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FREQUENCY OF CARPAL TUNNEL SYNDROME AMONG HOSPITAL WORKERS USING ULTRASONOGRAPHY: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background and Objective:
Non-invasive ultrasound imaging has emerged as a robust diagnostic tool to examine the median nerve and identify early signs of carpal tunnel syndrome (CTS), contributing to the early detection and management. The objective of this study was to determine the frequency of CTS among hospital workers using ultrasonography technique.

Methods:
This was a cross-sectional conducted at Department of neurology, Federal Government Polyclinic Hospital, from September 7, 2023 to March 6, 2024. All eligible individuals meeting inclusion criteria, were enrolled after obtaining informed consent. Following clinical examination, participants were referred to the radiology department for CTS diagnosis using ultrasound technique. Data was analysed by IBM SPSS (version 27.0).

Results:
There were 260 healthcare staff enrolled in this study. The mean age was 36.8±15.3 years. There were 96 (36.9%) males, while 164 (63.1%) were female. The prevalence of CTS was found to be 22.3%, where significant association was found between occurrence of CTS and gender ($p<0.01$) and employment status ($p=0.017$).

Conclusion:
CTS is commonly prevalent in hospital workers who have numbness and pain in fingers. This disease condition was more frequently found among males and physicians healthcare cadre.

Keywords: Carpal tunnel syndrome, Hospital workers, Ultrasound

INTRODUCTION

Carpal tunnel syndrome (CTS) can be very painful and functionally limiting disorder associated with hand use.[1] Several medical conditions, including obesity, pregnancy, diabetes mellitus, and hypothyroidism, have been identified as important risk factors.[2] Occupational exposures also play a substantial role in the development of this condition, particularly tasks involving prolonged or repetitive hand movements, forceful exertion, and exposure to vibration.[3] Evidence from international studies further underscores the significance of occupation-related factors in CTS pathogenesis, with estimates suggesting that approximately 34% of hospital workers develop CTS attributable to the nature of their occupational activities.[4,5]

Typically, clinical criteria is used to diagnose CTS, which can be further confirmed by performing some medical tests such as electroneuromyography, and imaging techniques which includes ultrasonography and more sophisticated magnetic resonance imaging (MRI).[6] Among available diagnostic modalities, neurophysiological testing is regarded as the gold standard for the diagnosis of CTS; however, it demonstrates a sensitivity of approximately 85%.[7] In addition, this technique is relatively painful, costly, and does not provide anatomical information about the median nerve or underlying etiological factors.[6] In contrast, ultrasonography requires less time to perform, is associated with minimal patient discomfort, and may represent a more cost-effective first-line approach for confirming the clinical suspicion of CTS.[7] Ultrasonographic assessment of the median nerve cross-sectional area demonstrates relatively high diagnostic accuracy for CTS and may be regarded as a

non-invasive, alternative, and complementary modality for the evaluation of this condition.[8-11] In a study conducted by Fathy M et al the prevalence of CTS among hospital workers was reported to be 21.5% assessed by ultrasonography technique.[12]

Most of the regional data in literature has evaluated CTS among the general population, and no concrete data is available on CTS among health workers in Pakistan. Such data can be helpful in improving the health and well-being of healthcare staff, enhancing patient care, timely prevention strategies, early interventions, and policy decisions to mitigate the impact of CTS on hospital workers. The aim of this study was to evaluate the frequency of CTS among hospital workers via ultrasound technique.

METHODS

This cross-sectional study was carried out in the Department of Neurology, Federal Government Polyclinic Hospital, for six months (7 Sep 2023 to 6 Mar 2024). Ethics approval was obtained from the Ethics Review Committee of Federal Government Polyclinic Hospital (no.FGPC. 1/12/2024/E-Committee, dated 4th December 2024). The sample size of 260 healthcare staff was calculated with the help of WHO sample size calculator by considering 21.5% prevalence of CTS among hospital workers, 95% level of confidence, 80% study power and 10% precision.[9] Consecutive sampling technique was used to select all the healthcare staff presenting with numbness and pain of fingers in the outpatient department fulfilling the eligibility criteria.

Patients aged 18–70 years of either sex who had been employed in the hospital for a minimum duration of one year were included in the study. Individuals with a history of diabetes mellitus, thyroid disease, renal or hepatic disorders, known bone or joint conditions such as rheumatoid arthritis or gout, prior direct trauma to the upper limb, symptoms suggestive of peripheral neuropathy, as well as pregnant or lactating women, were excluded.

Prior to the enrolment, informed consent was taken by explaining complete details of the study. At the time of enrolment, demographics, clinical history and physical signs & symptoms data was collected. For assessment of the severity of symptoms, the Boston CTS questionnaire was used.[10] After examination and severity assessment, all participants were referred to the radiology department for the diagnosis of CTS via ultrasound. Ultrasonography procedure was performed by single investigator, following set protocol 7–12 MHz linear array transducer. CTS was labelled as per the standard criteria defined to diagnose CTS via ultrasound in which median nerve cross sectional area was taken as more than or equal to 10 mm^2 at the inlet or pisiform bone.[11] All the data including demographics, clinical history, severity of symptoms and radiological findings were noted on pre-designed data collection tool.

Data was analysed by IBM SPSS (version 27.0). Quantitative variables such as age, height, weight, BMI, duration of symptoms, and BTCQ score were reported as mean and standard deviation. The Shapiro-Wilk test was applied to assess the normality. Descriptive analysis for categorical data was reported as frequency and percentage, including variables such as age groups, gender, place of residence, occupational status, and CTS. Frequency of occurrence of CTS was reported as percentage. Association between CTS and various baseline characteristics was explored by using Chi-square test. A p-value of ≤ 0.05 was considered significant.

RESULTS

There were 260 healthcare staff enrolled in this study, who reported to have numbness and pain in fingers/arm. The mean age of study participants was 36.8±15.3 years. Majority of the participants 165 (63.4%) belonged to age group of 18-40 years. There were 96 (36.9%) males and 164 (63.1%) females. The demographics of the study population is described in Table 1.

Table 1: Summary of baseline demographic characteristics of study participants (n=260)	
Characteristics	**n(%)**
Mean Age	36.8±15.3
Age groups	
• 31-40 years	165 (63.4%)
• >40 years	95 (36.5%)
Gender	
• Male	96 (36.9%)
• Female	164 (63.0%)
BMI (kg/m2)	
• 16-24	111 (42.6%)
• >24	149 (57.3%)
Residential area	
• Urban	176 (67.6%)
• Rural	84 (32.3%)
Designation	
• Physician	28 (10.7%)
• Nurses	40 (15.4%)
• Admin staff	61 (23.4%)
• Maintenance staff	131 (50.3%)
Duration of symptoms	
• 1-3 years	196 (75.4%)
• >3 years	64 (24.6%)

CTS was diagnosed in 58 out of 260 (22.3%) participants, with mean duration of symptoms reported to be 1.9±0.4 years (95% CI 1.85-0.94 years). The occurrence of CTS was 23.6% in the 18-40 age group and 20.0% in the over 40 age group (p=0.498).

There was a significant difference in occurrence of CTS among males and females. Among males, the frequency of CTS was 33.3% as compared to females in which the occurrence was reported to be 15.8% (p=0.001). Similarly, there was a significant association found between occurrence of CTS and occupation working status. On the other hand, no significant association was reported between occurrence of CTS and residential status, body mass index or duration of symptoms. Table 2 summarizes the occurrence of CTS with respect to demographic and clinical characteristics.

Table 2: Comparison of occurrence of CTS with demographic and clinical characteristics			
Characteristics	**Diagnosed with CTS (n=58)**	**Not diagnosed with CTS (n=202)**	**p-value**
Age groups •18-40 years •>40 years	 39 (23.6%) 19 (20.0%)	 126 (76.3%) 76 (80.0%)	0.498
Gender •Male •Female	 32 (33.3%) 26 (15.8%)	 64 (66.6%) 138 (84.2%)	0.001
BMI (kg/m^2) •16-24 •>24	 21 (18.9%) 37 (24.8%)	 90 (81.0%) 112 (75.1%)	0.257
Residential area •Urban •Rural	 41 (23.3%) 17 (20.0%)	 135 (76.7%) 67 (79.7%)	0.580
Work status •Physician •Nurses •Admin staff •Maintenance staff	 12 (42.8%) 10 (25.0%) 15 (32.6%) 46 (67.4%)	 21 (16.0%) 16 (57.1%) 30 (75.0%) 110 (83.9%)	0.017
Duration of symptoms •1-3 years •>3 years	 46 (23.4%) 150 (76.5%)	 12 (18.7%) 52 (81.2%)	0.431

DISCUSSION

CTS is a prevalent and debilitating condition that affects a significant number of individuals, particularly those engaged in occupations requiring repetitive hand and wrist movements.[2] Hospital workers, who often perform tasks that involve prolonged periods of keyboarding, mouse usage, and other repetitive manual activities, are susceptible to developing CTS.[5]

Ultrasound imaging provides a non-invasive and real-time assessment of the structures within the wrist, allowing for a more accurate diagnosis and monitoring of the condition.[8] By investigating the causes, symptoms, and potential risk factors associated with CTS in the hospital setting, this study aims to contribute to exploring the frequency of CTS among hospital workers who have complaint of numbness and pain in fingers, along with suggesting development of proactive strategies for prevention, early detection, and effective management of CTS among healthcare workers.

The findings of our study are comparable with multiple studies conducted worldwide, few of which are discussed here. In this study, the mean age was 36.8 ± 15.3 years. Another study reported a mean age of 40.0 years.[5] The study conducted by Fathy M et al recorded a mean age of 40.53 ± 11.234 years.[12] It can be stated that CTS diagnosis is most commonly made in people around middle age range.

In our study, CTS was found in 58 (22.3%) patients. A study conducted by Fathy M et al included 274 wrists of 137 healthcare professionals working in a tertiary care hospital in Egypt, using BCT questionnaire symptoms severity was assessed while ultrasound technique was used to diagnose CTS. Authors reported that CTS was diagnosed in 21.5% which is quite similar to figure reported in current study and it was concluded that ultrasound technique can be effectively used to screen healthcare professionals for CTS who have symptoms of numbness or pain in fingers, arms or hands.[12] Another study conducted by Castro M et al included 200 healthy hospital workers who underwent ultrasonography to measure median nerve area and BCT questionnaire was used to assess the symptoms severity. It was reported that CTS was diagnosed in 34% of the healthy hospital

workers, and significant associations were found with age ($p<0.001$), BCT questionnaire score ($p<0.001$), and years of formal education ($p<0.001$).5 A study conducted by Kurtul S et al in 2022 in Turkey reported that 74.1% of the hospital staff had symptoms of CTS while prevalence of CTS was found to be 31.5%. Significant associations were found between CTS symptoms severity and age ($p<0.001$), body mass index ($p=0.001$), previous diagnosis of CTS ($p<0.001$), daily work hours ($p=0.001$), using wrist-supported mouse ($p<0.001$), and work load ($p=0.02$).[13] Similar associations were observed in current study, where males were more frequently diagnosed with CTS probably due to more involvement in activities that trigger CTS.

In a study conducted by Alhusain FA et al in Riyadh tertiary care hospital in 2019 included 223 dentists in the study and reported prevalence of CTS in 30.5% of the participants. CTS diagnosis was significantly associated with male gender, higher BCTQ scores, and left-hand dominance ($p<0.001$ for all).[14] In a systematic review and meta-analysis by Chenna D et al, they reported a pooled prevalence of 15.0% of CTS among healthcare professionals owing to their occupation nature.[15]

It was reported by Rotaru-Zavaleanu AD et al in a review that CTS is commonly found in healthcare professionals and healthcare cost, lost productivity, and compensation claims due to CTS can have a substantial financial strain on businesses and society at large.[16] Therefore, programs that prevent CTS through education, early intervention, and workplace interventions are beneficial not just to the affected individuals but also to the healthcare workforce's general well-being and economic productivity.[16]

Current study had some limitations, such as exclusion of diabetes, thyroid disease and pregnancy from current cohort which may have underestimated the true CTS prevalence and compromised external validity of the study. The diagnosis of CTS in this study was purely based on ultrasound without further confirmation with nerve conduction test therefore equivalence to electrodiagnostic testing should not be implied.

Overall, it is evident that CTS in certain occupational setting is quite common, which requires early detection and management to keep the working force safer and healthier and also to provide safe work environment. More studies are necessary to evaluate with a larger sample size and with more parameters in multiple study centres in Pakistan to validate the findings of the present study.

CONCLUSION

CTS is commonly prevalent in hospital workers who have numbness and pain in fingers. This disease condition was more frequently found among males and physicians healthcare cadre. It is recommended that for future research, emphasis should be on longitudinal studies to assess the long-term impact of CTS on hospital workers.

REFERENCES

1. Hidayati HB, Subadi I, Fidiana F, Puspamaniar VA. Current diagnosis and management of carpal tunnel syndrome: A review. Anaesth Pain Intensive Care. 2022 Jan 6;26(3):394-404.
2. Roquelaure Y, Garlantézec R, Evanoff BA, Descatha A, Fassier JB, Bodin J. Personal, biomechanical, psychosocial, and organizational risk factors for carpal tunnel syndrome: a structural equation modeling approach. Pain. 2020 Apr 1;161(4):749-57.
3. Möllestam K, Englund M, Atroshi I. Association of clinically relevant carpal tunnel syndrome with type of work and level of education: a general-population study. Sci Rep. 2021 Oct 6;11(1):19850.
4. Genova A, Dix O, Saefan A, Thakur M, Hassan A. Carpal tunnel syndrome: a review of literature. Cureus. 2020 Mar;12(3).
5. Castro AD, Skare TL, Nassif PA, Sakuma AK, Barros WH. Sonographic diagnosis of carpal tunnel syndrome: a study in 200 hospital workers. Radiol Bras. 2015;48(5):287-91.
6. Murciano Casas MD, Rodríguez-Piñero M, Jiménez Sarmiento AS, Álvarez López M, Jiménez Jurado G. Evaluation of ultrasound as diagnostic tool in patients with clinical features suggestive of carpal tunnel syndrome in comparison to nerve conduction studies: Study protocol for a diagnostic testing study. PLoS One. 2023 Nov 10;18(11):e0281221.
7. Torres-Costoso A, Martinez-Vizcaino V, Alvarez-Bueno C, Ferri-Morales A, Cavero-Redondo I. Accuracy of ultrasonography for the diagnosis of carpal tunnel syndrome: a systematic review and meta-analysis. Arch Phys Med Rehabil. 2018 Apr 1;99(4):758-65
8. El-Najjar AR, Abu-Elsoaud AM, Sabbah DA, Zeid AF. Emerging role of ultrasonography in the diagnosis of carpal tunnel syndrome: relation to risk factors, clinical and electrodiagnostic severity. Egypt Rheumatol. 2021 Oct 1;43(4):341-5.
9. Dabbagh A, Ziebart C, MacDermid JC. Accuracy of diagnostic clinical tests and questionnaires in screening for carpal tunnel syndrome among workers-a systematic review. J Hand Ther. 2021 Apr 1;34(2):179-93.
10. Leite JC, Jerosch-Herold C, Song F. A systematic review of the psychometric properties of the Boston Carpal Tunnel Questionnaire. BMC Musculoskelet Disord. 2006 Dec;7:1-9.
11. Cara McDonagh, Michael Alexander, David Kane. The role of ultrasound in the diagnosis and management of carpal tunnel syndrome: a new paradigm. Rheumatology. 2015;54(1):9–19.
12. Fathy M, ElSadek A, Hamid E, AbdElMoneim A. Assessment of carpal tunnel syndrome via ultrasonography among hospital workers: a screening study. Egypt J Neurol Psychiatr Neurosurg. 2021 Dec;57:1-5.
13. Kurtul S, Mazican N. Prevalence and risk factors for self-reported symptoms of carpal tunnel syndrome among hospital office workers: a cross-sectional study. Int J Occup Saf Ergon. 2023 Apr 3;29(2):461-5.
14. Alhusain FA, Almohrij M, Althukeir F, Alshater A, Alghamdi B, Masuadi E et al. Prevalence of carpal tunnel syndrome symptoms among dentists working in Riyadh. Ann Saudi Med. 2019 Mar;39(2):104-11.
15. Chenna D, Madi M, Kumar M, Kumar V, Chopperla S, Tadikonda A, et al. Worldwide prevalence of carpal tunnel syndrome among dental health care personnel-A systematic review and meta-analysis. F1000Research. 2023;12.
16. Rotaru-Zavaleanu AD, Lungulescu CV, Bunescu MG, Vasile RC, Gheorman V, Gresita A et al. Occupational Carpal Tunnel Syndrome: a scoping review of causes, mechanisms, diagnosis, and intervention strategies. Front Public Health. 2024 May 22;12:1407302.

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Authors' contribution:
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Sadaf Nasir; Data collection, data analysis, manuscript writing
Riaz Mahmood; Data Analysis, data interpretation, manuscript writing
Ghulam Mujtaba; Data analysis, data interpretation, manuscript revision
Ayesha Ishaq; Data analysis, manuscript revision
Saima Shan; Data interpretation, manuscript writing

All the authors have approved the final version to be published and agree to be accountable for all aspects of the work.

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