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PREVALENCE OF TRAPEZIUS MUSCLE TIGHTNESS DUE TO POOR POSTURE IN TEACHERS: A CROSS-SECTIONAL STUDY

Original Research

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ABSTRACT

Background: Musculoskeletal disorders are a common occupational health issue, with trapezius muscle tightness frequently observed among teachers due to prolonged standing, repetitive tasks, and sustained head-down postures. Such conditions contribute to cervical spine stiffness, pain, and reduced quality of life. Despite being highly prevalent, limited data are available from Pakistan, particularly regarding teachers in Karachi, who often face challenging working conditions and heavy workloads.

Objective: This study aimed to determine the prevalence of trapezius muscle tightness among school teachers in Karachi and to identify associated risk factors including age, teaching experience, weekly working hours, and pain intensity.

Methods: A cross-sectional design was employed from August 2024 to January 2025. A total of 383 teachers, aged 20–45 years, were recruited through convenience sampling. Participants were assessed using validated tools including the Visual Analog Scale (VAS) for pain severity and the Neck Disability Index (NDI) for functional disability. Demographic and occupational characteristics such as gender, teaching experience, and working hours were recorded. Data were analyzed using SPSS version 26.0, with descriptive statistics and chi-square tests applied to explore associations between risk factors and trapezius tightness.

Results: Of the 383 participants, 318 (83.0%) were female and 65 (17.0%) were male. Disability on the NDI was observed in 232 participants (60.6%), while 151 (39.4%) reported no disability. Pain severity was widely distributed, with 132 (34.5%) reporting moderate pain, 48 (12.5%) severe pain, and 29 (7.6%) very severe pain. Significant associations were found between higher disability scores and advancing age ($p = 0.02$), greater weekly workload ($p < 0.001$), and increased pain intensity ($p < 0.001$). Teaching experience and gender showed no significant associations.

Conclusion: The findings demonstrate a high prevalence of trapezius muscle tightness among teachers, strongly influenced by workload, age, and pain severity. These results highlight the urgent need for ergonomic interventions, structured rest breaks, and posture correction programs to safeguard teachers' musculoskeletal health and improve their quality of life.

Keywords: Ergonomics; Faculty; Muscle Tightness; Neck Pain; Posture; Trapezius Muscle; Workload.

INTRODUCTION

The trapezius muscle, a large superficial back muscle shaped like a trapezoid, plays a vital role in shoulder and neck stability, as well as in facilitating upper-body movement. It is divided into upper, middle, and lower fibers, with motor innervation provided by the spinal accessory nerve (cranial nerve XI) and sensory innervation from the ventral rami of C3 and C4. Because of its anatomical positioning, the trapezius is particularly vulnerable to musculoskeletal stress, especially in occupations requiring prolonged standing, repetitive movements, and sustained head-down posture. Among such professions, teaching has emerged as one with high exposure to musculoskeletal disorders (MSDs), which have been shown to significantly impair quality of life and professional productivity (1). Neck and shoulder pain associated with trapezius dysfunction is increasingly recognized as a widespread occupational health issue, with prevalence estimates ranging from 30% to 60% among educators globally (2–4). Teachers frequently engage in repetitive tasks such as lesson planning, writing on boards, and prolonged use of digital devices for instructional and administrative purposes. These activities, compounded by poor ergonomics, job-related stress, and extended working hours, result in muscular fatigue, stiffness, and the development of trigger points within the trapezius (5). Studies from Europe, North America, and Asia consistently report that trapezius pain and other MSDs are major contributors to absenteeism and reduced efficiency among educators (6,7). The problem has been further amplified by the transition to online and hybrid teaching modalities, especially during and after the COVID-19 pandemic, when suboptimal home office setups and increased screen exposure exacerbated musculoskeletal strain (8).

Regional studies underscore the global burden of this condition. For example, prevalence of neck and trapezius pain among teachers has been reported as 41% in Malaysia, 48% in Sweden, 50% in Japan, and nearly 60% in India (9–12). In Pakistan, research from Islamabad and Lahore has shown that 30–40% of teachers and office workers experience chronic neck and shoulder pain, often linked to trapezius muscle tightness caused by prolonged standing, repetitive writing, and lack of ergonomic support (13,14). Such findings highlight the universality of the problem, cutting across cultural, geographic, and socioeconomic boundaries. The pathophysiology of trapezius tightness and pain involves disrupted oxidative metabolism, poor local muscle blood flow, and accumulation of pain-inducing chemicals within cervical muscles, ultimately leading to stiffness, tenderness, and restricted mobility (15). Risk factors include advancing age, female gender, lengthy work hours, previous injury, and psychosocial stressors (16). Given the persistent nature of symptoms, these conditions often progress to chronic pain syndromes, with a significant impact on daily functioning and quality of life. Despite the wealth of literature documenting the prevalence and risk factors of trapezius pain, there remains a need for targeted, evidence-based interventions in specific occupational groups such as teachers. While ergonomic training, physical activity, and stress management programs have shown promise internationally, localized data are crucial for guiding interventions tailored to the Pakistani educational context. In light of this gap, the present study seeks to determine the prevalence of trapezius muscle tightness due to poor posture among schoolteachers in Karachi, Pakistan. By identifying key occupational risk factors such as age, work hours, and pain intensity, the research aims to provide a foundation for prevention and management strategies that can enhance both the well-being of educators and the sustainability of the teaching profession.

METHODS

The present study was designed as a cross-sectional investigation to determine the prevalence and associated risk factors of trapezius muscle tightness among schoolteachers in Karachi, Pakistan. The study was conducted over a six-month period from August 2024 to January 2025. A total of 383 teachers were recruited using a convenient sampling technique. Participants were eligible if they were between 20 and 45 years of age, male or female, had a minimum of three to five years of teaching experience or reported long working hours, carried a full-time teaching workload with standard duties, and presented with symptoms such as neck uneasiness or trapezius stiffness. Teachers above the age of 45 years, pregnant female teachers, and those with a past history of trapezius musculoskeletal disorders, recent injury or surgery in the trapezius region, or congenital anomalies such as Sprengel deformity and torticollis were excluded from participation. Data collection was carried out following informed consent from each participant, and ethical approval was obtained from the institutional review board of the relevant institute. A structured survey was administered to record demographic characteristics including age, gender, teaching experience, and weekly working hours. Clinical assessment was performed to document musculoskeletal symptoms, and validated tools were employed to measure outcomes. Pain severity was quantified using the Visual

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Analog Scale (VAS), where scores ranged from 0 (no pain) to 10 (worst possible pain). Functional disability and its impact on daily activities were evaluated using the Neck Disability Index (NDI), a widely used instrument for quantifying the effects of neck pain on quality of life. These tools together provided insights into both the intensity of pain and the functional consequences of trapezius muscle tension.

The data collection process also involved a review of medical records where relevant, along with direct physical assessment to confirm the presence of trapezius tightness. Ethical standards were upheld throughout the study, ensuring participant confidentiality, voluntary participation, and the right to withdraw without penalty. Data was recorded and entered into SPSS version 26.0 for analysis. Descriptive statistics, including frequency distributions and percentages, were computed to summarize demographic and clinical variables. The prevalence of trapezius muscle tightness associated with poor posture was calculated, and proportions were used to illustrate the outcome of interest. The chi-square test of association was applied to explore the relationship between demographic characteristics (such as age, gender, teaching experience, and work hours) and clinical outcomes, including pain intensity and disability scores. This allowed the identification of significant predictors of trapezius tightness and neck disability among the study population.

RESULTS

The study included 383 schoolteachers, with a predominance of females (83.0%) compared to males (17.0%). The mean age distribution revealed that the largest group comprised participants aged 18–25 years (34.7%), followed by those aged 26–33 years (25.1%), 34–40 years (23.5%), and 41 years or older (13.6%). Only a small proportion (3.1%) were younger than 18 years. In terms of teaching experience, 13.3% reported less than two years of experience, 24.8% had two to three years, 19.6% had four to five years, 20.4% had six to seven years, and 21.9% had more than seven years. Weekly workload indicated that the majority worked 30–39 hours per week (38.6%), followed by 20–29 hours (24.8%), fewer than 20 hours (17.2%), and 40 hours or more (19.3%). Assessment of pain intensity using the Visual Analog Scale (VAS) showed that 18.5% reported no pain, 24.5% reported mild pain, 34.5% reported moderate pain, 12.5% reported severe pain, 7.6% reported very severe pain, and 2.3% reported worst possible pain. Functional disability, measured through the Neck Disability Index (NDI), indicated that 232 participants (60.6%) had scores higher than 22, consistent with the presence of disability, whereas 151 participants (39.4%) had scores below 22. When age was analyzed in relation to disability, significant differences were observed. Teachers under 18 years showed higher representation in the NDI < 22 group compared to the NDI ≥ 22 group ($p = 0.02$). In contrast, participants aged 34–40 years and those aged 41 years or older were more frequently represented in the NDI ≥ 22 group, highlighting the association between advancing age and increased disability. Teaching experience showed a trend where those with less than two years of experience were more represented in the NDI < 22 group, while teachers with four to seven years of experience were increasingly represented in the NDI ≥ 22 group. However, these differences were not statistically significant ($p = 0.06$).

Gender analysis showed that females accounted for the majority of both groups, with 78.1% in the NDI < 22 group and 86.2% in the NDI ≥ 22 group. Males were more proportionally represented in the lower disability group, but no significant association between gender and disability was found ($p = 0.40$). Workload analysis indicated a strong association, as teachers working fewer than 20 hours weekly were significantly more represented in the NDI < 22 group (29.1%) compared to those in the NDI ≥ 22 group (9.5%) ($p < 0.001$). Teachers working more than 20 hours per week were disproportionately represented in the NDI ≥ 22 group, though differences across the higher workload categories were not statistically significant. Pain intensity analysis revealed a strong association between VAS scores and NDI outcomes. Among participants with no pain, 42.4% were in the NDI < 22 group, compared to only 3.0% in the NDI ≥ 22 group ($p < 0.001$). Severe and very severe pain was almost exclusively represented in the NDI ≥ 22 group, with 19.4% and 12.5%, respectively. The worst pain was reported only in the NDI ≥ 22 group (3.9%). These findings highlight a significant relationship between higher pain severity and increased disability. Overall, the results demonstrated that trapezius muscle tightness and disability were strongly associated with advancing age, higher workload, and greater pain severity, while teaching experience and gender showed weaker or non-significant associations.

Analysis of posture-related workload factors demonstrated a significant association between working hours and trapezius muscle tightness. Teachers working fewer than 20 hours per week were more frequently represented in the NDI < 22 group, suggesting lower levels of disability (29.1% versus 9.5%, $p < 0.001$). Conversely, individuals with workloads of 30–39 hours or 40 hours and above showed higher representation in the NDI ≥ 22 group, indicating that longer durations of sustained posture and prolonged head-down activities were linked to increased disability and trapezius tightness. These findings imply that excessive teaching hours, likely associated with poor ergonomics and repetitive postures, may directly contribute to the onset and progression of trapezius muscle dysfunction.

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While the data did not explicitly capture variables such as classroom ergonomics, frequency of board writing, or digital device usage, working hours served as a strong surrogate marker of posture-related risk, highlighting the importance of ergonomic awareness and workload management in preventing trapezius-related musculoskeletal disorders.

Table 1: Demographic Characteristics, Workload, Pain Intensity, and Neck Disability Index (NDI) Distribution of School Teachers in Karachi

Variable	Categories	N %
Age	under 18	12 (3.1)
	18-25	133 (34.7)
	26-33	96 (25.1)
	34-40	90 (23.5)
	41-above	52 (13.6)
Years of Teaching Experience	less than 2 years	51 (13.3)
	2-3 year	95 (24.8)
	4-5 year	75 (19.6)
	6-7 year	78 (20.4)
	more than 7 years	84 (21.9)
Average Hours Work Per Week	less than 20 hours	66 (17.2)
	20-29 hours	95 (24.8)
	30-39 hours	148 (38.6)
	40 hours or more	74 (19.3)
Gender	male	65 (17.0)
	female	318 (83.0)
VAS	no pain	71 (18.5)
	mild pain	94 (24.5)
	moderate pain	132 (34.5)
	severe pain	48 (12.5)
	very severe	29 (7.6)
	worst pain	9 (2.3)
NDI	less than 22	151 (39.4)
	higher than 22	232 (60.6)

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Table 2: Association of Demographic, Occupational, and Pain-Related Factors with Neck Disability Index (NDI) Scores Among Teachers

Variables	Categories	NDI		
		less than 22	higher than 22	P value
Age	under 18	7 (4.6)	5 (2.2)	0.02*
	18-25	59 (39.1)	74 (31.9)	
	26-33	44 (29.1)	52 (22.4)	
	34-40	27 (17.9)	63 (27.2)	
	41-above	14 (9.3)	38 (16.4)	
Years of Teaching Experience	Less than 2 years	28 (18.5)	23 (9.9)	0.06**
	2-3 year	41 (27.2)	54 (23.3)	
	4-5 year	24 (15.9)	51 (22.0)	
	6-7 year	25 (16.6)	53 (22.8)	
	more than 7 years	33 (21.9)	51 (22.0)	
Gender	male	33 (21.9)	32 (13.8)	0.40**
	female	118 (78.1)	200 (86.2)	
VAS	less than 20 hours	44 (29.1)	22 (9.5)	<0.001**
	20-29 hours	29 (19.2)	66 (28.4)	
	30-39 hours	53 (35.1)	95 (40.9)	
	40 hours or more	25 (16.6)	49 (21.1)	
NDI	no pain	64 (42.4)	7 (3.0)	<0.001*
	mild pain	52 (34.4)	42 (18.1)	
	moderate pain	32 (21.2)	100 (43.1)	
	severe pain	3 (2.0)	45 (19.4)	
	very severe	0 (0.0)	29 (12.5)	
	worst pain	0 (0.0)	9 (3.9)	

*Fisher exact test **chi square test

Table 3: Association Between Average Weekly Work Hours and Neck Disability Index (NDI) Scores Among Teachers

Average Weekly Work Hours	NDI < 22 n (%)	NDI ≥ 22 n (%)	p-value
< 20 hours	44 (29.1)	22 (9.5)	<0.001**
20–29 hours	29 (19.2)	66 (28.4)	—
30–39 hours	53 (35.1)	95 (40.9)	—
≥ 40 hours	25 (16.6)	49 (21.1)	—

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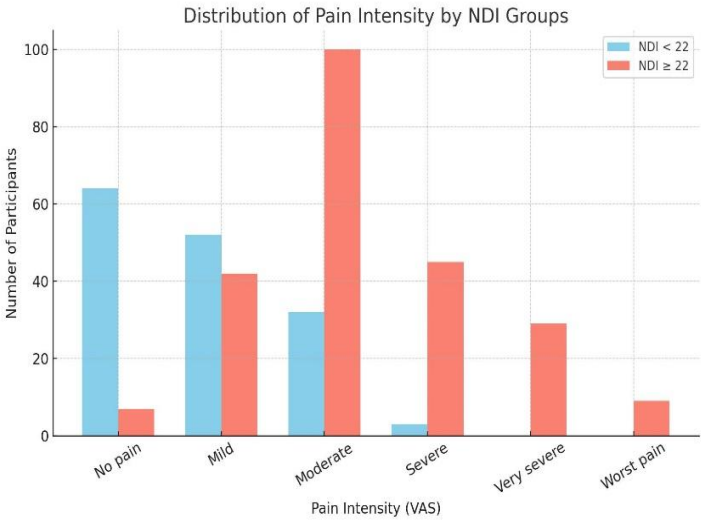


Figure 1 Distribution of Pain Intensity by NDI Groups

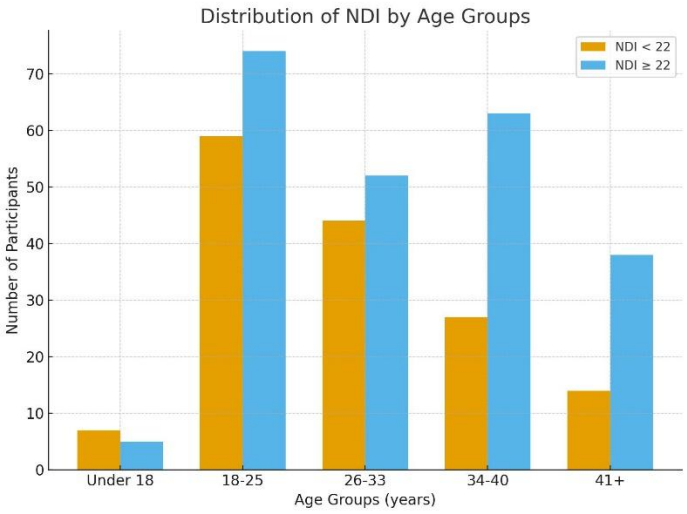


Figure 2 Distribution of NDI by Age Groups

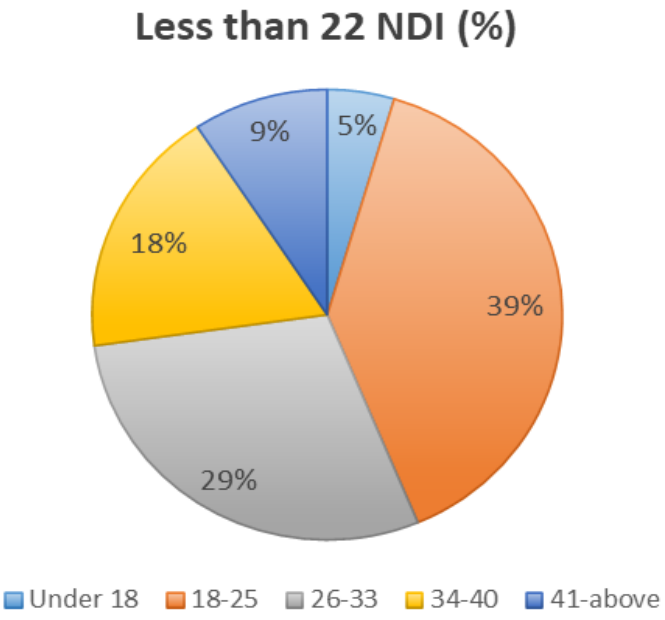
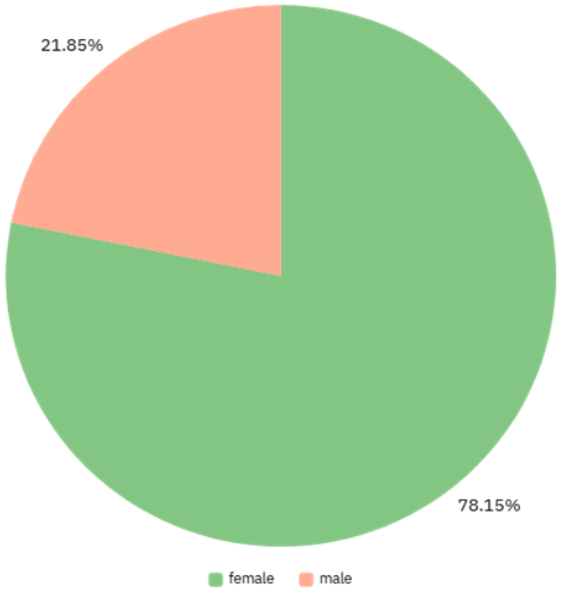


Figure 3 Less Than 22 NDI (%)



DISCUSSION

The present study highlighted a high prevalence of trapezius muscle tightness among teachers in Karachi, reflecting the occupational demands and postural strain inherent to the profession. A substantial proportion of participants reported moderate to severe pain intensity, with more than half demonstrating disability on the Neck Disability Index, findings that align with global literature documenting musculoskeletal disorders as a major occupational health burden among teachers. Similar studies conducted in Asia and Europe have consistently identified the trapezius and cervical regions as common sites of discomfort due to prolonged standing, repetitive board writing, and sustained head-down postures, supporting the current results that link longer working hours and advancing age with increased disability (16,17). Gender disparities were evident, with female teachers disproportionately represented in the higher disability

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group, although statistical significance was not achieved. This finding echoes previous reports suggesting that women often experience greater musculoskeletal strain, potentially due to a combination of physiological, psychosocial, and workload-related factors (18,19). Workload analysis further underscored posture as a major contributing factor, as teachers working fewer than 20 hours per week were less likely to develop trapezius tightness, while those working 30–39 hours or more were more frequently represented in the disability group. Pain severity strongly correlated with functional limitation, as higher VAS scores translated into greater disability levels, emphasizing the clinical relevance of trapezius-related pain in impairing occupational performance (20,21).

The study adds to the body of evidence by focusing on teachers in a developing country context, where limited ergonomic infrastructure and high workload pressures may exacerbate musculoskeletal risks. The results reinforce the need for ergonomic modifications, structured rest breaks, and awareness programs aimed at posture correction and stress reduction. Although the study provides important insights, certain limitations must be acknowledged. The cross-sectional design restricts causal inference, as associations between teaching workload, posture, and trapezius tightness cannot establish temporal sequence. The reliance on self-reported symptoms introduces the possibility of recall bias and subjective perception errors, potentially underestimating or overestimating the true prevalence of symptoms. Moreover, the sample size, although adequate for statistical analysis, may not be representative of the diverse teaching population across Karachi, particularly given differences in infrastructure between public and private schools. A further limitation lies in the absence of a control group, which prevents comparison with non-teaching populations and limits conclusions regarding the occupational specificity of trapezius tightness. Additionally, the study did not directly quantify posture-related variables such as head-down duration, furniture ergonomics, or frequency of digital device use, instead relying on working hours as a surrogate marker. This gap reduces the precision of attributing trapezius tightness solely to poor posture. Variability in school infrastructure, particularly in the ergonomics of desks and chairs, was also not accounted for, despite being a known determinant of musculoskeletal strain.

Despite these constraints, the study offers several strengths. It focused on a high-risk professional group, generating context-specific data that can serve as a baseline for further research in Pakistan. By identifying age, workload, and pain severity as predictors of trapezius tightness, it contributes practical implications for prevention, particularly the importance of reducing prolonged static postures and incorporating ergonomic interventions. The emphasis on teachers, a group whose occupational health is often overlooked despite their central societal role, ensures that the findings have both public health and educational significance. Future research should build on these results by adopting longitudinal designs to monitor the progression of trapezius tightness over time, thereby clarifying causal relationships. Incorporating objective diagnostic tools such as electromyography or ultrasonography would improve the accuracy of muscle assessment and reduce reliance on subjective reporting. Expanding the sample to include diverse teaching levels and institutions would enhance generalizability, while the inclusion of posture-related ergonomic measures would strengthen causal attribution. Moreover, interventional studies assessing the impact of ergonomic training, stress management, and structured exercise programs could provide actionable strategies for reducing the burden of musculoskeletal disorders among teachers (22). In conclusion, the study underscores that trapezius muscle tightness represents a significant occupational health issue for teachers, with strong associations with workload and pain severity. Although limited by its cross-sectional nature and lack of direct ergonomic measures, the findings highlight the urgent need for preventive strategies that integrate ergonomic improvements, posture correction, and workload management to safeguard the health and productivity of educators.

CONCLUSION

This study concluded that trapezius muscle tightness and neck disability among teachers were strongly influenced by advancing age, extended working hours, and higher levels of pain severity, while gender and teaching experience showed weaker associations. These findings emphasize that occupational demands and posture-related strain are key contributors to musculoskeletal discomfort in the teaching profession. By highlighting these risk factors, the study underscores the importance of implementing ergonomic modifications, workload management, and effective pain control strategies to safeguard the health and productivity of educators. The results contribute valuable evidence to guide preventive measures and support future interventions aimed at improving the well-being of teachers in school environments.

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AUTHOR CONTRIBUTION

Author	Contribution
Alina Aslam*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Ameesha Kumari	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Arsheen	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Fatima Abbasi	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Khushboo Qureshi	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Mehak	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Nisha Kumari	Contributed to study concept and Data collection Has given Final Approval of the version to be published

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