ACADEMIA International Journal for Social Sciences
Volume 4, Issue 2, 2025 ISSN-L (Online): 3006-6638

Prevalence and Risk Factors for Self-Reported Symptoms of Carpal Tunnel Syndrome among IT Office Workers in Karachi: A Cross-Sectional Study

Narmish Abbasi
abbasinarmish@gmail.com
DPT Indus University, Department of Allied Health Sciences

Dr. Paras Ayaz
paraskhalid14@gmail.com
Assistant Professor, Department of Allied health Sciences, Indus University, Karachi

Dr. Okasha Anjum
okashaanjum86@hotmail.com
Head of Department, Department of Allied health Sciences, Indus University, Karachi
Corresponding Author: * Narmish Abbasi abbasinarmish@gmail.com

Received: 09-03-2025 **Revised:** 10-04-2025 **Accepted:** 07-05-2025 **Published:** 22-06-2025

ABSTRACT

Carpal Tunnel Syndrome (CTS) is the most common peripheral nerve entrapment disorder, often triggered by repetitive wrist movements and poor ergonomics. With the rise of digital professions, particularly in the IT sector, CTS has emerged as a significant occupational health concern. Symptoms such as numbness, tingling, and hand weakness not only reduce quality of life but also impact productivity and professional performance. While international studies have highlighted these issues, data specific to Pakistan's IT workforce remain limited.To determine the prevalence and associated risk factors for self-reported symptoms of Carpal Tunnel Syndrome among IT office workers in Karachi. A cross-sectional study was conducted over six months, involving 169 full-time IT professionals employed across three institutions in Karachi. Participants were selected via non-probability convenience sampling. The Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) was used to assess symptom severity and functional impairment. Data were analysed using SPSS, with descriptive statistics, chi-square tests, correlation analyses, and diagnostic tests (reliability, normality, multicollinearity, and homogeneity). Among 169 participants, 15.98% reported mild symptoms, 63.91% moderate, and 15.98% severe symptoms. Symptom severity was highest among males (82.35%) and those aged 21–30. Similarly, impairment severity followed a comparable trend, with 19.53% reporting severe impairment. Statistically significant associations were observed between symptom severity and demographic variables (age, gender, and marital status). Cronbach's alpha for BCTQ was 0.878, indicating good reliability. The correlation coefficient between symptom and impairment severity was 0.34, and all null hypotheses were rejected in chi-square tests, affirming the role of demographic factors. CTS is notably prevalent among IT office workers in Karachi, especially in younger males and single individuals. Key contributing factors include prolonged computer use, poor ergonomics, and limited awareness of preventive strategies. These findings underscore the need for targeted ergonomic interventions and occupational health policies within the IT industry to reduce the risk and burden of CTS.

Keywords: *Carpal Tunnel Syndrome, IT Workers, Occupational Health, Ergonomics, BCTQ, Prevalence, Risk Factors, Pakistan*

INTRODUCTION

Carpal tunnel syndrome (CTS), caused by compression of the median nerve within the carpal tunnel, is the most prevalent peripheral nerve entrapment disease, affecting thousands of individuals. Different occupational populations involving the mentioned risk factors has been susceptible to CTS development.[1] CTS is a common musculoskeletal condition, and although diagnostic criteria for CTS varies, the clinical profile typically included a combination of symptom assessments (e.g., numbness, tingling, night pain, and paraesthesia), clinical signs (e.g., Tinel's sign, Phalen's sign), and/or nerve conduction velocity (NCV) testing of the median nerve across the carpal tunnel.[2] CTS is characterized by numbness, tingling, burning, or pain in the thumb, index, and long fingers of the hand and involved slowing of median nerve conduction at the wrist due to entrapment of the median nerve. Occupationally related CTS cases resulted in a significant burden of worker's compensation claims, lost work time and productivity, and disability.[3]

Various occupational groups involving the above risk factors has been susceptible to CTS development. Wrist and hand symptoms are associated with repetitive use of hands, poor posture during computer work, and prolong exposure to visual display terminals (VDTs) including computer screens, keyboards, and mouse. Psychosocial variables such as high job pressure, low decision-making authority, and low job rewards also pose risks for musculoskeletal complaints. [1] In Kuwait, high rates of overweight and obesity, diabetes mellitus, cigarette smoking, and other known CTS risk factors indicated that CTS is emerging as a significant occupational health issue.[2] One study explored associations between electrophysiological measures of median nerve latency and exposure to occupational psychosocial and biomechanical risks, while adjusting for personal variables like age, gender, and obesity. [3] Both occupational and non-occupational risk factors (e.g., gender, age, BMI, thyroid dysfunction, diabetes) are consider relevant in CTS. Conditions such as diabetes, rheumatoid arthritis, hypothyroidism, and pregnancy are known to cause CTS. Certain occupations are reported as risk factors for CTS. [4] CTS and other work-related musculoskeletal disorders (MSDs) has been common issues across general industries, including dental hygiene. The purpose of one particular study is to determine the prevalence of CTS and other MSDs among dental hygienists. Notably, no previous studies involving dental hygienists has combined nerve conduction studies (NCS) and symptom evaluation in their CTS case definitions. [5] CTS is also the most common nerve entrapment syndrome. Studies on selected occupational populations suggested an association between CTS and forceful repetitive work as well as vibration. Only a few population-based studies had addressed the role of physical load factors in CTS. One study aimed to investigate the relationships between exposures to a single or a combination of physical work load factors and CTS.[6]

The prevalence of work-related CTS across different occupational studies varies , ranging from 1% to 61%. The highest CTS prevalence of 61% is found among industrial workers primarily using grinding tools, while only about 1% of industrial workers with forceful but low-repetitive hand use developed CTS. Evidence is lacking for determining the prevalence of CTS in Chinese office workers and identifying relevant work-related predictors. Researchers investigated the prevalence of CTS symptoms involving the wrist and hand among office workers in China and identified potential risk factors for CTS development.[1] Prevalence estimates of CTS in the general adult population range from approximately 1% to 16%. Little is known about the prevalence, costs, and contributing factors of CTS in the Arabian Peninsula, including Kuwait.[2] CTS is a common condition among workers, with reported prevalence rates between 3% and 11% depending on the industry studied. It is associated with significant disability and job loss. Controversy remained regarding specific workplace factors and their exposure-response relationships due to imprecise exposure measurements.[3] The prevalence of CTS in VDT workers is not significantly high compared to that in control populations. If the etiology of CTS is deemed occupational, the affected worker became eligible for compensation. [4] The prevalence of CTS is found to be 8.4% using a combination of symptoms and NCS, but as high as 42% if defined by symptoms alone. [5] The prevalence

of possible or probable CTS is 2.1% in men and 5.3% in women. Work tasks involving vibrating tools (adjusted odds ratio (OR) 1.9, 95% CI 1.2–2.9) and handgrips with high force (OR 1.7, 95% CI 1.2–2.5) are related to increased CTS prevalence. Significant joint effects are observed between combinations of forceful and repetitive tasks or use of vibrating tools.[6] Overall CTS prevalence is 1.6% on the dominant (working) hand and 0.7% on the non-dominant hand. There is a significantly increased risk of CTS for every 10-hour increase of repetitive non-forceful work (OR = 1.84; 95% CI = 1.06–3.19) on the working hand.[7] In Pakistan, carpal tunnel syndrome (CTS) has emerged as a growing occupational health concern, especially among healthcare professionals, office workers, and industrial labourers. The prevalence of CTS in Pakistan varies across occupational categories. In a report 14.5% of hospital staff had symptoms suggestive of CTS, with nurses and computer users being particularly affected focusing on medical transcriptionists found a prevalence rate of 11.2%, underscoring the risk associated with prolonged computer use. [21]

Therefore, the overarching goal of this study **is** to identify the prevalence and risk factors for self-reported CTS symptoms among IT office workers.

METHODOLOGY

Study Design

A cross-sectional study was conducted in June 2025 among male and female IT office workers of Karachi age between 18-50 years.

Sampling Techniques

The study was conducted by convenient sampling technique in IT department of LUHMS diagnostic and research laboratory, IT department of National Medical Centre (NMC) and IT department of Advance Radiology Clinic (ARC) in Karachi.

Outcome Measure

Questionnaire for Assessment was Boston Carpal Tunnel Questionnaire (BCTQ) was used to gather the data for conducting this research. The chosen outcome measures comprehensively assess the incident of being IT office workers in Karachi.

Data analysis procedure

Data were analyzed using software packages. Descriptive statistics (means, frequencies, and percentages) were used to describe the demographics of study participants and their levels of knowledge regarding carpal tunnel syndrome. SPSS was also used to perform inferential statistical analyses, including tests such as chi-square tests or t-tests to determine significant differences in knowledge levels between different participant groups.

Ethical Consideration

This study ensured informed consent through written consent forms and clear explanations of the research purpose and procedures. Participants' confidentiality was maintained throughout the study and secure data storage. This study's benefits outweigh the potential risks, and no conflict of interest.

Reliability

Reliability of the Boston Carpal Tunnel Questionnaire (BCTQ) as a survey instrument ensures the accuracy of measurements by evaluating its internal consistency. To determine the reliability of the questionnaire, various statistical methods can be used. In this study, SPSS software was utilized, and Cronbach's alpha was applied to assess internal consistency. Cronbach's alpha is a statistical measure that evaluates how closely related a set of items are within a scale, thereby reflecting the scale's reliability. According to standard interpretations, a Cronbach's alpha value between 0.70 and 0.79 indicates acceptable internal consistency, values between 0.80 and 0.89 indicate good internal consistency, and values of 0.90 or above are considered to reflect excellent internal consistency.

RESULT

This chapter discusses the results of statistical applications on dependent variables, independent variables, and their mutual relations. It reviews two aspects of data analysis i.e.

(i) Data dissection and its visualization aiming to provide research glimpse briefly to general audience and (ii) Statistical descriptions including descriptive statistics, correlation & chi-square analysis, and diagnostic analysis.

Chart: 1 Gender Distribution Pie Chart

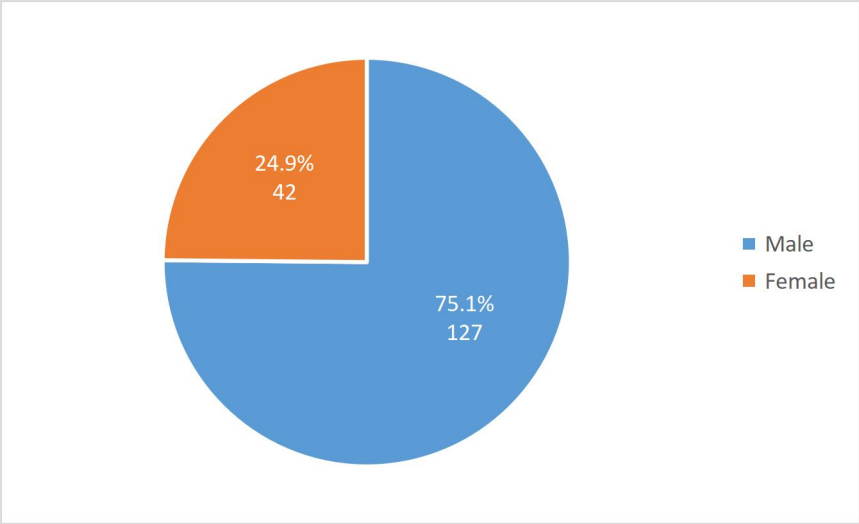

Table 1: Gender Distribution

Gender	Number of Participants	Percentage
Male	127	75.1%
Female	42	24.9%

Correlation Matrix

Table 2: Correlation Analysis of BCTS Components:

BCTS	N	Min.	Max.	Mean	SD	Variance	%
SSC1. How severe is the hand/wrist pain that you have at night?	169	1	23	2.69	1.839	3.381	11.7%
SSC2. How often did hand/wrist pain wake you up during a typical night in the past two	169	1	5	2.63	.931	.866	52.5%

weeks?							
SSC3. Do you typically have pain in your hand/wrist during the daytime?	169	1	5	2.66	.879	.772	53.3%
SSC4. How often do you have hand/wrist pain during daytime?	169	1	5	2.70	.950	.902	54.0%
SSC5. How long on average does an episode of pain last during the daytime?	169	1	5	2.62	.945	.893	52.3%
SSC6. Do you have numbness in your hand/wrist?	169	1	5	2.64	.947	.897	52.9%
SSC7. Do you have weakness in your hand/wrist?	169	1	5	2.73	.864	.747	54.6%
SSC8. Do you have tingling sensations in your hand?	169	1	5	2.54	.838	.702	50.8%
SSC9. How severe is numbness (loss of sensation) or tingling at night?	169	1	5	2.59	.869	.755	51.8%
SSC10. How often did hand weakness or tingling wake you up during a typical night during the past two weeks?	169	1	5	2.73	.896	.804	54.7%
SSC11. Do you have difficulty with the grasping and use of small objects such as keys or pens?	169	1	5	2.49	.933	.870	49.7%
FSS1. Writing	169	1	5	2.54	.938	.880	50.9%
FSS2. Buttoning of cloths	169	1	4	2.04	.978	.957	51.0%
FSS3. Holding a book while reading	169	1	5	2.17	.986	.972	43.3%
FSS4. Gripping a telephone handle	169	1	23	2.25	1.857	3.450	9.8%
FSS5. Opening of jars	169	1	5	3.40	1.007	1.015	67.9%
FSS6. Household chores	169	1	5	2.56	.905	.820	51.1%
FSS7. Carrying of grocery basket	169	1	5	3.81	.838	.702	76.2%
FSS8. Bathing & dressing	169	1	5	1.96	.978	.957	39.2%

Above table shows descriptive analysis of BCTS related to Prevalence and risk factors for self-reported symptoms of carpal tunnel syndrome among IT office workers; study of each element showing how frequently respondents made assertive answers against these questions. BCTS is the parameters to show the overall involvement of respondents in response to assess the Prevalence and risk factors for self-reported symptoms of carpal tunnel syndrome among IT office workers here and in the rest of documents as well; showing that 76.2% respondents have highest response for item “Carrying of grocery basket” and 9.8% respondents have lowest response for item “Griping a telephone handle”.

Levene's Test for Homogeneity:

Table 3: Homogeneity Test

		Levene Statistic	Sig.
Age bracket	Symptom severity	2.084	0.104
	Impairment severity	0.323	0.809

Gender	Symptom severity	0.011	0.916
	Impairment severity	2.799	0.096
Marital status	Symptom severity	0.136	0.713
	Impairment severity	4.970	0.027

Above table shows that population of all elements for assessment of all factors have significant impact on Prevalence and risk factors for self-reported symptoms of carpal tunnel syndrome among IT office workers Here for age bracket, gender and marital-status; p-value is more than 0.05 in prevalence of symptom and impairment severity assessment; hence homogeneity assumption of the variance is met; have a mean that spread of data within each combination of factors should be roughly the same.

DISCUSSION

Carpal Tunnel Syndrome (CTS), the most common peripheral nerve entrapment disorder, arises from compression of the median nerve within the wrist. It manifests through symptoms such as numbness, tingling, and pain in the fingers, and is commonly diagnosed via clinical signs or nerve conduction studies. CTS is particularly prevalent in occupations involving repetitive hand use, awkward wrist postures, or prolonged use of visual display terminals. Psycho-social stressors like job strain and low workplace autonomy also contribute to its development. The condition significantly impacts workers through compensation claims, reduced productivity, and disability. Prevalence rates vary widely by industry, ranging from 1% to 61%, with higher rates in workers using forceful, repetitive tools. In Kuwait and other regions of the Arabian Peninsula, lifestyle-related conditions such as diabetes and obesity increase CTS risk. In Pakistan, CTS is emerging as a major occupational health concern, especially among healthcare and office workers, with prevalence reaching 14.5% in hospital staff and 11.2% in medical transcriptionists. Despite its burden, inconsistencies in diagnostic criteria and measurement methods hinder precise assessment across populations. Greater awareness and improved ergonomic and diagnostic strategies are essential to manage and reduce CTS prevalence in occupational settings globally.

The research study assessed 169 respondents using the Boston Carpal Tunnel Syndrome Questionnaire (BCTS) to evaluate the severity of symptoms and functional impairment. Based on symptom severity, the findings showed that 27 individuals (15.98%) experienced mild symptoms, 108 (63.91%) had moderate symptoms, and another 27 (15.98%) suffered from severe symptoms. Age-wise analysis revealed that the highest proportion of severe symptoms was reported in the 21–30 age group (55.88%), while the lowest was in those aged up to 20 years (8.82%). Gender-wise, males represented a significantly higher proportion of severe symptoms cases (82.35%) compared to females (17.64%). Marital status analysis showed that singles experienced more severe symptoms (61.76%) than married individuals (38.23%). In terms of impairment severity, 35 respondents (20.71%) had mild impairment, 101 (59.76%) had moderate impairment, and 33 (19.53%) reported severe impairment. The highest number of severe impairments was again found in the 21–30 age group (60.60%), while the 41–50 age group had the lowest prevalence (3.03%). Males also made up the majority of severe impairment cases (78.78%), compared to females (21.21%). Regarding marital status, single participants showed a higher prevalence of severe impairment (60.60%) compared to married participants (39.39%). Overall, the findings indicate a notable association between younger age, male gender, and single marital status with more severe symptoms and impairments.

LIMITATIONS

This study has several limitations. The use of non-probability convenience sampling limits the representativeness of the findings and may reduce generalizability to broader IT populations. Data collection was restricted to three healthcare-based IT departments in Karachi, which may not reflect the ergonomic and organizational conditions of other sectors. The cross-sectional design precludes causal inferences, and reliance on self-reported data introduces potential recall and response biases. Additionally, the absence of clinical diagnostic tools like nerve conduction studies limits the accuracy of symptom-based CTS identification.

RECOMMENDATIONS

Future studies should use probability-based sampling to enhance representativeness and include IT professionals from various industries for broader applicability. A longitudinal design is recommended to track symptom progression and establish causal relationships. Incorporating objective diagnostic tools alongside self-reports would improve data accuracy. Including psychosocial and ergonomic factors, along with standardized assessment instruments, can offer a more comprehensive understanding of CTS risk among IT workers.

CONCLUSION

This study highlights the significant burden of Carpal Tunnel Syndrome (CTS) among IT office workers, primarily due to repetitive hand use, poor ergonomics, and psychosocial stressors. Among 169 participants, 63.91% reported moderate symptoms, with the 21–30 age group most affected. Males and single individuals showed greater symptom severity. Statistical analysis confirmed significant associations between demographic factors and CTS symptoms. The Boston Carpal Tunnel Syndrome Questionnaire (BCTS) proved reliable, and diagnostic tests confirmed data validity.

Given the high prevalence of CTS, especially in younger IT professionals, there is a pressing need for ergonomic interventions, workplace awareness programs, and routine health monitoring. Despite its insights, the study's limitations, including convenience sampling, restricted setting, cross-sectional design, and lack of clinical confirmation, limit generalizability. Future research should adopt randomized sampling, include varied sectors, use longitudinal methods, and integrate clinical diagnostics to strengthen findings and inform effective prevention strategies.

REFERENCES

Al-Hashel JY, Ahmed SF, Alroughani R, Al-Tamimi M, Khan EA, Al-Awadi M. Prevalence and risk factors of carpal tunnel syndrome in Kuwait. *Med Princ Pract*. 2010;19(2):142–6.

Anton D, Rosecrance J, Merlino L, Cook T. Prevalence of musculoskeletal symptoms and carpal tunnel syndrome among dental hygienists. Am J Ind Med. 2002;42(3):248–57.

Aroori S, Spence RAJ. Carpal tunnel syndrome. Ulster Med J. 2008;77(1):6–17.

Burt S, Crombie K, Jin Y, Wurzelbacher S, Ramsey J, Deddens J. Workplace and individual risk factors for carpal tunnel syndrome. Occup Environ Med. 2011;68(12):928–33.

Çupi B, Šarac I, Jovanović JJ, Jovanović S, Petrović-Oggiano G, Debeljak-Martačić J, et al. Occupational and non-occupational risk factors correlating with the severity of clinical manifestations of carpal

tunnel syndrome and related work disability among workers who work with a computer. Arh Hig Rada Toksikol. 2023;74(4):252–72.

Fan ZJ, Harris-Adamson C, Gerr F, Eisen EA, Hegmann KT, Bao S, et al. Associations between workplace factors and carpal tunnel syndrome: A multi-site cross sectional study. Am J Ind Med. 2015;58(5):509–18.

Feng B, Chen K, Zhu X, Ip WY, 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;21:1–10.

Gerr F, Marcus M, Monteilh C. Epidemiology of musculoskeletal disorders among computer users: lesson learned from the role of posture and keyboard use. J Electromyogr Kinesiol. 2004;14(1):25–31.

Ghasemi M, Rezaee M, Chavoshi F, Mojtahed M, Shams Koushki E. Carpal tunnel syndrome: the role of occupational factors among 906 workers. Trauma Mon. 2012;17(2):296–300.

Harris-Adamson C, Eisen EA, Kapellusch J, Garg A, Hegmann KT, Thiese MS, et al. Biomechanical risk factors for carpal tunnel syndrome: a pooled study of 2474 workers. Occup Environ Med. 2015;72(1):33–41.

Kubo K, Cheng YS, Zhou B, An KN, Moran SL, Amadio PC, et al. The quantitative evaluation of the relationship between the forces applied to the palm and carpal tunnel pressure. J Biomech. 2018;66:170–4.

Mansfield M, Thacker M, Sandford F. Psychosocial Risk Factors and the Association With Carpal Tunnel Syndrome: A Systematic Review. Hand (N Y). 2018;13(5):501–8.

Mediouni Z, Bodin J, Dale AM, Herquelot E, Carton M, Leclerc A, et al. Carpal tunnel syndrome and computer exposure at work in two large complementary cohorts. BMJ Open. 2015;5(9):e008156.

Ohnari K, Uozumi T, Tsuji S. Brain Nerve. 2007;59(11):1247–52.

Padua L, Coraci D, Erra C, et al. Carpal tunnel syndrome: clinical features, diagnosis, and management. Lancet Neurol. 2016;15(12):1273–84.

Pahn G, Wollny J, Hartmann B, Schiele R, Hofmann GO. Metaanalyse zur Bestimmung von Risikofaktoren für das Karpaltunnelsyndrom (KTS) Teil II. Berufliche Risikofaktoren. Z Orthop Unfall. 2012;150(5):516–24.

Raman SR, Al-Halabi B, Hamdan E, Landry MD. Prevalence and risk factors associated with self-reported carpal tunnel syndrome (CTS) among office workers in Kuwait. BMC Res Notes. 2012;5:289.

Riaz M, Malik A, Tariq M, Aslam M. Carpal tunnel syndrome among typists and transcriptionists: frequency and risk factors. *Pak J Med Sci*. 2020;36(4):772–6.

Saleem M, Ahmed M, Khan MS. Gender-wise prevalence of carpal tunnel syndrome symptoms in a suburban population. *Pak J Neurol*. 2019;25(2):88–92.

Sharma R, Gupta A, Khanna A. Prevalence of carpal tunnel syndrome among computer professionals in India. *Indian J Occup Environ Med*. 2014;18(3):145–9.

Shiri R, Miranda H, Heliövaara M, Viikari-Juntura E. Physical work load factors and carpal tunnel syndrome: a population-based study. Occup Environ Med. 2009;66(6):368–73.

Siddiqi HU, Qureshi NR, Fatima T. Prevalence of carpal tunnel syndrome among hospital staff: a cross-sectional study. *Liaquat National Journal of Primary Care*. 2017;1(2):60–4.

Tabatabaeifar S, Dalbøge A. Carpal tunnel syndrome and occupational hand exposures: a Danish nationwide cohort study. Occup Environ Med. 2024;81(8):417–24.

Thomsen JF, Hansson GA, Mikkelsen S, Lauritzen M. Carpal tunnel syndrome in repetitive work: a follow-up study. Am J Ind Med. 2002;42(4):344–53.

You D, Smith AH, Rempel D. Meta-analysis: association between wrist posture and carpal tunnel syndrome among workers. Saf Health Work. 2014;5(1):27–31.