

DEMOGRAPHIC AND CLINICAL PROFILE OF PATIENTS WITH CARPAL TUNNEL SYNDROME: a DESCRIPTIVE CROSS-SECTIONAL STUDY

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ABSTRAK

Sindrom Terowongan Karpal (CTS) merupakan neuropati terjepit yang paling sering terjadi pada ekstremitas atas. Kondisi ini ditandai dengan nyeri, mati rasa, parestesia, serta gangguan fungsi tangan yang semakin parah dan dapat memengaruhi aktivitas sehari-hari. Beberapa faktor demografis dan klinis secara konsisten terkait dengan perkembangan dan progresivitas CTS. Mengidentifikasi faktor-faktor ini sangat penting untuk mengenali populasi berisiko tinggi serta meningkatkan strategi pencegahan dan terapi. Sebuah studi potong lintang deskriptif dilakukan menggunakan data awal dari 24 pasien dengan CTS yang telah dikonfirmasi secara klinis dan elektrofisiologis. Variabel yang dianalisis meliputi usia, jenis kelamin, pekerjaan, indeks massa tubuh, waktu munculnya gejala, tangan dominan, tangan yang terkena, dan tingkat keparahan CTS. Data dianalisis secara deskriptif dan disajikan dalam bentuk frekuensi dan persentase. Pasien CTS dalam studi ini didominasi oleh wanita paruh baya hingga lanjut usia yang mengalami obesitas, onset gejala kronis, keterlibatan bilateral, dan keparahan penyakit sedang. Temuan ini sejalan dengan pola epidemiologi CTS yang telah diketahui dan dapat membantu para klinisi mengidentifikasi populasi yang lebih berisiko terhadap gangguan ini.

ABSTRACT

Demographic And Clinical Profile of Patients with Carpal Tunnel Syndrome: A Descriptive Cross-Sectional Study. Carpal Tunnel Syndrome (CTS) is the most frequent entrapment neuropathy of the upper extremity. This condition is characterized by pain, numbness, paresthesia, and progressive impairment of hand function that can affect daily activities. Several demographic and clinical factors are consistently associated with the development and progression of CTS. Characterizing these factors is crucial for identifying high-risk populations and improving prevention and therapeutic strategies. A descriptive cross-sectional study was conducted using baseline data from 24 patients with clinically and electrophysiologically confirmed CTS. The variables analyzed included age, gender, occupation, body mass index, symptom onset, dominant hand, affected hand, and CTS severity. Data were analyzed descriptively and presented as frequencies and percentages. The CTS patients in this study were predominantly middle-aged to elderly women with obesity, chronic symptom onset, bilateral involvement, and moderate disease severity. These findings are consistent with established CTS epidemiological patterns and can assist clinicians in identifying populations at higher risk for this disorder.

INTRODUCTION

Carpal Tunnel Syndrome (CTS) is the most common peripheral entrapment neuropathy and occurs as a result of compression of the median nerve within the carpal tunnel. The syndrome is characterized by pain, numbness, tingling, and weakness in the distribution of the median nerve, involving the thumb, index finger, middle finger, and the radial half of the ring finger. Progressive compression of the median nerve may lead to impaired hand function, reduced grip strength, and substantial limitations in activities of daily living.¹

The prevalence of CTS in the general adult population has been estimated at approximately 3–5%, with incidence rates increasing steadily with advancing age. Previous epidemiological studies have consistently demonstrated a higher prevalence among women compared with men, with the peak occurrence observed between the ages of 40 and 60 years. The greater susceptibility among women has been attributed to anatomical differences in carpal tunnel dimensions, hormonal influences, and higher exposure to repetitive manual activities.²

The pathophysiology of CTS is multifactorial. Increased pressure within the carpal tunnel impairs intraneural microcirculation, leads to ischemia, demyelination, and, eventually, axonal degeneration of the median nerve.³ Several mechanisms contribute to this process, including elevated intracarpal pressure, microvascular injury, connective tissue compression, and hypertrophy of the flexor tendon synovium. These pathological changes ultimately lead to sensory and motor dysfunction of the median nerve.^{4,5}

A number of demographic and clinical factors have been identified as important risk factors for CTS. Obesity is one of the strongest modifiable risk factors, as increased adipose tissue around the wrist may elevate intracarpal pressure and contribute to median nerve compression. Occupational activities involving repetitive wrist flexion and extension, forceful gripping, and prolonged use of handheld devices are also strongly associated with CTS. In many populations, domestic activities performed by housewives may expose individuals to similar repetitive hand movements and sustained wrist postures. Clinically, patients with CTS may present with varying durations and severities of symptoms.¹ Early manifestations are predominantly sensory, including paresthesia and nocturnal numbness, whereas prolonged compression may result in weakness of thumb abduction and opposition, difficulty grasping objects, and atrophy of the thenar muscles. Bilateral involvement is frequently encountered, particularly in patients with systemic or occupational risk factors. Electrodiagnostic studies, particularly Electroneuromyography (ENMG), can be used to confirm the diagnosis and grade disease severity.²

Despite the high prevalence of CTS, demographic and clinical characteristics may vary across populations due to differences in lifestyle, occupation, healthcare accessibility, and underlying comorbidities. In Indonesia, comprehensive reports describing the demographic and clinical profile of patients with CTS remain limited. Such information is important for understanding local epidemiological patterns and for developing targeted screening, prevention, and management strategies. Therefore, the present study aimed to describe the demographic and clinical characteristics of patients with Carpal Tunnel Syndrome by evaluating age, sex, occupation, body mass index, symptom onset, dominant hand, affected hand, intervention side, and baseline disease severity. The findings are expected to provide baseline epidemiological data that may support future analytical and interventional studies involving CTS in the Indonesian population.

METHOD

This descriptive cross-sectional study used baseline demographic and clinical data from patients with Carpal Tunnel Syndrome (CTS) treated at the Electroneuromyography Clinic of Dr. Mohammad Hoesin General Hospital between June and August 2020. A total of 24 patients with mild-to-moderate CTS, as determined by clinical assessment and electrophysiological examination, were included. Patients were eligible if they were aged ≥ 18 years and had electrophysiologically confirmed mild or moderate CTS. Patients with severe CTS, previous carpal tunnel surgery, pregnancy, diabetes mellitus, hypothyroidism, rheumatoid arthritis, malignancy, wrist infection or open wounds were excluded to minimize potential confounding factors. Demographic and clinical information was collected through patient interviews, physical examination, and review of medical records. The variables analysed included: Age, gender, occupation, Body Mass index (BMI), duration of symptoms, dominant hand, side affected by CTS, CTS severity based on ENMG. CTS severity was classified electrophysiologically into mild and moderate categories, according to the electrodiagnostic grading system. Body mass index was categorized according to the Asia-Pacific BMI classification: Underweight ($<18.5 \text{ kg/m}^2$), Normal ($18.5\text{--}22.9 \text{ kg/m}^2$), Overweight ($23.0\text{--}24.9 \text{ kg/m}^2$), Obesity ($\geq 25 \text{ kg/m}^2$). Descriptive statistical analysis was performed using IBM SPSS Statistics version 22. Continuous variables were summarized as mean $\pm$ standard deviation (SD), whereas categorical variables were presented as frequencies and percentages. The dataset was collected in 2020, whereas manuscript preparation and submission were completed in 2026 due to the extended period required for data verification, analysis, and manuscript development. Nevertheless, this time interval should be acknowledged as a limitation, as temporal changes may affect the applicability of the findings to present-day settings.

RESULT

Twenty-four patients diagnosed with Carpal Tunnel Syndrome were included in this study. The mean age of the participants was 50.25 ± 9.61 years. Regarding age categories, the majority of subjects (58.3%) fell within the 46–60 age range. The majority of patients were female (75% overall). The most common occupational status was housewife, representing more than half of all participants (54.2%). Regarding Body Mass Index (BMI), the majority of patients were classified as obese (58.3% overall). Regarding the onset of Carpal Tunnel Syndrome (CTS), the majority of patients presented with a chronic condition (defined as > 3 months), accounting for 70.8% of the total. All patients (100%) were right-hand dominant for daily activities. The majority of patients suffered from bilateral CTS (70.8% overall). CTS severity showed that nearly all patients had moderate-degree CTS (95.8% overall).

Tabel 1. Characteristic Patients with CTS

Characteristic	Total n (%)
Age	
< 31 y.o	1(4,2)
31-45 y.o	5(20,8)
46-60 y.o	14(58,3)
> 60 t y.o	4(16,7)
Gender	
Female	18(75,0)
Male	6(25,0)
Occupation	
Housewife	13(54,2)
Laborer	1(4,2)
Civil Servant	4(16,7)
Private Sector Employee	3(12,5)
Student	2(8,3)
Unemployed	1(4,2)
Body Mass Index (BMI)	
Obesity	14(58,3)
Overweight	2(8,3)
Normal	7(29,2)
Underweight	1(4,2)
Onset CTS	
Sub acute	7(29,2)
Chronic	17(70,8)
Dominant Hand	
Right	24(100)
Left	0(0,0)
Hand affected CTS	
Bilateral	17(70,8)
Right	3(12,5)
Left	4(16,7)
Degree of CTS	
Moderate Degree	23(95,8)
Mild Degree	1(4,2)

DISCUSSION

The present study described the demographic and clinical characteristics of patients with Carpal Tunnel Syndrome (CTS) treated at the Electroneuromyography Clinic of Dr. Mohammad Hoesin General Hospital. The study demonstrated that CTS predominantly affected women, individuals with obesity, patients presenting with chronic symptoms, and those with bilateral involvement. Furthermore, almost all participants exhibited moderate electrophysiological severity at baseline. These findings provide an overview of the typical characteristics of patients seeking neurological care for CTS and are generally consistent with the epidemiological patterns reported worldwide.

The predominance of female patients observed in this study (75%) is consistent with previous epidemiological studies reporting that women have a two- to four-fold greater risk of developing CTS than men. Several mechanisms have been proposed to explain this difference.⁶ Anatomically, women generally have a smaller carpal tunnel cross-sectional area than men, making the median nerve more susceptible to compression when intracarpal pressure increases.⁷ Hormonal influences, particularly fluctuations in estrogen and progesterone, may contribute to fluid retention and connective tissue changes within the carpal tunnel, thereby increasing pressure on the median nerve.⁸ In addition, women are more frequently engaged in repetitive manual activities, including household tasks requiring sustained wrist flexion and repetitive gripping, which may further increase the cumulative mechanical stress on the carpal tunnel.⁹ The predominance of female patients in the present study, therefore reflects both biological susceptibility and occupational exposure.¹⁰

More than half of the participants were classified as obese. Obesity has consistently been recognized as one of the strongest modifiable risk factors for CTS.¹¹ Increased adipose tissue surrounding the wrist may reduce the available space within the carpal tunnel, thereby increasing intracarpal pressure and compromising median nerve microcirculation. Chronic compression initially produces venous congestion and intraneural edema, followed by ischemia, demyelination, and ultimately axonal degeneration when compression persists.¹² In addition, obesity is associated with systemic low-grade inflammation, altered connective tissue metabolism, and impaired nerve regeneration, all of which may contribute to the development and progression of median nerve dysfunction. The high proportion of obese patients observed in this study supports previous evidence suggesting that body weight management should be considered an integral component of CTS prevention and long-term management.¹³

Housewives represented the largest occupational group in this study. Although CTS has traditionally been associated with industrial workers performing repetitive, hand-intensive tasks, domestic activities also expose individuals to repetitive wrist movements, forceful gripping, prolonged wrist flexion and extension, and repetitive loading of the flexor tendons.⁹ Activities such as washing clothes, cooking, carrying household objects, cleaning, and food preparation require repeated activation of the flexor tendons passing through the carpal tunnel. Repetitive tendon excursion may increase friction within the confined tunnel, promoting synovial hypertrophy and elevated intracarpal pressure.¹⁰ Consequently, the predominance of housewives in this study emphasizes that repetitive domestic work should also be recognized as a significant occupational risk factor for CTS.¹¹

Most participants reported chronic symptom onset, indicating that symptoms had persisted for more than 3 months before treatment was initiated.⁴ Chronic symptom duration suggests delayed medical consultation or delayed diagnosis, which remains common in patients with CTS. In the early stage, intermittent numbness and nocturnal paresthesia are often underestimated because symptoms may temporarily improve with rest or changes in hand position. As compression persists, however, progressive ischemia leads to structural nerve injury characterized by segmental demyelination, impaired saltatory conduction, and eventually axonal loss.¹⁴ Consequently, prolonged symptom duration has been associated with more severe electrophysiological abnormalities, poorer functional outcomes, and slower recovery following treatment.¹⁵ The predominance of chronic presentations in this study highlights the importance of improving awareness among both patients and primary healthcare providers to facilitate earlier diagnosis and intervention.¹⁶

An interesting finding of the present study was that bilateral CTS was observed in more than two-thirds of patients. Bilateral involvement has been reported in previous studies, particularly among individuals with systemic risk factors such as obesity, diabetes mellitus, thyroid disorders, and inflammatory conditions. Although patients frequently report symptoms predominantly in one hand, electrophysiological studies often reveal subclinical abnormalities in the contralateral hand. Bilateral disease supports the concept that CTS is not merely a localized mechanical disorder but may also reflect systemic metabolic and connective tissue changes that simultaneously affect both wrists. Because bilateral CTS may substantially impair activities requiring bimanual coordination, clinicians should routinely evaluate both upper extremities even when symptoms appear unilateral.¹⁷

All participants in the present study were right-hand dominant. This finding is expected because right-hand dominance predominates in the general population. Nevertheless, the side receiving intervention was evenly distributed between the right and left wrists, as several patients with bilateral CTS underwent treatment on the more symptomatic side. Previous studies have demonstrated that the dominant hand is often affected earlier due to greater cumulative mechanical loading; however, prolonged exposure to systemic and occupational risk factors eventually results in bilateral involvement.¹⁸

Nearly all patients demonstrated moderate CTS based on electrophysiological assessment. Electrodiagnostic studies can confirm CTS and assess the severity of median nerve dysfunction. Moderate CTS generally reflects abnormalities involving both sensory and motor conduction without complete axonal degeneration. At this stage, structural nerve injury remains potentially reversible if decompression or conservative management is initiated promptly. Conversely, prolonged compression may progress to severe CTS characterized by marked slowing of nerve conduction, axonal loss, thenar muscle atrophy, and irreversible functional impairment. The predominance of moderate CTS in this study may indicate that patients generally seek specialist evaluation only after symptoms begin to interfere with daily activities, rather than at the initial stage of the disease.¹⁹

Collectively, the demographic and clinical characteristics identified in this study portray a relatively homogeneous population of patients with CTS, characterized by female predominance, obesity, chronic symptom duration, bilateral involvement, and moderate disease severity. These characteristics are consistent with the current understanding of CTS pathophysiology, in which repetitive mechanical stress and increased intracarpal pressure interact with patient-related factors to produce progressive median nerve compression. The findings also emphasize the importance of comprehensive patient evaluation, including assessment of anthropometric characteristics, occupational history, symptom duration, and electrophysiological severity, before selecting appropriate treatment strategies.²⁰

From a clinical perspective, the present findings have important implications. Individuals with multiple risk factors, particularly elderly women with obesity who perform repetitive manual activities, should be considered high-risk populations for CTS. Early screening, patient education on ergonomic modifications and weight reduction, and timely referral for electrodiagnostic evaluation may facilitate earlier diagnosis before irreversible nerve injury develops. Such preventive strategies may reduce disability, improve hand function, and decrease the socioeconomic burden associated with CTS. The present study provides a comprehensive description of the demographic and clinical characteristics of patients with CTS evaluated using standardized electrophysiological criteria. These baseline data provide valuable epidemiological information on CTS in the Indonesian population and

may serve as a reference for future clinical and interventional studies. However, several limitations should be acknowledged. First, the relatively small sample size ($n = 24$) limits the generalizability of the findings. Second, because of its descriptive design, causal relationships between demographic factors and CTS cannot be established. Future multicentre studies with larger sample sizes are warranted to further investigate predictors of disease severity and treatment outcomes.

CONCLUSION

Patients with Carpal Tunnel Syndrome included in this study were predominantly female, obese, and presented with chronic symptoms. Most patients demonstrated bilateral involvement and moderate electrophysiological severity. These findings are consistent with the established epidemiological profile of CTS and emphasize the contribution of demographic and clinical factors to disease presentation. Recognition of these characteristics may facilitate earlier diagnosis, identification of high-risk individuals, and implementation of preventive and therapeutic strategies to improve clinical outcomes

REFERENCE

1. Jennifer Wiperman KG. Carpal Tunnel Syndrome: Diagnosis and Management. *Am Fam Physician*. 2016;94(15):993-999.
2. Ibrahim, W S Khan, N Goddard PS. Carpal tunnel syndrome: a review of the recent literature. *Open Orthop J*. 2012;6:69-76. doi:10.2174/1874325001206010069
3. Perhimpunan Dokter Spesialis Saraf Indonesia (PERDOSSI). Pedoman Nasional Pelayanan Kedokteran Carpal Tunnel Syndrome. In: 2021.
4. Moutasem S Aboonq. Pathophysiology of carpal tunnel syndrome. *Neurosci*. 2015;20(1):4-9.
5. Luca Padua. et al. Carpal tunnel syndrome: updated evidence and new questions. *Lancet Neurol*. 2023;22(3):255-267.
6. San Ko Y, Yang HJ, Park SB, et al. Carpal tunnel syndrome in elderly patients. *The Nerve*. 2018;4(2):27-31.
7. Seror P. Carpal tunnel syndrome in the elderly «Beware of severe cases. In: *Annales de Chirurgie de La Main et Du Membre Supérieur*. Vol 10. Elsevier; 1991:217-225.
8. Verdú E, Ceballos D, Vilches JJ, Navarro X. Influence of aging on peripheral nerve function and regeneration. *J Peripher Nerv Syst*. 2000;5(4):191-208.
9. Newington L, Harris EC, Walker-Bone K. Carpal tunnel syndrome and work. *Best Pract Res Clin Rheumatol*. 2015;29(3):440-453.
10. Falkiner S, Myers S. When exactly can carpal tunnel syndrome be considered work-related? *ANZ J Surg*. 2002;72(3):204-209.
11. Mattioli S, Baldasseroni A, Curti S, et al. Incidence rates of surgically treated idiopathic carpal tunnel syndrome in blue-and white-collar workers and housewives in Tuscany, Italy. *Occup Environ Med*. 2009;66(5):299-304.
12. Mansoor S, Siddiqui M, Mateen F, et al. Prevalence of obesity in carpal tunnel syndrome patients: a cross-sectional survey. *Cureus*. 2017;9(7).
13. Werner RA, Albers JW, Franzblau A, Armstrong TJ. The relationship between body mass index and the diagnosis of carpal tunnel syndrome. *Muscle Nerve*. 1994;17(6):632-636.
14. Kementerian Kesehatan Republik Indonesia. Pedoman Nasional Pelayanan Kedokteran Carpal

Tunnel Syndrome. In: 2022.

15. Basiri K, Katirji B. Practical approach to electrodiagnosis of the carpal tunnel syndrome: A review. *Adv Biomed Res.* 2015;4(1):50.
16. Wang L. Electrodiagnosis of carpal tunnel syndrome. *Phys Med Rehabil Clin.* 2013;24(1):67-77.
17. Ferrante MA. The relationship between sustained gripping and the development of carpal tunnel syndrome. *Fed Pract.* 2016;33(7):10.
18. Dec P, Zyluk A. Bilateral carpal tunnel syndrome—A review. *Neurol Neurochir Pol.* 2018;52(1):79-83.
19. Somaiah Aroori RAJS. Carpal tunnel syndrome. *Ulster Med J.* 2008;77(1):6-17.
20. 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).