

Association between work period and the incidence of carpal tunnel syndrome in bankers

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ABSTRACT

Background: Improper computer use without regard for occupational safety and health can lead to work-related musculoskeletal disorders (WMSD), including severe conditions like Carpal Tunnel Syndrome (CTS). This study aimed to identify further the association between work period and the incidence of carpal tunnel syndrome in bank employees.

Methods: The study used a literature review design using secondary data from relevant study articles regarding the association between work periods and the incidence of CTS. Journals were searched in the PubMed and Google Scholar databases using keywords such as “tenure,” “risk factor,” “work period,” “years of service,” “work,” “computer,” and “carpal tunnel syndrome,” with Boolean operators “OR” and “AND” to refine the search. Articles from the search results were screened, and six relevant articles were selected. The study included international and national peer-reviewed articles that examined the relationship between work period (tenure) and the incidence of CTS. The exclusion criteria were articles that focused on non-occupational causes of CTS, lacked full-text access, or consisted of reviews, commentaries, editorials, or conference abstracts without original research data.

Results: A significant association was found, with the risk increasing for employees working more than 3 to 5 years. Workers with over 5 years of experience had up to an 8-fold higher likelihood of developing CTS, while those with four or more years faced a 2 to 18 times greater risk.

Conclusion: This study’s findings indicate a significant association between the work period and the incidence of CTS in bank employees.

Keywords: carpal tunnel syndrome, ergonomics, risk factor work, working injury, working period

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Introduction

Improper computer use without attention to health and safety can lead to work-related musculoskeletal disorders (WMSD).¹ Occupational diseases are health conditions caused or worsened by work activities.² Bank employees, especially those who use computers, face a high risk of musculoskeletal disorders due to repetitive typing and prolonged flexion and extension movements.³ This may cause pressure on the median nerve and lead to carpal tunnel syndrome (CTS).⁴

CTS is a common condition caused by compression of the median nerve in the wrist and palm, where the carpal bones and transverse carpal ligament confine it. It leads to several symptoms affecting the fingers, hands, and arms.⁵ CTS is more common in women and adults over 30, with 76% of cases occurring between ages 40 and 60.^{6,7} The median nerve

runs through the narrow carpal tunnel alongside multiple flexor tendons. Any condition causing congestion in this space can compress the nerve, leading to CTS.⁵

CTS is a WMSD caused by carpal tunnel narrowing, which compresses the median nerve in the wrist.⁸ The prevalence of CTS in office workers reportedly ranged from 5,000-7,000 per 100,000 population, which indicates that the percentage prevalence of CTS in office workers is around 5-7%.⁹ According to the International Labour Organization (ILO), CTS cases are almost always included in the list of WMSD in several countries.¹⁰ In Indonesia, the prevalence of CTS reaches 267 out of 100,000 in the general population.¹¹ In occupations that have a high risk to the wrist and hand, it has been reported that the risk ranges from 5.6%-15%.¹⁰ The prevalence of CTS among Indonesian bank employees is uncertain due to limited reports. However, a 2015 study by

Saerang et al. found that 28% of employees at BNI and BCA in Bitung experienced CTS.¹²

Two categories of risk factors contribute to CTS: individual and work-related. Personal factors include body mass index, gender, age, and a history of diabetes or rheumatoid arthritis. Work-related factors include improper hand posture, prolonged work periods, duration, and repetitive movements.¹³ A major work-related risk factor for CTS is the duration of employment. The longer a person works, the more repetitive finger movements accumulate over time, increasing the risk of CTS.¹⁴ People with CTS may experience symptoms such as numbness, tingling, and paresthesia (a burning-like sensation).¹⁵ CTS can lower employee productivity and reduce company profits.¹⁶ CTS has become a significant occupational disease requiring attention. However, research on CTS incidence among bank employees remains limited, particularly in Indonesia and Bali. This study gap prompted the author to conduct a literature review exploring the relationship between work duration and CTS incidence in bank employees.

Methods

This study employed a literature review design using secondary data from previous research on the relationship between work tenure and CTS. Journal searches were conducted in PubMed and Google Scholar using keywords such as “tenure,” “risk factor,” “work period,” “years of service,” “computer,” and “carpal tunnel syndrome,” combined with Boolean operators “OR” and “AND.” Six relevant articles were selected based on inclusion criteria: international and national peer-reviewed studies published between 2014 and 2024 that examined the link between tenure and CTS. Only full-text articles in English or the national language were considered. Exclusion criteria included studies on non-occupational CTS causes, inaccessible full texts, reviews, commentaries, editorials, conference abstracts without original research, and duplicate or overlapping data from the same research group.

Results

Demissie et al. reported an 11.7% annual prevalence of CTS in a sample of 422 participants. Significant risk factors included age ($p=0.000$), smoking ($p=0.001$), over five years of work experience ($p=0.001$), repetitive activities ($p=0.000$), and insufficient ergonomic training ($p=0.000$). Individuals with five or more years of experience had a 7.98 times higher risk [AOR: 7.98; 95% CI: 3.70–17.33] than those with less experience. Frequent wrist movements increased CTS risk by 5.4 times [AOR: 5.4; 95% CI: 1.29–8.96]. The diagnosis was based on Durkan’s compression test, Phalen’s test, the flexion and compression test, and Tinel’s test.¹⁷

Hamid et al. found that among respondents with at least four years of work experience, 91.8% (89 individuals) were at higher risk for CTS, while 8.2% (8 individuals) were not. Among those with less than four years of experience, 58.3% (7 individuals) were at risk, and 41.7% (5 individuals) were not. A Chi-Square test showed a significant correlation

between work duration and CTS complaints ($p = 0.005$, $p \leq \alpha$), leading to the rejection of H_0 . The prevalence ratio indicated that employees with four or more years of experience were 2.192 times more likely to develop CTS than those less than four years [PR: 2.192; 95% CI: 1.445–3.325]. The study used a standardized questionnaire and observational methods for validation.¹⁸

Rahardjo et al. found that 61.1% of employees with less than three years of experience developed CTS, compared to 92.9% of those over three years ($n=11$ and $n=39$, respectively). A Fisher’s exact test showed a significant association between work duration and CTS incidence ($p = 0.005$, OR = 8.273, 95% CI: 1.829–37.410). Work duration was calculated by multiplying years of service by average daily work hours, assuming 276 practical workdays per year. The study assessed median nerve function using Nerve Conduction Studies (NCS) at the wrist.¹⁹

In a study by Hartanti et al., univariate analysis revealed that 70% of computer operators experience CTS symptoms, with tingling being the most common symptom (57.5%). Operators aged 30 or older comprise 47.5% of the sample, and 62.5% have worked for less than 25 years. Additionally, 82.5% have been in their roles for over 4 years and 85% work four or more consecutive hours. Notably, 70% of operators maintain awkward, non-ergonomic postures. The Chi-Square Test showed a significant relationship between work duration and CTS ($p = 0.029$, odds ratio = 9.286, 95% CI 1.475–58.467). Phalen’s test was used for measurements.²⁰

The Kasatria Putra et al. study found that 64 participants (61.3%) had more than 4 years of work experience, while 11 participants (14.7%) had 4 years or less. Bivariate analysis using the Chi-Square test revealed a significant association between employment duration and CTS symptoms ($p=0.025$), with a PR of 1.753 (95% CI 0.907–3.389). The incidence of CTS was higher among employees with over 4 years of service compared to those with 1–4 years. Employees with over 4 years of service had an 18.096 times greater risk of developing CTS than those with 1–4 years. Phalen’s test was used to measure CTS.⁸

Nafasa et al. found that individuals with over four years of computer use are at a higher risk of developing CTS than those under four years. Using Fisher’s exact test, the study showed a significant difference ($p = 0.000$) and a prevalence ratio of 2.61 (95% CI: 1.42–4.78) based on assessments from the Boston Carpal Tunnel Syndrome Questionnaire.²¹

Discussion

CTS is a musculoskeletal disorder caused by compression of the median nerve in the wrist due to constriction of the carpal tunnel.⁸ Prolonged computer use in office workers, such as bank employees, is a key cause of CTS.²¹ The work period refers to the duration an employee works at a specific place, and it can impact performance positively or negatively. The work period can enhance workforce experience but may also lead to occupational diseases.¹⁸ The risk of developing occupational diseases like

CTS increases with extended work periods due to repetitive wrist flexion movements, which can compress the median nerve combined with extended working hours.²¹

Hamid et al. (2022) identified work duration as a risk factor for CTS. Prolonged hand and finger movements can stress or compress the median nerve, leading to CTS.¹⁸ Computer-based work involves repetitive motions, such as continuous typing and mouse use. Prolonged work periods increase the likelihood of these repetitive activities, leading to mechanical stress and, eventually, CTS.¹⁹ Longer work duration increases repetitive hand and finger movements, raising the risk of CTS.²⁰ Repetitive hand movements significantly increase the risk of CTS, doubling the risk over time. Literature highlights work duration as a key risk factor, as more extended working periods involve more repetitive hand motions, raising the likelihood of CTS, especially when sustained over extended periods.²¹

This study has several limitations. First, it relied on secondary data from existing literature, which may introduce bias based on the quality and reliability of the selected studies. The findings depend on the reviewed articles' methodological soundness and data accuracy. Second, the literature review was limited to studies published between 2014 and 2024, potentially omitting older research that could offer additional context on the relationship between work period and CTS. Finally, the search was restricted to PubMed and Google Scholar, possibly excluding relevant studies indexed in other databases or published in less accessible journals.

Conclusions

This literature review suggests that the work period significantly impacts the incidence of CTS. The lowest incidence is associated with a work period of 3 years, while the highest occurs after 5 years. Prolonged, repetitive wrist flexion over time can narrow the carpal tunnel, compressing the median nerve and eventually leading to CTS.

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Conflict of interest

This study contains no conflicts of interest.

Author contributions

NPVW designed the study, collected data, and wrote the manuscript, while MW and GV collected and revised the data.

Ethical consideration

This review study employed publically available publications, so informed consent and ethical approval were not required.

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