between physical activity and academic performance.

Conclusion: This study revealed that stress, anxiety, and depression are highly prevalent among undergraduate students. Higher levels of stress were associated with increased sedentary behaviour. Interestingly, academic performance was positively influenced by elevated levels of stress and depression.

Keywords: Anxiety, Academic Performance, Depression, Physical Activity, Stress

1. Introduction

Mental health is an essential and pivotal component of health. [1] It is defined by the World Health Organization as the state of positive psychological well-being in which an individual realizes his or her own abilities, alleviates normal life stresses, work productively, enthusiastically and is able to make positive contribution to the community. [2] According to survey conducted, almost 350 million people are affected by mental illness. [3] Psychological problems like anxiety, depression and stress is commonly found in students around the world. [4] Significant proportion of university undergraduate medical students is affected by anxiety, depression and stress. [5] Depression is chronic mental disorder usually characterized by feeling of loneliness, low self-esteem, feeling of sadness and self-reproach, withdraw from social contact. [6] Anxiety is characterized by feeling of distress also associated with somatic symptoms like sweating, tachycardia, dry mouth, diarrhoea. [7] Stress is considered as nonspecific response that result due to different kind of stressors person either response positively or negatively. [8] For challenging environment positive stress response is beneficial for students. [9] Among college and university students stressors maybe the contributing factors for development of many various mental problems like difficulty in

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concentration, depression, anxiety, psychiatric illness and eating disorder. [10, 11] Medical students may have more physical and emotional challenges and psychological hazards and also mood disorders as they think about professional goals and future. [12-14] Financial instability, poor social support, bad relationship, high family expectations are also factors toward depression, anxiety and stress. [15] Both developed and developing nations are affected by mental health problems. [16] high levels of psychological distress is observed among undergraduate students of the UK 17.3%, China 11%, Malaysia 41.9%, Canada 30% and Nepal 20.9%. [17-21] A study conducted in medical college Peshawar shows prevalence of depression 65%, prevalence of anxiety 70.3%, prevalence of stress 69.7%. [22] physical therapy students perceive more stress than other health care students. [23] Students of physical therapy follow same course content as medical students follow so they are also exposed to mental health. [24] stress associated with anxiety and depression has also negative effect on academic performance. [25] Stress and anxiety is inevitable even in developed countries where good mental health care and education is provided to the medical students. [26] it is completely normal to take stress in daily life situations as it improves performance in academic work load but if the stress exceeds the threshold limit then it may be detrimental for social life, academic performance and efficiency of the medical students. [27] Also the excessive amount of stress in medical students may have negative consequences and lead to problems like lack in concentration, diminished attention, negligence and increased chances of error. [28] Medical professionals recommend that almost 150 min of exercise in a week can significantly reward with good health both mental and physical. [29] Physical activity develops body by the contraction and stretching of muscles which in fact lead to the positive connection with personal wellness. [30]

University life presents numerous academic, social, and personal challenges that can significantly impact students' mental health and overall well-being. [31] Stress, anxiety, and depression are increasingly common among undergraduate students and may influence their lifestyle habits, such as physical activity and sedentary behaviour. [32] These factors can, in turn, affect academic performance. Understanding the relationships among these variables is essential for developing effective interventions and support programs that promote both mental health and academic success. Therefore, this study was conducted to explore how stress, anxiety, depression, physical activity, and sedentary behaviour are associated with academic performance among undergraduate students.

2. Materials & Methods

This was an analytical cross sectional study conducted on undergraduate students of Institute of Physical Medicine & Rehabilitation, Khyber Medical University, Peshawar. The study protocol was reviewed and approved by the Ethics Review Committee Allied Health Sciences (No: KMU/Dean/AHS-25/807). The sample size was calculated using Raosoft online sample size calculator with 95% confidence level, 5% margin error. Total 83 students were recruited in the study through convenience sampling technique. Participants comprised male and female students from all levels of the undergraduate program to ensure representation across different academic years. Students with previous history of (1) Schizophrenia, (2) Bipolar disorder, (3) clinically diagnosed major depression, (4) Post-Traumatic Stress Disorder, (4) Obsessive Compulsive Disorder and (5) Substance abuse were excluded from the study. Socio-demographic data (such as age, enrollment year, gender, religion, province, socioeconomic status, parent's marital status, current relationship status, current financial situation) and academic information (such as GPA and examination scores) were obtained from all participating students. Informed consent was obtained from all subjects involved in the study.

The level of psychological distress was determined using the Depression, Anxiety, and Stress Scale DASS-21, a validated tool that is extensively used to measure the state of depression, anxiety and stress. Physical activity among sample students was determined using the International Physical Activity Questionnaire IPAQ. Screen time is a common indicator to quantify the duration of sedentary behavior. [33] Sedentary behavior was estimated through self-reported screen time, defined as the total number of hours per day spent on electronic devices such as smartphones, laptops, and televisions.

Data was analyzed using Statistical Package for the Social Sciences SPSS version 22. Descriptive statistical methods were employed for determining sample characterizes. Prevalence of level of psychological distress and physical activity was obtained using frequency tables. Cross-tabulation and Chi-square tests were applied to determine the association between psychological distress, academic performance, and physical activity; p value < 0.05 was considered as statistically significant.

3. Results

The mean age of study sample was 22.5 years with standard deviation of 0.45 having 33 males and 50 females. Socioeconomic status was categorized as low, middle, and high based on participants' self-reported family income and parental occupation.

Table 1: Socio-Demographic Characteristics of the Study Sample

Age	22.5 ±0.458 years
Gender	Male (n=**33**) (39.75%) Female (n=**50**) (60.24%)
Marital status	Single (**n= 81**) (97.59%) Married (n= **2**) (2.40%)
Socioeconomic status	Middle (n=**83**) (100%)
Religion	Islam (n=**83**) (100%)

The trend across academic years revealed that the majority of the students were from the 4th (n=31) and the 5th year (n=21) of study. Figure 1

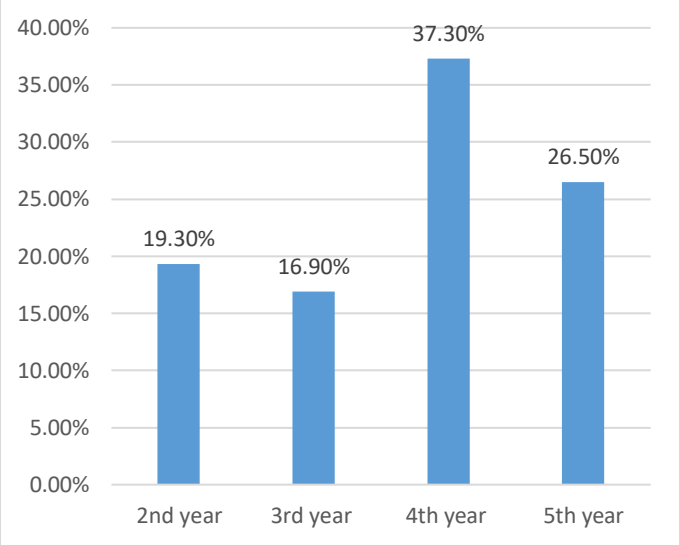
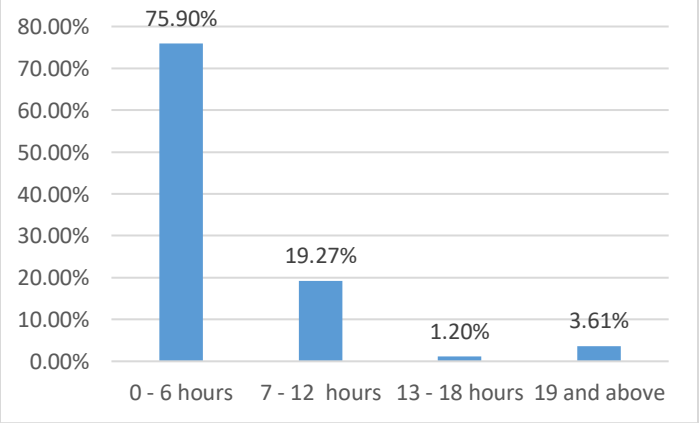


Figure 1: Distribution of students across academic years



Sedentary Behaviour (Screen time) was assessed as the total number of hours spent per day on electronic devices such as mobile phones, laptops, or televisions. See figure 2.

Figure 2: sedentary behaviour as the total number of hours spent per day on electronic devices

The academic performance was assessed using the of mean of Grade Point Average (GPA) of all the previous semesters obtained by each student as the GPA serves as a standardized indicator of academic achievement. Based on literature, academic performance was classified as at risk (GPA= < 2.5), good (2.5 to 2.9), very good (3.0 to 3.4) or excellent (≥ 3.5). [1] see figure 3

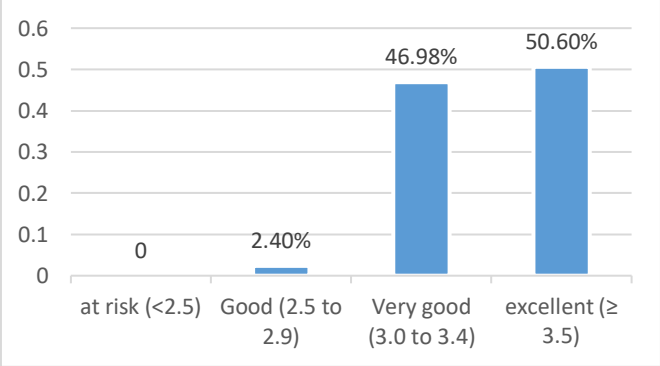


Figure 3: Academic Performance based on GPA obtained

Based on frequency chart, it was determined that the overall prevalence of depression was 65%. While 71% students reported anxiety and 57% reported stress. For each student, scores were recorded for the intensity of their routine physical activities, categorized as mild, moderate, and vigorous. The trend of physical activity showed that majority of the students were engaged in performing moderate and low level activities while only few were vigorously active. See Figure 4

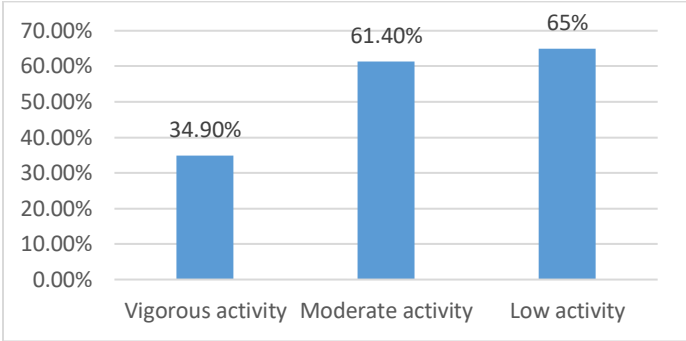


Figure 4: levels of physical activity

Based on cross-tabulation and chi square test, it was observed that academic performance is strongly associated with stress and depression. Table 2

Table 2: Association between Psychological Distress and Academic Performance

Based on cross-tabulation and chi square test, it was observed that stress is strongly associated with all the determinants of the study, that is, strong correlation with sedentary behaviour, academic performance and physical activity were observed. Table 3

Variable		Academic performance			P value	df
		Good (GPA 2.5-2.9)	Very Good (GPA 3-3.490	Excellent (GPA ≥3.5)		
Depression	Normal	0	18	11	P=0.013	8
	Mild	0	5	3		
	Moderate	2	9	6		
	Severe	0	4	8		
	Extremely Severe	0	3	14		
Anxiety	Normal	0	10	6	P=0.073	8
	Mild	0	4	3		
	Moderate	0	8	3		
	Severe	1	6	3		
	Extremely Severe	1	11	27		
Stress	Normal	0	21	11	P=0.012	8
	Mild	1	6	2		
	Moderate	0	7	11		
	Severe	0	2	10		
	Extremely Severe	1	3	8		

Table 3: Association of psychological distress with study determinants

	Physical activity	**Sedentary Behavior (screen time)**	**Academic performance**
Depression	***0.06***	0.22	***0.01***
Anxiety	0.28	0.59	0.07
Stress	***0.03***	***0.01***	***0.01***

Further it was established in this study that physical activity does not directly impact academic performance among students according to cross-tabulation and chi square test.

4. Discussion

The aim of this study was to determine the prevalence of stress, anxiety, depression and its association physical activity, sedentary behaviour and academic performance among undergraduate students of physical therapy in Khyber Medical University.

The study revealed a high prevalence of stress, anxiety, and depression among undergraduate students. Higher stress levels were significantly associated with increased sedentary behaviour, indicating that students experiencing greater psychological strain tend to engage in fewer physical activities. Interestingly, academic performance was positively associated with elevated levels of stress and depression, suggesting that a moderate degree of psychological pressure may enhance motivation and academic outcomes. However, no significant relationship was identified between physical activity and academic performance. These findings highlight the complex interplay between mental health, lifestyle behaviors, and academic achievement among university students.

In this study we observed a high prevalence of psychological distress such as depression 65%, anxiety 71% and stress 57%. The findings of this study can be compared with a cross sectional study conducted in undergraduate medical students of Nepal by Sreeramredy et al et al. In his study, the prevalence of psychological distress was assessed with DASS-42. His study showed a comparatively low prevalence of anxiety 41.1%, stress 27% and depression 29.9% than reported in our study. [21] The reason behind this may be annual system and difference in examination schedules. R.Beiter at al study conducted on undergraduate students showed prevalence of stress, anxiety and depression 38%, 40% and 33% respectively which was less than our study. (35) This might be due to

environmental difference between the population. Another cross sectional study organized in Sindh on undergraduate physical therapy students showed 54.2% prevalence of stress and the prevalence of depression was 48%, again the results were different from our findings. (36) It might be due to the different assessment tools (DASS-42) used for depression and stress. A Cross sectional study conducted in Karachi on undergraduate medical students showed the prevalence of anxiety 70% by using AKUADS (Agha khan university anxiety depression scale) which is quite similar to our study. (37) The prevalence of depression 60% and prevalence of anxiety recorded 66% in India which is close enough to the results of our study. [38] According to cross sectional study conducted among undergraduate medical students showed the prevalence of depression, anxiety and stress was 65%, 70% and 69% respectively. (22) Their findings favoured our analysis. Our study suggested that academic performance can be affected by stress and the same findings were founded in study conducted from Malaysia which identified stressor level related to academics by means of General health questionnaire and medical student stress questionnaire. (39)

On the basis of our analysis a strong relationship existed between physical activity and psychological distress, which was favoured by many of the studies. A cross sectional study conducted in 10 European countries revealed that psychological distress had association with physical activity by Zung self-rating anxiety scale (SAS) and modified form of PACE (physical activity calorie expenditure) which was same as our results. (40) Most of the students in our study were physically inactive and they had adapted sedentary life style. In our study there was no association of depression, anxiety and stress with age, religion, socioeconomic status, financial status and parental status.

Validated self-reported questionnaires, for physical activity and level of stress, anxiety and depression, were used in this study that enabled efficient data collection; however, recall bias may still exist, and recruiting from a single institution with convenience sampling technique may limit broader generalizability.

Conclusion:

This study revealed that stress, anxiety, and depression are highly prevalent among undergraduate students. Higher levels of stress were associated with increased sedentary behaviour. Interestingly, academic performance was positively influenced by elevated levels of stress and depression, suggesting that a certain degree of psychological pressure may enhance students' motivation and performance. However, no significant relationship was found between physical activity and academic performance.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Singh V, Kumar A, Gupta S. Mental health prevention and promotion—A narrative review. Frontiers in psychiatry. 2022;13:898009.
2. Organization WH. World mental health report: Transforming mental health for all: World Health Organization; 2022.
3. Choudhary S, Sharma AK, Jabeen N, Magotra R. Study of Incidence of Depression, Anxiety and Stress Among the First Year Medical Students in Government Medical College. JK Science. 2019;21(2):76-80.
4. Shah SMA, Mohammad D, Qureshi MFH, Abbas MZ, Aleem S. Prevalence, psychological responses and associated correlates of depression, anxiety and stress in a global population, during the coronavirus disease (COVID-19)

pandemic. Community mental health journal. 2021;57(1):101-10.

5. Mackenzie S, Wiegel JR, Mundt M, Brown D, Saewyc E, Heiligenstein E, Harahan B, Fleming M. Depression and suicide ideation among students accessing campus health care. American journal of orthopsychiatry. 2011;81(1):101.
6. Onukwuba M, Ekpe I, Amaechi D. Depression in various stages of Human Development and its relationship with Health, Diet and Genes. International Journal of Early Childhood Special Education. 2022;14(6).
7. Guthrie S, Podvigin S, Dzhumaeva L, AA M, Musheer M. ANXIETY AND ANXIETY DISORDERS: AN OVERVIEW. Turkish Journal of Physiotherapy and Rehabilitation.32:3.
8. Manosso LM, Gasparini CR, Réus GZ, Pavlovic ZM. Definitions and concepts of stress. Glutamate and neuropsychiatric disorders: Current and emerging treatments: Springer; 2022. p. 27-63.
9. Hoferichter F, Kulakow S, Raufelder D. How teacher and classmate support relate to students' stress and academic achievement. Frontiers in psychology. 2022;13:992497.
10. Duane EA, Stewart CS, Bridgeland WM. College student suicidality and family issues. College Student Journal. 2003;37(1):135-45.
11. Izgiç F, Akyüz G, Doğan O, Kuğu N. Social phobia among university students and its relation to self-esteem and body image. The Canadian journal of psychiatry. 2004;49(9):630-4.
12. Lima M, Domingues MS, Cerqueira A. Prevalence and risk factors of common mental disorders among medical students. Revista de saude publica. 2006;40(6):1035.
13. Chan G, Koh D. Understanding the psychosocial and physical work environment in a Singapore medical school. Singapore medical journal. 2007;48(2):166.
14. Wilkinson TJ, Gill DJ, Fitzjohn J, Palmer CL, Mulder RT. The impact on students of adverse experiences during medical school. Medical teacher. 2006;28(2):129-35.
15. Guan N, Guariglia A, Moore P, Xu F, Al-Janabi H. Financial stress and depression in adults: A systematic review. PloS one. 2022;17(2):e0264041.
16. Nochaiwong S, Ruengorn C, Thavorn K, Hutton B, Awiphan R, Phosuya C, Ruanta Y, Wongpakaran N, Wongpakaran T. Global prevalence of mental health issues among the general population during the coronavirus disease-2019 pandemic: a systematic review and meta-analysis. Scientific reports. 2021;11(1):10173.
17. Macaskill A. The mental health of university students in the United Kingdom. British Journal of Guidance & Counselling. 2013;41(4):426-41.
18. Adlaf EM, Gliksman L, Demers A, Newton-Taylor B. The prevalence of elevated psychological distress among Canadian undergraduates: Findings from the 1998 Canadian Campus Survey. Journal of American College Health. 2001;50(2):67-72.
19. Chen L, Wang L, Qiu XH, Yang XX, Qiao ZX, Yang YJ, Liang Y. Depression among Chinese university students: prevalence and socio-demographic correlates. PloS one. 2013;8(3):e58379.
20. Mohd Sidik S, Rampal L, Kaneson N. Prevalence of emotional disorders among medical students in a Malaysian university. Asia Pacific Family Medicine. 2003;2(4):213-7.
21. Sreeramareddy CT, Shankar PR, Binu V, Mukhopadhyay C, Ray B, Menezes RG. Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal. BMC Medical education. 2007;7(1):26.
22. Ali Z, Khalid Z, Hamza M, Darain H, Zeb A, Abidin SZU. PREVALENCE AND CORRELATES OF STRESS, ANXIETY AND DEPRESSION AMONG UNDERGRADUATE STUDENTS OF KHYBER MEDICAL UNIVERSITY, PESHAWAR; A CROSSSECTIONAL STUDY. Annals of Allied Health Sciences. 2019;5(1):23-7.
23. Afridi A, Fahim MF. Identification of stressors and Perceptional difference of stress in first and final year Doctor of Physical Therapy students; a comparative study. JPMA. 2019.
24. Shah I, Habib SH, Yousafzai YM, Ali A, Ikram S, Zia H, Said R. PERCEIVED STRESS IN UNDERGRADUATE PHYSICAL THERAPY STUDENTS OF PESHAWAR, PAKISTAN. Pakistan Journal of Physiology. 2018;14(3):60-3.

25. Regehr C, Glancy D, Pitts A. Interventions to reduce stress in university students: A review and meta-analysis. Journal of affective disorders. 2013;148(1):1-11.
26. Youssef FF. Medical student stress, burnout and depression in Trinidad and Tobago. Academic Psychiatry. 2016;40(1):69-75.
27. Rahman NIA, Ismail S, Ali RM, Alattraqchi AG, Dali W, Umar BU, Nadiger HA, Haque M. Stress among first batch of MBBS students of Faculty of Medicine and Health Sciences, Universiti Sultan Zainal Abidin, Malaysia: when final professional examination is knocking the door. Int Med J. 2015;22(4):1-6.
28. Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand S-L, Walters EE, Zaslavsky AM. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychological medicine. 2002;32(6):959-76.
29. Wen CP, Wai JPM, Tsai MK, Yang YC, Cheng TYD, Lee M-C, Chan HT, Tsao CK, Tsai SP, Wu X. Minimum amount of physical activity for reduced mortality and extended life expectancy: a prospective cohort study. The lancet. 2011;378(9798):1244-53.
30. 30. Biddle SJ, Mutrie N. Psychology of physical activity: Determinants, well-being and interventions: Routledge; 2007.
31. Porru F, Schuring M, Bültmann U, Portoghese I, Burdorf A, Robroek SJ. Associations of university student life challenges with mental health and self-rated health: A longitudinal study with 6 months follow-up. Journal of Affective Disorders. 2022;296:250-7.
32. Guerriero MA, Dipace A, Monda A, De Maria A, Polito R, Messina G, Monda M, di Padova M, Basta A, Ruberto M. Relationship between sedentary lifestyle, physical activity and stress in university students and their life habits: A scoping review with PRISMA checklist (PRISMA-ScR). Brain Sciences. 2025;15(1):78.
33. Thivel D, Tremblay A, Genin PM, Panahi S, Rivière D, Duclos M. Physical activity, inactivity, and sedentary behaviors: definitions and implications in occupational health. Frontiers in public health. 2018;6:288.
34. Rifat MRI, Al Imran A, Badrudduza A. Educational performance analytics of undergraduate business students. International Journal of Modern Education and Computer Science. 2019;10(7):44.
35. Beiter R, Nash R, McCrady M, Rhoades D, Linscomb M, Clarahan M, Sammut S. The prevalence and correlates of depression, anxiety, and stress in a sample of college students. Journal of affective disorders. 2015;173:90-6.
36. Syed A, Ali SS, Khan M. Frequency of depression, anxiety and stress among the undergraduate physiotherapy students. Pakistan journal of medical sciences. 2018;34(2):468.
37. Khan MS, Mahmood S, Badshah A, Ali SU, Jamal Y. Prevalence of depression, anxiety and their associated factors among medical students in Karachi, Pakistan. Journal-Pakistan Medical Association. 2006;56(12):583.
38. Singh M, Goel NK, Sharma MK, Bakshi RK. Prevalence of depression, anxiety and stress among students of Punjab University, Chandigarh. Age (in years). 2017;86(211):52.8.
39. Masilamani R, Aung MMT, Bhagat V, Bakar AA, Soon TH, Yao LC, Hui NJ, Ning LZ. Prevalence of Stress and Associated Stressors among Medical Students: A Comparative Study between a Private and Public Medical School in Malaysia. Research Journal of Pharmacy and Technology. 2018;11(6):2531-7.
40. McMahon EM, Corcoran P, O'Regan G, Keeley H, Cannon M, Carli V, Wasserman C, Hadlaczky G, Sarchiapone M, Apter A. Physical activity in European adolescents and associations with anxiety, depression and well-being. European child & adolescent psychiatry. 2017;26(1):111-22.

Original Article

Role Overload and Job Performance among Nurses: Moderating Role of Mindfulness

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Abstract

Objective: This study aimed This study aimed to examine the impact of role overload on nurses' job performance and to investigate the moderating role of mindfulness in mitigating its negative effects

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

Place and duration of study: Data were collected through convenience sampling from 310 nurses working in various hospitals.

Material and Methods: A quantitative, cross-sectional research design was employed. Data were collected through convenience sampling from 310 nurses working in various hospitals. Standardized instruments were used, including Reilly's Role Overload Scale ($\alpha = .87$), the Mindful Attention Awareness Scale (MAAS) ($\alpha = .79$), and the Individual Work Performance Questionnaire (IWPQ, version 1.0) ($\alpha = .80$). All measures demonstrated satisfactory reliability.

Results: Findings revealed a significant negative relationship between role overload and job performance. Regression analysis indicated that mindfulness was positively associated with improved performance. Furthermore, mindfulness significantly moderated the relationship between role overload and both task and contextual performance. However, its moderating effect on counterproductive work behavior was not significant.

Conclusion: The results suggest that mindfulness acts as a valuable psychological resource that buffers the adverse effects of role overload on performance. The study highlights the importance of integrating mindfulness-based interventions in high-stress work environments to enhance employee well-being, resilience, and overall job performance.

Keywords: Mindfulness, Job Performance, Role Overload, Healthcare Sector, Nurses

1. Introduction

Emotions profoundly shape our experiences of the world. Positive emotions can help us create good experiences, resulting in better outcomes for individuals . [1] Conversely, negative emotions can sour even a relatively good day, transforming a manageable experience into a challenging one. Individuals suffering from psychological disorders often report that negative emotions can distort everyday experiences and make even the act of getting out of bed a chore. [2] Therefore, it is crucial to find ways to improve the emotional experiences of individuals to enhance their quality of life and overall well-being.

Nurses are among the highest-risk professions for developing psychological issues. Research indicates that nurses are at higher risk for suicide and suffer from severe anxiety and depression as a result of their jobs . [3] Healthcare workers, including nurses, are at the forefront of providing essential care and managing community welfare. Thus, it is imperative to prioritize their psychological well-being to ensure the overall health of society . [4] Mindfulness has been proposed as a therapeutic intervention technique that strengthens the psychological health of practitioners. It improves focus on the present, removes the agency of unwanted distractions, and increases appreciation of previously unnoticed positive aspects of life . [5] Mindfulness is associated with decreased anxiety, reduced depression, and improved well-being. [6]

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Clinical trials and extensive experiments consistently show the benefits of mindfulness on the well-being of nurses . [7] As stressors are an unavoidable part of the nursing profession, it is prudent to accept them as such. Rather than solely focusing on strategies to reduce stressors, teaching techniques that help manage the effects of these stressors on nurses' well-being should take priority. Role overload, sometimes confused with work overload, has been a subject of great interest in high-performance, long-hour professions. Unlike work overload, which pertains solely to job responsibilities, role overload encompasses all the roles and responsibilities an individual performs, including those at home and among friends and relatives . [8] When individuals feel pressured by these roles encroaching on their limited time resources to the extent that they cannot fulfill their responsibilities adequately, they consider themselves victims of role overload. Researchers often define role overload as the experience of having too much to do in too little time. [9]

It is generally considered that stressors are a prerequisite to stress; however, multiple studies across various countries and cultures show that stressors are not necessarily synonymous with stress itself . [10] While stressors have the potential to cause stress, individual responses to these external stressors vary widely based on personal characteristics . [11] Research, however, does indicate that stressors often lead to stress among nurses which in turn is negatively related to wellbeing and performance . [12,13] Although conflicting findings on stressors like Mittal & Bhakar (2018) study on the positive effects of role overload on performance among bank employees, makes it less clear and more nuanced.

This highlights the importance of self-management strategies that improve individual responses to stressors. For instance, mindfulness helps mitigate the negative effects of stressors and may even highlight the positive aspects of stressors on performance . [14] Some studies suggest that under moderate levels of role overload, individuals tend to perform better as compared to those who are experiencing low role overload . [15]

2. Materials & Methods

Conceptual Framework

Figure: Conceptual Model depicting Role Overload, Mindfulness, and Job Performance

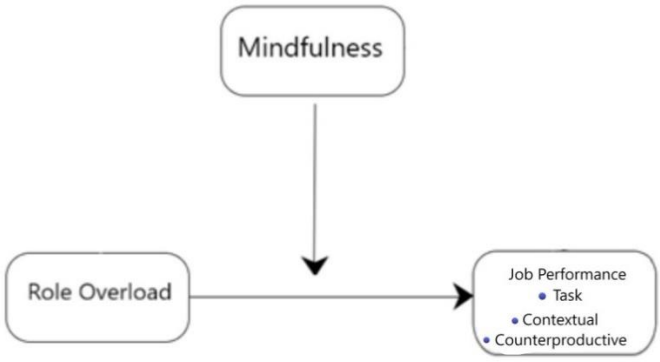

Figure: Conceptual Model depicting Role Overload, Mindfulness, and Job Performance

Hypothesis

1. Mindfulness moderates the relationship between Role overload and Job Performance (Task Performance, Contextual Performance, Counterproductive Work Behavior) among nurses.

Instruments

Role overload:

Role overload was evaluated using the revised version of Reilly's Role Overload Scale. This scale comprises 6 items, each rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Previous research has shown this scale to have high internal consistency, with Cronbach's alpha coefficients ranging from 0.87 to 0.92 . [16]

Job Performance

Job performance was measured using version 1.0 of the Individual Work Performance Questionnaire (IWPQ). The IWPQ includes three sub-scales: task performance, contextual performance, and

counterproductive work behavior, encompassing a total of 18 items. The IWPQ has been validated in various studies and is considered reliable (Jakada et al., 2020; Van der Vaart, 2021). [17]

Mindfulness

Dispositional mindfulness was measured using the Mindful Attention Awareness Scale (MAAS) by Brown and Ryan (2003). This scale consists of 15 items rated on a 6-point Likert scale (1 = Almost Always to 6 = Almost Never). The MAAS has been shown to be stable, reliable, and valid, with Cronbach's alpha coefficients ranging between 0.76 and 0.93 (Osman et al., 2016; MacKillop & Anderson, 2007; Black et al., 2012).

Sampling

Convenience sampling was employed to collect data from nurses working in both public and private hospitals.

Procedure

Data collection involved contacting the heads of nursing departments in hospitals to seek permission to approach nurses for participation. After obtaining approval, nurses with job experience were invited to participate and provided with consent forms detailing their rights and a brief overview of the study. Participants completed the questionnaires independently, either in person or through an online Google form, ensuring anonymity and the option to withdraw from the study at any time. Ethical guidelines were strictly followed throughout the data collection process.

3. Result

Table 1 Mindfulness moderates Between Role Overload and Task Performance (N = 310)

Variables	β	SE	*p*	95% CI	
Role Overload	-.18	.04	.00	[-.25	-.10]
Mindfulness	.14	.02	.00	[.11	.18]
RO x M	.01	.00	.00	[.00	.02]

Model for the a-path $R^2 = .19$, $F (3, 306) = 23.33$, $p < .001$, RO = Role Overload, M = Mindfulness

The analysis showed a significant interaction between role overload and mindfulness on task performance ($p < .001$), indicating a moderating effect. Role overload negatively affected task performance at low and moderate levels of mindfulness, but this effect became non-significant at high mindfulness, suggesting a buffering role. Additionally, role overload had a significant negative direct effect, while mindfulness had a significant positive effect on task performance. Bootstrap confidence intervals confirmed the significance of these relationships.

Table 2

Mindfulness moderates Between Role Overload and Contextual Performance (N = 310)

Variables	β	SE	*p*	95% CI	
Role Overload	-.22	.07	.00	[-.36	-.07]
Mindfulness	.14	.03	.00	[.06	.21]
RO x M	.01	.01	.03	[.00	.03]

Variables	β	SE	*p*	95% CI	
Role Overload	.19	.04	.00	[.11	.28]
Mindfulness	-.08	.02	.00	[-.12	-.04]
RO x M	.00	.00	.39	[.00	.01]

Model for the a-path $R^2 = .08$, $F(3, 306) = 9.09$, $p < .001$

The results showed a significant interaction between role overload and mindfulness on contextual performance ($p < .05$), indicating a moderating effect. Role overload negatively affected contextual performance at low and moderate levels of mindfulness, but this effect became non-significant at high levels of mindfulness, suggesting a buffering role. Additionally, role overload had a significant negative direct effect, while mindfulness had a significant positive effect on contextual performance. Bootstrap confidence intervals confirmed the significance of these relationships.

Table 3

Mindfulness moderates Between Role Overload and Counterproductive Work Behavior (N = 310)

Model for the a-path $R^2 = .10$, $F(3, 306) = 11.72$, $p < .001$

The results showed no significant moderating effect of mindfulness on the relationship between role overload and counterproductive work behavior ($p > .05$). However, role overload had a significant positive effect on counterproductive behavior, while mindfulness had a significant negative effect. This indicates that higher role overload increases counterproductive behaviors, whereas mindfulness helps reduce them. Bootstrap confidence intervals confirmed the significance of the direct relationships.

4. Discussion

The results of this study highlight the significant interaction between Role Overload and Mindfulness on Job Performance. These findings help us understand how psychological resilience factors, such as Mindfulness, can buffer the detrimental effects of stressors such as Role overload among nurses.

Table 1 shows that all the scales used in the study had acceptable reliability as shown in their alpha values. The three scales, Reilly's Role Overload Scale (Thiagarajan et al., 2006; Reilly, 1982) with Cronbach's alpha of .87, the Mindful Attention Awareness Scale (MAAS) [18] with Cronbach's alpha of .79, and the Individual Work Performance Questionnaire version 1.0 (IWPQ) (Koopmans, 2015) with a Cronbach's alpha of .80, .85 and .65 for the sub-scales of Task performance, Contextual performance and Counterproductive Work Behaviour.

The regression results demonstrate that Role Overload has a negative impact on Job Performance. This is consistent with existing literature, which has consistently shown that excessive demands and responsibilities can lead to decreased performance and higher levels of job-related stress . [19,20] The negative consequences of Role Overload can be attributed to the depletion of cognitive and emotional resources, leaving individuals less capable of effectively managing their work tasks . [21] Moreover, the strain resulting from Role Overload can lead to burnout, further exacerbating its adverse effects on performance . [22]

Results show that Mindfulness has a significant positive effect on Job Performance, which aligns with previous research suggesting that Mindfulness can enhance job performance by improving focus, reducing stress, and promoting emotional regulation. [23,24] Mindfulness practices help individuals remain present and attentive, reducing the impact of external stressors on their cognitive functions . [25] This is particularly relevant in high-stress professions, such as nursing, where the ability to manage stress effectively can significantly influence job performance and overall well-being (Li, 2021).

As shown in Tables 2 and 3, the significant interaction between Role Overload and Mindfulness indicates a buffering effect of Mindfulness on the negative impacts of Role Overload on Task and Contextual Performance. At lower and medium levels of Mindfulness, the effect of Role Overload is significantly diminished in Task and Contextual Performance; however, at higher levels of Mindfulness, the moderating effect is not significant. This finding suggests that Mindfulness can serve as a crucial coping mechanism, enabling individuals to manage the stress and demands associated with Role Overload more effectively . [26] By fostering a mindful approach to daily tasks, individuals can create a psychological buffer and improve their focus, thereby diminishing the impact of excessive role demands on their job performance . [24]

The findings indicate that mindfulness did not significantly moderate the relationship between role overload and counterproductive work behavior (CWB), suggesting that higher levels of mindfulness do not buffer the negative impact of role overload on such behaviors. However, both role overload and mindfulness independently showed significant effects on CWB. One possible explanation is that CWB may be resistant to the protective effects of mindfulness. Prior research highlights that factors such as supervisor incivility, internal locus of control, and job resources (e.g., social job crafting) may play a more influential role in mitigating CWB than mindfulness alone. Additionally, CWB is often shaped by complex situational, personal, and sociocultural factors, making it difficult to address through a single psychological resource. These findings suggest that understanding and reducing CWB requires a broader, multi-factorial approach rather than relying solely on mindfulness.

Conclusion:

In conclusion, this study contributes to the growing body of literature on the impact of Role Overload and the protective role of Mindfulness on Job Performance. These findings exemplify the importance of Mindfulness as a moderating factor that can buffer the negative effects of Role Overload on both Task and Contextual performance, implying that mindfulness not only is related to improved task performance but also to prosocial behaviours, as in contextual performance. Future research should explore the long-term benefits of Mindfulness interventions and their applicability across various professional settings. By integrating Mindfulness practices into

workplace wellness programs, organizations can create a more supportive environment that promotes both employee well-being and organizational success.

Limitations

The study is limited by its cross-sectional design, which restricts causal interpretations. Reliance on self-reported data may introduce bias and affect the accuracy of findings. The use of a convenience sample limits generalizability across different contexts. Additionally, focusing only on mindfulness and not considering longitudinal effects or other variables limits the depth of understanding .

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Diener, E., Thapa, S., & Tay, L. (2020). Positive emotions at work. Annual review of organizational psychology and organizational behavior, 7(1), 451-477.)
2. Keltner, D., & Kring, A. M. (1998). Emotion, social function, and psychopathology. Review of General Psychology, 2(3), 320-342.).
3. Sullivan, S., & Germain, M. L. (2020). Psychosocial risks of healthcare professionals and occupational suicide. Industrial and Commercial Training, 52(1), 1-14.).
4. Davidson, J. E., Ye, G., Parra, M. C., Choflet, A., Lee, K., Barnes, A., ... & Zisook, S. (2021). Job-related problems prior to nurse suicide, 2003-2017: A mixed methods analysis using natural language processing and thematic analysis. Journal of Nursing Regulation, 12(1), 28-39.).
5. Kriakous, S. A., Elliott, K. A., Lamers, C., & Owen, R. (2021). The effectiveness of mindfulness-based stress reduction on the psychological functioning of healthcare professionals: A systematic review. Mindfulness, 12, 1-28.).
6. Norouzi, E., Gerber, M., Masrour, F. F., Vaezmosavi, M., Pühse, U., & Brand, S. (2020). Implementation of a mindfulness-based stress reduction (MBSR) program to reduce stress, anxiety, and depression and to improve psychological well-being among retired Iranian football players. Psychology of Sport and Exercise, 47, 101636.).
7. Sulosaari, V., Unal, E., & Cinar, F. I. (2022). The effectiveness of mindfulness-based interventions on the psychological well-being of nurses: A systematic review. Applied Nursing Research, 64, 151565
8. Wortman, C., Biernat, M., & Lang, E. (1991). Coping with role overload. Women, work, and health: Stress and opportunities, 85-110
9. Duxbury, L., Lyons, S., & Higgins, C. (2008). Too much to do, and not enough time: An examination of role overload. In Handbook of work-family integration (pp. 125-140). Academic Press.).
10. Lazarus, R. S., & Folkman, S. (1984). Stress, appraisal, and coping. Springer publishing company.
11. Luo, J., Zhang, B., Cao, M., & Roberts, B. W. (2023). The stressful personality: A meta-analytical review of the relation between personality and stress. Personality and social psychology review, 27(2), 128-194.).
12. Muhamad Robat, R., Mohd Fauzi, M. F., Mat Saruan, N. A., Mohd Yusoff, H., & Harith, A. A. (2021). Why so stressed? A comparative study on stressors and stress between hospital and non-hospital nurses. BMC nursing, 20, 1-10.)
13. Foster, K., Roche, M., Giandinoto, J. A., & Furness, T. (2020). Workplace stressors, psychological well-being, resilience, and caring behaviours of mental health nurses: A descriptive correlational study. International journal of mental health nursing, 29(1), 56-68
14. Jones, B. J., Kaur, S., Miller, M., & Spencer, R. M. (2020). Mindfulness-based stress reduction benefits psychological well-being, sleep quality, and athletic performance in female collegiate rowers. Frontiers in psychology, 11, 572980.)
15. Mittal, M., & Bhakar, S. S. (2018). Examining the impact of Role-Overload on job stress, job satisfaction and job performance-a study among married working women in banking sector. International Journal of Management Studies, 2 (7), 1-11
16. Thiagarajan, P., Chakrabarty, S., & Taylor, B. (2006). A confirmatory factor analysis of Reilly's Role Overload Scale. Educational and Psychological Measurement, 66(2), 193-211.

17. Van der Vaart, L. (2021). Performance management and well-being in high-demand environments. Human Resource Management Review, 31(1), 100-111.
18. Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. Journal of personality and social psychology, 84(4), 822.
19. Zhang, Y., Ding, X., & Zhao, J. (2022). Mindfulness and job performance: A meta-analysis. Journal of Occupational Health Psychology, 27(4), 501-517.
20. Tang, C., & Vandenberghe, C. (2021). Role overload and its impact on job performance and stress: A meta-analytic review. International Journal of Stress Management, 28(4), 345-364.
21. Pitchford, S. (2022). An Examination of Nurse Role-Overload and Burnout During COVID-19 Pandemic: A Quantitative Correlation Study (Doctoral dissertation, University of Phoenix).
22. Maslach, C., & Leiter, M. P. (2016). Understanding the burnout experience: Recent research and its implications for psychiatry. World Psychiatry, 15(2), 103-111.
23. Şahin, S., Arıcı Özcan, N., & Arslan Babal, R. (2020). The mediating role of thriving: Mindfulness and contextual performance among Turkish nurses. Journal of nursing management, 28 (1), 175-184.
24. Chu, S. T. W., & Mak, W. W. (2020). How mindfulness enhances meaning in life: a meta-analysis of correlational studies and randomized controlled trials. Mindfulness, 11, 177-193.
25. Gawande, R., To, M. N., Pine, E., Griswold, T., Creedon, T. B., Brunel, A., ... & Schuman-Olivier, Z. (2019). Mindfulness training enhances self-regulation and facilitates health behavior change for primary care patients: a randomized controlled trial. Journal of general internal medicine, 34, 293-302
26. Dane, E. (2015). Mindfulness and Performance: Cautionary Notes on a Compelling Concept. Industrial and Organizational Psychology, 8 (4), 647-652. doi:10.1017/iop.2015.94

Original Article

Immediate Effectiveness Of PNF Hold Relax Exercise And Quads Strengthening On Pain, ROM And Quality Of Life In Piriformis Syndrome: A Case Report

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Abstract

Introduction: Piriformis syndrome is a neuromuscular disorder in which there is entrapment of sciatic nerve under the piriformis muscle. The current cases study explained the effectiveness of stretching exercises along with quads strengthening exercises in treatment of a patient with piriformis syndrome (PS).

Case Presentation: The 35-years old female patient with the episodes of previous back pain from last 1 year presented to the physiotherapy department of District Head Quarter Hospital Jhelum for physiotherapy treatment due to persistent pain in the lower lumbar and buttock areas radiating towards the left leg. The treatment of the patient included the PNF hold relax hamstring and quads long arc exercise. Outcome measures include NPRS for pain intensity, ROM, and Lower extremity functional scale (LEFS) was used to measure lower limb function. Patient was assessed immediately after treatment.

Results: The post intervention measures indicated improvement in all symptoms i-e; NPRS = 2, SLR = 95°, hip abduction= 40° and hip internal rotation= 36°, LEFS=93.8%.

Conclusion: The PNF stretching exercise of the hamstring along with quads strengthening exercise resulted in immediate improvement in pain, ROM and lower limb function in patient having piriformis syndrome.

Keywords: Piriformis syndrome, PNF Hold Relax, Quads Strengthening

1. Introduction

Piriformis syndrome (PS) is a neuromuscular disorder caused by the entrapment of sciatic nerve by the shortened piriformis muscle while exiting through the greater sciatic foramen and characterized by pain, tenderness and numbness radiating down the back of ipsilateral lower limb. Piriformis syndrome is one of the most common diagnosis in the absence of discogenic or spinal pathology. (1) The shortened or tight piriformis muscle exerts pressure on the underlying sciatic nerve resulting in the nerve irritation and symptoms along the course of the nerve in the posterior part of the leg . (2) PS is common in females due to wider Q angle, with female to male ratio of 6:1. Overall prevalence is 6% in the general population. PS involves 6-8% of sciatic pain and 5-6% of chronic low back cases and is common in fourth and fifth decades of the life span . (1) There are two types of PS; Primary PS and secondary PS. The primary PS is results from anatomical variations in the form of split sciatic nerve or piriformis muscle. The secondary PS is caused by other factors like overuse, compression (eg. wallet neuritis), macrotrauma and local ischemia . (3) In a systematic review, Hopayian and Danielyan gave the the criteria for the diagnosis of PS i-e, gluteal pain, tenderness near greater sciatic notch, increase pain while sitting, and pain caused by any maneuver that aggravates tension in the piriformis muscle and limits straight leg raising. (4) Diagnostic tests for PS include the FAIR test, Freiberg's test, Lasegue's test, and the Pace and Beatty maneuvers, all of which may show positive signs for PS[17]. MRI and CT scans may help to differentiate between muscular spasm and spinal pathology including vertebral and disc problems. (3)

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There are many treatment options identified in the management of piriformis syndrome including physical therapy, medications, injections, and surgical decompression. [4] The physiotherapy management includes electrotherapeutic modalities like heat application, ultrasound, therapeutic exercises including stretching exercises, strengthening exercises of hip muscles, muscle energy techniques etc. Techniques such as proprioceptive neuromuscular facilitation (PNF) are particularly good at reducing pain symptoms and restoring a specific muscle's range of motion, enhancing flexibility and muscle strength. [5] It has been identified that the weakness of hip muscles and quads results in spasm of piriformis muscle and compromises pelvic stability. The strengthening of quads along with gluteal muscles decrease the load and enhances the pelvic stability which in turn releases the pressure on the sciatic nerve. The strengthening of hip muscles like adductors and extensors are found to have positive effects in the management of piriformis syndrome when combined with stretching exercises. [6] but there is lack of evidence regarding the effects of quads strengthening exercise along with PNF hold relax of hamstring in the management of PS. It has been found that active contraction of quads creates a 'neuromuscular reset', increasing the relaxation of hamstring and helps in improving overall pain and function of lower limb. [7] The current case study aims to describe the immediate effectiveness of quads strengthening along with PNF hold relax of hamstring in piriformis syndrome.

2. Materials & Methods

The study was conducted at DHQ hospital Jhelum. The aim of the study was explained to the participant for his/her agreement to take part in the study. The whole procedure was explained and informed consent was signed by the patient. The treatment of the patient included the PNF hold relax hamstring and quads strengthening using long arc exercise. Outcome measures include NPRS for pain intensity, ROM, and Lower extremity functional scale was used to measure lower limb function. Patient was assessed immediately after treatment.

CASE

The 35-year old female patient presented to the physiotherapy department of DHQ Hospital Jhelum due to persistent pain in the lower lumbar and buttock areas radiating towards left leg. History revealed intermittent episodes of back pain from the last 1 year and the patient had continuous pain while performing basic ADLs and relieved on doing rest and taking painkillers. Pain radiated to the left posterior and lateral aspect of the hip and lower leg. The aggravating factors were prolonged sitting, walking, lying down and performing basic household chores. Pain usually aggravated at night.

The medical history of the patient was non-contributory. The initial assessment showed pain and tenderness over the sacroiliac joint, greater sciatic notch, left piriformis muscle, decrease in hip joint active and passive ROM.

The clinical examination revealed FAIR (Flexion, adduction, internal rotation) test was positive, indicating irritation of the piriformis muscle. The patient was diagnosed with piriformis syndrome. The diagnosis was based on the positive special test (FAIR), characteristic signs and symptoms, and detailed assessment. The Functional status and subjective pain was evaluated using the NPRS and lower extremity functional scale (LEFS), and ROM was measured using Goniometer. The Pain intensity using the Numeric Pain Rating Scale (NPRS) was 6/10 and the functional status indicated by lower extremity functional score was 16/80=20%. An Active straight leg raise on the left leg produced pain in the posterior aspect of the leg at approximately 30° of hip flexion. Goniometer assessment further demonstrated reduced ranges

accompanied by significant pain during movement i.e: left hip flexion= 30°, hip abduction 20°and hip internal rotation 17°.

The patient was fully informed about the treatment steps, and informed consent was obtained before starting the treatment. The initial treatment session began with application of moist heating pack to the lumbosacral and gluteal region for 10 minutes. Following heat application, the patient was positioned in supine position and the hold-relax technique for hamstring was performed with 10 repetitions to improve hams flexibility and reduce tightness. After that the quads long arc exercise is performed. The patient was seated on the quadriceps bench with 1kg of resistance. Each repetition was held for 10 seconds with a total of 10 repetitions. Subsequently, a piriformis stretch was administered. The left lower limb was positioned to achieve a targeted stretch over the piriformis muscle with 10 repetitions and each stretch was maintained for 10 seconds

After the session, the patient reported immediate pain relief and improved hip flexion to 95°, hip abduction to 40° and hip internal rotation to 36°. Pain level decreased to 2/10 (NPRS) 75/80=93.8% (LEFS) immediately after session along with that demonstrating enhanced walking ability with no pain.

3. Results

The baseline and immediate post treatment scores of Numeric pain rating scale (NPRS), Straight leg raise (SLR), and lower extremity functional scale (LEFS) has been shown in table 1. The outcomes indicated massive improvements immediately post session. The NPRS scores improved from 6 to 2 immediately post treatment. The SLR was improved to 95degree post treatment and lower extremity functional scale improved from 16(20%) to 75(94%) indicating massive improvements. The graphical representation is shown in figure 1.

TABLE 1: Baseline and Post Treatment scores of NPRS, Hip ROM (flexion, abduction, internal rotation (IR) & LEFS

	Baseline	**Post Treatment**
NPRS	6	2
SLR(in degrees)	30	95
Hip Abduction(in degrees)	20	40
Hip IR(in degrees)	17	36
LEFS (in %)	20	93.8

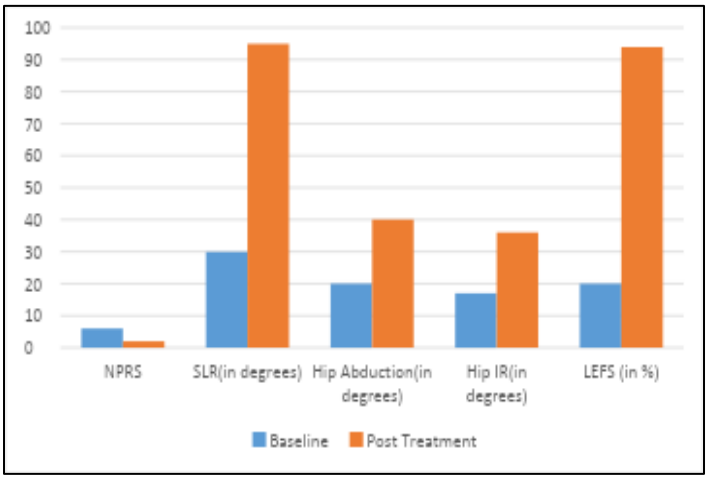

FIGURE 1: Graph demonstrating baseline and immediate post treatment scores of NPRS, HIP ROM and LEFS

4. Discussion

This case study investigated the immediate effect of PNF hold relax exercise of hamstring along with quads strengthening exercises in improving pain, ROM and lower extremity function in patients with piriformis syndrome. The results of the study showed that PNF hold relax exercise of hamstring along with quads strengthening exercises have immediate effects in relieving pain and improving mobility and lower limb function. Even though there is evidence regarding stretching exercises in the treatment of piriformis

syndrome, there is lack of evidence regarding the effect of quads strengthening in the treatment of piriformis syndrome. This study is the first to report the immediate effectiveness of quads strengthening exercise in the management of Piriformis syndrome. These findings are aligned with the previous studies which have demonstrated the benefits of strengthening hip joint muscles along with stretching exercises including PNF hold relax in reducing musculoskeletal dysfunctions by increasing circulation, reducing spasm and enhancing neuromuscular control. The current study demonstrated the effectiveness of stretching exercises along with quads strengthening exercises in the treatment of piriformis syndrome (PS).

A study demonstrated that hip abductor and extensor strengthening along with neural mobilisations and stretching exercises are effective in enhancing the hip abductor strength and functional status in piriformis syndrome. The piriformis muscle becomes overstressed due to weakness of hip muscles including hip abductor & extensors, resulting in spasm of piriformis muscle, ultimately compressing the sciatic nerve. So, strengthening of those muscles is needed to reduce strain on the piriformis muscle. The current study demonstrated that combining the quads strengthening along with stretching exercises resulted in massive improvements in pain and quality of life. [6] A case study about the treatment of a patient having piriformis syndrome revealed that the treatment plan focusing on hip muscle strengthening and correction of faulty lower limb movement patterns had significant outcomes. There were clinically significant findings in the absence of the usual treatment protocol i-e; stretching, soft tissue mobilization, injections. That is why the management plan focusing on strengthening of weak muscles may be beneficial in patients having piriformis syndrome. The current case study involved the strengthening of quads muscle along with PNF hold relax of the hamstring and demonstrated significant immediate improvements in pain, and lower limb function. [8] .It has been found that strengthening of hip abductors along with sciatic nerve mobilization is effective in improving lower limb motor function. The current study involved quads strengthening instead of abductors strengthening and showed robust improvements in pain, range of motion and lower limb function. [9]

The evidence supports the effectiveness of PNF stretching in improving range of motion and reducing pain in patients having piriformis syndrome, offering a promising rehabilitation strategy. The current study involves the PNF hold relax of hamstring muscle with quads strengthening and found immediate improvements in pain, range of motion and lower limb motor function . [10]

Conclusion:

The current case study demonstrated robust immediate improvements in pain, ROM and lower limb function after the treatment concluding that Quads strengthening along with PNF hold relax of the hamstring has immediate effects in resolution of symptoms and improvement in lower motor function.

Limitations

The single session was not sufficient enough for the complete resolution of symptoms and functional recovery. Furthermore, more studies with larger sample size and randomized controlled trials are warranted to compare the long term effectiveness of the techniques.

Disclosure /Conflict of interest:

Authors declare no conflict of interest.

References:

1. Shahzad M, Rafique N, Shakil-ur-Rehman S, Ali Hussain S. Effects of ELDOA and post-facilitation stretching technique on pain and functional performance in patients with piriformis syndrome: A randomized controlled trial. Journal of back and musculoskeletal rehabilitation. 2020;33(6):983-8.
2. Salam A, Khalid A, Waseem I, Mahmood T, Mahmood W. Comparison Between Effects Of Passive Versus Self-Mobilization Of Sciatic Nerve In Piriformis Syndrome For Relieving Pain And Improving Hip Outcomes: soi: 21-

2017/re-trjvol06iss01p298. The Rehabilitation Journal. 2022;6(01):298-302.

3. Arora A, Sinha I. Effectiveness of Muscle Energy Technique among Piriformis Syndrome Patients with Pain, Disability, and Limitations in Internal Rotation Range of Motion of Hip Joint: A Systematic Review. INTERNATIONAL JOURNAL. 2025;14(3):404-10. [Reviewer Comment: Limitations section is brief; consider adding more limitations such as single case design and lack of follow-up.]
4. Monteleone G, Stevanato G, Alimandi M, Cappa E, Sorge R. Piriformis syndrome: a systematic review of case reports. BMC surgery. 2025;25(1):468. [Reviewer Comment: Case description is detailed, but consider organizing into subsections (history, examination, intervention).]
5. Danazumi MS. Effect of integrated neuromuscular inhibition technique in the management of piriformis syndrome: a case report. Middle East Journal of Rehabilitation and Health Studies. 2020. [Reviewer Comment: Case description is detailed, but consider organizing into subsections (history, examination, intervention).]
6. Laha K, Sarkar B, Kumar P, Patel L, Sarkar N. Efficacy of hip abductor and extensor strengthening on pain, strength and lower extremity function in piriformis syndrome: a randomized clinical trial. Int J Health Sci Res. 2018;8(9):80-8.
7. Liyanage E, Malwanage K, Senarath D, Wijayasinghe H, Liyanage I, Chellapillai D, et al. Effects of different physical therapy interventions in improving flexibility in university students with hamstring tightness-A systematic review and network meta-analysis. International Journal of Exercise Science. 2024;17(3):359.
8. Tonley JC, Yun SM, Kochevar RJ, Dye JA, Farrokhi S, Powers CM. Treatment of an individual with piriformis syndrome focusing on hip muscle strengthening and movement reeducation: a case report. journal of orthopaedic & sports physical therapy. 2010;40(2):103-11. [Reviewer Comment: Case description is detailed, but consider organizing into subsections (history, examination, intervention).]
9. Idrees K, Khan K, Sharif K, Ahmad K, Rahman H, Fahad F. Efficacy Of Hip Abductors Strengthening As Compared To Piriformis Muscle Stretching In Improving Lower Extremity Function In Patients With Piriformis Syndrome. Pakistan Journal of Medical & Health Sciences. 2022;16(07):721.
10. Syed Abudaheer K. The Impact of PNF Stretching on Pain and Range of Motion Compared to Static Stretching in Patients with Piriformis Syndrome: A Randomized Controlled Trial. Journal of Neonatal Surgery. 2025;14(15s):2348. Savarese G, Lund LH. Global Public Health Burden of Heart Failure. Card Fail Rev [Internet]. 2017;03(01):7. Available from: https://www.cfrjournal.com/articles/global-public-health-burden-heart-failure