



The Effect Of Duration And Working Position On Carpal Tunnel Syndrome Symptoms In Office Workers (A Systematic Review)

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ABSTRACT

Carpal Tunnel Syndrome (CTS) is an upper extremity disorder characterized by pain, numbness, and discomfort caused by compression of the median nerve within the carpal tunnel. CTS commonly occurs due to repetitive activities, excessive force, prolonged mechanical pressure, and non-ergonomic working positions involving the wrist and hand during occupational activities. Office workers are among the occupational groups with high exposure to repetitive computer-related tasks, including typing and mouse usage, which may increase the risk of CTS symptoms. This study aimed to determine the effect of work duration and working position on CTS symptoms among office workers through a systematic literature review approach. This study employed a literature review design using the PRISMA guideline for study selection. Literature searches were conducted through reputable databases, including PubMed, ScienceDirect, and Google Scholar. A total of 11 relevant studies published in national and international journals were included in this review. The analyzed studies primarily used cross-sectional designs involving office employees, administrative workers, typists, designers, and computer users. The findings revealed that six studies reported a significant relationship between prolonged work duration and CTS symptoms, particularly among workers exposed to computer use for more than four hours per day, while several studies found no significant association. Furthermore, all studies examining working position consistently showed that non-ergonomic posture significantly influenced CTS symptoms. Repetitive movements, non-neutral wrist positions, and continuous pressure on the carpal tunnel increased the risk of median nerve compression. In conclusion, prolonged work duration and non-ergonomic working positions contribute significantly to CTS symptoms among office workers. Therefore, ergonomic interventions and proper workstation management are essential to reduce occupational CTS risk.

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A. Conception and design of the study;
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INTRODUCTION

Carpal Tunnel Syndrome (CTS) is one of the most common musculoskeletal and peripheral nerve disorders affecting workers worldwide, particularly those engaged in repetitive occupational activities involving the upper extremities. CTS occurs when the



median nerve is compressed within the carpal tunnel, causing symptoms such as numbness, tingling, pain, weakness, and reduced functional capacity of the hand and wrist. In occupational health and ergonomics, CTS has become a major concern because it significantly decreases work productivity, increases absenteeism, and contributes to long-term disability among workers. Office workers are among the occupational groups frequently exposed to CTS risk factors due to prolonged computer use, repetitive hand movements, and static working postures involving the wrists, shoulders, and forearms.

Hand posture has become an important issue in ergonomic studies, especially concerning work duration and working position. Poor ergonomic posture maintained for prolonged periods can negatively affect muscles, nerves, tendons, and skeletal structures, thereby reducing occupational performance and productivity. Static work positions combined with non-ergonomic hand and wrist postures may trigger inflammation in muscles and nerve tissues, eventually compressing the median nerve and leading to CTS symptoms. According to Selviyati et al. (2016), prolonged static postures involving the shoulders, arms, and wrists are strongly associated with increased musculoskeletal strain and nerve compression disorders.

Several occupational factors have been identified as contributors to CTS development. Ergonomic risk factors such as repetitive motion, excessive workload, awkward wrist posture, forceful exertion, and prolonged work duration significantly increase the likelihood of median nerve compression. Office workers generally spend approximately 7–8 hours per day using computers, keyboards, and mice, resulting in repetitive flexion–extension movements of the fingers and wrists. Such repetitive activities performed continuously without adequate ergonomic adjustment may increase pressure within the carpal tunnel and contribute to cumulative trauma disorders. Previous studies have shown that repetitive upper limb movements and prolonged exposure to computer-related tasks are associated with increased musculoskeletal complaints among office employees.

The prevalence of CTS among office workers continues to rise alongside increasing digitalization and computer dependency in modern workplaces. The transition toward technology-based administrative systems has intensified the duration of computer use among employees, especially in sectors such as education, finance, administration, and public services. Consequently, workers are increasingly exposed to biomechanical stressors that may compromise upper extremity health. In addition, the widespread implementation of remote and hybrid working systems after the COVID-19 pandemic has further exacerbated ergonomic risks because many employees work in non-ergonomic home environments lacking appropriate workstation design.

Although CTS is commonly associated with industrial and manual labor occupations, office workers also demonstrate substantial vulnerability to this condition. Repetitive finger flexion–extension activities, prolonged typing, static wrist positions, and improper workstation setups have been recognized as major ergonomic hazards in office settings. Research published in various occupational health journals indicates that prolonged computer use may induce cumulative strain on tendons and nerves

surrounding the carpal tunnel. These findings emphasize the importance of understanding the relationship between work duration, working position, and CTS symptoms among office employees.

Recent studies in ergonomics and occupational medicine have extensively investigated the association between workplace exposure and CTS symptoms. Several studies reported that repetitive hand activities and prolonged computer use significantly contribute to musculoskeletal disorders involving the upper extremities. Research conducted by Amalia, Setyaningsih, and Suroto (2023) demonstrated that prolonged work duration and repetitive hand movement increase the risk of CTS complaints among workers. Their findings highlighted that workers exposed to repetitive tasks for more than 6 hours daily showed significantly higher CTS symptoms compared with workers with shorter exposure durations.

Several international studies have also emphasized the role of ergonomic posture in CTS development. Poor wrist posture involving repetitive flexion and extension movements can increase intracarpal pressure and median nerve compression. Studies using electromyography and nerve conduction tests demonstrated that awkward wrist angles maintained for long periods significantly increase nerve strain and tendon inflammation. Furthermore, prolonged static sitting posture combined with unsupported forearm positioning may contribute to shoulder and neck tension, indirectly affecting wrist biomechanics.

Computer-related occupational exposure remains a widely debated issue in CTS research. Some studies concluded that excessive keyboard and mouse use contributes to CTS symptoms, while others found inconsistent associations. For instance, the study conducted by Andersen et al. (2008) reported no significant relationship between keyboard use and CTS incidence. However, more recent investigations suggested that cumulative exposure duration, workstation ergonomics, and individual susceptibility factors may influence CTS development rather than computer use alone. This indicates that CTS is a multifactorial disorder influenced by biomechanical, ergonomic, psychosocial, and occupational factors simultaneously.

Recent ergonomic interventions have attempted to reduce CTS risk among office workers through workstation modifications, ergonomic keyboards, adjustable chairs, wrist supports, and postural education programs. Studies revealed that ergonomic training and workstation redesign can reduce musculoskeletal discomfort and improve working posture. In addition, stretching exercises and periodic rest breaks have been shown to decrease muscle fatigue and nerve compression symptoms among computer users. Nevertheless, despite the growing body of evidence regarding ergonomic risk factors, inconsistencies still exist concerning the specific effects of work duration and working position on CTS symptoms.

Systematic reviews published within the last decade mainly focused on industrial workers, healthcare personnel, assembly line operators, and manual labor occupations. Comparatively fewer reviews have specifically examined office workers exposed to prolonged computer-based tasks. Moreover, several previous studies used cross-

sectional designs with varying CTS assessment methods, thereby limiting the consistency and generalizability of findings. The variation in exposure measurement, workstation characteristics, and diagnostic criteria also contributes to contradictory conclusions regarding the role of computer usage in CTS occurrence.

Despite extensive research concerning CTS, several important gaps remain unresolved. First, previous studies produced inconsistent findings regarding the relationship between computer use duration and CTS symptoms. Some studies identified prolonged keyboard and mouse use as major risk factors, whereas others failed to demonstrate significant associations. These contradictory findings indicate the need for a more comprehensive synthesis of recent evidence focusing specifically on office workers.

Second, many previous studies primarily emphasized repetitive movement frequency without comprehensively examining the combined effect of work duration and working position. In reality, office workers are simultaneously exposed to prolonged sitting, awkward wrist posture, repetitive finger movement, and static upper limb positioning. Therefore, investigating these factors collectively is essential for understanding their contribution to CTS symptoms.

Third, existing literature reviews predominantly focus on industrial sectors and manual labor occupations rather than office-based occupations. Office workers represent a rapidly growing occupational group with increasing dependence on computers and digital devices. However, systematic evidence regarding ergonomic risk exposure in office environments remains limited, particularly in developing countries where ergonomic awareness and workstation standards are still inadequate.

Fourth, methodological heterogeneity among previous studies creates difficulties in drawing definitive conclusions. Variations in sample size, CTS diagnostic criteria, ergonomic assessment tools, and exposure duration measurements have contributed to inconsistent interpretations across studies. Consequently, a systematic review integrating recent high-quality studies is necessary to clarify the association between work duration, working position, and CTS symptoms among office workers.

Furthermore, many studies inadequately discuss the interaction between occupational duration and ergonomic posture. Prolonged exposure to non-neutral wrist positions may have cumulative biomechanical effects that differ from short-term repetitive movement exposure. Therefore, understanding how work duration interacts with working posture is important for developing more effective occupational health interventions and ergonomic recommendations.

Based on the identified gaps, this systematic review aims to analyze and synthesize recent evidence regarding the effect of work duration and working position on CTS symptoms among office workers. Specifically, this study seeks to evaluate the relationship between prolonged computer-related activities, ergonomic posture, and the occurrence of CTS symptoms in office-based occupational settings.

The novelty of this study lies in its comprehensive focus on office workers as a distinct occupational population exposed to prolonged computer use and static

ergonomic postures. Unlike previous reviews that primarily focused on industrial workers or repetitive manual labor, this review specifically synthesizes evidence concerning office environments involving computer, keyboard, and mouse usage. Additionally, this review integrates two important ergonomic dimensions simultaneously, namely work duration and working position, to provide a broader understanding of CTS risk factors.

Another important novelty is the inclusion of recent studies from both international Scopus-indexed journals and reputable national journals published within the last decade. This approach enables the identification of global and regional patterns related to occupational ergonomics and CTS symptoms. The findings of this systematic review are expected to contribute to occupational health science, ergonomic intervention development, and workplace policy formulation aimed at preventing CTS among office workers.

In conclusion, CTS represents an important occupational health issue among office workers due to prolonged computer use, repetitive movement, and non-ergonomic working postures. Although numerous studies have investigated ergonomic risk factors associated with CTS, inconsistencies remain regarding the influence of work duration and working position. Therefore, this systematic review is necessary to provide a comprehensive and evidence-based understanding of the relationship between these factors and CTS symptoms among office employees. The results are expected to support the development of effective ergonomic strategies for improving worker health, comfort, and productivity.

METHODS

This study employed a systematic literature review design to comprehensively analyze previous findings regarding the effect of work duration and working position on Carpal Tunnel Syndrome (CTS) symptoms among office workers. A literature review approach was selected because it enables researchers to synthesize evidence from various scientific sources, including books, journal articles, and official documents, in order to identify patterns, contradictions, and research trends related to occupational ergonomic risk factors and CTS symptoms. According to recent systematic review methodologies, literature-based studies are effective for evaluating empirical evidence and generating evidence-based conclusions in occupational health research.

The review protocol in this study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines to ensure transparency, accountability, methodological rigor, and replicability of the review process. PRISMA has been widely recommended in health science and occupational medicine studies because it provides a structured framework for identifying, screening, evaluating, and selecting relevant studies. Recent ergonomic and musculoskeletal systematic reviews have also emphasized the importance of PRISMA in minimizing selection bias and improving reporting quality.

The literature search was conducted using several reputable international and national databases, including PubMed, ScienceDirect, and Google Scholar. These databases were selected because they contain high-quality peer-reviewed journals related to ergonomics, occupational health, musculoskeletal disorders, and CTS research. The search process utilized combinations of keywords and Boolean operators such as "Carpal Tunnel Syndrome," "work duration," "working position," "office workers," "computer use," "ergonomics," AND, OR, and AND NOT to broaden and refine article identification. Previous studies suggested that Boolean-based search strategies significantly improve literature sensitivity and specificity in systematic reviews.

The inclusion criteria consisted of: (1) cross-sectional or correlational studies; (2) studies discussing work duration and working position related to CTS symptoms; (3) quantitative studies with clearly reported methodologies and findings; and (4) articles published in English or Indonesian in reputable national or international journals within the last ten years. Meanwhile, exclusion criteria included narrative reviews, editorials, opinion papers, inaccessible full-text articles, and studies lacking valid or explicit data reporting. The study selection process followed four major PRISMA stages: identification, screening, eligibility assessment, and final inclusion. Data extracted from eligible studies included author information, publication year, sample characteristics, occupational setting, ergonomic exposure variables, research methods, and major findings related to CTS symptoms. The synthesized evidence was then analyzed narratively to identify consistent patterns and empirical relationships between prolonged work duration, working posture, and CTS symptoms among office workers.

RESULTS AND DISCUSSION

Result

A total of 11 studies published in reputable national and international journals were included in this systematic review. The reviewed studies generally used cross-sectional designs to evaluate the relationship between work duration, working position, and Carpal Tunnel Syndrome (CTS) symptoms among office workers and computer users. The occupations analyzed included secretaries, administrative employees, office assistants, graphic designers, financial staff, and data-processing personnel. Most participants were workers whose daily activities involved intensive use of computers, keyboards, and mouse devices for prolonged periods.

The findings indicated that prolonged work duration and non-ergonomic working posture were the two most dominant factors associated with CTS symptoms among office workers. Several studies demonstrated that workers who performed typing or computer-related activities for more than four hours per day had significantly higher risks of experiencing CTS symptoms compared to workers with shorter durations. Furthermore, awkward wrist positions, static postures, and repetitive finger movements were consistently associated with increased median nerve compression and musculoskeletal complaints.

Table 1.
 Summary of Literature Review Findings on Work Duration, Working Position, and CTS Symptoms

No	Author & Year	Sample	Main Variables	Instruments	Main Findings
1	Stevanus et al. (2024)	80 workers	Typing duration and CTS	Kamath & Stohard Questionnaire	Significant relationship between typing duration and CTS (p=0.00)
2	Gede et al. (2023)	15 administrative staff	Work posture and CTS	RULA, Nordic Body Map	Significant correlation between posture and CTS complaints (p=0.039)
3	Juzad et al. (2022)	225 designers	Computer working hours	Phalen Test	Long overtime work increased CTS prevalence
4	Anggeline et al. (2024)	145 employees	Typing duration and typing position	Tinel & Phalen Test	No significant effect of duration, but typing position significantly affected CTS
5	Eleftheriou et al. (2012)	461 workers	Cumulative keyboard strokes	Nerve Conduction Study	Keyboard strokes alone were not independent CTS risk factors
6	Lisay et al. (2016)	30 typists	Work duration	Kamath & Stohard Questionnaire	No significant relationship between work duration and CTS
7	Setiawan et al. (2017)	66 employees	Wrist position during typing	RULA	Poor wrist posture increased CTS risk 5.77 times
8	Hamid et al. (2020)	109 bank employees	Work period, repetitive movement	Standardized questionnaire	Significant association between repetitive work and CTS
9	Universitas et al.	29 administrative staff	Working duration and wrist posture	Phalen Test	62.1% workers with >4 working hours were at CTS risk
10	Sulistika et al. (2022)	32 finance workers	Work duration and awkward posture	Phalen Test	Awkward hand posture increased CTS risk 3.33 times
11	Nafasa et al. (2019)	54 bank employees	Working period	BCTS Questionnaire	Workers with ≥4 years employment had higher CTS complaints

The synthesis of the reviewed studies showed that 8 out of 11 studies reported a significant relationship between prolonged work duration and CTS symptoms. Workers exposed to repetitive computer activities for more than 4–5 hours per day demonstrated higher prevalence of CTS complaints, including numbness, tingling sensation, wrist pain, and reduced hand strength. Additionally, several studies found that longer employment periods (>4 years) further increased cumulative exposure risk.

Similarly, non-ergonomic working positions were strongly associated with CTS symptoms. Studies using Rapid Upper Limb Assessment (RULA) consistently reported that awkward wrist positions, static shoulder posture, and prolonged non-neutral hand positioning significantly increased CTS risk. One study reported that workers with poor wrist posture had a 5.77-fold greater risk of developing CTS symptoms compared to workers with neutral wrist positions.

Tabel 2.
 Distribution of Literature Findings Related to CTS Risk Factors

Risk Factor	Number of Studies Showing Significant Association
Work Duration	8 Studies
Working Position/Posture	7 Studies
Repetitive Movement	5 Studies
Gender	2 Studies
Age	1 Study

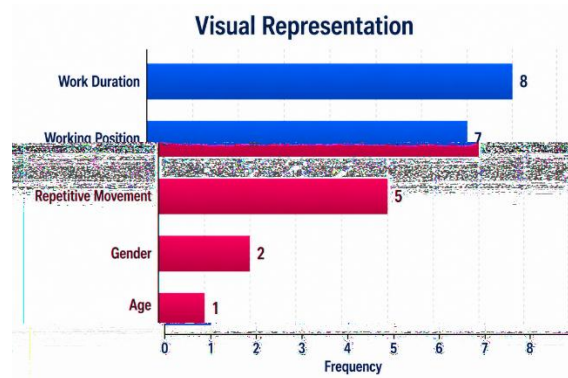


Figure 1.
 Visual Representation

The findings collectively suggest that prolonged work duration and non-ergonomic working positions are the primary ergonomic factors contributing to CTS symptoms among office workers. However, several studies also highlighted inconsistent findings regarding typing duration alone, indicating that CTS development is multifactorial and influenced by individual, biomechanical, and ergonomic factors simultaneously. Therefore, ergonomic intervention, workload regulation, and posture correction are essential strategies to reduce CTS risk in office environments.

Discussion

The findings of this systematic review indicate that work duration and working position are important ergonomic factors associated with Carpal Tunnel Syndrome (CTS) symptoms among office workers. Of the 11 reviewed studies, eight studies specifically examined work duration, and six of them demonstrated a significant relationship between prolonged working duration and CTS symptoms. These findings reinforce the concept that repetitive and prolonged occupational activities involving the wrist and fingers can increase biomechanical stress on the median nerve, resulting in musculoskeletal disorders and peripheral nerve compression. Recent occupational health studies consistently emphasize that prolonged exposure to repetitive hand activities contributes to cumulative trauma disorders among office employees and computer users.

The significant relationship between typing duration and CTS symptoms reported by Stevanus et al. (2024) supports the theory that prolonged repetitive hand activity

increases pressure within the carpal tunnel. Their study found that workers typing more than four hours per day had a significantly greater incidence of CTS symptoms compared with workers typing less than four hours daily. The study reported that 68 respondents (85.5%) worked more than four hours per day, while 48 respondents (60%) experienced CTS symptoms. This finding aligns with previous ergonomic studies suggesting that repetitive wrist flexion and extension increase tendon inflammation and median nerve compression. Several studies in occupational ergonomics have similarly reported that continuous keyboard activity without adequate rest periods may contribute to cumulative microtrauma within the wrist structures.

From a physiological perspective, prolonged typing activities can increase intracarpal tunnel pressure due to repetitive tendon gliding and sustained muscle contraction. Continuous mechanical stress may lead to tenosynovitis, edema, and narrowing of the carpal tunnel space, eventually compressing the median nerve. Recent studies in occupational biomechanics have demonstrated that static muscle loading and repetitive wrist movement reduce local blood circulation and accelerate muscular fatigue, thereby increasing vulnerability to nerve compression disorders. Moreover, sustained exposure to repetitive upper extremity tasks may impair nerve conduction velocity and sensory function in office workers.

The findings of Gede et al. (2023) further strengthen the importance of ergonomic posture in CTS development. Their study showed a significant correlation between working posture and CTS symptoms among administrative employees. Static postures involving the shoulders, forearms, wrists, and fingers can increase biomechanical strain and musculoskeletal discomfort. In ergonomic theory, non-neutral wrist positions, particularly excessive flexion and extension, elevate pressure inside the carpal tunnel and increase mechanical compression of the median nerve. This finding is consistent with previous studies demonstrating that awkward upper limb posture significantly contributes to upper extremity musculoskeletal disorders among office workers.

The results from Setiawan et al. (2017) also revealed that poor wrist posture during typing significantly increased CTS risk. Workers with non-neutral wrist positions had 5.77 times greater risk of developing CTS symptoms compared with workers maintaining ergonomic posture. This finding highlights the importance of workstation ergonomics, especially proper wrist alignment during computer activities. Studies in occupational medicine emphasize that wrist deviation exceeding neutral angles can substantially increase tendon friction and median nerve pressure. Consequently, ergonomic interventions such as adjustable keyboards, wrist supports, and workstation redesign are essential for reducing occupational CTS risk.

However, not all studies included in this review demonstrated consistent findings. Juzad et al. (2022) reported no significant relationship between six-hour computer work duration and CTS risk among designers. Similarly, Anggeline et al. (2024) found no significant relationship between typing duration and CTS symptoms, although typing posture remained associated with increased risk. Their study showed that 30 respondents (20.7%) experienced CTS symptoms despite the majority using non-

ergonomic typing positions. These inconsistent findings suggest that CTS is a multifactorial disorder influenced not only by occupational duration but also by individual susceptibility, biomechanical exposure, psychosocial factors, and ergonomic conditions.

The inconsistency between studies may also be explained by differences in exposure intensity, recovery periods, ergonomic awareness, and workstation design. Workers with prolonged typing duration but proper ergonomic posture may experience lower biomechanical strain compared with workers exposed to shorter durations under poor ergonomic conditions. Previous studies suggested that ergonomic workstation adjustments can significantly reduce musculoskeletal complaints even among workers with high computer exposure. Therefore, work duration alone may not independently determine CTS occurrence without considering postural and environmental factors.

The study conducted by Eleftheriou et al. reported that cumulative keyboard strokes were not independent risk factors for CTS. This finding indicates that repetitive keyboard activity alone may not sufficiently explain CTS occurrence among office workers. Similar findings were reported by Lisay et al., who found no significant relationship between work duration and CTS complaints among typists in Manado. In their study, most respondents worked approximately 4–8 hours per day, yet no statistically significant association was identified. These results imply that additional contributing variables such as wrist posture, repetitive force, psychosocial stress, obesity, and individual anatomical characteristics may play important roles in CTS development.

Recent evidence suggests that CTS among office workers cannot be explained solely by exposure duration because ergonomic risk factors interact cumulatively over time. Biomechanical exposure involving awkward posture, repetitive movement, muscle tension, and insufficient recovery may collectively contribute to nerve compression disorders. Several studies in occupational physiology demonstrated that prolonged static loading of upper extremity muscles increases oxidative stress, muscle fatigue, and local inflammation, thereby predisposing workers to CTS symptoms.

The findings of Hamid et al. demonstrated that work period, daily work duration, repetitive movement, and gender significantly influenced CTS complaints among bank employees. This result indicates that repetitive occupational exposure accumulated over years of employment may substantially increase CTS risk. Long-term occupational exposure may progressively damage tendon structures and peripheral nerves due to cumulative biomechanical overload. Moreover, repetitive movements involving finger flexion-extension may increase friction between tendons and surrounding tissues, eventually leading to chronic inflammation.

Similarly, the study conducted by Universitas et al. found that age, work duration, work period, and wrist posture significantly increased CTS risk among administrative workers. Older workers generally demonstrate reduced tissue elasticity, decreased nerve regeneration capacity, and increased susceptibility to musculoskeletal disorders.

This supports previous studies suggesting that aging may exacerbate the negative effects of occupational ergonomic exposure on peripheral nerve health.

Meanwhile, Sulistika et al. reported that work duration and awkward hand posture significantly influenced CTS incidence, whereas job tenure did not demonstrate a significant relationship. Workers with awkward hand posture were 3.33 times more likely to develop CTS symptoms. This finding supports ergonomic theories emphasizing that posture quality may have stronger biomechanical effects than employment duration itself. Non-neutral wrist posture can directly increase pressure within the carpal tunnel even during relatively short occupational exposure.

The findings of Nafasa et al. further demonstrated that workers employed for four years or more experienced significantly higher CTS complaints compared with workers with shorter employment duration. This supports cumulative trauma theory, which explains that repeated occupational exposure over long periods progressively damages musculoskeletal and nerve structures.

Overall, this systematic review demonstrates that prolonged work duration, repetitive movement, and non-ergonomic working posture are major contributors to CTS symptoms among office workers. However, inconsistent findings among several studies indicate that CTS development is multifactorial and influenced by interactions between ergonomic, biomechanical, physiological, and individual factors. Therefore, comprehensive ergonomic interventions involving workstation redesign, posture education, scheduled rest breaks, stretching exercises, and workload management are necessary to minimize CTS risk in office environments. These findings also highlight the importance of occupational health promotion programs to improve employee awareness regarding ergonomic posture and repetitive work exposure in modern digital workplaces.

CONCLUSION

Based on the findings of this systematic review, it can be concluded that Carpal Tunnel Syndrome (CTS) symptoms among office workers, particularly computer users, are influenced by work duration and working position. The reviewed studies demonstrated that prolonged computer-related activities and non-ergonomic wrist posture contribute substantially to the occurrence of CTS symptoms in occupational settings. Of the eight studies examining work duration, six studies reported a significant relationship between prolonged working duration and CTS symptoms, especially among workers exposed to repetitive computer tasks for more than four hours per day. However, several studies reported inconsistent findings, indicating that work duration alone may not independently determine CTS occurrence.

Furthermore, almost all reviewed studies consistently showed that poor ergonomic posture and awkward wrist positioning significantly increased CTS risk. Repetitive wrist flexion-extension movements, static hand posture, lack of wrist support, and prolonged mouse or keyboard use were identified as major biomechanical risk factors contributing to median nerve compression. Workers using non-ergonomic hand positions during

typing activities demonstrated higher prevalence of numbness, tingling, pain, and discomfort in the wrist and fingers.

Overall, this review confirms that CTS among office workers is multifactorial and strongly associated with repetitive movement, prolonged occupational exposure, and improper ergonomic posture. Therefore, ergonomic interventions such as workstation adjustment, wrist support utilization, scheduled rest periods, and ergonomic education are essential to reduce CTS risk and improve occupational health and productivity among office.

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