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The Relationship Between Stress Levels and Neck Pain: A Literature Review

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Abstract. *Neck pain is a common musculoskeletal complaint, especially in individuals who engage in activities involving prolonged static body positions. In addition to physical factors, psychological factors such as stress can also influence the onset of neck pain. Stress can increase muscle tension and modulate pain perception, potentially worsening neck complaints. This study aims to examine the relationship between stress levels and the incidence of neck pain through a systematic literature review. The literature search was conducted in March 2026 through PubMed, ScienceDirect, and Google Scholar with publications spanning 2021–2026. The selected articles were peer-reviewed studies relevant to the topic. Based on the PRISMA flow, five articles met the criteria for in-depth analysis. The results of the study indicate that individuals with higher stress levels tend to experience more severe neck pain. Influencing factors include muscle tension, changes in pain perception, non-ergonomic posture, and psychosocial factors such as academic pressure and workload. In conclusion, stress can significantly influence the onset of neck pain. These findings emphasize the importance of understanding the relationship between psychological and physical factors, such as stress management, posture, and ergonomics education, as a basis for designing more effective neck pain prevention strategies.*

Keywords: *Stress, Neck Pain, Musculoskeletal, Psychology*

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INTRODUCTION

Neck pain is one of the most common musculoskeletal complaints across various age groups, especially in individuals who engage in activities with a static body position for long periods, such as sitting in front of a computer or using digital devices repeatedly (Gao et al., 2023). The prevalence of neck pain has increased in recent years, not only impacting quality of life and daily function, but also increasing the economic burden due to decreased productivity and the need for health services (Daher & Halperin, 2021; Vassilaki & Hurwitz, 2014; Safiri et al., 2020; Kawai et al., 2017; Hoy et al., 2014).

In addition to physical factors such as poor ergonomic posture, a history of injury, muscle tension, and degenerative processes, psychological factors also play a role in the onset and worsening of neck pain (Wankhade et al., 2021; Shahidi et al., 2015; Andersen et al., 2002; Kazeminasab et al., 2022). Stress in response to perceived physical or social pressures that are difficult to control has been shown to affect muscle activity, nervous system sensitivity to pain stimuli, and an individual's perception of the intensity of the complaint (Linton & Shaw, 2021).

Problems arise when stress and neck pain form a mutually reinforcing cycle, where pain exacerbates stress, while stress increases muscle tension and exacerbates pain intensity (Linton & Shaw, 2021; Aboushaar & Serrano, 2024; Finestone et al., 2008; Rees et al., 2025). In college

students and workers, academic pressure, workload, prolonged use of digital devices, and lack of physical activity often contribute simultaneously, making it difficult to separate the influence of physical and psychological factors independently (Daher & Halperin, 2021; Cohen & Herbert, 1996; Linton & Shaw, 2011; Goldstein & Niaura, 1992; Ehrman, 1990). Furthermore, several systematic reviews have shown that stress and psychological disorders such as depression, anxiety, and other psychological distress are important predictors of the occurrence and recurrence of non-traumatic neck pain.-specific (Khatri et al., 2024; Yu et al., 2025; Verwoerd et al., 2019; Feleus et al., 2007; Ris et al., 2017).

The limitations of current knowledge lie in the lack of reviews explicitly linking stress levels to the incidence and intensity of neck pain through a systematic approach focusing on physiological mechanisms and pain perception, as well as the context of different student and worker populations (Liang et al., 2025; Ortego et al., 2016; Jannat, 2025). Furthermore, several studies still show inconsistent results, so an in-depth analysis that combines findings from various research designs is needed to clarify the direction of the relationship between stress and neck pain (Khatri et al., 2024).

The aim of this study was to systematically review the relationship between stress levels and the incidence of neck pain through a systematic literature review approach based on the 2020 PRISMA guidelines, taking into account physiological mechanisms, pain perception, postural factors, and relevant psychosocial factors. The urgency of this study lies in the importance of integrating a biopsychosocial approach in the prevention and management of neck pain, so that stress management, ergonomics education, and physiotherapy interventions can be designed in a more comprehensive and evidence-based manne (Liang et al., 2025; Fleischmann, 2026; Alagappan, 2025).

The novelty of this study lies in the combination of a focus on stress as a primary psychological factor, a review of recent findings (2021–2026), and the association of results with the context of practice in the fields of physiotherapy and psychology, which can form the basis for developing more holistic and contextual neck pain prevention strategies (Morf et al., 2025).

METHODS

This study used a systematic literature review approach based on the 2020 PRISMA guidelines to examine the relationship between stress levels and neck pain. A literature search was conducted in March 2026 through PubMed, ScienceDirect, and Google Scholar databases, using the keywords "stress levels," "psychological stress," "neck pain," "psychosocial factors," and "musculoskeletal neck pain." Included articles were peer-reviewed publications between 2021 and 2026, available in full text, and written in both Indonesian and English. Inclusion criteria for this review were developed using the PICOS framework (Buddrus et al., 2026; Eriksen & Frandsen, 2018; Buddrus et al., 2026; Methley et al., 2014; Kloda et al., 2020; Robinson et al., 2011; Amir-Behghadami & Janati, 2020). Participants included individuals from various populations, including students and workers, without age or gender restrictions. Intervention/Exposure was the level of stress or stress-related psychological factors. The observed outcome was the incidence or intensity of neck pain. Study Type encompassed the types of studies analyzed in the literature review, such as observational, cross-sectional, or cohort studies, that addressed the relationship between stress levels and neck pain. Comparison included comparisons between groups with and without stress, or between groups with different levels of stress. However, studies that did not conduct direct group comparisons were included as long as they addressed the relationship between stress and neck pain. Studies that did not specifically examine the relationship between stress and neck pain, were not available in full-text, or were published before 2021 were excluded from this review. The article selection process for this study followed four stages according to the PRISMA process: identification, screening, eligibility, and inclusion. Initially, 1,376 articles were identified through searches across various databases. After removing duplicates and initial screening based on titles and abstracts, 842 articles remained for further processing. The screening of titles and abstracts yielded 126 articles

deemed relevant to the research topic. These articles were then thoroughly reviewed in the full-text stage. From this process, 114 articles were eliminated due to inappropriate research methods, lack of topic relevance, or unavailability of the full text. This left 12 articles for the final stage. Finally, after considering their suitability for inclusion criteria, only 5 articles met all requirements and were systematically analyzed. These articles served as the primary basis for ensuring that the analyzed data was valid, relevant, and supported the research objectives.

RESULT AND DISCUSSION

This literature review analyzed five studies that met the inclusion criteria and addressed the relationship between stress levels and neck pain. The results showed variations in findings across studies, likely influenced by differences in respondent characteristics, measurement methods, and study designs (Table 1). In general, most studies indicated that higher stress levels were associated with increased incidence or intensity of neck pain, although some studies reported non-significant associations.

Table 1. Summary of Included Studies

Author (Years)	Country	Study Design	Population	Measure Tools	Main Outcomes
Adrianto et al. (2026)	Indonesia	Cross-sectional	Yogyakarta City Health Service Workers	Northwick Park Neck Pain Questionnaire, Perceived Stress Scale (PSS-10)	Stress Level, Neck Pain
Aulia et al. (2025)	Indonesia	Cross-sectional	Yogyakarta Students	NDI, IPAQ-SF, CV, DASS-2,	Neck pain, stress level, physical activity, neck curve
Kumar et al. (2024)	India	Cross-sectional	Medical students, constituent Colleges of Baba Farid University of Health Sciences, India	VAS, MSSQ, SAS	Neck pain, stress, anxiety.
Batool et al. (2022)	Pakistan	Cross-sectional	Young adults at Shifa Tameer-e-Millat University Islamabad, Pakistan	NPRC, DASS-21	Neck pain, depression, anxiety, stress,
Wankhade et al. (2021)	India	Cross-sectional	Undergraduate physiotherapy and nursing student	PSS, SAS, NPRS	Anxiety, Neck pain, Nursing, Stress,

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methods, and study designs. In general, most studies indicated that higher stress levels were associated with increased incidence or intensity of neck pain, although some studies reported non significant associations. This variation is important because it shows that the relationship between stress and neck pain cannot be understood as a simple direct association. Rather, neck pain appears to emerge from the interaction between psychological pressure, physical posture, pain perception, daily activity patterns, and broader psychosocial conditions. Therefore, the discussion of this review should not only emphasize that stress is related to neck pain, but should also explain how stress contributes to pain through physiological, behavioral, and psychological pathways.

Understanding psychological factors, particularly stress, is crucial in preventing and treating neck pain. Stress is not only associated with the onset of pain but also influences how severe the pain is perceived. This is because stress involves a complex interaction between physical and psychological mechanisms, including muscle tension, central nervous system pain modulation, and the individual's perception of pain. In other words, stress acts not only as a risk factor but also as a potentiator of pain severity. This means that individuals with similar physical exposure, such as prolonged sitting or frequent digital device use, may experience different levels of pain depending on their stress level, coping capacity, emotional condition, and sensitivity to pain. This interpretation strengthens the need to view neck pain through a biopsychosocial framework rather than through a purely mechanical explanation.

The Role of Psychological Factors in the Prevention and Treatment of Neck Pain

Psychological factors play a significant role in the onset and intensity of neck pain. Stress can increase muscle tension and make the nervous system more sensitive to painful stimuli, making the pain more severe (Świeboda et al., 2013; Burton et al., 2016; Janssen, 2002). This finding is important because it suggests that neck pain treatment should not only focus on visible physical symptoms. Although posture correction, stretching, and strengthening exercises remain necessary, they may not be sufficient when psychological stress continues to maintain muscle tension and increase pain sensitivity. In this sense, stress may function as a hidden driver that sustains or worsens neck complaints even when the physical strain has been reduced.

Therefore, neck pain treatment should not only focus on physical aspects, such as posture and stretching, but also incorporate psychological strategies. For example, stress management, muscle relaxation, counseling, and psychosocial support can help reduce the psychological burden and lower the risk of neck pain. These strategies are particularly relevant for students and workers because both groups are frequently exposed to prolonged sitting, academic or occupational pressure, repetitive digital device use, and limited recovery time. When psychological intervention is combined with physical rehabilitation, treatment becomes more comprehensive because it addresses both the bodily source of pain and the mental condition that may intensify the pain experience.

Stress Mechanisms of Neck Pain

Stress increases sympathetic nervous system activity, triggers muscle tension, and affects pain modulation in the central nervous system. This makes individuals more susceptible to complaints of cervical pain. Several studies have shown that college students with high levels of stress tend to experience more frequent and intense neck pain (Daher & Halperin, 2021; Chan et al., 2020; Ekpenyong et al., 2013; Kanaan et al., 2022; Jahre et al., 2020). This mechanism can be understood through the body's response to stress, where emotional pressure may cause sustained contraction of the neck and shoulder muscles. Over time, this sustained contraction can lead to fatigue, stiffness, restricted movement, and pain in the cervical region.

Understanding these mechanisms helps design interventions that not only address physical symptoms but also reduce stress as a contributing cause. If stress is ignored, treatment may only reduce symptoms temporarily without addressing one of the factors that helps maintain the pain cycle. Stress and neck pain may also reinforce each other. Pain can increase worry, reduce

concentration, disturb sleep, and interfere with academic or work performance. At the same time, stress can increase muscle tension and pain sensitivity, which may worsen the original complaint. This reciprocal relationship explains why some individuals continue to experience neck pain even when there is no severe structural abnormality. It also supports the need for prevention strategies that target stress regulation, relaxation, ergonomic behavior, and movement habits simultaneously.

Posture and Physical Activity Factors

Poor posture, prolonged sitting, and repetitive use of electronic devices increase mechanical stress on the neck (El et al., 2024; Goswami et al., 2024). This strain can be exacerbated by high levels of stress, increasing the risk of pain. When the head is positioned forward for long periods, the cervical muscles must work harder to support the head and maintain stability. This condition increases muscular load and may contribute to fatigue and discomfort. In students and workers, this problem becomes more relevant because learning, working, and communication increasingly depend on computers and smartphones.

However, posture should not be interpreted only as a physical issue. Stress may influence posture by making individuals more tense, less aware of body position, and more likely to maintain rigid or static positions for long periods. A stressed individual may unconsciously elevate the shoulders, tighten the jaw, reduce movement, or remain seated for longer periods without adequate rest. These responses increase mechanical strain on the neck and may amplify the effect of poor posture. Therefore, the interaction between posture and stress is important because it shows that physical and psychological factors may operate together rather than separately.

Preventive strategies should include posture education, regular rest breaks, and regular stretching exercises, especially for individuals who engage in high stance activities or work on computers. These strategies need to be practical and easy to apply in daily routines. For example, students and workers can be encouraged to take short movement breaks, adjust screen height, avoid prolonged forward head posture, and perform simple neck and shoulder exercises. Physical activity is also important because it improves muscle endurance, circulation, flexibility, and postural control. Without sufficient physical activity, the neck muscles may become less resilient to prolonged static load.

Psychosocial Factors

Psychosocial factors such as academic pressure, work demands, and insufficient sleep can increase stress, which in turn impacts the onset and intensity of neck pain (Andias & Silva, 2020; Igwesi-Chidobe et al., 2024). Theoretically, these factors influence pain perception through cognitive and emotional modulation. For example, individuals who experience high academic pressure or heavy workload may have less time for rest, physical activity, and recovery. They may also experience emotional exhaustion, sleep disturbance, and reduced coping capacity. These conditions can increase sensitivity to pain and reduce the body's ability to recover from musculoskeletal strain.

Pain prevention strategies should also include workload management, improved sleep patterns, and social support to reduce stress and enhance well being. This is particularly important because psychosocial factors may explain why some individuals experience severe neck pain while others with similar posture or activity patterns do not. In student populations, academic stress, examination pressure, long study hours, and frequent digital device use may operate together. In worker populations, job demands, repetitive tasks, time pressure, and poor ergonomic conditions may produce a similar risk pattern. These realities show that neck pain prevention should not be limited to individual exercise programs but should also consider the social and environmental conditions that contribute to stress.

A broader psychosocial perspective also helps avoid blaming individuals for their pain. Neck pain may not simply result from poor personal habits, but from the interaction between

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institutional demands, lifestyle patterns, limited rest, and psychological pressure. Therefore, universities, workplaces, and healthcare providers should promote healthier routines, ergonomic awareness, stress reduction programs, and supportive environments. Such efforts may reduce both psychological burden and physical risk factors.

Pain Perception and Psychological Responses

Pain is not only a reaction to physical stimuli but is also influenced by psychological conditions. The neuromatrix theory of pain explains that the experience of pain is the result of an integration of physical, cognitive, and emotional factors. Individuals experiencing high levels of stress tend to experience pain more intensely, so treatment must combine psychological approaches with physical interventions for more effective results. This explanation is highly relevant to neck pain because many cases of neck pain are non specific, meaning that the pain cannot always be fully explained by clear structural damage.

Psychological responses such as fear, worry, anxiety, and negative interpretation of pain may increase attention to bodily discomfort. When individuals become highly focused on pain, they may perceive it as more threatening and may avoid movement. This avoidance can reduce physical activity, weaken muscles, and increase stiffness, which may worsen neck pain over time. In this way, psychological responses do not merely accompany pain but may actively shape the course and severity of the condition.

Treatment should aim to reduce pain intensity and improve the individual's confidence in movement. Physiotherapy may help restore mobility, improve posture, and reduce muscle tension, while psychological strategies may help reduce fear, stress, and maladaptive coping patterns. A combined approach is more suitable because it recognizes that pain is both a bodily and psychological experience. This is especially important for students and workers who may continue to perform daily tasks despite pain, stress, and fatigue.

Implications for Prevention and Management

The findings of this review support the importance of a biopsychosocial approach in the prevention and management of neck pain. Stress, posture, physical activity, sleep, academic pressure, workload, and pain perception should be understood as connected factors. A purely physical approach may overlook the role of stress and psychosocial burden, while a purely psychological approach may ignore the mechanical strain caused by poor posture and prolonged static activity. Therefore, the most appropriate strategy is an integrated approach that addresses both physical and psychological contributors.

In practical terms, prevention programs should include ergonomics education, posture training, regular movement breaks, stretching, strengthening exercises, stress management, relaxation techniques, and sleep improvement. For students, universities can provide education on healthy study habits, digital device use, and stress coping strategies. For workers, institutions can support ergonomic workstation design, reasonable workload distribution, active break routines, and access to psychosocial support. These strategies are important because they target the actual conditions in which neck pain often develops.

This review also highlights the need for stronger future research. Since the included studies were mostly cross sectional, causal conclusions remain limited. Future studies should use longitudinal or intervention designs to examine whether stress precedes neck pain, whether neck pain increases stress, or whether both conditions develop together in a reciprocal cycle. Future studies should also use more consistent instruments to measure stress and neck pain so that findings can be compared more accurately across populations. In addition, future research should consider the role of sleep quality, physical activity, duration of digital device use, gender, and academic or occupational context as potential factors that may influence the relationship between stress and neck pain.

CONCLUSION

Based on the findings of a systematic review of five studies that met the inclusion criteria, it can be concluded that higher stress levels are generally associated with increased incidence and intensity of neck pain, although some studies reported associations that were not always significant. This pattern is consistent with evidence that stress amplifies muscle tension, increases the nervous system's sensitivity to pain stimuli, and modulates pain perception through psychological mechanisms such as anxiety and pain catastrophizing (Liang et al., 2025). The main limitations of this study are its reliance on a cross-sectional design, diverse population size, and differences in measurement instruments and definitions of stress, making it difficult to draw strong causal conclusions and generalize the findings across age groups and professions (Khatri et al., 2024). For further research, longitudinal designs or interventions that objectively measure stress and neck pain, such as Mendelian randomization or physiological stress measurements, are needed to clarify the direction of the relationship and the role of stress as a risk factor and consequence of neck pain (Morf et al., 2025). Furthermore, it is necessary to explore the interactions between stress, duration of digital device use, physical activity, and psychosocial factors such as sleep quality and social support, taking into account gender differences and work or academic contexts (Khatri et al., 2024).

SUGGESTION

From a practical perspective, these findings emphasize the importance of a biopsychosocial approach in the prevention and treatment of neck pain, where physiotherapists can combine ergonomics education, posture training, and physical strengthening with stress management strategies, relaxation, and psychological support to reduce psychological burden and improve the quality of life of individuals vulnerable to neck pain (Park et al., 2023).

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