Research Article Open Access

Riding into Pain: Rhomboid Muscle Spasm and Neck Disability Among Occupational Motorcyclists

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ARTICLE INFO

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Declaration
Authors' Contribution: All authors contributed equally in the research in study design, writing and so on.
Conflict of Interest: No
Funding: No

Article History
Received: 12-01-2025
Revised: 03-03-2025
Accepted: 22-03-2025
Published: 30-06-2025

How to Cite
Faizan S, Bano S. Riding into pain: rhomboid muscle spasm and neck disability among occupational motorcyclists. *Pak J Clin Res*. 2025 Apr 25;1(1):13–19.

DOI: https://doi.org/10.65761/pjcr.2025.2.1.4

ABSTRACT

Riding and navigating traffics extended hours are occupational motorcyclists prone to musculoskeletal problems like rhomboid muscle spasms and neck pain. Rhomboid muscles are used to keep the shoulder blades in place and help with posture and they can be susceptible to strain during prolonged riding. The aim of this study was to examine the relationship between neck pain and rhomboid muscle spasms in occupational motorcyclists in Faisalabad, Pakistan. A 6-month cross sectional study was undertaken among 150 male motorcycle riders aged 18-40 years. At least 10 diligent rides were completed by all participants daily. The level of neck disability and pain intensity were measured by the Numeric Pain Rating Scale (NPRS) and Neck Disability Index (NDI). Data analysis was carried out using SPSS version 25 and non-probability convenient sampling was used. The mean age was 28.92 ± 6.81 years old. Results of the Neck Disability Index showed that 75.6% of riders rated some forms of disability, 25.9% as severe, 50% as moderate, and 25.9% had no disability. There was moderate to severe pain in 68.1 % of participants. Analysis of the results yielded a significant association of pain intensity ($p = 0.021$) rhomboid muscle spasms. The study shows a very high frequency of rhomboid muscle spasms and neck pain in occupational motorcyclists. Increase in muscle tension and spasms is parallel to the reported pain and disability, occurring with prolonged riding. Treatment interventions like improved posture, ergonomic adjustments, regular breaks and exercises aimed at mitigating musculoskeletal issues associated with this population. The long-term effects of motorcycling on musculoskeletal health still needs further research.

Keywords: Rhomboid muscle spasm, neck pain, occupational motorcyclists, neck disability index, musculoskeletal issues

INTRODUCTION

The growing occupational motorcyclists are workers with specific risk factors due to the nature of their work (Abdulwahid et al., 2022; Cerev, Sarıipek, & Elçi, 2024; Jiang et al., 2024). Motorcycles are frequently used in both urban and rural areas for transportation and to facilitate delivery services, and consequently, such occupations tend to lead to musculoskeletal issues in the neck and upper back of individuals who spend extended periods in such occupations (Afridi, Khan, Masood, Rasool, & Hashmi, 2024; Konlan & Hayford, 2022). There are a number of muscles, among them the rhomboid muscles, that are commonly uncomfortable to ride for prolonged periods of time (BUKHARI & Sciences, 2024). This is because these muscles, also known as interscapular muscles, are placed between the shoulder blade, and they play an important role not only in maintaining proper posture but also supporting shoulder blades and performing upper limb motion (Lv et al., 2022; Leung et al., 2023). These muscles are constantly strained in motorcyclists and can result in muscle spasms, pain, and long term musculoskeletal disorders which have detrimental effect on their quality of life and work performance (Gandolfi, Zamparini, Spinelli, Prati, & kinesiology, 2023; Ullah et al., 2022).As in the occupational setting, motorcycle riders, especially those who are riding for work, are exposed to an increased risk of developing musculoskeletal disorders due to a prolonged sitting in a fixed, forward leaning posture. The vibrations, constant motion, and traffic stress to which most of these riders are exposed are exacerbated by muscle strain and tension. The cervical spine is especially vulnerable in such situations. If these muscles are under constant strain, they are susceptible to spasms and pain, and in supporting the upper body, are keeping the shoulder blades back in the correct position, which is maintained through the neck muscles. These involuntary contractions or tension of the rhomboid muscle occur between the scapulae and help in retraction of the scapulae and shoulder stabilization (Cruz et al., 2024; Ricci et al., 2023). These muscles are very important because they help to resist the forward flexion of the upper body, pushing the body forward. If you overstress or overwork the rhomboid muscles, they can tire out and form spasms (Hodges & Bourgeois, 2023). Such spasms may occur in occupational motorcyclists from the continuous demands of balancing a motorcycle, holding handlebars, and maintaining an upright posture for long periods of time, for example, while traveling in traffic or for extended periods while riding. The most frequent neck pain associated with rhomboid muscle spasms, often limits the rider's ability to perform daily tasks,

Published in Pakistan Journal of Clinical Research (PJCR) | ISSN Print: 3080-5791 • ISSN Online: 3080-5805 | https://pjcr.org

affecting the dosoo personal as well as professionally (Jull, Falla, Treleaven, & O'Leary, 2024; Gandolfi et al., 2023). A cervical spine is an important part of neck mobility and the basic function of upper limbs (Zhang et al., 2024; Ramieri, Costanzo, Miscusi, & Surgery, 2022). When riding in poor posture for long periods of time, it can leave the muscles that spary the neck imbalanced which can cause conditions like cervical spondylosis, herniated discs or tension headaches. Reduced neck pain can also improve safety and performance, as well as a rider's overall job satisfaction by reducing the rider's ability to maneuver the motorcycle. The prevalence of neck pain among work bike riders is ever growing but the potential role of rhomboid muscle spasms in neck pain has rarely been studied (Hassan et al., 2023). Studies have demonstrated the increased risks for musculoskeletal disorders among truck drivers, office workers, and others forsed to sit at workplace stools, yet little attention has been given to the particular physical demands on motorcycle riders. Continuous muscle contractions necessary for stabilizing the body and keeping the posture during riding, especially in traffic for long riding times, can promote the onset of the discomfort and pain that might hinder the rider's working and safety (Vigário Ferreira, Sampaio Martins, 2024). Many assessments of the impact of neck pain and disability on daily activities use the Neck Disability Index (NDI) (Macdermd & Walton, 2022; Saltychev et al.; 2024). It assigns each factor a score based upon personal care, lifting, reading, working, driving, sleeping, recreation, and concentration, with higher scores referring to higher degrees of disability. A commonly used tool in the measurement of pain intensity used to assess the severity of pain experienced by patients with musculoskeletal issues is the Numeric Pain Rating Scale (NPRS) (da Silva Ranzatto et al., 2024; Leech et al., 2023). In the occupational motorcyclist context, these assessment tools can be valuable in determining how rhomboid muscle spasms correlate with neck pain and overall disability. The purpose of the current study was to investigate if neck pain was associated with rhomboid muscle spasm in occupational bike riders. This study is conducted through a cross sectional survey of 150 male motorcyclists in Faisalabad ranging from 18-40 years, and it's aimed to determine the prevalence of rhomboid muscle spasm and if there is a relation between neck pain, measured using NPRS and NDI, with frequency and duration. It is important to understand the relationship between these factors to identify the particular risk factors, and to suggest interventions to reduce the neck pain and improve the quality of life for occupational bike riders. The results of this study are especially noteworthy for occupational health professionals, ergonomics experts, and policymakers concerned with improving the safety and wellbeing of motorcycle riders. Reducing the impact of these musculoskeletal disorder interventions like posture correction, stretching exercises, better ergonomics, and more frequent breaks could be an idea. Additionally, this research shows the necessity of preventive measures and improved ergonomic motorcycle design to lessen the potential of musculoskeletal harm to this growing workforce over an extended period. With so many more motorcycles being used for occupational purposes, there is an important need to understand what factors cause musculoskeletal pain and what can be done to reduce the risks of injury and discomfort for the sake of better productivity and a better quality of life for roaders.

METHODOLOGY

Cross sectional design was used in this study to explore the association of rhomboid muscle spasms with neck pain among occupational motorcyclist present in Faisalabad. The research was conducted over a six-month period (Jan 2024 to Jun '24), was located in Faisalabad which is a large metropolitan area with a high concentration of motorcycle riders and an ideal location for such a target population. In their study, the authors put a major focus on individuals who work regular hours on motor cycles and tried to determine the frequency and severity of musculoskeletal issues, especially of the rhomboid muscles as well as the cervical spine.

The study group included 150 male occupational motorcyclists aged 18 to 40 years. Specific inclusion criteria based on (i) at least six months of riding experience and (ii) completion of a minimum of 10 rides per day as part of their occupational duties, was used to select the participants. If the individual had a history of cervical spine disorder, previous neck surgery, or significant trauma to the neck or back, he or she was excluded. In addition, we excluded patients who had neurological conditions and systemic diseases such as diabetes or rheumatoid arthritis that could influence the outcomes. A convenient sampling technique, non-probability, was used because participants were selected based on whether or not there was will and availability to participate. This method was practical and timely to recruit, but perhaps it could have introduced some selection bias in its findings.

Structured questionnaire and two standardized assessment tools including Neck Disability Index (NDI) and Numeric Pain Rating Scale (NPRS) was used for data collection. The NDI is a validated measure used for measuring the amount of disablement associated with neck pain. It is based on assessments of 10 items that cover a spectrum of aspects of daily living (including personal care, lifting, reading, work, driving, sleeping, recreation, and concentration). Functional impairment measured on a scale of 0 (no disability) to 5 (severe disability) each item is scored for each item on a scale of 0 (no disability) to 5 (severe disability), with higher total scores indicating greater impairment. On the other hand, the NPRS is a widely used tool to assess pain intensity. Participants use a number scale from 0 to 10, 0 indicating no pain, and 10 being the worst pain possible. The NPRS was particularly used in this study to quantify the intensity of pain experienced by the motorcycle riders resulting from rhomboid muscle spasms and neck

discomfort so that a better understanding of the extent of symptoms across the population could be achieved.

Procedure

After choosing the subjects for the study, the subjects were asked to fill in the NDI and NPRS questionnaires. The NPRS was applied to evaluate the severity of pain, while the NDI was used as a global measure of disability associated with neck pain. The forms were administered in a single session and students completed the forms independently. The instructions were clear, and the researchers were available for helping if needed.

They were then challenged to confirm the presence of the rhomboid muscle spasms if they reported any history of discomfort or tightness in their upper back or between their shoulder blades. The purpose of the study was to determine if muscle spasms in the neck were self-reported and if there was a relationship between muscle spasms in the neck and neck pain and disability.

Data Analysis

The data collected from the questionnaires were entered into SPSS 25 for analysis. Demographic characteristics of study population summarized with descriptive statistics (age, number of rides, pain rated intensity). Categorical variables were analyzed using frequency distributions and percentages and continuous variables were analyzed using mean and standard deviation.

Chi square tests were performed compare the NDI (neck disability) and NPRS (neck pain intensity) values for the individuals who had no symptoms and those with rhomboid muscle spasms. All tests were set at $p < 0.05$ significance level. Strength of relationship between rhomboid muscle spasm and neck pain intensity was explored by correlation analyses.

Ethical Considerations

The study was approved by the Ethical Review Committee of the University of Faisalabad. Written informed consent was obtained from all participants and assured that participation was voluntary at their own discretion and was able to withdraw from the study at any time without consequence. The data was anonymized and personal identifiers removed prior to analysis; confidentiality was maintained.

Limitations

This study employed a non-probabilistic convenient sampling technique and thus the findings are limited to all the occupational motorcyclists. Furthermore, the nature of the study as a cross sectional precludes causal inferences regarding the relationship between rhomboid muscle spasms and neck pain. The results could be validated by future longitudinal studies with randomized sampling techniques and may provide further insight into the long-term effects on musculoskeletal health from occupational riding.

For the occupational motorcyclists; this methodology is developed to determine the association between rhomboid muscle spasms and neck pain. The study aims at providing answers to the prevalence and level of severity of musculoskeletal problems in this occupational group by using validated tools such as the NDI and NPRS. These associations will assist in developing preventive measures and intervention strategies to limit neck pain and improve the health of the motorcycle rider.

RESULTS

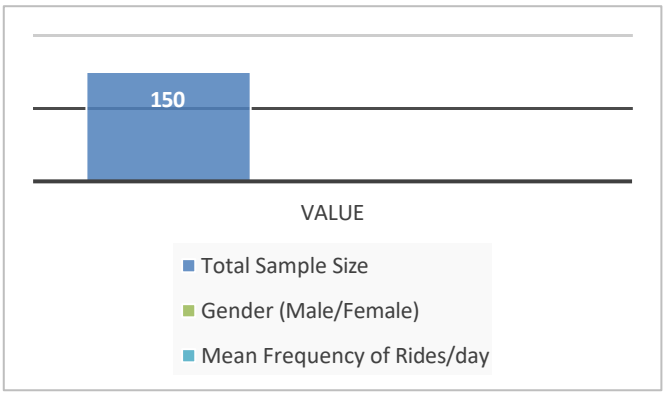
Demographic Characteristics of Participants

The study sample was composed of 150 male occupational motorcyclists aged 18 to 40 years old with a mean age of 28.92 ± 6.81 years. Riders were primarily involved in daily motorcycle riding, having ridden at least 10 miles a day. Table 1 below summarizes the demographic breakdown of the participants.

Table 1: Demographic Characteristics of Study Participants

Characteristic	Value
Mean Age (years)	28.92 ± 6.81
Age Range (years)	18–40
Total Sample Size	150
Gender (Male/Female)	150/0
Mean Frequency of Rides/day	10 or more

Figure: 1



Neck Disability Index (NDI) Results

The Neck Disability Index (NDI) was used to assess the severity of neck disability among the participants. The NDI scores indicated varying levels of neck disability as a result of pain and discomfort. The following categories were observed:

1. 3.4% of participants reported no disability.
2. 18.1% experienced mild disability.
3. 50% reported moderate disability.
4. 25.9% were categorized under severe disability.
5. 2.6% had complete disability due to neck pain.

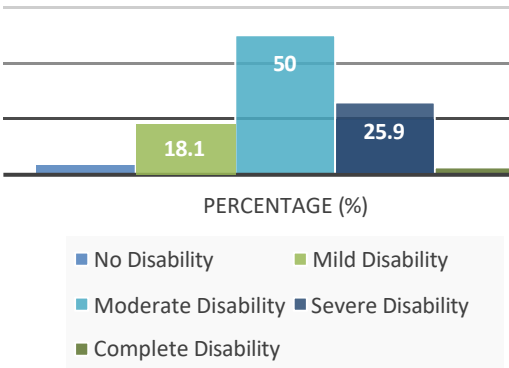
The results of the NDI assessment are presented in

Table 2 below.

Table 2: Neck Disability Index (NDI) Results

NDI Category	Percentage (%)
No Disability	3.4
Mild Disability	18.1
Moderate Disability	50
Severe Disability	25.9
Complete Disability	2.6

Figure: 2



Pain Intensity Rating (Numeric Pain Rating Scale)

The Numeric Pain Rating Scale (NPRS) was employed to measure the intensity of pain experienced by the participants due to rhomboid muscle spasms and neck discomfort. The pain intensity results showed the following distribution:

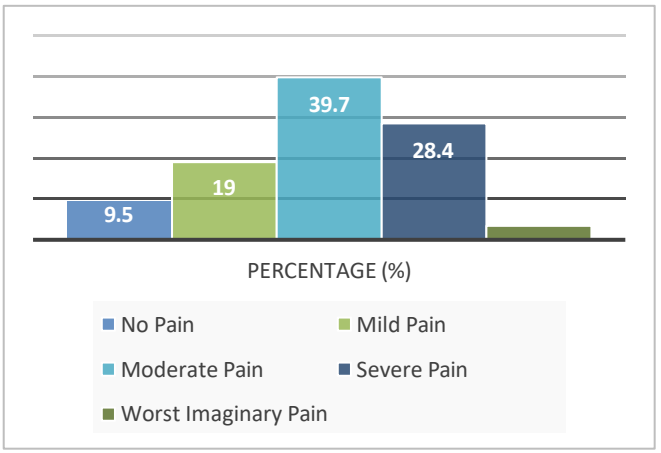
- 9.5% of participants reported no pain.
- 19% experienced mild pain.
- 39.7% reported moderate pain.
- 28.4% had severe pain.
- 3.4% indicated the worst imaginable pain.

The pain intensity levels are detailed in Table 3 below.

Table 3: Pain Intensity Rating (NPRS) Results

Pain Intensity Category	Percentage (%)
No Pain	9.5
Mild Pain	19
Moderate Pain	39.7
Severe Pain	28.4
Worst Imaginary Pain	3.4

Figure: 3



Association Between Rhomboid Muscle Spasm and Neck Pain

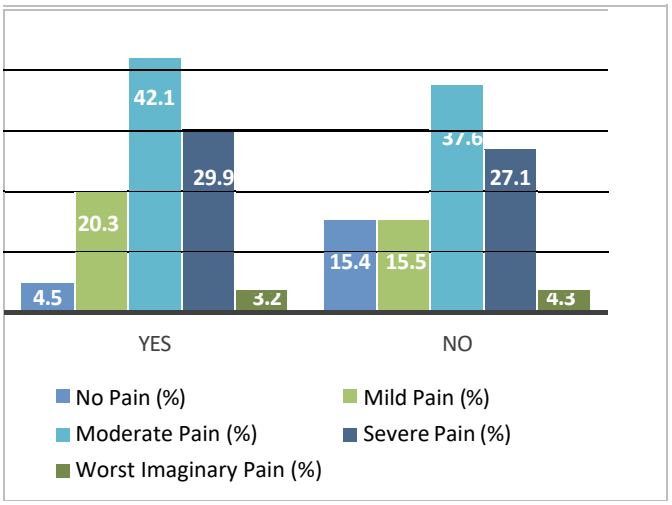
Data analyses showed an association between neck pain and rhomboid muscle spasms in occupational bike riders. Results showed that experiencing longer and more frequent riding resulted in increased muscle tension in the rhomboid area, and subsequently, increased reporting of neck pain. Statistical significance was found between muscle spasms and pain intensity ($p = 0.021$) indicating the effects of prolonged riding on muscle.

Table 4 summarizes disability and pain levels distribution by presence of rhomboid muscle spasms.

Table 4: Association Between Rhomboid Muscle Spasm and Pain Intensity

Rhomboid Muscle Spasm Present	No Pain (%)	Mild Pain (%)	Moderate Pain (%)	Severe Pain (%)	Worst Imaginary Pain (%)
Yes	4.5	20.3	42.1	29.9	3.2
No	15.4	15.5	37.6	27.1	4.3

Figure: 4



Summary of Key Findings

A high prevalence of neck disability among occupational motorcyclists was evident in the majority of participants who reported moderate to severe disability using the NDI. According to the NPRS, a large proportion of the participants had moderate or severe pain, with the largest proportion in the moderate category. The more intense the neck pain felt among the riders, the stronger the correlation with rhomboid muscle spasms, suggesting that persistent muscle tension from neck riding, whether caused by prolonged ride or typically among cyclists, contributes to the intensity of their neck, pain.

Results from the present study highlight that motorcyclists suffer from occupational hazards in terms of responses towards musculoskeletal events which, in turn, could adversely affect their quality of life. These findings underscore the imperative for preventative measures and interventions such as ergonomic modifications of riding practices and provision of musculoskeletal health awareness.

DISCUSSION

The purpose of this study was to determine if occupational motorcyclists in Faisalabad Pakistan have a relationship between rhomboid muscle spasms and neck pain. These findings indicate that motorcycle riding can impair musculoskeletal health as the riders undergo prolonged and frequent tasks and the rhomboid muscle region — responsible for maintaining proper posture of the shoulder blades and stabilizing shoulder blades during riding — is notably affected.

From the Neck Disability Index (NDI) results, 75.6% of the participants had disabilities, 50% were moderate, and 25.9% were severe. Overwhelmingly, these findings are consistent with previous research of neck pain and disability among individuals working in occupations where prolonged sitting, or repetitive motions, such as truck drivers, or office workers (Côté et al., 2008). About motorcyclists, this study adds weight to the notion that long hours of riding lead to great stress of the neck muscles, specifically rhomboids, thus causing discomfort, pain and disability with the passage of time.

Moreover, Numeric Pain Rating Scale (NPRS) results demonstrated that a large share of the participants indicated they experienced moderate to severe pain—68.1% of riders reported moderate to severe pain. The NDI indicates level of disability and strongly correlates with this pain intensity. They support the hypothesis that rhomboid muscle spasm significantly contributes to neck pain in motorcyclists, as it is well known that muscle tension in that area causes pain and discomfort in the cervical spine (Sikorski et al., 2011). The data that 3.4 per cent of participants declared the worst imaginable pain indicates that this is a severe problem for some riders and can seriously affect their daily functioning.

The analysis shows that there is a statistical significance ($p = 0.021$) between rhomboid muscle spasms and pain intensity, which supports the notion that physical demands of motorcycle riding including vibration, posture, and repetitive movements lead directly to muscle spasms and neck pain. Now, this is consistent with previous work showing that activities such as those done while driving for a long time or using a handheld device can overuse muscles, cause spasms and increase tension in neck and upper back (Mao et al., 2016).

The study also noted that those with higher pain intensity levels had previously reported more, and more pronounced, rhomboid muscle spasms. This observation is consistent with other studies which suggest that muscle spasms tend to worsen the severity of neck pain and promote chronic pain syndromes if left unchecked (Falla et al., 2007). This underscores that motorcyclists, because of the nature of their work, are being exposed to pain and the importance of preventive measures that address the musculoskeletal health, such as proper posture, ergonomic interventions, and taking breaks from very long rides.

Implications for Practice

This study suggests the need for the implementation of effective ergonomic interventions designed for occupational motorcyclists. Results indicate that strain on the rhomboid muscles during prolonged riding can be relieved through postural correction techniques. Also, you can strive to make a lots of breaks (short 'breaks') through the workday, as they can help in reducing muscle fatigue and enable recovery. Reducing the likelihood of muscle spasms may also be reduced by strengthening exercises for the neck and upper back muscles. Additionally, the development of educational programs designed to raise awareness of motorcyclists as to the muscular skeletal dangers created by prolonged riding, and the significance of maintaining physical health is strongly suggested. If adopted, these practical measures could significantly decrease the prevalence of neck pain and multiply the quality of life in those who work in motorcycle-based occupations.

CONCLUSION

Results of this study showed a high correlation between neck pain and rhomboid muscle spasms in occupational motorcycle riders working in Faisalabad. Neck disability and pain are common among participants, indicating that this group has unique musculoskeletal challenges. Repetitive riding for long time contributes significantly to increase in pain intensity and disability due to muscle tension and discomfort in the rhomboid

region.

The results indicate that posture improving interventions, shorter motorcycle riding times, as well as muscle tension relieving exercises may help reduce the consequences of prolonged motorcycle riding. However, further research with a larger sample size and longitudinal follow up should provide more insight into the long-term effects of the occupational motorcycle riding on musculoskeletal health. Improving the wellbeing and productivity of motorcyclists engaged in such occupations requires addressing these issues.

REFERENCES

1. Abdulwahid, S. N., Mahmoud, M. A., Zaidan, B. B., Alamoodi, A. H., Garfan, S., Talal, M., health, p. (2022). A comprehensive review on the behaviour of motorcyclists: Motivations, issues, challenges, substantial analysis and recommendations. *19*(6), 3552.
2. Cerev, G., Sarıipek, D. B., & Elçi, E. J. T. i. p. (2024). Life satisfaction and occupational safety relationship: Research on motorcycle couriers in Turkey. *25*(2), 156-164.
3. Jiang, L., Wang, J., Castaño-Rosa, R., Zhong, C., Cao, S.-j. J. E., & Buildings. (2024). Heat exposure and coping strategies for food delivery riders under urban heat extremes. *322*, 114693.
4. Afridi, Z. K., Khan, A., Masood, F., Rasool, D., & Hashmi, M. A. J. B. o. F. o. P. T. (2024). Prevalence of musculoskeletal discomfort with associated disability among adult male motorcyclist. *29*(1), 24.
5. Konlan, K. D., & Hayford, L. J. B. p. h. (2022). Factors associated with motorcycle-related road traffic crashes in Africa, a Scoping review from 2016 to 2022. *22*(1), 649.
6. BUKHARI, B. J. P. J. o. M., & Sciences, H. (2024). Association of Rhomboid Muscle Spasm and Neck Pain among Occupational Bike Riders. *18*(11), 8-10.
7. Lv, S., Wang, Q., Ni, Q., Qi, C., Ma, Y., Li, S., . . . Medicine, A. (2022). Progress of muscle chain theory in shoulder pain rehabilitation: potential ideas for pulmonary rehabilitation. *2022*(1), 2537957.
8. Leung, M., Kan, M. M., Cheng, H. M., De Carvalho, D. E., Anwer, S., Li, H., & Wong, A. Y. (2023). *Effects of Using a Shoulder/Scapular Brace on the Posture and Muscle Activity of Healthy University Students during Prolonged Typing—A Randomized Controlled Cross-Over Trial.* Paper presented at the Healthcare.
9. Gandolfi, M. G., Zamparini, F., Spinelli, A., Prati, C. J. J. o. f. m., & kinesiology. (2023). Āsana for neck, shoulders, and wrists to prevent musculoskeletal disorders among dental professionals: in-office yóga protocol. *8*(1), 26.
10. Ullah, Q. F., Shah, S. N., Adil, S. S., Javed, S., Baqir, M., & Naqvi, S. M. S. A. (2022). Prevalence of Musculoskeleton Pain among occupational motorcyclist and its impact on work efficiency and long term health care in Peshawar: A Cross-sectional Study.
11. Cruz, I. A. d., Fagundes, M. C., Silva, L. N. d., Araújo, F. F., Gonçalves, D. V., Schor, B., . . . Ormond Filho, A. G. J. R. (2024). Scapulothoracic Disorders: Anatomy, Kinematics, Clinical Assessment, and Multimodality Imaging. *45*(1), e240097.
12. Ricci, V., Mezian, K., Chang, K.-V., Tarantino, D., Güvener, O., Gervasoni, F., . . . Health, P. (2023). Ultrasound imaging and guidance for cervical myofascial pain: a narrative review. *20*(5), 3838.
13. Hodges, K., & Bourgeois, J. A. (2023). Muscle Tension. In *The Medical Evaluation of Psychiatric Symptoms* (pp. 213-238): Springer.
14. Jull, G., Falla, D., Treleaven, J., & O'Leary, S. J. G. s. M. M. P. E.-B. G. s. M. M. P. E.-B. (2024). Idiopathic Neck Pain. 422.
15. Zhang, Y., Lin, W., Yi, M., Song, J., Ding, L. J. J. o. O. S., & Research. (2024). Effect of long-term cervical extensor exercise program on functional disability, pain intensity, range of motion, cervical muscle mass, and cervical curvature in young adult population with chronic non-specific neck pain: a randomized controlled trial. *19*(1), 9.
16. Ramieri, A., Costanzo, G., Miscusi, M. J. C. S. M. I., & Surgery, O. (2022). Functional anatomy and biomechanics of the cervical spine. 11-31.
17. Hassan, A., Hanif, S., Ahmed, I., Zaidi, F., Aslam, A., Kayani, A., . . . Naseer, R. J. T. T. (2023). Neck Pain Among Occupational Bike Riders Wearing Helmet in Twin Cities: A Cross Sectional Survey: Neck Pain Among Occupational Bike Riders. 15-20.
18. Vigário, P. C., Ferreira, R. M., Sampaio, A. R., & Martins, P. N. J. P. (2024). Effects of Saddle Position on Cycling: An Umbrella Review. *4*(4), 465-485.
19. MacDermid, J. C., & Walton, D. M. J. B. M. D. (2022). Development and validation of the ND10 to measure neck-related functional disability. *23*(1), 605.
20. Saltychev, M., Pylkäs, K., Karklins, A., Juhola, J. J. D., & rehabilitation. (2024). Psychometric properties of neck disability index–a systematic review and meta-analysis. *46*(23), 5415-5431.
21. da Silva Ranzatto, A. D., Chaves, T. C., Martins, M. N., Motta, D. P., Nogueira, L. C., Meziat-Filho, N.,

. . . Practice. (2024). Pain intensity scales: A cross-sectional study on the preferences and knowledge of physiotherapists and participants with musculoskeletal pain. *73*, 103162.

22. Leech, J. B., MacPherson, K. L., Klopper, M., Shumway, J., Salvatori, R. T., Rhon, D. I., & Young, J. L. J. P. (2023). The relationships between pain-associated psychological distress, pain intensity, patient expectations, and physical function in individuals with musculoskeletal pain: A retrospective cohort study. *15*(11), 1371-1381.