ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

INCIDENCE OF SHOULDER IMPINGEMENT SYNDROME AMONG PATIENTS WITH CARPAL TUNNEL SYNDROME: EPIDEMIOLOGICAL STUDY

Sikha[1], Piyush Sharma[2], Vikas Kumar[3]

[1]Senior Resident, Department of Physical Medicine & Rehabilitation, Patna Medical College and Hospital, Patna, Bihar, India
[2]Post Graduate Trainee, Department of Physical Medicine & Rehabilitation, Patna Medical College and Hospital, Patna, Bihar, India
[3]Professor & Unit Head, Department of Physical Medicine & Rehabilitation, Patna Medical College and Hospital, Patna, Bihar, India

Corresponding Author:
Vikas Kumar,
(vikasjha025@gmail.com)

Abstract

This study examined the occurrence of shoulder impingement syndrome (SIS) in a group of 250 patients with carpal tunnel syndrome (CTS) at Patna Medical College and Hospital's Physical Medicine and Rehabilitation Outpatient Department over 18 months. It was found that a significant percentage of patients with CTS also experienced SIS, with a higher occurrence among women and individuals over 50 years old. Significant associations were found between SIS and factors such as age, duration of CTS symptoms, and occupation involving repetitive use, as revealed by logistic regression analysis. These findings highlight the importance of recognizing the relationship between CTS and SIS, indicating the necessity for comprehensive clinical evaluations and proactive strategies to care for patients who are at risk. This study enhances our understanding of the relationship between CTS and SIS and highlights the significance of prompt and comprehensive treatment methods.

Keywords: Carpal Tunnel Syndrome, Shoulder Impingement Syndrome, Epidemiology, Occupational Risk

INTRODUCTION

Shoulder impingement syndrome (SIS) and carpal tunnel syndrome (CTS) are two common musculoskeletal conditions that have a significant impact on the quality of life and functional abilities of those affected [1]. Shoulder impingement syndrome is a condition where the rotator cuff tendons and the subacromial bursa are compressed against the acromion, resulting in shoulder pain and limited range of motion. On the other hand, carpal tunnel syndrome occurs when the median nerve in the wrist is compressed within the carpal tunnel [2,3]. This leads to symptoms such as numbness, tingling, and weakness in the hand. Repetitive motion and overuse are frequently linked to both of these conditions, which are

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

prevalent among individuals who engage in tasks that heavily involve the use of their upper extremities [4].

Studies on the spread of CTS have revealed that it affects a significant portion of the population, particularly women and those involved in manual labor or repetitive tasks. The prevalence of CTS in the general population is between 3% and 6% [5]. Likewise, SIS has been found to impact around 20% of individuals, especially those engaged in tasks that involve raising their arms overhead. Although both conditions are quite common, there hasn't been much research done on the connection between CTS and SIS [6]. It is essential to grasp the frequency and possible link between these two conditions to create thorough treatment plans and enhance patient results [7].

The development of SIS is caused by the mechanical compression of the rotator cuff tendons, resulting in inflammation, degeneration of the tendons, and the experience of pain. Possible causes of SIS can be attributed to repetitive overhead activities, maintaining poor posture, and anatomical variations like a hooked acromion [8]. CTS, on the other hand, occurs when there is heightened pressure within the carpal tunnel. This pressure can be caused by repetitive movements of the wrist, bending or extending the wrist, and certain conditions that lead to swelling within the tunnel, like diabetes and rheumatoid arthritis. There seems to be a connection between both conditions, as they have similar risk factors associated with repetitive motion and overuse [9].

Recent research suggests that individuals with CTS may have a higher likelihood of developing SIS as a result of changes in biomechanics and compensatory movements in the shoulder and wrist [10]. For example, people with CTS may develop alternative shoulder movements to relieve wrist pain, which could result in added strain on the shoulder structures and potential impingement. In addition, the long-term nature of CTS can lead to muscle imbalances and weakness, making individuals more susceptible to shoulder injuries [11].

This study seeks to explore the occurrence of shoulder impingement syndrome in individuals diagnosed with carpal tunnel syndrome. Through an analysis of the prevalence and potential risk factors linked to the coexistence of these two conditions, our goal is to offer valuable insights into their interrelationship and the impact they have on clinical practice. By gaining a deeper understanding of the occurrence of SIS in patients with CTS, healthcare providers can enhance their ability to create better prevention and management techniques. This, in turn, will lead to an improvement in the general caliber of life for individuals who are impacted by these debilitating conditions.

METHODOLOGY

Study Design and Setting

This cross-sectional epidemiological study examines shoulder impingement syndrome in carpal tunnel syndrome patients. The Physical Medicine and Rehabilitation Outpatient Department at Patna Medical College and Hospital conducts the 18-month research from June 2022 to January 2024.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

Study Population

The study included 250 carpal tunnel syndrome (CTS) participants. The inclusion criteria for patients are: EMG and clinical evaluation verified carpal tunnel syndrome. 18 or older. Study participation and informed consent.

Exclusion criteria include:

- Previous surgery for carpal tunnel syndrome or shoulder impingement syndrome.
- History of traumatic injury to the wrist or shoulder affecting the study variables.
- Other neurological or orthopedic conditions that may influence upper extremity function.

Data Collection

Expert department clinicians analyze patients to obtain data. The assessment contains demographic data (age, gender, occupation, etc.). A detailed medical history of CTS symptoms' duration and severity. Shoulder clinical examination for impingement syndrome, including overhead discomfort, positive Neer's and Hawkins-Kennedy tests, and range of motion testing. If clinically appropriate, ultrasonography or MRI to diagnose shoulder impingement syndrome.

Diagnostic Criteria

Carpal Tunnel Syndrome: Clinical symptoms (nocturnal discomfort, median nerve tingling) and EMG findings suggest median nerve compression corroborate the diagnosis. Shoulder Impingement Syndrome: Clinical examination and imaging confirm the diagnosis. Diagnostic criteria include overhead pain, positive impingement tests, and imaging showing tendon inflammation or bursitis.

Statistical Analysis

The demographic and clinical features of the study population are summarised using descriptive statistics (mean, standard deviation, frequencies, and percentages). Calculated shoulder impingement syndrome incidence in CTS patients. Logistic regression methods analyze shoulder impingement risk factors in CTS. Statistical significance is $p<0.05$. Data is analyzed using SPSS or R.

RESULTS

A total of 250 patients were included in the study, all of whom had been diagnosed with carpal tunnel syndrome. Out of the total participants, 150 were women, representing 60% of the group, while 100 were men, constituting the remaining 40%. The ages of the participants ranged from 18 to 65 years, with an average age of 45 years. A large majority of participants (70%) were engaged in occupations that involved frequent use of their hands or arms, such as computer work, assembly line work, or manual labor. Throughout the study period, a notable percentage of patients (24.8%) diagnosed with carpal tunnel syndrome were also discovered to have shoulder impingement syndrome. This finding was observed among a total of 250 patients. There was a small variation in the occurrence rates among females (27%) and males

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

(21%).

After conducting a logistic regression analysis, several factors were discovered to be strongly linked to the development of shoulder impingement syndrome in patients who have been diagnosed with carpal tunnel syndrome:

- The risk of developing shoulder impingement was found to be higher in individuals who were 50 years old or older, with a 2.5 times greater chance (OR = 2.5, 95% CI: 1.4 - 4.3, p = 0.001).
- Certain occupations that require repetitive arm movements can significantly increase the risk of developing shoulder impingement. Individuals in these occupations face a significantly higher risk, with the odds ratio being three times greater compared to those who do not engage in such movements (OR = 3.0, 95% CI: 1.7 - 5.2, $p < 0.001$).

- There is a correlation between the duration of symptoms and an increased risk associated with carpal tunnel syndrome. In this study, it was discovered that individuals who had been experiencing symptoms for more than 6 months had a greater risk. The odds ratio was 2.2, with a 95% confidence interval of 1.3 to 3.7, and a p-value of 0.003.

Gender-specific differences were also highlighted in the analysis. While the overall incidence was slightly higher in women, the link between occupation and the risk of shoulder impingement was more noticeable in men. In men, the odds ratio was 3.5 (95% CI: 1.8 - 6.7, $p < 0.001$), whereas in women, it was 2.8 (95% CI: 1.5 - 5.3, p = 0.002).

There appears to be a significant occurrence of shoulder impingement syndrome in individuals diagnosed with carpal tunnel syndrome, affecting around 25% of patients. The identified risk factors, such as age, occupation, and duration of CTS symptoms, highlight the importance of early intervention and specific preventive measures in populations at risk. These findings highlight the significance of making ergonomic modifications and promptly addressing CTS to potentially lower the chances of developing future shoulder problems.

This study offers valuable insights into the shared epidemiology of these two prevalent musculoskeletal conditions, emphasising the significance of adopting holistic treatment approaches to tackle the multifaceted aspects of musculoskeletal well-being.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

Variable	Total Participants	Affected with SIS	Percentage	Odds Ratio (OR)	95% Confidence Interval (CI)	P-value
Total	250	62	24.8%	-	-	-
Gender						
- Women	150	41	27.3%	-	-	-
- Men	100	21	21.0%	-	-	-
Age						
- Under 50	160	30	18.8%	Ref.	-	-
- 50 and over	90	32	35.6%	2.5	1.4 - 4.3	0.001
Occupation						
- Repetitive use	175	53	30.3%	3.0	1.7 - 5.2	<0.001
- Non-repetitive use	75	9	12.0%	Ref.	-	-
Duration of CTS Symptoms						
- Less than 6 months	110	17	15.5%	Ref.	-	-
- More than 6 months	140	45	32.1%	2.2	1.3 - 3.7	0.003

Abbreviations: SIS = Shoulder Impingement Syndrome, CTS = Carpal Tunnel Syndrome, Ref. = Reference group

This table aggregates the study's findings, highlighting the incidence and analysis of risk factors by age, gender, occupation, and duration of CTS symptoms. The p-values indicate the statistical significance of the associations found, with lower values suggesting strong evidence against the null hypothesis of no association.

Discussion

The present epidemiological study explored shoulder impingement syndrome (SIS) incidence among patients with carpal tunnel syndrome (CTS), revealing significant associations between these conditions and various demographic and occupational factors. Our findings indicate that 24.8% of patients with CTS also suffer from SIS, which is a substantial proportion and suggests a potential biomechanical or systemic link between these conditions [12,13].

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

Interpretation of the Main Results

1. Incidence and Gender Differences: Women were found to have a somewhat greater incidence of SIS (27.3%) than men (21.0%). This gender gap may be caused by variations in the tasks associated with different occupations, hormonal variations, or even physical variations in the structures of the wrist and shoulder between men and women. According to earlier research, women may be more prone to repetitive strain injuries, which could explain why there are more cases of SIS and CTS in women [14].

2. Age-related alterations in musculoskeletal tissues: It is generally known that age-related degenerative changes in these tissues can predispose persons to impingement syndromes as well as diseases involving nerve compression. This is supported by the higher incidence of SIS among older patients (OR = 2.5 for those 50 years of age and above). The necessity of early preventative strategies and interventions specific to older people at risk of these illnesses is highlighted by this study [15].

3. Occupational Risk Factors: With a threefold increase in risk, our study emphasises the significance of repeated use activities in the development of SIS among CTS patients. This association emphasises how crucial ergonomic interventions and routine clinical assessments are to preventing the development and progression of these crippling illnesses in those who work in high-risk jobs [16].

4. Length of CTS Symptoms: Research indicates that a longer duration of CTS symptoms raises the possibility of SIS development. argues that protracted nerve compression and the pain it causes may cause compensatory postures or movements that put more strain on the shoulder. Impingement symptoms may arise as a result of this compensatory strategy, highlighting the necessity for thorough CTS care to avoid the emergence of secondary musculoskeletal problems [17].

This study's finding of a substantial correlation between CTS and SIS has important ramifications for clinical practice. It implies that to guarantee comprehensive treatment, individuals presenting with either condition should be carefully assessed for the other. Furthermore, especially in occupational health settings, the results support integrated treatment approaches that address shoulder and wrist mechanics [18].

Although our work yields valuable insights, it is not without limits. Our capacity to demonstrate causation between CTS and SIS is restricted by the cross-sectional design. To clarify the directionality and causative processes that connect these disorders, longitudinal research would be helpful [19]. Furthermore, the fact that our study was limited to a specific clinical setting may have limited the applicability of the findings to other demographics or work settings. Future studies should concentrate on longitudinal approaches to identify the causes and possible reciprocal effects between SIS and CTS. Analyzing the efficacy of particular treatments and preventive measures that target both illnesses at the same time may also yield important information for improving patient outcomes [20].

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

Conclusion

Nearly one in four carpal tunnel syndrome (CTS) patients also had shoulder impingement syndrome (SIS), according to an epidemiological study. This connection was strongest in older persons, women, and repeated usage workers, emphasising the necessity of considering both problems in clinical assessments and therapies. The findings suggest integrated treatment approaches and ergonomic improvements to reduce the incidence of these illnesses, especially in sensitive groups. To fully understand causal links and develop better preventive and treatment strategies, longterm studies are needed.

REFERENCES

1. Michener, L. A., McClure, P. W., & Karduna, A. R. (2003). Anatomical and biomechanical mechanisms of subacromial impingement syndrome. Clinical Biomechanics, 18(5), 369-379.
2. Palmer, K. T., & Walker-Bone, K. (2000). Carpal tunnel syndrome: The role of occupational factors. Best Practice & Research Clinical Rheumatology, 14(1), 93-110.
3. Wipperman, J., & Goerl, K. (2014). Carpal tunnel syndrome: Diagnosis and management. American Family Physician, 90(12), 835-840.
4. Neer, C. S. (1983). Impingement lesions. Clinical Orthopaedics and Related Research, 173, 70-77.
5. Bongers, F. J., Schellevis, F. G., van den Bosch, W. J., & van der Zee, J. (2007). Carpal tunnel syndrome in general practice (1987 and 2001): Incidence and the role of occupational and non-occupational factors. British Journal of General Practice, 57(534), 36-39.
6. Barr, A. E., Barbe, M. F., & Clark, B. D. (2004). Work-related musculoskeletal disorders of the hand and wrist: Epidemiology, pathophysiology, and sensorimotor changes. Journal of Orthopaedic & Sports Physical Therapy, 34(10), 610-627.
7. van Rijn, R. M., Huisstede, B. M., Koes, B. W., & Burdorf, A. (2009). Associations between work-related factors and specific disorders of the shoulder - a systematic review of the literature. Scandinavian Journal of Work, Environment & Health, 35(3), 189-201.
8. Seitz, A. L., McClure, P. W., Finucane, S., Boardman, N. D. III, & Michener, L. A. (2011). Mechanisms of rotator cuff tendinopathy: Intrinsic, extrinsic, or both? Clinical Biomechanics, 26(1), 1-12.
9. Atroshi, I., Gummesson, C., Johnsson, R., Ornstein, E., Ranstam, J., & Rosén, I. (1999). Prevalence of carpal tunnel syndrome in a general population. JAMA, 282(2), 153-158.
10. Urwin, M., Symmons, D., Allison, T., Brammah, T., Busby, H., Roxby, M., Simmons, A., & Williams, G. (1998). Estimating the burden of musculoskeletal disorders in the community: The comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. Annals of the Rheumatic Diseases, 57(11), 649-655.
11. Katz, J. N., & Simmons, B. P. (2002). Clinical practice. Carpal tunnel syndrome. New England Journal of Medicine, 346(23), 1807-1812.
12. Cho, C. H., Song, K. S., Min, B. W., Lee, S. M., Chang, H. W., & Eum, D. S. (2010). Shoulder impingement syndrome in workers: A 10-year longitudinal study. Journal of Occupational and Environmental Medicine, 52(11), 1090-1095.
13. Gerritsen, A. A. M., de Krom, M. C. T. F. M., Struijs, M. A., Scholten, R. J. P. M., de Vet, H. C. W., & Bouter, L. M. (2002). Conservative treatment options for carpal tunnel

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 06, 2024

syndrome: A systematic review of randomised controlled trials. Journal of Neurology, 249(3), 272-280.
14. Ludewig, P. M., & Reynolds, J. F. (2009). The association of scapular kinematics and glenohumeral joint pathologies. Journal of Orthopaedic & Sports Physical Therapy, 39(2), 90-104.
15. Huisstede, B. M. A., Miedema, H. S., van Opstal, T., de Ronde, M. T. W., Kuiper, J. I., & Verhaar, J. A. N. (2008). Interventions for treating the carpal tunnel syndrome: A systematic review of randomised clinical trials. Journal of Hand Surgery (European Volume), 33(5), 623-634.
16. Leclerc, A., Landre, M. F., Chastang, J. F., Niedhammer, I., & Roquelaure, Y. (2001). Upper limb disorders in repetitive work. Scandinavian Journal of Work, Environment & Health, 27(4), 268-278.
17. Walker-Bone, K., & Palmer, K. T. (2002). Musculoskeletal disorders in farmers and farm workers. Occupational Medicine, 52(8), 441-450.
18. Werner, R. A., & Andary, M. (2002). Carpal tunnel syndrome: Pathophysiology and clinical neurophysiology. Clinical Neurophysiology, 113(9), 1373-1381.
19. Feuerstein, M., Burrell, L. M., Miller, V. I., Lincoln, A., Huang, G. D., & Berger, R. (1999). Clinical management of carpal tunnel syndrome: A 12-year review of outcomes. American Journal of Industrial Medicine, 35(3), 232-245.
20. Silverstein, B., Fine, L. J., & Armstrong, T. J. (1986). Occupational factors and carpal tunnel syndrome. American Journal of Industrial Medicine, 9(4), 343-358.