http://dx.doi.org/10.18623/rvd.v23.6120

PREVALENCE OF HYPOTHYROIDISM IN PATIENTS WITH CARPAL TUNNEL SYNDROME PRESENTING IN A TERTIARY CARE HOSPITAL

PREVALÊNCIA DO HIPOTIREOIDISMO EM PACIENTES COM SÍNDROME DO TÚNEL DO CARPO ATENDIDOS EM UM HOSPITAL DE REFERÊNCIA

Article received on: 3/11/2026
Article accepted on: 4/4/2026

Wali Rehman*
***Pak Emirates Military Hospital, Rawalpindi, Pakistan
drwalirehman1995@gmail.com

Khurram Haq Nawaz*
***Pak Emirates Military Hospital, Rawalpindi, Pakistan
khurramhaq@gmail.com

Asif Hashmat**
****Combined Military Hospital, Lahore, Pakistan
asif1673@gmail.com

Aamir Farooq*
***Pak Emirates Military Hospital, Rawalpindi, Pakistan
draamir96@gmail.com

Tahir Khan*
***Pak Emirates Military Hospital, Rawalpindi, Pakistan
tahirsmc03@gmail.com

Jabran Zamir*
***Pak Emirates Military Hospital, Rawalpindi, Pakistan
jabranzamir4@gmail.com

The authors declare that there is no conflict of interest

Abstract

Objective: To determine the frequency of hypothyroidism in patients presenting with carpal tunnel syndrome at tertiary care hospital. Study Design: Descriptive cross-sectional study. Place and Duration of the Study: Neurology Department, Pak Emirates Military Hospital Rawalpindi, from 09-12-2025 to 08-03-2026. Methodology: This descriptive cross-sectional study was conducted on 183 adults with clinically and electrophysiologically confirmed CTS. Ethical approval was obtained prior to data collection and written informed consent was obtained from patients before recruitment. Blood samples were analyzed for TSH and free T4 to identify hypothyroidism. Data were analyzed using SPSS, with continuous variables reported median (IQR) and categorical variables as frequencies and percentages; associations were tested using chi-square or Fisher's exact test ($p \leq 0.05$). Results: Among 183 CTS patients, median age and BMI was 40 years and 24 kg/m², respectively; 65% were female and 60% from

Resumo

Objetivo: Determinar a frequência do hipotireoidismo em pacientes que apresentam síndrome do túnel do carpo em um hospital de atendimento terciário. Desenho do estudo: Estudo descritivo transversal. Local e duração do estudo: Departamento de Neurologia, Hospital Militar Pak Emirates de Rawalpindi, de 09/12/2025 a 08/03/2026. Metodologia: Este estudo descritivo transversal foi realizado em 183 adultos com STC clinicamente e eletrofisiologicamente confirmada. A aprovação ética foi obtida antes da coleta de dados e o consentimento informado por escrito foi obtido dos pacientes antes do recrutamento. Amostras de sangue foram analisadas para TSH e T4 livre a fim de identificar o hipotireoidismo. Os dados foram analisados utilizando o SPSS, com variáveis contínuas relatadas como mediana (IQR) e variáveis categóricas como frequências e porcentagens; as associações foram testadas utilizando o teste qui-quadrado ou o teste exato de Fisher ($p \leq 0,05$). Resultados: Entre os 183

urban areas. Hypothyroidism was observed in 13.1% patients. Stratified analysis showed significantly higher prevalence of hypothyroidism in patients with family history of CTS ($p = 0.001$) and BMI >25 kg/m² ($p < 0.001$). No significant associations were found with age, gender, residence, comorbidities, or CTS severity. Conclusion: In current study, hypothyroidism was observed in notable proportion of CTS patients (13.1%), with significantly higher among those with family history of CTS and elevated BMI.

Keywords: Carpel Tunnel Syndrome. Hypothyroidism. Prevalence.

pacientes com STC, a mediana da idade e do IMC foi de 40 anos e 24 kg/m², respectivamente; 65% eram mulheres e 60% eram de áreas urbanas. O hipotireoidismo foi observado em 13,1% dos pacientes. A análise estratificada mostrou prevalência significativamente maior de hipotireoidismo em pacientes com histórico familiar de STC (p = 0,001) e IMC > 25 kg/m² (p < 0,001). Não foram encontradas associações significativas com idade, sexo, local de residência, comorbidades ou gravidade da STC. Conclusão: No presente estudo, observou-se hipotireoidismo em uma proporção notável de pacientes com STC (13,1%), com prevalência significativamente maior entre aqueles com histórico familiar de STC e IMC elevado.

Palavras-chave: *Síndrome do Túnel do Carpo. Hipotireoidismo. Prevalência.*

1 INTRODUCTION

Carpal tunnel syndrome arises from compression of median nerve, affecting medial three and a half fingers and adjacent palm.(1) Patients often report difficulty with gripping, reduced hand strength, and burning sensations. CTS is the most common entrapment neuropathy worldwide, with studies estimating its prevalence approximately 3–6% globally.(2) In Pakistan, available data suggest prevalence figures around 2–5% in the general population, with higher rates observed in specific occupational groups such as office workers and repetitive hand users.(3, 4)

Its etiology is multifactorial, including repetitive wrist movements, obesity, diabetes, and hormonal disorders.(5) Among these, hypothyroidism is notable contributor, as fluid retention and tissue changes can increase pressure within carpal tunnel. While CTS typically affects one hand, in patients with hypothyroidism it often occurs bilaterally due to systemic tissue changes.(6)

Studies indicate that CTS occurs more frequently in individuals with hypothyroidism, with some research reporting that up to 22.5% of patients with hypothyroidism may develop CTS.(7) If left untreated, hypothyroidism-related CTS can lead to worsening neurological symptoms.(8) Early diagnosis and medical management, however, can significantly improve outcomes and may prevent the need for surgical

intervention.(9) Given this relationship, it is important to assess the presence of hypothyroidism in patients presenting with CTS. Identifying hypothyroidism in these patients can guide clinicians in providing timely and appropriate care, improving management outcomes and patient quality of life. Therefore, we have conducting this study to find the frequency of hypothyroidism in patients presenting with carpal tunnel syndrome presented at a tertiary care hospital.

2 METHODOLOGY

This descriptive cross-sectional study was conducted at the Department of Neurology, Pak Emirates Military Hospital, Rawalpindi, over a period of three months 09-12-2025 to 08-03-2026. Ethical approval was obtained from the hospital ethical committee prior to data collection [ERC/102/2025; Dated: 04-09-2025]. A sample size of 183 patients with CTS was estimated using 95% confidence level, 5% margin of error, and expected prevalence of hypothyroidism in CTS patients as 13.8%,(10) calculated using the WHO sample size calculator.

Eligible participants were adults aged 18–70 years of either gender, diagnosed with CTS according. Patients with previous history of wrist trauma, CTS surgery, or pregnant women were excluded. Patients were enrolled using non-probability consecutive sampling.

After obtaining informed consent, demographic data including age, gender, residence, socioeconomic status, and body mass index were recorded. Clinical history was obtained to assess comorbidities such as hypertension, diabetes, ischemic heart disease, and family history of CTS. CTS diagnosis was confirmed clinically by symptoms including pain, tingling, and numbness along the median nerve distribution, in addition to positive Phalen’s and Tinel’s tests. Nerve conduction studies were performed by qualified neurologist to confirm diagnosis. Based on NCS findings, CTS was classified as mild, moderate, or severe, according to standard latency and conduction velocity criteria consistent with AANEM guidelines.(11)

Blood samples were collected under aseptic conditions from any venous access point and analyzed in institutional laboratory for serum thyroid-stimulating hormone and free T4 levels. Hypothyroidism was defined as TSH >4.0 mIU/L with free T4 <0.8 ng/dL.

Patients were categorized as hypothyroid based on these results. All data were recorded on predesigned questionnaire. Statistical analysis was performed using SPSS version 26. Continuous variables such as age, BMI, TSH, and free T4 levels were expressed as mean ± standard deviation or median (IQR) based on normality assessed with the Shapiro-Wilk test. Categorical variables such as gender, presence of hypothyroidism, and CTS severity were expressed as frequencies and percentages. Stratification was done with respect to age, gender, residence, comorbidities, and family history of CTS, BMI, and CTS severity. Post-stratification, associations were assessed using the chi-square test or Fisher's exact test, with p-values ≤0.05 considered statistically significant.

3 RESULTS

A total of 183 patients with Carpal Tunnel Syndrome were included in the study. As shown in Table 1, median age and BMI of patients was 40 years (IQR = 26) and 24 (IQR = 1). Majority of the participants were female 119 (65%) compared to 64 (35%) males. Regarding residence, 109 (60%) were from urban areas, while 74 (40%) were from rural areas. Family history of CTS was present in 33 (18%) patients. Among comorbidities, diabetes was present in 62 (34%), hypertension in 55 (30%), and ischemic heart disease in 48 (26%) patients. CTS severity was mild in 45 (25%), moderate in 105 (57%), and severe in 33 (18%) patients. Median TSH level was 3 mIU/L (IQR = 0) and median FT4 was 1.7 pmol/L (IQR = 0.8).

Table 1

Summary of patient related variables (N=183)

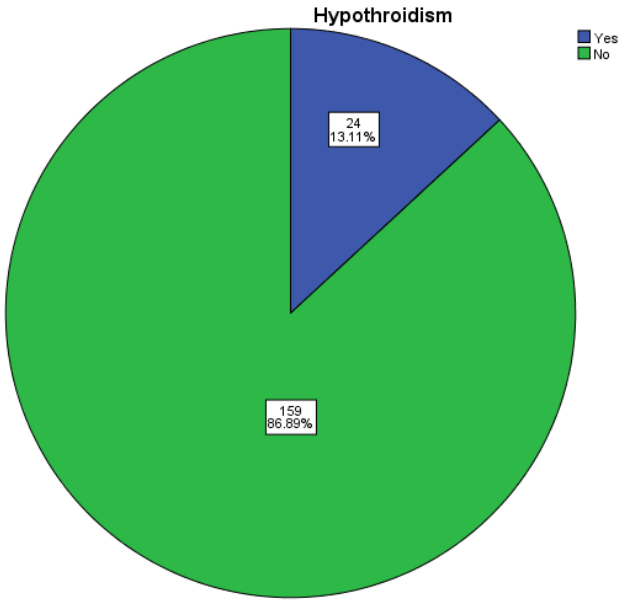
Variables		
Age years Median (IQR)		40 (26)
BMI Median (IQR)		24 (1)
Gender	**Male**	64 (35%)
	Female	119 (65%)
Residence	**Rural**	74 (40%)
	Urban	109 (60%)
Family History of CTS	**Yes**	33 (18%)
	No	150 (82%)
Diabetes (Yes)		62 (34%)
Hypertension (Yes)		55 (30%)
IHD (Yes)		48 (26%)
CTS	**Mild**	45 (25%)

	Moderate	105 (57%)
	Severe	33 (18%)
TSH mIU/L Median (IQR)		3 (0)
FT4 pmol/L Median (IQR)		1.7 (0.8)

As shown in Graph I, hypothyroidism was observed in 24 (13.11%) out of 183 patients with CTS.

Graph 1

Frequency distribution of hypothyroidism in study population (N=183)



On stratification with respect to effect modifiers, hypothyroidism was more frequent in patients with family history of CTS (41.7%) compared to those without (14.5%) ($p = 0.001$). Similarly, hypothyroidism was significantly associated with higher BMI. Among patients with BMI >25 kg/m², 21 (87.5%) had hypothyroidism compared to 3 (12.5%) patients with BMI ≤25 kg/m² ($p < 0.001$). No significant associations were observed between hypothyroidism and age group, gender, residence, diabetes, hypertension, IHD, or CTS severity ($p > 0.05$).

Table 2

Data stratification with respect to effect modifiers.

Variable	Hypothyroidism Yes Frequency (%)	Hypothyroidism No Frequency (%)	p-value
Age Group			0.179
18–40 years	9 (37.5%)	83 (52.2%)	
>40 years	15 (62.5%)	76 (47.8%)	
Gender			0.272
Male	6 (25.0%)	58 (36.5%)	
Female	18 (75.0%)	101 (63.5%)	
Residence			0.90
Rural	10 (41.7%)	64 (40.3%)	
Urban	14 (58.3%)	95 (59.7%)	
Diabetes Mellitus			0.387
Yes	10 (41.7%)	52 (32.7%)	
No	14 (58.3%)	107 (67.3%)	
Hypertension			0.919
Yes	7 (29.2%)	48 (30.2%)	
No	17 (70.8%)	111 (69.8%)	
Ischemic Heart Disease			0.726
Yes	7 (29.2%)	41 (25.8%)	
No	17 (70.8%)	118 (74.2%)	
Family History of CTS			**0.001***
Yes	10 (41.7%)	23 (14.5%)	
No	14 (58.3%)	136 (85.5%)	
BMI Group			**<0.001***
Normal/Overweight	3 (12.5%)	138 (86.8%)	
Obese	21 (87.5%)	21 (13.2%)	
CTS Severity			0.604
Mild	6 (25.0%)	39 (24.5%)	
Moderate	12 (50.0%)	93 (58.5%)	
Severe	6 (25.0%)	27 (17.0%)	

4 DISCUSSION

In this study of 183 patients with CTS, median age calculated was 40 years and median BMI was 24 kg/m², majority were female (65%) and from urban areas (60%). Shetye et al, also reported mean age of CTS patients as 37.60 years, however, in contrast to current findings showed male predominance (61.9%).(12) Shaukat et al, however,

found 71.66% females in CTS cohort.(13) A retrospective analysis by Leelamani et al, found higher mean patient age of 47.5 ± 10.3 years.(14)

In current study, hypothyroidism was identified in 13.1% of patients with CTS. Aldaghri et al, also reported that 13.8% patients with CTS and 5% had subclinical disease.(15) Rhee et al, found prevalence of hypothyroidism 1.6 times higher in CTS patients than in non-CTS patients.(16) Duan et al, supports the genetic evidence of relation between hypothyroidism and CST.(17) Dahlin et al, highlights that obesity and endocrine disorders are among the recognized systemic risk factors for developing CTS, supporting the metabolic risk profile seen in current CTS cohort.(18)

On stratified analysis, hypothyroidism was significantly more frequent in patients with family history of CTS ($p = 0.001$) and in those with BMI >25 kg/m² ($p< 0.001$). No significant associations were observed between hypothyroidism and age, gender, residence, comorbidities, or CTS severity. In support of this, indicated that while thyroid dysfunction may influence CTS occurrence, its influence on electrophysiological severity measures remains unclear or inconsistent.(19) However, Yang et al, and Lampainen et al, supported the significant association of higher BMI with CTS.(20, 21)

Limitations: This study may have underestimated thyroid dysfunction as subclinical hypothyroidism was not assessed. Being descriptive cross-sectional study, potential confounders were not controlled. Causal relationships between hypothyroidism and CTS cannot be determined; longitudinal studies are needed.

5 CONCLUSION

In current study, hypothyroidism was observed in notable proportion of CTS patients (13.1%), with significantly higher among those with family history of CTS and elevated BMI. These results suggest that metabolic and hereditary factors may play key role in CTS development, highlighting the importance of screening for thyroid dysfunction, particularly in high-risk patients.

REFERENCES

Abuzinadah AR. Effect of hypothyroidism on the risk of carpal tunnel syndrome and electrodiagnostic parameters. *Neurology International*. 2025;17(9):150. https://doi.org/10.3390/neurolint17090150

Aldaghri F, Algahtani MS, Almutairi TA, Albusair M, Bin Ghali K, Al Asim FS. Prevalence of hypothyroidism among carpal tunnel syndrome patients at a hospital in Saudi Arabia. *Cureus*. 2020;12(12):e12264. https://doi.org/10.7759/cureus.12264

Aldaghri F, Algahtani MS, Almutairi TA, Albusair M, Ghali KB, Al Asim FS. Prevalence of hypothyroidism among carpal tunnel syndrome patients at a hospital in Saudi Arabia. *Cureus*. 2020;12(12). https://doi.org/10.7759/cureus.12264

Dahlin LB, Zimmerman M, Calcagni M, Hundepool CA, van Alfen N, Chung KC. Carpal tunnel syndrome. *Nature Reviews Disease Primers*. 2024;10(1):37. https://doi.org/10.1038/s41572-024-00521-1

Duan X, Zhang T, Wang K. Causal relationship between hypothyroidism and peripheral neuropathy: a Mendelian randomization study of European ancestry. *Frontiers in Endocrinology*. 2024;15. https://doi.org/10.3389/fendo.2024.1436823

Feng B, Chen K, Zhu X, Ip W-Y, Andersen LL, Page P, et al. Prevalence and risk factors of self-reported wrist and hand symptoms and clinically confirmed carpal tunnel syndrome among office workers in China: a cross-sectional study. *BMC Public Health*. 2021;21(1):57. https://doi.org/10.1186/s12889-020-10137-1

Hassan S, Ali U, Qureshi A. Frequency of risk factors in patients with carpal tunnel syndrome. *Pakistan Journal of Neurological Surgery*. 2022;26(4):673–8. https://doi.org/10.36552/pjns.v26i4.798

Hidayati HB, Subadi I, Fidiana F, Puspamaniar VA. Current diagnosis and management of carpal tunnel syndrome: a review. *Anaesthesia, Pain & Intensive Care*. 2022;26(3):394–404. https://doi.org/10.35975/apic.v26i3.1902

Joshi A, Patel K, Mohamed A, Oak S, Zhang MH, Hsiung H, et al. Carpal tunnel syndrome: pathophysiology and comprehensive guidelines for clinical evaluation and treatment. *Cureus*. 2022;14(7). https://doi.org/10.7759/cureus.27053

Ku YC, Gannon M, Fang W, Norcini RC, Woodberry KM. Management of acute carpal tunnel syndrome: a systematic review. *Journal of Hand Surgery Global Online*. 2023;5(5):606–11. https://doi.org/10.1016/j.jhsg.2023.06.012

Lampainen K, Shiri R, Auvinen J, Karppinen J, Ryhänen J, Hulkkonen S. Weight-related and personal risk factors of carpal tunnel syndrome in the Northern Finland Birth Cohort 1966. *Journal of Clinical Medicine*. 2022;11(6):1510. https://doi.org/10.3390/jcm11061510

Leelamani V, Shankar S, Al Zoubi MA, Ali MR, Elawady A, Raju R. Retrospective analysis of carpal tunnel syndrome: clinical profile, demographics, and risk factors at Sohar Hospital over a two-year period. *Cureus*. 2025;17(6):e86777. https://doi.org/10.7759/cureus.86777

Osiak K, Elnazir P, Walocha J, Pasternak A. Carpal tunnel syndrome: state-of-the-art review. *Folia Morphologica*. 2022;81(4):851–62. https://doi.org/10.5603/fm.a2021.0121

Padua L, Cuccagna C, Giovannini S, Coraci D, Pelosi L, Loreti C, et al. Carpal tunnel syndrome: updated evidence and new questions. *The Lancet Neurology*. 2023;22(3):255–67. https://doi.org/10.1016/s1474-4422(22)00432-x

Pugdahl K, Tankisi H, Fuglsang-Frederiksen A. Electrodiagnostic testing of entrapment neuropathies: a review of existing guidelines. *Journal of Clinical Neurophysiology*. 2020;37(4):299–305. https://doi.org/10.1097/wnp.0000000000000668

Rhee SY, Cho HE, Kim JH, Kim HS. Incidence and reappraisal of known risk factors associated with carpal tunnel syndrome: a nationwide, 11-year, population-based study in South Korea. *Journal of Clinical Neurology*. 2021;17(4):524–33. https://doi.org/10.3988/jcn.2021.17.4.524

Shakeel H, Waris S, Shamas S, Malik A, Ali M, Rajput R. Prevalence of carpal tunnel syndrome and its risk factors among information technology students in Sialkot. *Healer Journal of Physical Therapy and Rehabilitation Sciences*. 2025;5(1):241–8. https://doi.org/10.55735/12vk5p36

Shaukat A, Aamir H, Ahmad Z, Ahmad U. Diagnostic accuracy of ultrasonography in diagnosis of carpal tunnel syndrome. *Pakistan Journal of Medical Sciences*. 2024;40(4):753. https://doi.org/10.12669/pjms.40.4.8332

Waseem M, Amin K, Aleem M, Tariq U, Nadeem F, Nasir MF, et al. Frequency of cubital tunnel syndrome among tailors: a descriptive cross-sectional study. *Healer Journal of Physiotherapy and Rehabilitation*. 2024;4(6):104–10. https://doi.org/10.55735/v40rx403

Yang C, Chen H-H, Lee M-C, Kao H-K, Lin Y-T, Chen C-T, et al. Risk factors of carpal tunnel syndrome in Taiwan: a population-based cohort study. *Annals of Plastic Surgery*. 2022;88(1):74–8. https://doi.org/10.1097/sap.0000000000002950

Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Rehman, W., Nawaz, K. H., Hashmat, A., Farooq, A., Khan, T., & Zamir, J. (2026). PREVALENCE OF HYPOTHYROIDISM IN PATIENTS WITH CARPAL TUNNEL SYNDROME PRESENTING IN A TERTIARY CARE HOSPITAL. Veredas Do Direito, 23(6), e236120. https://doi.org/10.18623/rvd.v23.6120