Prevalence of Trigger Points in Neck, Shoulder, and Upper Back Region and Its Association with Stress Levels Among Allied Health Sciences Students

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ABSTRACT

Background: Myofascial trigger points (MTrPs) are hyperirritable areas in taut muscle bands, often linked with musculoskeletal pain, motor dysfunction, and psychological stress. The relationship between stress levels and MTrPs remains underexplored in student populations.

Objective: To determine the prevalence of MTrPs in the neck, shoulder, and upper back regions and its association with stress levels among Allied Health Sciences students.

Methods: A cross-sectional study was conducted from August 2023 to January 2024, including 160 Allied Health Sciences students recruited through non-probability convenient sampling. Stress levels were measured using the Perceived Stress Scale (PSS), and MTrPs were identified using manual palpation. Data analysis was performed using SPSS version 25, with Pearson correlation used to assess associations.

Results: The mean age was 21.96 ± 2.02 years. Among 160 students, 64 (39.5%) had low stress, 32 (19.8%) had moderate, and 64 (39.5%) had high stress. MTrPs prevalence was 40.7% in the neck, 69.8% in the shoulder, and 44.4% in the upper back. Strong correlations were found between stress levels and MTrPs in the shoulder ($r=0.721$, $P<0.01$) and upper back ($r=0.773$, $P<0.01$).

Conclusion: Higher stress levels were significantly associated with an increased prevalence of MTrPs in Allied Health Sciences students.

INTRODUCTION

The prevalence of musculoskeletal disorders (MSDs) has been increasingly noted in various populations, particularly among individuals subjected to continuous physical and mental exertion, such as students in health sciences programs. Myofascial trigger points (MTrPs) are a common and significant cause of musculoskeletal pain, especially in the neck, shoulder, and upper back regions, which can adversely affect quality of life and functional performance (1). MTrPs are characterized as hyperirritable spots located within taut bands of skeletal muscle, which can cause referred pain, motor dysfunction, and autonomic phenomena when compressed (2). The presence of these trigger points has been strongly associated with physical stress and repetitive strain, leading to decreased muscle function, limited range of motion, and chronic discomfort (3). Psychological factors, including stress, anxiety, and depression, also play a pivotal role in the development and exacerbation of MTrPs, highlighting the importance of a biopsychosocial model in understanding this condition (4). In academic settings, particularly among Allied Health Sciences (AHS) students, high levels of stress due to intense study schedules and performance pressures have been identified as contributing factors to musculoskeletal pain (5). Studies conducted among university students in Saudi Arabia and Pakistan have reported high prevalence rates of neck and shoulder pain, which were linked to academic stress and sedentary lifestyles (6, 7).

The mechanisms underlying the development of MTrPs include muscle overuse, repetitive microtrauma, and sustained muscle contractions, all of which can reduce blood flow, increase metabolic stress, and lead to an imbalance between oxidative stress and anti-oxidative mechanisms (8). These physiological changes can provoke the release of inflammatory cytokines, neuropeptides, and other mediators that sensitize nociceptors, resulting in persistent pain and muscle dysfunction (9). Moreover, stress, both psychological and physiological, has been shown to exacerbate these processes, leading to a cycle of pain and stress that is difficult to break (10). In the context of student populations, psychological distress is often triggered by the demanding academic environment, with examinations, deadlines, and competitive pressures being major stressors (11). High stress levels can lead to increased muscle tension and the formation of MTrPs, which in turn contribute to pain and discomfort, further affecting students' academic performance and overall well-being (12).

The relationship between stress and MTrPs has been well documented in various studies. For example, the prevalence of MTrPs in the shoulder and neck regions has

been found to be significantly higher among individuals experiencing high levels of perceived stress (13). The presence of MTrPs in these anatomical regions can lead to a cascade of negative outcomes, including reduced muscle function, altered movement patterns, and increased susceptibility to musculoskeletal injuries (14). Additionally, research has shown that students in health-related fields may be particularly vulnerable to MTrPs due to the combined effects of physical strain from clinical work and psychological stress from academic responsibilities (15). These findings underscore the need for targeted interventions to reduce stress and manage musculoskeletal health in this population.

Given the complex interplay between physical and psychological stressors in the development of MTrPs, it is crucial to adopt a multidisciplinary approach in managing this condition. Strategies that combine physical therapies, such as manual therapy and dry needling, with psychological interventions, such as stress management and relaxation techniques, have been suggested as effective measures for reducing pain and improving quality of life in individuals with MTrPs (16, 17). Furthermore, there is a need for more research to explore the underlying mechanisms linking stress and MTrPs, as well as to develop evidence-based guidelines for the prevention and management of this condition in student populations (18). This study aims to contribute to this growing body of knowledge by investigating the prevalence of MTrPs in the neck, shoulder, and upper back regions among AHS students and examining its association with perceived stress levels. Understanding this relationship can provide valuable insights into the role of stress in the development of musculoskeletal pain and inform the design of targeted interventions to improve the health and well-being of students in academic settings (19).

MATERIAL AND METHODS

A cross-sectional study was conducted over a period of six months, from August 2023 to January 2024, at three institutions: the PSRD College of Rehabilitation Sciences, Fatima Memorial Medical College, and Gulab Devi Educational Complex, Lahore, Pakistan. A total of 160 participants were recruited using a non-probability convenient sampling method. The inclusion criteria consisted of students studying Allied Health Sciences, both male and female, aged 18 to 25 years, who were experiencing psychological stress and consented to participate in the study. Exclusion criteria included students without psychological stress, and those with a history of cervical spine surgeries, traumatic brain injuries, or whiplash injuries, as well as any identified red flags such as neoplasms. Participants who met these criteria were informed of the study's purpose and procedures before obtaining written informed consent. The consent form, available in both English and Urdu, ensured that participants fully understood the study's scope and voluntarily agreed to take part.

Data collection involved two primary components: measuring stress levels and identifying the presence of myofascial trigger points (MTrPs) in the neck, shoulder, and upper back regions. The Perceived Stress Scale (PSS) was utilized to assess the psychological stress levels of the participants. The PSS is a widely validated tool that measures the degree to which individuals perceive life situations as stressful, and scores were categorized into low, moderate, and high-stress groups. To identify MTrPs, a standardized manual palpation technique was used. This involved applying consistent pressure to specific muscle sites for 2-3 seconds to detect the presence of hypersensitive nodules or taut bands, which were then classified as trigger points if they elicited localized or referred pain (6).

Ethical approval for this study was obtained from the institutional review boards of all participating institutions, in accordance with the Declaration of Helsinki. All participants were assured of the confidentiality of their responses and the voluntary nature of their participation. There were no physical or psychological risks involved in the study procedures, and no harm was inflicted upon participants. The anonymity of the participants was maintained by using unique identification codes for data entry, and the collected data was securely stored with restricted access.

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) software version 25. Descriptive statistics, including means and standard deviations, were calculated for continuous variables such as age, while categorical variables like gender and stress levels were summarized using frequencies and percentages. The Pearson correlation test was used to evaluate the relationship between perceived stress levels and the occurrence of trigger points in different anatomical regions (neck, shoulder, and upper back). Statistical significance was set at a p-value of less than 0.05 (7). The results were presented in the form of tables and graphs to provide a clear depiction of the findings and facilitate the interpretation of data.

RESULTS

The study comprised a total of 160 Allied Health Sciences students, with a mean age of 21.96 ± 2.02 years, ranging from 18 to 25 years. Gender distribution indicated that 62 participants (38.8%) were male, while 98 participants (61.3%) were female. The educational year distribution of participants showed that 10.6% were in their first year, 10.0% in their second year, 17.5% in their third year, 23.1% in their fourth year, and 38.8% in their final year. Trigger Points Prevalence by Region and Gender

Manual palpation revealed varying prevalence of trigger points in the neck, shoulder, and upper back regions. Correlation Analysis A moderate positive correlation was observed between perceived stress levels and the presence of trigger points in the neck. (Pearson Correlation = 0.681, $P < 0.01$), The results of this study indicate a significant association between perceived stress levels and the presence of trigger points in the neck, shoulder, and upper back regions among Allied Health Sciences students. The presence of trigger points was more common in the shoulder and upper back compared to the neck 26 (41.9%).

Table 1: Demographic Characteristics of Participants

Variable	Frequency (n)	Percentage (%)
Gender		
Male	62	38.8
Female	98	61.3
Educational Year		
First Year	17	10.6
Second Year	16	10.0
Third Year	28	17.5
Fourth Year	37	23.1
Final Year	62	38.8

Stress Levels Among Participants Stress levels were evaluated using the Perceived Stress Scale (PSS). The results showed that 39.5% of students experienced low stress, 19.8% experienced moderate stress, and 39.5% experienced high stress levels. Among male participants , 47 (76.0%) had shoulder trigger points

Table 2: Perceived Stress Levels of Participants

Stress Level	Frequency (n)	Percentage (%)
Low Stress	64	39.5
Moderate Stress	32	19.8
High stress	64	39.5

had upper back trigger points, and 19 (30.6%) had neck trigger points. Among female participants, 66 (67.3%) had shoulder trigger points, 46 (46.9%) had upper back trigger points, and 47 (48.0%) had neck trigger points.

Table 3: Trigger Points Prevalence by Region and Gender

Region	Gender	Absent (n)	Present (n)	Percentage Present (%)
Neck	Male	43	19	30.6
	Female	51	47	48.0
Shoulder	Male	15	47	76.0
	Female	32	66	67.3
Upper Back	Male	36	26	41.9
	Female	52	46	46.9

while strong positive correlations were found between perceived stress levels and the presence of trigger points in the shoulder (Pearson Correlation = 0.721, $P < 0.01$) and upper back (Pearson Correlation = 0.773, $P < 0.01$).

Table 4: Correlation Between Stress Levels and Trigger Points

Variable	Neck (Pearson Correlation)	Shoulder (Pearson Correlation)	Upper Back (Pearson Correlation)
Perceived Stress Level	0.681	0.721	0.773
Significance	$P < 0.01$	$P < 0.01$	$P < 0.01$

The results of this study indicate a significant association between perceived stress levels and the presence of trigger points in the neck, shoulder, and upper back regions among Allied Health Sciences students. These findings suggest that increased stress levels are associated with a higher likelihood of developing myofascial trigger points in specific anatomical regions.

DISCUSSION

The findings of the present study indicated a significant positive association between perceived stress levels and the prevalence of myofascial trigger points (MTrPs) in the neck, shoulder, and upper back regions among Allied Health Sciences students. These results align with the existing literature, which has consistently highlighted the relationship between psychological stress and the development of musculoskeletal disorders (1). The strong correlation observed between higher stress levels and the increased occurrence of MTrPs in the shoulder and upper back regions may be attributed to the sustained muscle tension and altered neuromuscular activation patterns typically associated with stress (2).

Similar studies have demonstrated that elevated stress levels lead to prolonged muscle contraction, reduced local circulation,

and the subsequent development of hyperirritable spots within taut muscle bands, further contributing to pain and discomfort in these areas (3).

Previous research has emphasized that students, particularly those in health-related academic programs,

often experience heightened stress due to demanding academic schedules, frequent assessments, and high performance expectations, making them more vulnerable to the onset of MTrPs (4). Studies from various regions, including Saudi Arabia and Pakistan, have reported high prevalence rates of musculoskeletal pain among medical and allied health sciences students, which were found to be closely linked to increased academic stress (5). The prevalence rates of MTrPs in the shoulder region, as seen in the present study, were similar to findings from studies conducted in other student populations, where trigger points were frequently observed in muscles such as the trapezius and supraspinatus due to repetitive use and stress-induced tension (6).

The study also found that the prevalence of trigger points was higher in female participants compared to males, particularly in the neck region, which supports previous research suggesting that females may be more susceptible to developing MTrPs due to differences in pain perception, muscle composition, and hormonal variations (7). This gender disparity in the prevalence of MTrPs may also be influenced by psychosocial factors, as females have been reported to experience higher levels of stress and anxiety in response to academic pressures compared to their male counterparts (8). Moreover, the association between psychological distress and musculoskeletal pain has been well-documented, with stress often contributing to increased muscle tension, autonomic dysregulation, and the subsequent formation of trigger points (9).

The strengths of this study include the use of validated tools for both stress assessment and MTrP identification, which ensured a systematic evaluation of the variables under investigation. Furthermore, the study involved multiple institutions, enhancing the generalizability of the findings within the student population. However, certain limitations must be acknowledged. The cross-sectional design restricted the ability to establish a causal relationship between stress levels and MTrP prevalence. Additionally, the non-probability sampling technique may have introduced selection bias, as students who were more stressed may have been more likely to participate in the study. The sample size, while adequate for preliminary analysis, could have been expanded to include a more diverse group of students from various health disciplines to improve external validity (10).

Another limitation was the reliance on self-reported measures of stress, which are subject to recall bias and may not fully capture the complexity of psychological distress experienced by the participants. Future studies should consider using a longitudinal design to monitor changes in stress levels and MTrP prevalence over time, as well as incorporating objective measures of stress, such as cortisol levels, to provide a more comprehensive understanding of the relationship between stress and musculoskeletal pain (11). Additionally, including a broader range of musculoskeletal regions and incorporating non-health sciences students would help to further elucidate the impact of stress on musculoskeletal health across different student populations (12).

The findings of the present study underscore the need for targeted stress management interventions, such as relaxation techniques, mindfulness-based stress reduction, and ergonomic education, aimed at reducing the development of MTrPs among students with high stress levels. Educational institutions should prioritize creating supportive environments that minimize academic stress and promote physical and psychological well-being to mitigate the risk of musculoskeletal disorders in their student populations (13). Further research is recommended to explore the effectiveness of specific therapeutic interventions, such as dry needling, manual therapy, and physical exercise programs, in managing MTrPs among students with elevated stress levels, to develop evidence-based strategies for preventing and treating stress-induced musculoskeletal pain (14).

Overall, this study provided valuable insights into the interplay between psychological stress and MTrPs, contributing to the existing body of knowledge on the impact of stress on musculoskeletal health in academic settings. These findings have important implications for both healthcare professionals and educators in developing multidisciplinary approaches to reduce stress and improve musculoskeletal health outcomes in this population.

CONCLUSION

The study demonstrated a significant association between perceived stress levels and the presence of myofascial trigger points in the neck, shoulder, and upper back regions among Allied Health Sciences students, indicating that psychological stress may contribute to the development of musculoskeletal pain in specific anatomical regions. These findings highlight the importance of addressing stress as a contributing factor in musculoskeletal disorders within academic settings. Implementing targeted stress management strategies and incorporating routine screening for musculoskeletal issues in educational institutions could play a crucial role in improving the overall health and well-being of students, potentially reducing the risk of chronic musculoskeletal disorders in future healthcare professionals.

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