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A Cross-Sectional Study on the Prevalence of Carpal Tunnel Syndrome Among Office Workers

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ABSTRACT

Carpal Tunnel Syndrome (CTS) is a common occupational health issue among office workers due to repetitive strain and poor ergonomic practices. This study aims to determine the prevalence of CTS in this population and to explore the association with ergonomic and psycho social factors. We conducted a cross-sectional study involving 200 office workers from various corporate sectors. Participants were evaluated for symptoms of CTS using clinical examinations and a standardized questionnaire that assessed ergonomic practices, workplace stress and awareness of preventive measures. Data analysis included descriptive statistics, chi-square tests for categorical variables and logistic regression to adjust for potential confounders. The prevalence of CTS among the participants was found to be 15.5%. Significant associations were noted between CTS and several ergonomic risk factors. Workers with inadequate desk setups had a CTS prevalence of 23.6%, while those using non-ergonomic chairs had a prevalence of 21.1%. High workplace stress was associated with a higher prevalence of CTS at 28.6%. Furthermore, despite high levels of awareness, preventive measures were poorly implemented, with only 22.5% of those aware of scheduled breaks actually taking them. The study confirms that CTS is prevalent among office workers and is significantly associated with poor ergonomic conditions and high stress levels. There is a critical need for improved ergonomic designs and effective stress management programs in office environments. Employers should also focus on enhancing the implementation of known preventive measures to reduce the risk of CTS.

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Key Words
Carpal tunnel syndrome, ergonomics, workplace stress

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INTRODUCTION

Carpal Tunnel Syndrome (CTS) is a neuropathic disorder characterized by the compression of the median nerve as it travels through the carpal tunnel in the wrist. This condition is predominantly associated with repetitive strain and ergonomic stress, making it highly relevant to office workers who engage in prolonged computer use and repetitive hand movements. The increasing dependence on digital technology in the workplace has potentially escalated the incidence of CTS among this population, warranting a detailed exploration of its prevalence and associated factors[1,2]. The pathophysiology of CTS involves swelling or deformation within the carpal tunnel, which exerts pressure on the median nerve. This pressure results in the classic symptoms of numbness, tingling, and weakness in the hand and arm. While the condition is well-documented in various manual labor sectors, there is a growing concern about its prevalence in office settings due to suboptimal ergonomic practices[3,4]. Various studies have indicated that improper desk setup, non-ergonomic keyboard and mouse usage and inadequate rest breaks can significantly increase the risk of developing CTS. Furthermore, the psychosocial stress associated with high-demand, low-control jobs may exacerbate the physical strain experienced by office workers, contributing to the onset of CTS[5,6]. This study is pertinent as it not only addresses the direct impact of occupational factors on CTS among office workers but also explores preventive measures and awareness that can be integrated into corporate health programs. By understanding the prevalence and occupational correlates of CTS, companies can implement targeted interventions to reduce the incidence and impact of this debilitating condition, ultimately enhancing worker productivity and well-being[7,8].

Aims: To determine the prevalence of Carpal Tunnel Syndrome among office workers.

Objectives:

- To identify the association between ergonomic factors and the prevalence of Carpal Tunnel Syndrome among office workers.
- To evaluate the role of workplace stress in the development of Carpal Tunnel Syndrome.
- To assess the awareness and implementation of preventive measures for Carpal Tunnel Syndrome in office environments.

MATERIALS AND METHODS

Source of Data: The data for this cross-sectional study were collected from office workers employed in various corporate sectors within a metropolitan area.

Study Design: A cross-sectional study design was utilized to assess the prevalence and associated risk factors of Carpal Tunnel Syndrome among office workers.

Study Location: The study was conducted in multiple corporate offices located in a central business district known for its high concentration of corporate headquarters.

Study Duration: Data collection was carried out over a period of six months, from January 2024 to June 2024.

Sample Size: A total of 200 office workers were included in the study through a convenience sampling method.

Inclusion Criteria: Participants included were office workers aged between 20-60 years, employed full-time and who had been working in their current role for at least one year.

Exclusion Criteria: Excluded from the study were individuals with previous hand surgery or injuries, known neurological or musculoskeletal disorders affecting the upper extremities and those not consenting to participate in the study.

Procedure and Methodology: Participants underwent a standardized questionnaire to gather demographic data, job description, duration of computer use, ergonomic practices and symptoms related to CTS. Physical examinations focusing on Tinel's sign, Phalen's maneuver and hand strength tests were conducted by a trained occupational health specialist.

Sample Processing: No biological samples were required as the study primarily involved diagnostic clinical tests and surveys.

Statistical Methods: Data were analyzed using SPSS software. Descriptive statistics were calculated for all variables. The association between CTS and potential risk factors was evaluated using chi-square tests for categorical variables and t-tests for continuous variables. Logistic regression was employed to adjust for confounding variables and to identify predictors of CTS among the participants.

Data Collection: Data were collected through direct interviews and physical examinations conducted at the workplace. Each session lasted approximately 30 minutes per participant, ensuring minimal disruption to their workday.

Table 1: Prevalence of Carpal Tunnel Syndrome Among Office Workers

Description	n	%	95% CI	P-value
CTS diagnosed	31	15.5	10.7%-20.3%	0.023
No CTS	169	84.5	79.7%-89.3%	
Total	200	100.0	-	

Table 2: Association Between Ergonomic Factors and the Prevalence of Carpal Tunnel Syndrome

Ergonomic Factors	CTS Present (n)	CTS Absent (n)	% (CTS Present)	95% CI	P-value
Adequate desk setup	5	85	5.6	1.8%-9.4%	0.002
Inadequate desk setup	26	84	23.6	15.9%-31.3%	
Ergonomic chair use	4	68	5.6	1.6%-9.6%	0.004
Non-ergonomic chair use	27	101	21.1	14.5%-27.7%	
Regular breaks	6	96	5.9	2.2%-9.6%	0.001
No regular breaks	25	73	25.5	17.2%-33.8%	

Table 3: Role of Workplace Stress in the Development of Carpal Tunnel Syndrome

Workplace Stress Level	CTS Present (n)	CTS Absent (n)	% (CTS Present)	95% CI	P-value
High stress	22	55	28.6	18.3%-38.9%	<0.001
Moderate stress	7	58	10.8	4.4%-17.2%	0.019
Low stress	2	56	3.4	0.4%-6.4%	0.030

Table 4: Awareness and Implementation of Preventive Measures for CTS

Preventive Measure	Aware and) Implemented (n)	Aware but Not Implemented (n)	Not Aware (n)	% Aware and Implemented	95% CI	P-value
Ergonomic training	30	60	110	15.0	10.2%-19.8%	0.045
Regular physical exercises	25	75	100	12.5	8.1%-16.9%	0.038
Scheduled breaks	45	90	65	22.5	16.7%-28.3%	0.002
Ergonomic assessments	20	40	140	10.0	6.2%-13.8%	0.050

RESULTS AND DISCUSSIONS

This table presents the prevalence of Carpal Tunnel Syndrome (CTS) among a sample of 200 office workers, revealing that 31 workers (15.5%) have been diagnosed with CTS. The confidence interval (CI) for this percentage is between 10.7% and 20.3%, indicating a statistically significant prevalence (P-value=0.023). The majority of the sample, 169 workers or 84.5%, do not have CTS, with the CI ranging from 79.7-89.3%. This table investigates the link between ergonomic workplace factors and the presence of CTS among office workers. Key findings include that workers with inadequate desk setups show a notably higher prevalence of CTS at 23.6%, compared to just 5.6% for those with adequate setups. Similarly, the use of non-ergonomic chairs is associated with a CTS prevalence of 21.1%. Regular breaks appear to be protective, with a CTS prevalence of 5.9% among those taking them, versus 25.5% among workers not taking regular breaks. These associations are statistically significant with P-values ranging from 0.001-0.004. The data illustrates that high workplace stress correlates with a higher incidence of CTS (28.6%), with a statistically significant P-value of >0.001. Moderate stress and low stress levels are associated with much lower CTS prevalences, at 10.8% and 3.4% respectively, each also statistically significant. These results underscore stress as a significant factor in the development of CTS among workers. This table assesses the awareness and implementation of preventive measures for CTS within the workplace. Only 15% of workers who are aware of ergonomic training have implemented it and 22.5% have adopted scheduled breaks as a preventive measure, both of which show a positive impact on reducing CTS prevalence, as indicated by significant P-values. The awareness and implementation of regular physical exercises and ergonomic assessments are less prevalent, with only 12.5% and 10.0% adoption rates respectively.

(Table 1): Prevalence of Carpal Tunnel Syndrome Among Office Workers: This table indicates a 15.5% prevalence of Carpal Tunnel Syndrome (CTS) among office workers, a notable finding considering the reported ranges in other populations. According to Savitri[9], the general population prevalence of CTS is typically lower, estimated around 1-3%. However, studies focusing on populations engaged in repetitive hand use or with occupational risks, like that by Mirghani[10], report prevalence rates closer to those found in this study. This suggests that specific occupational risks associated with office work, such as prolonged keyboard and mouse use, significantly contribute to the risk of developing CTS.

(Table 2): Association Between Ergonomic Factors and the Prevalence of Carpal Tunnel Syndrome: This table elucidates strong associations between ergonomic factors and CTS prevalence. Workers with inadequate desk setups and those not using ergonomic chairs exhibit a CTS prevalence of 23.6% and 21.1%, respectively, far exceeding the prevalence in those with more ergonomic setups. These findings align with the results from Kraut[11], who found that ergonomic modifications could significantly decrease the risk of

musculoskeletal disorders, including CTS. The stark differences underscore the potential benefits of ergonomic interventions in reducing CTS risk.

(Table 3): Role of Workplace Stress in the Development of Carpal Tunnel Syndrome: The data here highlights a direct correlation between workplace stress levels and the prevalence of CTS, with high stress correlating with the highest prevalence (28.6%). This aligns with the findings from Oveisi[12], who noted that psycho social stress could exacerbate physical symptoms and contribute to the incidence of repetitive strain injuries, including CTS. This correlation suggests that interventions aimed at reducing workplace stress could be beneficial in managing CTS risk.

(Table 4): Awareness and Implementation of Preventive Measures for CTS: Despite awareness of preventive measures, implementation rates remain relatively low. Only 15% of those aware of ergonomic training and 22.5% of those aware of scheduled breaks have implemented these strategies. This gap in awareness versus implementation is noted in the literature, where John[13] discuss barriers to effective ergonomic practice adoption despite awareness, such as organizational support and personal motivation. Improving implementation rates could be addressed through comprehensive education programs and organizational policies promoting ergonomic health.

CONCLUSION

This cross-sectional study on the prevalence of Carpal Tunnel Syndrome (CTS) among office workers has revealed significant findings that enhance our understanding of occupational health risks in office environments. The study established a CTS prevalence rate of 15.5% among office workers, which is notably higher than general population estimates, underscoring the particular vulnerability of this group to ergonomic stressors associated with extended computer use and repetitive manual tasks. The analysis further demonstrated a strong association between ergonomic factors and the prevalence of CTS. Office workers with inadequate desk setups and non-ergonomic chairs were significantly more likely to develop CTS. Additionally, the lack of regular breaks was associated with a higher prevalence of the syndrome, indicating the protective role that adequate breaks can play in mitigating the risk of CTS. Workplace stress emerged as another critical factor influencing the development of CTS, with workers experiencing high levels of stress showing the highest prevalence of the syndrome. This finding highlights the need for comprehensive workplace stress management programs alongside physical ergonomic improvements. Despite the awareness of preventive measures, there remains a substantial gap in their implementation. This study has shown that even among workers who are aware of the benefits of ergonomic training and regular physical exercises, only a fraction adopts these measures. Bridging this gap requires targeted educational efforts and stronger policy interventions that promote health and safety practices at the workplace. In conclusion, this study underscores the need for improved ergonomic designs, stress management programs and enhanced implementation of preventive measures to reduce the incidence of CTS among office workers. Employers and policy makers must prioritize these aspects to safeguard worker health, enhance productivity and reduce healthcare costs associated with occupational disorders like Carpal Tunnel Syndrome.

Limitations of Study:

- **Cross-Sectional Design:** The inherent nature of a cross-sectional study limits the ability to establish causality between ergonomic factors, workplace stress and the development of Carpal Tunnel Syndrome (CTS). The study provides a snapshot in time, which is useful for determining prevalence but not for tracking the progression of CTS or changes in risk factors over time.
- **Sampling Methodology:** The use of convenience sampling to recruit participants may introduce bias, as it does not ensure a representative sample of the office worker population. This sampling method may limit the generalizability of the findings to all office workers, particularly those in different geographical locations or in varied types of office settings.
- **Self-Reported Data:** Much of the data, especially regarding ergonomic practices and symptoms of CTS, were collected through self-reports, which can be subject to recall bias and personal interpretation. This may affect the accuracy of the information related to workplace habits and the presence of symptoms associated with CTS.
- **Lack of Objective Diagnostic Criteria:** The study primarily relied on clinical examinations and participant reports to diagnose CTS, without the use of more definitive tests such as nerve conduction studies. This may lead to underestimation or overestimation of CTS prevalence.
- **Exclusion and Inclusion Criteria:** The exclusion of participants with previous hand surgery or known

neurological conditions might have eliminated individuals who are at a higher risk of developing CTS, potentially skewing the prevalence data.

- **Limited Assessment of Other Risk Factors:** While the study focused on ergonomic and stress-related factors, other potential risk factors such as genetic predisposition, underlying health conditions and lifestyle choices (e.g., physical activity levels outside of work) were not extensively explored.
- **Potential Confounders:** The study may not have adequately controlled for all potential confounding variables that could influence the development of CTS, such as age, gender, body mass index and duration of employment in office roles.
- **Variability in Workplace Environments:** The variability in office setups and definitions of what constitutes 'adequate' or 'inadequate' ergonomic arrangements can differ significantly, leading to variability in the interpretation of what is considered ergonomic.

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