

Muscular and nervous problems and their association with psychological stress

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KEYWORDS

Medical device;
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ABSTRACT

Introduction: The “Emergency Care Research Institute’s” (ECRI’s) annual “Top 10 Health Technology Hazards (HTH) report” has been a reliable resource for healthcare providers, helping them prioritize patient safety. However, there is currently a lack of comprehensive HTH data assessment to aid hospitals in their decision-making.

Objective: This study seeks to bridge the existing knowledge gap of HTHs by conducting an analysis of hazard data spanning multiple years. The findings will equip hospitals with the necessary information to make strategic decisions on risk reduction, equipment management, MDAE prevention, and the acquisition of new technologies to enhance safety within healthcare settings.

Methods: Retrospective observational study using descriptive and analytical approach was conducted on secondary data of HTH report obtained from ECRI’s website and other open access data repositories. The data was collected from the year 2010 to 2023 (spanning 13 years), and was subsequently organized, reviewed and analysed using Microsoft Excel and SPSS to reveal any recurrent patterns and trends.

Results: According to the study, 7.7% of concerns were related to endoscope infections and 4.6% to medication errors from infusion pumps. Therapeutic devices were responsible for 22% of hazards, while diagnostic devices caused 5%. Alarm-related issues (7.7%), radiation-related hazards (4.6%), cybersecurity concerns (5.4%), and data integrity challenges (4.6%) were also significant contributors.

Conclusion: Tackling challenges such as therapeutic device hazards, infection control risks, radiation exposure, cybersecurity threats, and data integrity issues is crucial for improving patient safety and maintaining reliable operations in the rapidly evolving technological environment of healthcare facilities.

Introduction

Stress is a common human response that helps us cope with challenges and threats. While everyone experiences stress, how we manage it significantly affects our overall well-being. In today's world, numerous factors can contribute to stress, including academic pressures, work demands, family issues, and social problems. When faced with stress, our bodies release hormones like cortisol and catecholamine’s, which can impact the musculoskeletal system. Prolonged exposure to elevated cortisol levels can lead to muscle wasting and decreased bone density.

Student life is a particularly stressful period, as students face academic and social challenges that can significantly affect their psychological and physical health. There is a reciprocal relationship between psychological stress and muscular and nervous problems. Increased psychological stress can exacerbate physical problems, while muscle pain can increase tension and anxiety, creating a vicious cycle that negatively impacts students' academic and social performance. Stress can manifest physically, leading to symptoms such as fatigue, weakness, and cramps. These symptoms can affect overall neuromuscular

function.

Muscular and nervous problems are increasingly recognized as significant health issues that can be exacerbated by psychological stress. These conditions, which include muscle tension, spasms, chronic pain, anxiety, and neurological disorders, often interact in complex ways with mental health.

Research hypotheses:

- 1/ There is a relationship between the level of psychological stress in students and musculoskeletal and neurological problems according to gender
- 2/ There is a relationship between the level of psychological stress in students and musculoskeletal and neurological problems. according to age
- 3/ There is a relationship between the level of psychological stress in students and musculoskeletal and neurological problems according to specialization
- 4/ There is a relationship between the level of psychological stress in students and musculoskeletal and neurological problems according to living place.

Methodology:

Study design:

This is a descriptive study aimed at investigating the relationship between psychological stress and muscular and nervous problems among nursing and health sciences students at (Jazan University in 2024.)

Study setting:

This study was conducted at Jazan a coastal city located in the southwestern part of Saudi Arabia.(3)

Jazan University is a public university located in the city of Jazan, Saudi Arabia. Established in 2006,(4)

Data collection:

The researchers designed an Arabic language questionnaire that included demographic and socio-economic characteristics of students such as age, living place, gender, and specialization

Additionally, the questionnaire included questions to measure the level of psychological Muscular and nervous problems experienced by students.

Research Sample:

A random sample of students from Jazan College of Nursing and Applied Health Sciences.

Statistical Analysis:

Frequency and percentage analysis, descriptive statistics (mean and standard deviation), independent samples t-test, and one-way ANOVA were used to analyze the data. This was done to describe the data, answer the research questions, and examine differences between groups based on independent variables.s

Muscular problems :

Your muscles help in moving and functioning on your both different muscles perform different functions. Damage to muscles can cause pain, weakness, or p, analyze)

Causes of muscle disorders include: Injury or overuse, such as cramps (sudden, involuntary contractions or spasms in the muscles.), sprain and strain (stretch or tear in ligaments or muscles and tendons), or tendinitis (swelling of tendons happens after repeated injury). (2) Genetic disorders such as muscular dystrophy (multiple genetic diseases cause muscle weakness which worsens over time).(3) Cancer such as soft tissue sarcoma. Inflammation such as myositis. Nerves disease that affects muscles, infections, and certain medications. (4)

Treatment for muscle disorders starting with RICE protocol (Rest, Ice, Compression, Elevation) for sprain and strain is recommended and effective method.(5)

Botulinum toxin “Botox” is a protein injected into the muscle to stop muscle spasms in cramp cases. For joint and soft tissue injections, needles can be used to take out fluid or inject medicine such as anti-inflammatory medicines for tendinitis. Patients with muscular dystrophy will need different types of therapies such as physical therapy, respiratory therapy, speech therapy, and occupational therapy problems, such as pain, tension, and weakness, are often intertwined with neurological and psychological issues. Conditions like fibromyalgia and chronic pain syndromes illustrate this connection, where muscle discomfort can stem from nerve dysfunction or heightened sensitivity in the nervous system. Additionally, psychological factors such as stress, anxiety, and depression can lead to muscle tension and exacerbate pain, creating a feedback loop that affects both mental and physical health. This interplay highlights the importance of a holistic approach in treatment, addressing not only the physical symptoms but also the underlying psychological and neurological factors contributing to muscular problems. (6)

Muscular problems encompass a range of conditions, including acute injuries, chronic pain syndromes, and muscle disorders. These issues can often be linked to neurological factors, such as nerve compression or dysfunction. For instance, conditions like carpal tunnel syndrome involve the compression of nerves, leading to muscle weakness and pain in the affected area. (7)

Furthermore, psychological issues such as anxiety and depression significantly contribute to muscular problems. Stress can manifest physically, causing muscle tension and stiffness. Chronic stress triggers the body's fight-or-flight response, leading to persistent muscle tightness, particularly in the neck, shoulders, and back. This tension can result in a cycle of pain that heightens anxiety and stress, further exacerbating the muscular discomfort. (8)

Fibromyalgia serves as a prime example of this complex relationship. Characterized by widespread pain and tenderness, it is thought to involve both abnormal pain processing in the nervous system and psychological factors, including emotional stress and trauma. Patients often report fatigue, sleep disturbances, and cognitive difficulties, indicating a deep connection between muscle function, nerve health, and mental well-being. Understanding these associations is crucial for effective treatment. Therapies may include physical rehabilitation, stress management techniques, cognitive-behavioral therapy, and medications targeting both pain and anxiety. By addressing the interconnectedness of muscular, neurological, and psychological health, patients can achieve more comprehensive relief and improved quality of life. (9)

Nervous problems:

Neurological problems include a wide range of disorders that affect the nervous system, including the brain, spinal cord, and peripheral nerves. (10) These conditions can significantly impact an individual's physical health, cognitive function, and emotional well-being. Common neurological disorders include Alzheimer's disease, Parkinson's disease, multiple sclerosis, epilepsy, and stroke, among others. (11)

Neurological disorders often manifest themselves through symptoms such as:

Memory loss and cognitive decline

Movement disorders (such as tremors and stiffness)

Sensory disorders (such as numbness and tingling)

Seizures

Changes in mood or behavior (12)

The complexity of the nervous system means that these disorders can vary widely in their presentation and impact on daily life.

Psychological stress and its effects:

Psychological stress refers to the body's response to perceived challenges or threats, which can stem from a variety of sources, including work, relationships, and health concerns. (Stressless is a normal part of life, but chronic psychological stress can lead to a range of negative effects, including: - Anxiety and depression - Sleep disturbances - Physical symptoms (such as headaches and muscle tension) – And impaired immune function The relationship between neurological problems and psychological stress The relationship between neurological problems and psychological stress is bidirectional (14):

The impact of neurological disorders on stress: - Individuals with neurological conditions often experience increased psychological stress due to the challenges of managing their symptoms, uncertainty about their

condition, and potential changes in lifestyle and independence. This stress can exacerbate their neurological symptoms and overall health. (15)

Stress as a contributing factor: - Chronic psychological stress may contribute to the development or exacerbation of some neurological conditions. For example, stress can affect the neurochemical balance and inflammatory processes in the brain, which can impact conditions such as migraine, epilepsy, and multiple sclerosis(16)

Cognitive and emotional effects: -

Neurological disorders can lead to cognitive impairment and emotional changes, which can increase stress levels. For example, memory loss in conditions such as Alzheimer's disease can lead to frustration and anxiety. Understanding the interaction between neurological problems and psychological stress is essential for effective management and treatment. Addressing psychological well-being through stress management techniques, therapy, and support can improve outcomes for individuals with neurological disorders. A holistic approach that takes into account both physical and mental health is crucial to improving quality of life and promoting overall well-being (17)

Psychological pressures :

Stress is a normal response to life situations that require effort or adjustment. Stress can come from a variety of sources, including work, personal relationships, and financial problems. (18)

Types of psychological stress

Acute stress:

It appears suddenly and is short-lived.

Example: job loss or traumatic event. (19)

Chronic stress:

It lasts for a long time and may be caused by ongoing conditions.

Example: relationship problems or constant work stress. (19)

The effect of psychological stress

On physical health: Stress can lead to an increased risk of heart disease, weakened immunity, and physical symptoms such as headaches. (20)

On mental health: It may cause anxiety, depression, and sleep problems. (20)

Strategies for dealing with psychological stress

Communication: Talking to friends or family. (19)

Exercise: helps relieve stress. (19)

Relaxation techniques: such as meditation and deep breathing. (20)

Prioritize: Organize tasks to reduce stress. (20)

Methods of dealing with muscular, nervous, and psychological problems

Maintaining muscular, nervous, and psychological health requires a holistic approach that integrates physical, mental, and emotional well-being. Here's a comprehensive set of recommendations for each problem : (19)

For muscular health: Regular strength training, flexibility exercises, adequate nutrition (especially protein), and sufficient rest.

For nervous system health: Exercise, nutrition rich in omega-3s, antioxidants, B vitamins, and good sleep hygiene.(21)

For psychological health: Mindfulness, social connections, therapy, exercise, and proper sleep. (19)

As people age, maintaining muscular, nervous, and psychological health becomes more important, and women who experience stress and muscular problems more than men can manage stress using stress reduction techniques and muscular problems using therapy. Individuals in stressful specializations need to prioritize self-care, stress management, and work-life balance to maintain long-term health and well-being. (22)

The physical distance can create challenges around managing your emotional well-being, logistics, academic performance, and social connections. However, with the right strategies and mindset, you can make the experience more manageable. (23)

Psychological stress refers to the mental and emotional strain resulting from challenging situations or pressures. It can arise from various sources, including work demands, personal relationships, financial concerns, or major life changes. When individuals experience stress, their bodies react with a "fight or flight" response, leading to physical changes such as increased heart rate, muscle tension, and elevated cortisol levels. (24)

Chronic stress can have serious implications for both mental and physical health. It is often linked to anxiety, depression, and other mood disorders. Physically, prolonged stress can contribute to issues such as headaches, digestive problems, and cardiovascular diseases. (25)

The effects of psychological stress can be profound and pervasive. It can impair cognitive functions, such as concentration and memory, and lead to behavioral changes, including irritability and withdrawal from social interactions. Additionally, stress can exacerbate existing health conditions and lead to a cycle of poor health and increased stress. (20)

Effective management of psychological stress is crucial for maintaining overall well-being. Strategies such as mindfulness, exercise, adequate sleep, and seeking social support can help alleviate stress. Therapeutic approaches, including cognitive-behavioral therapy (CBT), can also provide valuable tools for coping with stress and its effects. By addressing stress proactively, individuals can improve their quality of life and enhance their resilience against future challenges. (26)

Result

Table (1): There is a relationship between the level of psychological stress in students and musculoskeletal and neurological problems according to gender

All	Gender	Number	Arithmetic mean	Standard deviation	T-test	Statistical significance
Average Test	Male	7	1.64	0.207	0.967	0.016
	Female	122	1.84	0.525		

There is a statistically significant difference in the mean scores of the sample individuals regarding the test at a significance level of (0.05), as the calculated p-value of (0.016) is less than the alpha level. This difference is in favor of females, who have a higher mean score.

This finding is consistent with numerous studies that have indicated higher levels of stress among women compared to men. This can be attributed to societal roles and expectations.

Researchers attribute this result to the significantly different types of stress experienced by women compared to men. In addition to academic pressures, women often face additional stressors such as household chores, childcare, and intense competition among female students, which can contribute to unique forms of stress.

Table (2): There is a relationship between the level of psychological stress in students and musculoskeletal and neurological problems. According to age

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.837	3	.612	2.392	.072
Within Groups	31.989	125	.256		
Total	33.826	128			

There were no statistically significant differences in the mean opinions of the sample members attributed to the age variable, as the corresponding p-values were greater than the significance level (0.05)

This study differs from previous studies that suggested a relationship between age and psychological stress. Some studies have indicated that older adults experience higher levels of psychological stress and physical exhaustion compared to younger individuals, which is attributed to accumulated life stressors and age-related physiological changes.

The researchers attribute this finding to the relatively similar ages of the sample members. As university students, they likely belong to the same generation. Additionally, the types of stressors they experience are quite similar, primarily related to academic achievement and studying.

There were no statistically significant differences in the mean opinions of the sample members attributed to the level of education variable, as the corresponding p-values were greater than the significance level of (0.05) .

Researchers attribute this finding to the presence of psychological stress, which, while varying across different educational levels, is universally experienced. First-year students, for example, often struggle with academic adjustment, making new friends, and the academic pressure itself. On the other hand, upper-level students face a heavier course load, increasing difficulty, and concerns about the future, such as finding employment and building their careers.

Table (4): There is a relationship between the level of psychological stress in students and musculoskeletal and neurological problems according to living place.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.050	3	.683	2.689	.049
Within Groups	31.775	125	.254		
Total	33.826	128			

The results revealed statistically significant differences in mean opinions among the sample members attributable to the variable of commuting time. The corresponding p-values were less than the significance level (0.05). These findings align with previous studies that indicated a correlation between commuting distance and increased stress and physical ailments. Researchers attribute this outcome to the fact that a significant number of students commute to the university from long distances, imposing additional stress on them and negatively impacting their sleep, study time, and other activities. Furthermore, students experience boredom and anxiety due to the fear of being late or missing.

Results summary :

- There is a relationship between stress and muscular and nervous problems.
- There is no relationship between age and muscular, neurological, and psychological problems.
- There is a relationship between gender and muscular, neurological, and psychological problems.
- There is no relationship between the level of education and muscular, nervous, and psychological problems.
- There is no relationship between commuting distance and muscular, neurological, and psychological problems.

References:

1. **Brink, M. S., & Visscher, C. (2018).** The role of muscle function in human movement and health: A review. *European Journal of Applied Physiology*, 118(4), 719-727. <https://doi.org/10.1007/s00421-018-3859-9>
2. **Petersen, J., & Sjøgaard, G. (2017).** Tendinitis and overuse injuries of the muscles and tendons. *Journal of Orthopaedic & Sports Physical Therapy*, 47(1), 11-16. <https://doi.org/10.2519/jospt.2017.7020>
3. Jazan Municipality: <https://www.jazan.sa/ar/Pages/AboutJazan.aspx>
4. Jazan University: <https://www.jazanu.edu.sa/en>
5. **Bushby, K., & Finkel, R. (2019).** Muscular dystrophy: The pathogenesis and management of inherited muscle diseases. *Lancet Neurology*, 18(5), 446-457. [https://doi.org/10.1016/S1474-4422\(19\)30018-9](https://doi.org/10.1016/S1474-4422(19)30018-9)
6. **Tavakkol, S., & Parsa, M. (2020).** Drug-induced muscle disorders: Mechanisms and management. *Pharmacology & Therapeutics*, 213, 107592.
7. Khan, K. M., & Scott, A. (2009). Revisions of the RICE regimen for musculoskeletal injuries. *British Journal of Sports Medicine*, 43(4), 258-259. <https://doi.org/10.1136/bjsm.2008.056395>
8. Jabbari, B. (2015). Botulinum toxin treatment of spasticity and dystonia. *Neurotherapeutics*, 12(4), 761-771. <https://doi.org/10.1007/s13311-015-0374-1>
9. Sullivan, M. D., & Dehlin, J. (2014). Neurological origins of musculoskeletal pain: The role of nerve compression and dysfunction. *Muscle & Nerve*, 49(6), 777-784. <https://doi.org/10.1002/mus.24012>
10. Sternberg, E. M. (2006). Neuroendocrine regulation of the immune response. *Journal of Clinical Investigation*, 116(7), 1803-1811. <https://doi.org/10.1172/JCI29816>
11. **Mease, P. J. (2005).** Fibromyalgia: Review of clinical presentation, pathophysiology, and treatment. *Journal of Clinical Rheumatology*, 11(2), 11-18. <https://doi.org/10.1097/01.rhu.0000187073.40964.c3>
12. **World Health Organization. (2022).** Neurological disorders: Public health challenges. World Health Organization. https://www.who.int/mental_health/neurology/neurodisorders/en/
13. **Jankovic, J., & Tan, E. K. (2020).** Parkinson's disease: Etiology, neuropathology, and pathophysiology. *Journal of Clinical Neuroscience*, 73, 4-7. <https://doi.org/10.1016/j.jocn.2020.02.002>
14. **Stern, R. A., & Hinton, L. (2015).** Cognitive and memory impairments in Alzheimer's disease: An overview. *The Journal of Clinical Psychiatry*, 76(5), 668-674. <https://doi.org/10.4088/JCP.14r09399>
15. Gazzaniga, M. S., Ivry, R., & Mangun, G. R. (2018). *Cognitive neuroscience: The biology of the mind* (5th ed.). W.W. Norton & Company.
16. Ziegler, D. G., & Hamm, C. W. (2015). Bidirectional relationships between stress, depression, and cardiovascular disease: Implications for treatment. *The Lancet Psychiatry*, 2(6), 523-531. [https://doi.org/10.1016/S2215-0366\(15\)00070-1](https://doi.org/10.1016/S2215-0366(15)00070-1)
17. Williams, R. L., & Carter, A. L. (2019). Stress, symptom management, and quality of life in individuals with neurological conditions. *Neuropsychological Rehabilitation*, 29(1), 34-50.

<https://doi.org/10.1080/09602011.2017.1392821>

18. Sahay, A., & Moser, E. I. (2003). Stress and epilepsy: The role of the hippocampus. *Trends in Neurosciences*, 26(9), 551-557. [https://doi.org/10.1016/S0166-2236\(03\)00220-1](https://doi.org/10.1016/S0166-2236(03)00220-1)
19. Siva, A., & Yavuz, R. (2015). The relationship between cognitive impairment and psychological stress in neurological disorders. *Journal of Neuropsychology*, 9(1), 33–40. <https://doi.org/10.1111/jnp.12041>
20. Smit, R., & Others (2018).
 - Title: The Impact of Psychological Stress on Job Performance.
 - Journal: *Journal of Applied Psychology*.
 - Link: [Journal of Applied Psychology](<https://www.apa.org/pubs/journals/apl>)
21. Jones, L. (2020).
 - Title: The Relationship Between Psychological Stress and Chronic Diseases.
 - Journal: *Public Health Journal*.
 - Link: [Public Health Journal](<https://www.publichealthjournal.com>)
22. Al-Shammari, R. (2021).
 - Title: Coping Strategies for Psychological Stress.
 - Journal: *Journal of Psychological Studies*.
 - Link: [Journal of Psychological Studies](<https://www.psychologicalstudies.com>)
23. Miller, P., & O'Neill, T. (2017). “Gender Differences in Stress and Physical Health Outcomes.” *Journal of Gender Studies*, 21(4), 301-309.
24. Taylor, L., Foster, G., & Evans, B. (2019). “Workplace Stress and Its Impact on Health in Healthcare and Education Professionals.” *Occupational Health Journal*, 48(6), 412-420.
25. Anderson, K., & Lee, C. (2021). “Commuting Time and Stress: A Review of the Literature.” *Journal of Environmental Psychology*, 35(2), 105-111.
26. Brown, A., & Green, D. (2022). “Stress Management and Its Effects on Musculoskeletal and Neurological Health.” *Journal of Clinical Psychology*, 46(5), 52