Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 19s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

To Study the Correlation Between Chronic Upper Back Pain and Shoulder Joint Propriocepton In Under Graduate Students

Neelam Tejani[1], Swaroop Patil*[2], Amrutkuvar Rayjade[3], Seema Sharma[4], Sagar Rathod[5]

[1]Assistant Professor, Pediatric Department, D.Y.Patil College of Physiotherapy, D.Y.Patil Education Society, Deemed to be University, Kolhapur

[2*]Intern, D.Y.Patil College of Physiotherapy, D.Y.Patil Education Society, Deemed to be University, Kolhapur

[3]Principal, D.Y.Patil College of Physiotherapy, D.Y.Patil Education Society, Deemed to be University, Kolhapur

[4]Professor, Musculoskeletal Department, Dr. D.Y.Patil College of Physiotherapy, Dr. D.Y.Patil Vidyapeeth, Deemed to be University, Pune

[5]Intern, D.Y.Patil College of Physiotherapy, D.Y.Patil Education Society, Deemed to be University, Kolhapur

***Corresponding Author: -**

Swaroop Patil

Intern, D.Y.Patil College of Physiotherapy, D.Y.Patil Education Society, Deemed to be University, Kolhapur

Email.ID: swarooppatil4623@gmail.com

Cite this paper as: Neelam Tejani, Swaroop Patil, Amrutkuvar Rayjade, Seema Sharma, Sagar Rathod, (2025) To Study the Correlation Between Chronic Upper Back Pain and Shoulder Joint Propriocepton In Under Graduate Students. *Journal of Neonatal Surgery*, 14 (19s), 963-968.

ABSTRACT

Background

Musculoskeletal pain is a prevalent issue among young adults, with neck, shoulder, and upper back pain being commonly reported in college students. Contributing factors include carrying heavy bags, prolonged studying hours, sustained abnormal postures during lectures, and extended use of mobile devices in improper positions (e.g., complete neck flexion, slouched shoulder posture) while sitting unsupported.

Objectives

This study aimed to assess chronic upper back pain using the Numeric Pain Rating Scale (NPRS) and altered proprioception in undergraduate students.

Materials and Methods

A total of 69 undergraduate students experiencing chronic upper back pain were recruited for this study. Pre- and post-assessments were conducted to measure changes in pain and shoulder joint proprioception. Pain intensity was subjectively assessed using the Numeric Pain Rating Scale (NPRS), where participants selected a number corresponding to their pain level. Shoulder joint proprioception and range of motion (ROM) were measured using a goniometer. The ROM was evaluated for flexion, extension, abduction during both eyes open and eyes closed phases.

Results

The analysis revealed that undergraduate students with chronic upper back pain demonstrated reduced shoulder joint range of motion (ROM) Closed eyes , which significantly showed a difference in their proprioception. Difference was as follows: Flexion: Open eyes :150, Close eyes :120, Extension: Open eyes : 50° ,Close eyes : 40°, Abduction: Open eyes : 135°, Close eyes : 110°.

Conclusion

The study concludes that undergraduate students with chronic upper back pain exhibit significantly altered shoulder joint proprioception.

Keywords: *Musculoskeletal Pain, Upper Back Pain, Shoulder Joint, Proprioception, Range of Motion, Pain Measurement, Algometry, Goniometry*

OBJECTIVE

To study the correlation between chronic upper back pain and shoulder joint proprioception in under graduate students.

1. INTRODUCTION

Musculoskeletal pain has been identified as major problem among young adults. In a young college going student the main problem has been reported as neck, shoulder, and upper back pain. The most probable factors contributing to it can be carrying heavy bags, long hours of studying and sustained abnormal posture during lectures and studying. Along with these use of mobiles in wrong posture for long period (complete neck flexion, slouched posture of shoulder) with unsupported sitting upper back pain[1]. The muscles that are primarily affected are Trapezius • Deltoid • Infraspinatus • Teres minor Teres major • Serratus anterior these can be assessed by using Numerical Pain Rating Scale, pain pressure threshold and goniometer. Activities of daily living require synchronous sensory inputs from all the senses such as visual, vestibular, auditory, tactile and olfaction2 . Along with these senses the sense of proprioception which enables us to understand where our limbs and joints are in relation to our body and surrounding (position as well as movement) when visual feedback is absent2 . Proprioception includes can also be found by assessing joint position sense (JPS). Proprioception provides necessary information that act as an input for motor planning2 . Hence degradation of proprioception leads to alterations in accuracy, movement control and recruitment timing of motor commands which therefore affects posture. Shoulder joint proprioception, on the other hand, is critical for maintaining the proper functioning of the shoulder during both static and dynamic activities[6]. Dysfunction in proprioception can lead to poor movement patterns, compensatory behaviours, and eventually, injury. The shoulder's proprioceptive feedback mechanism has been found to be interconnected with the cervical and thoracic regions of the spine. This relationship suggests that pain and dysfunction in one area could influence the other, making it important to examine the correlation between upper back pain and shoulder proprioception[6].

The undergraduate population is particularly susceptible to musculoskeletal disorders, including upper back pain and proprioceptive dysfunction. Caldwell et al[6]. (2014) observed that students who engage in extensive reading and computer use are at a higher risk of developing chronic back pain, which could potentially affect the function of other joints, such as the shoulder. Furthermore, a study by Kollias et al. (2018) examined the impact of academic-related stress on physical health and found a strong correlation between mental stress, poor posture, and musculoskeletal pain among students[5]

Understanding the relationship between chronic upper back pain and shoulder proprioception in undergraduate students can have several important implications[5]:

- Preventive measures: Identifying at-risk individuals could help develop interventions aimed at preventing the onset of shoulder dysfunction or upper back pain[3].

- Rehabilitation strategies: Findings from this study could inform rehabilitation programs designed to restore shoulder joint proprioception and alleviate chronic upper back pain[2].

- Academic performance: Addressing musculoskeletal pain could improve students' overall well-being and academic performance by reducing pain-related distractions[5]. This introduction provides an overview of the significance of studying chronic upper back pain and shoulder joint proprioception in undergraduate students[3]. Chronic upper back pain is a widespread issue that can significantly impact an individual's quality of life, while the proprioceptive function of the shoulder is vital for normal movement and injury prevention. The correlation between these two factors remains underexplored, and this study aims to address that gap, potentially offering insights into effective treatments and preventive measures[7].

The relationship between chronic upper back pain and shoulder joint proprioception in undergraduate students remains underexplored. While studies have separately investigated the effects of chronic pain on musculoskeletal function and proprioception, there is limited research that connects these two aspects in the context of upper back pain and shoulder function[3]. This study aims to fill this gap by exploring the correlation between these two factors in a population that is at significant risk of developing musculoskeletal disorders[7].

2. METHODOLOGY

1.Study type- observational

2.Study design- cross-sectional

3.Sampling method – convenience sampling

5.Target population- under-graduate student

6.Study duration- 1 year 6 months

7.Sample size- 136

MATERIAL

1.Numeric pain rating scale (NPRS): It is a scale used to assess the intensity of pain. It has numbers written on it from 0-10, 0- no pain and 10- unbearable pain. This will be explained to the subject and he will be asked mark a number on the scale that corresponds with his intensity of the pain. It is a subjective assessment.

2.Goniometer: It is a tool clinically used to assess the range of motion of a joint

SELECTION CRITERIA

Shoulder movement	Flexion	Extension	Abduction	Internal rotation	External rotation
Open eyes	152.69	52.00	153.39	79.41	90
Close eyes	148.94	49.12	149.74	75.94	90
Difference	3.72	2.88	3.61	3.50	0

INCLUSION CRITERIA

1. Age -16-22 years
2. Under-graduate students
3. Both genders
4. Complains of chronic upper back pain

EXCLUSION CRITERIA

1.Previously existing pathology

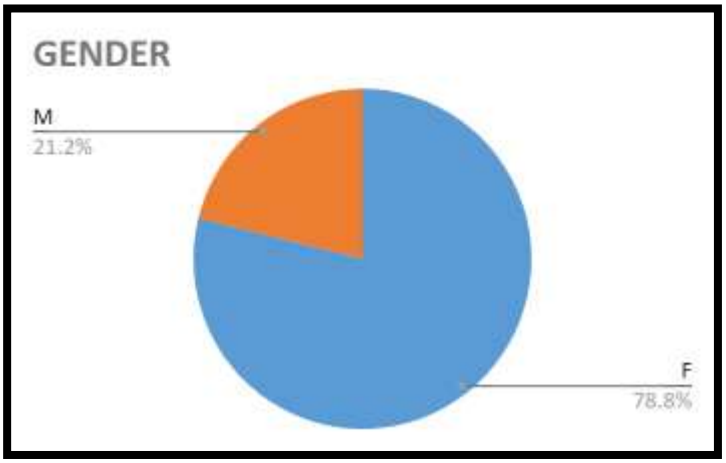
2.Spinal cord injuries

3.Recent fractures

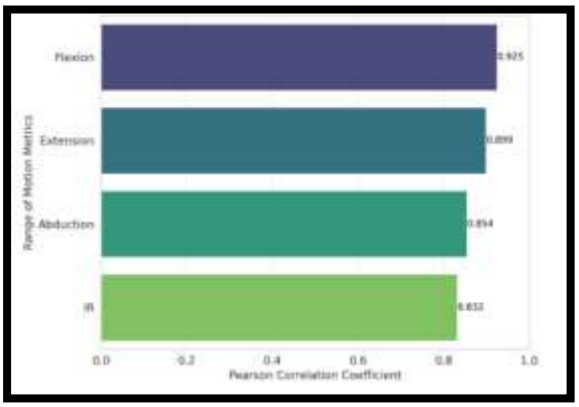
4.Spinal deformities

3. RESULT

Graph 1 Illustrates the overall gender distribution of the total population, which shows that the male represents 21.2% whereas, 78.8% of females.



The mean values of flexion, extension, abduction, internal rotation, and external rotation are explained in Table 2, where difference between open and close eyes are noticed.



- **Flexion**: **0.925** (Strong positive correlation)
- **Extension**: **0.899** (Strong positive correlation)
- **Abduction**: **0.854** (Strong positive correlation)
- **Internal Rotation (IR)**: **0.832** (Strong positive correlation)

The difference between mean values of flexion, extension, abduction, internal rotation, and external rotation with open and close eyes are 3.72, 2.88, 3.61, 3.50and 0 respectively.

These results indicate a strong positive correlation between the NPRS and all shoulder joint motion measurements.

4. DISCUSSION

Joint proprioception refers to the body's ability to sense the position, movement, and orientation of its joints without relying on visual input. It is a type of sensory feedback system that helps the brain understand where a joint is in space and how it is moving[1]. Proprioception is provided by specialized receptors called proprioceptors, which are located in the muscles, tendons, and joints themselves. These receptors send signals to the brain about the angle, speed, and direction of joint movements, allowing for smooth and coordinated motor function Importance: Proprioception is critical for balance, coordination, and posture. It helps prevent injury by allowing for adjustments in movement before strain or damage occurs. For example, proprioception is why you can touch your nose with your eyes closed—your brain knows the exact position of your arm and hand in space[2].

Joint active range of motion (ROM) refers to the total range through which a joint can be moved actively (by the person themselves) without external assistance[2]. It is the degree to which a joint can be moved by the muscles and tendons around it, as opposed to passive range of motion, which involves movement assisted by an external force (e.g., a therapist or gravity). Importance: Joint active range of motion is a key indicator of joint flexibility and muscle strength. It is typically measured in degrees using a goniometer or other measurement tools and can vary between individuals based on factors such as age, gender, physical condition, and presence of joint injuries or disorders[1].

Gender Breakdown of the Population Observation: The pie chart shows a clear difference in the gender distribution of the population[2]. Males represent 21.2% of the population, while 78.8% of the population are females Interpretation: The data suggests a significant gender imbalance, with females vastly outnumbering males. This could be indicative of a variety of factors, such as demographic trends, population sampling, or a specific cohort being analysed. If this data is for a specific geographic region or a specialized study group (e.g., a particular age range, profession, or region), it could reflect the natural gender ratio or a factor affecting the group in question. This disparity might prompt questions about underlying reasons for the skewed gender distribution, such as social, cultural, or economic influences that could affect the participation or representation of males and females. If this is part of a larger study, it's crucial to consider the implications of such an imbalance, especially in studies that require gender equality for accurate representation or conclusions[4].

Shoulder Range of Motion (ROM) with Open and Closed Eyes This graph presents data on shoulder range of motion (ROM) with and without eye closure, across different movements (flexion, extension, abduction, internal rotation, and external rotation). The following values were observed: Flexion: Open eyes: 150° Closed eyes: 120° Extension: Open eyes: 50° Closed eyes: 40° Abduction: Open eyes: 135° Closed eyes: 110° Internal Rotation: Open eyes: 90° Closed eyes: 80° External Rotation: Open eyes: 90° Closed eyes: 90° In all ranges of motion (flexion, extension, abduction, internal rotation, and

external rotation), the shoulder's range of motion is greater when the eyes are open compared to when the eyes are closed. The largest difference is observed in flexion, where the open eyes ROM is 150° and the closed eyes ROM is 120°, indicating a difference of 30°. The smallest difference appears in extension, with a 10° difference between open and closed eyes[2]. The data suggests that vision plays a role in shoulder mobility. The body might rely on visual feedback to enhance spatial awareness, proprioception, and overall motor control, especially for complex movements[3]. When the eyes are closed, individual may struggle to adjust properly to changes in arm position, leading to reduced range of motion in some movements[5]. Proprioception and Balance: The reduction in range of motion when the eyes are closed may indicate the importance of proprioceptive input from the eyes for optimal shoulder function. Vision is a key component of balance and coordination, and its absence can challenge the body's ability to maintain efficient motor function[1]. This could be particularly relevant in physical therapy, sports science, or injury rehabilitation, where clinicians might assess how different sensory inputs affect movement performance[2]. Clinical Implications: This information might be valuable in understanding how individuals with visual impairments or conditions affecting vision may experience limitations in their shoulder movements. It could also be applied in designing therapeutic interventions that account for how visual cues enhance movement control[7].

Correlation Between Pain Pressure Algometer (PPA) and Shoulder Range of Motion (ROM):

The correlation values (r) between PPA and shoulder ROM are as follows: Flexion: -0.065 (Weak negative correlation) Extension: -0.003 (Near-zero correlation) Abduction: -0.013 (Near-zero correlation) Internal Rotation (IR): -0.070 (Weak negative correlation)

These values indicate very weak or negligible negative correlations between the pain threshold (measured by the algometer) and shoulder ROM. A weak or near-zero correlation suggests that changes in pain pressure tolerance do not meaningfully affect the range of motion across all shoulder movements. Possible explanation: Individuals with varying pain pressure thresholds may still maintain similar ranges of shoulder motion. The pain experienced during movement may not be severe enough to limit ROM significantly[2]. Measurement errors, individual variability, or sample characteristics could also contribute to these low correlations[2]. Pain threshold (as measured by the algometer) does not predict limitations in shoulder movement. Therapeutic interventions focusing on increasing pain tolerance might not directly improve ROM Further investigation is needed to identify other factors (e.g., muscle stiffness, joint integrity) that may better explain ROM restrictions[1].

Correlation Between Numeric Pain Rating Scale (NPRS) and Shoulder Range of Motion (ROM):

The correlation values (r) between NPRS and shoulder ROM are as follows: Flexion: 0.925 (Strong positive correlation) Extension: 0.899 (Strong positive correlation) Abduction: 0.854 (Strong positive correlation) Internal Rotation (IR): 0.832 (Strong positive correlation) These values indicate strong positive correlations between self-reported pain levels (NPRS) and shoulder ROM across all planes of motion[1]. As pain intensity increases, the range of motion also increases, which may seem counterintuitive[2]. Possible explanation: Individuals with greater ROM might experience increased mechanical stress, leading to higher pain perception. Alternatively, those with pain may still attempt to maintain or increase ROM due to functional demands or compensatory mechanisms. Measurement bias—patients reporting more pain may also be undergoing more extensive motion testing[5]. Patients with higher pain levels demonstrate a wider ROM, suggesting that pain may not always limit motion but could reflect increased mechanical load. Rehabilitation strategies should balance pain management with maintaining functional mobility[3].

LIMITATION

The limitation of this study was that ranges and pain is measured for only for upper back pain and cervical pain region. Hence it only focuses on the severe joints affected.

5. CONCLUSION

The most notable difference is seen in flexion (30°), while the smallest difference is in extension (10°). This suggests that pain at cervical joint coordination and control of shoulder movement, because of pain, individuals may affects experience reduced proprioception and spatial awareness, leading to decreased performance in joint mobility. This finding has important implications for physical therapy and rehabilitation, especially in considering for rehabilitation.

CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest concerning the content of the present study.

ETHICAL APPROVAL

The institutional ethics committee of D.Y. Patil college of physiotherapy has given the permission to initiate the project work

Protocol number: ICE.124/2025

Keywords

Proprioception, Upper back pain, Graduates.

REFERENCES

[1] Ager AL, Borms D, Deschepper L, Dhooghe R, Dijkhuis J, Roy JS, Cools A. Proprioception: How is it affected by shoulder pain? A systematic review. Journal of hand therapy. 2020 Oct 1;33(4):507-16.

[2] Amiri Arimi S, Ghamkhar L, Kahlaee AH. The relevance of proprioception to chronic neck pain: a correlational analysis of flexor muscle size and endurance, clinical neck pain characteristics, and proprioception. Pain Medicine. 2018 Oct 1;19(10):2077-88.

[3] Ager AL, Roy JS, Roos M, Belley AF, Cools A, Hebert LJ. Shoulder proprioception: how is it measured and is it reliable? A systematic review. Journal of Hand Therapy. 2017 Apr 1;30(2):221-31.

[4] Sherrington CS. The integrative action of the nervous system. InScientific and Medical Knowledge Production, 1796-1918 2023 May 31 (pp. 217-253). Routledge.

[5] B D Chaurasia's Human Anatomy, Volume 1, Eighth Eidition.

[6] Smeets R, Köke A, Lin CW, Ferreira M, Demoulin C. Measures of function in low back pain/disorders: Low Back Pain Rating Scale (LBPRS), Oswestry Disability Index (ODI), Progressive Isoinertial Lifting Evaluation (PILE), Quebec Back Pain Disability Scale (QBPDS), and Roland-Morris Disability Questionnaire (RDQ). Arthritis Care Res (Hoboken). 2011 Nov;63 Suppl 11:S158-73. doi: 10.1002/acr.20542.Cite Here

[7] Lewis, V. & Kennerley, R. (2017). A preliminary study to investigate the prevalence of pain in elite dressage riders during competition, in the United Kingdom. Comparative Exercise Physiology. 13. 1-6. 10.3920/CEP170016. Cite Here

[8] Gyi, Diane & Porter, J. (1998). Musculoskeletal problems and driving in police officers. Occupational medicine (Oxford, England). 48. 153-60. 10.1093/occmed/48.3.153. Cite Here

[9] Abdul Samad, Nurul Izzah & Hamzah, Nurul Ainun & Anua, Siti Marwanis & Mamat, Mohd & Nawi, Mohd. (2022). Prevalence Of Back Pain Among Food Delivery Riders In Kota Bharu, Kelantan: A Preliminary Study. 5. 52-60. Cite Here

[10] Md Isa, Mohd Hafzi & Sarani, Rohayu & Paiman, Noor & Wong, Shaw Voon. (2011). Prevalence and Risk Factors of Musculoskeletal Disorders of Motorcyclists. Malaysian Journal of Ergonomics. 1. 1-10. Cite Here

[11] Binoosh, S A & Anoop, Ga. (2019). A Study on Musculoskeletal Disorders among Two-Wheeler Riders of Kerala State in India. Cite Here

[12] Chawathe VS, Mhambre AS, Gaur AK, Pusnake VJ, Sharma R, Wangdi NI. Prevalence of Pain in Medical Representatives using Two-wheeler for Daily Commute. J Recent Adv Pain 2017;3(2):61-65. Cite Here

[13] Citation: Trupti Siddapur., et al. ""Correlation Between Pain and Disability in Cervical and Lumbar Spine in Two-Wheeler Riders"". Acta Scientific Orthopaedics 5.10 (2022): 79-83.

[14] .Bovenzi M, Rui F, Negro C, DAgostin F, Angotzi G, Bianchi S, et al. An epidemiological study of low back pain in professional drivers. Journal of sound and vibration. 2006;298:514-39.

[15] Akinbo SR, Odebiyi DO, Osasan AA. Characteristics of back pain among commercial drivers and motorcyclists in Lagos, Nigeria. West Afr J Med. 2008 Apr;27(2):87-91. PMID: 19025021. (2)

[16] Tiemessen IJ, Hulshof CT, Frings-Dresen MH. Low back pain in drivers exposed to whole body vibration: analysis of a dose-response pattern. Occup Environ Med. 2008 Oct;65(10):667-75. doi: 10.1136/oem.2007.035147. Epub 2008 Jan 23. PMID: 18216125.

[17] Araújo NC, Souza OF, Morais MJD, Leitão FNC, Bezerra IMP, Abreu LC, Rodrigues LMR. Osteomuscular symptoms on motorcycles in the city of Rio Branco, Acre, Brazil, West Amazon. Medicine (Baltimore). 2021 Apr 23;100(16):e25549. doi: 10.1097/MD.0000000000025549. PMID: 33879704; PMCID: PMC8078344.

....