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Prevalence of carpal tunnel syndrome symptoms among garment factory workers: a cross-sectional study

Marta Urbaniak[1], Michalina Stepanik[1], Agata Gołba[1], Katarzyna Gwizdek[1], Tomasz Jurys[1], Mateusz Grajek[2]

[1] Department of Rehabilitation, Faculty of Health Sciences in Katowice, Medical University of Silesia in Katowice, Poland
[2] Department of Public Health, Faculty of Public Health in Bytom, Medical University of Silesia in Katowice, Poland

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Abstract

Introduction: Carpal tunnel syndrome (CTS) is a commonly occurring musculoskeletal disorder affecting the upper extremities. Accurate diagnosis is essential for early intervention and for the implementation of individualized therapy aimed at preventing progression and improving functional outcomes.

Aim: The aim of this study was to analyze the prevalence of CTS symptoms among sewing factory workers and to identify factors that may contribute to its development. The relationship between the presence of symptoms and selected variables like age, body mass index (BMI), years of work experience were examined.

Material and methods: The study included a group of 70 participants. The Phalen's test, reverse Phalen's test, and the Boston Carpal Tunnel Questionnaire (BCTQ) were used.

Results and discussion: A high prevalence of CTS symptoms (45.7%) was observed among sewing factory workers. Neither BMI nor years of professional experience had a statistically significant impact on test outcomes. The presence of chronic diseases and age significantly increased the frequency of positive test results. Findings from the BCTQ confirmed the presence of pain and functional limitations, which may contribute to decreased occupational performance.

Conclusions: Age and the presence of chronic diseases significantly influence the occurrence of CTS symptoms. The study highlights the necessity of implementing preventive measures and ergonomic interventions in the workplace to mitigate the risk of developing CTS.

Corresponding author: Tomasz Jurys; Department of Rehabilitation, Faculty of Health Sciences in Katowice, Medical University of Silesia in Katowice, Poland.
E-mail: jurystomek3@gmail.com

1. INTRODUCTION

Carpal tunnel syndrome (CTS) is the most common peripheral neuropathy and a significant occupational health issue among individuals performing repetitive manual tasks. Its prevalence in adult populations ranges from 7% to 16% and increases with age, making CTS an important clinical and socio-economic problem.[1] The disorder results primarily from compression of the median nerve within the carpal tunnel, leading to characteristic sensory disturbances and functional impairment of the hand.[1,2]

The etiology of CTS is multifactorial. Besides demographic and systemic factors (such as age, obesity, metabolic disorders, thyroid disease, or vascular conditions) occupational exposures play a central role in symptom development.[3] Work requiring repetitive wrist movements, precision gripping, or maintained wrist flexion and extension has consistently been associated with a higher risk of CTS.[1,4] Epidemiological studies indicate that occupations involving fine, monotonous hand activity, including sewing and tailoring, show a markedly increased prevalence of CTS symptoms compared with the general population.[5]

Despite this, workers in the garment industry remain a relatively understudied group, even though their daily tasks combine several high-risk factors: repetitive finger movements, prolonged static hand positions, and precision-based motor control. Existing studies are limited in number, differ in methodological quality, and provide inconsistent results regarding the influence of demographic and occupational variables. This creates a clear gap in the literature and highlights the need for targeted research focusing specifically on sewing machine operators.

Given the functional impact of CTS and its potential to reduce productivity and quality of life, identifying determinants of symptom occurrence in high-risk professions is essential. Understanding how factors such as age, BMI, duration of employment, and systemic comorbidities contribute to CTS symptoms may support the development of ergonomic guidelines and early preventive strategies tailored to sewing factory workers.

2. AIM

The primary objective of this study was to analyze the prevalence of CTS symptoms among sewing factory workers and to identify factors that may influence their occurrence. The research sought to determine the extent to which selected demographic and occupational variables contribute to the manifestation of CTS-related symptoms within this specific professional group.

To address the research problem comprehensively, the following specific research questions were formulated:

1. What proportion of sewing factory workers exhibit positive results on clinical diagnostic tests for CTS?
2. To what extent do age, body mass index (BMI), duration of employment, and the presence of chronic diseases influence the occurrence of CTS symptoms?

This analytical approach aimed to provide a more detailed understanding of the relationship between occupational exposure and the development of CTS, thereby supporting the formulation of preventive measures and early diagnostic strategies within high-risk occupational settings.

3. MATERIAL AND METHODS

3.1. STUDY DESIGN AND PARTICIPANTS

The study was conducted on a total of 70 participants (all available workers present during the study period), including 60 women and 10 men, with a mean age of 46.41 years. All participants were employed as sewing machine operators and performed identical job tasks involving repetitive manual activities. Their daily work consisted primarily of machine sewing, requiring continuous fine motor control, sustained wrist positions, and repetitive hand-finger movements typical of garment production. All workers were employed full-time in a standard 40-h work week (8 h per day, 5 days per week). The participants occupied comparable workstations with similar ergonomic conditions, production tasks, and workflow organization, ensuring a high degree of homogeneity in occupational exposure within the study group. All participants were fully informed about the purpose and procedures of the study and provided voluntary, written informed consent prior to participation.

3.2. ELIGIBILITY CRITERIA

Inclusion criteria were: participants aged 18–64 years, voluntary informed consent, and a minimum of 6 months of professional experience in sewing or related work. Exclusion criteria included: prior wrist injuries or disorders unrelated to occupational activity, lack of informed consent, current pregnancy, and professional experience of less than 6 months.

3.3. OUTCOME MEASURES

The assessment included the standardized Polish version Boston Carpal Tunnel Questionnaire (BCTQ), administered as a paper-based survey and supplemented with additional items to collect information

on participants' sex, age, years of employment, daily working hours, number of working days per week, and the presence of diagnosed chronic diseases. Participants completed the questionnaire independently, with the option of obtaining an answer in case of misunderstanding the questions

The BCTQ evaluates 6 key domains associated with CTS: pain, tingling, numbness, weakness, nocturnal symptom exacerbation, and overall functional status.[6] The BCTQ was completed with reference to the symptomatic hand; in cases of bilateral symptoms, the questionnaire was administered for the hand presenting greater symptom severity. It comprises two sections:

1. Symptom Severity Scale (Part A): includes 11 items addressing symptoms experienced within a typical 24-h period over the previous 2 weeks. Responses are scored on a 5-point Likert scale, where 1 represents minimal symptom severity and 5 indicates the most severe symptoms.
2. Functional Status Scale (Part B): contains 8 items assessing the degree of difficulty performing daily activities. Responses are scored on the same 5-point scale, where 1 indicates no difficulty and 5 indicates complete inability to perform the activity due to CTS symptoms.

For both sections, the final score is calculated as the mean of all item responses (there were no lack of the data), rounded to two decimal places, with higher scores indicating greater hand disability.[6]

The questionnaire also included items specific to female participants, including the number of previous pregnancies and current pregnancy status. Additionally, height and weight were recorded to calculate participants' BMI.

3.4. Clinical tests

Non-invasive clinical assessments were performed, including the Phalen's test and the reverse Phalen's test. The Phalen's test is a standard diagnostic maneuver for CTS in which the participant assumes a seated or standing position and maintains maximal wrist flexion (dorsal surfaces of the hands pressed together) for 60 s. A positive result is indicated by the occurrence of pain or paresthesia in the median nerve distribution (fingers I–III and radial half of IV).[7] The reverse Phalen's test is a modification of the classic test, performed by wrist extension rather than flexion, with interpretation identical to the standard Phalen's test.[7] All clinical examinations were performed by a licensed physiotherapist with over five years of clinical experience in musculoskeletal assessment. The Phalen's and reverse Phalen's tests were carried out on both hands in accordance with standard procedures. For the purpose of statistical analysis, the result of the hand presenting more pronounced symptoms was used. The assessor did not have access to the participants' BCTQ scores at the time of testing, which minimized the risk of assessment bias.

3.5. Statistical analysis

Statistical analysis was performed using Statistica software (v. 13.3; StatSoft, Tulsa, USA). Prior to the main analyses, the distribution of continuous variables was assessed using the Shapiro-Wilk test, which demonstrated that the data did not follow a normal distribution ($P < 0.05$). For this reason, non-parametric statistical methods were applied. The relationships between categorical variables were examined using the Chi-square test, while associations between continuous or ordinal variables were assessed using Spearman's rank correlation coefficient. The significance level was set at $\alpha = 0.05$ for all analyses. No missing data were identified in the dataset.

4. Results

4.1. Participants characteristics

Data collected through direct interviews provided information on participants' age, anthropometric parameters (height and body weight), years of employment, and the presence of chronic diseases. A total of 70 individuals were included in the study. The mean age of the participants was approximately 47 years. A detailed overview of the study group's characteristics is presented in Table 1.

According to WHO guidelines[8] for BMI interpretation, 43 participants (61.42%) fell within the range indicative of abnormal body weight. The mean duration of employment among study participants was approximately 22 years, with the standard deviation reflecting substantial variability in work experience within the group. Chronic diseases were reported in 40% of the participants.

Table 1. Patients characteristics.

Variable	SD	x̄	Min	Max	Mdn
Age, y	10.20	46.41	20	63	48.5
Height, m	0.08	1.65	1.5	1.89	1.64
Body mass, kg	12.63	70.20	49	100	69.5
BMI, kg/m^2	3.95	25.66	18	37	25
Seniority, y	10.50	21.91	2	42	24

Comments: SD – standard deviation, x̄ – mean, Min – minimum value, Max – maximum value, Mdn – median

4.2. Phalen's test and reverse Phalen's test results

Among the 70 participants, 32 individuals exhibited positive results on both the Phalen's test and the reverse Phalen's test. Correlation analyses revealed no statistically significant association between participants' age and the results of the Phalen's test ($P > 0.05$; $Z = 0.53$) or the reverse Phalen's test ($P > 0.05$; Z = 0.55). These findings indicate that age did not influence the outcomes of either clinical test in the study population.

Similarly, BMI showed no significant correlation with the results of the Phalen's test ($P > 0.05$; $Z = -0.70$) or the reverse Phalen's test ($P > 0.05$; $Z = -0.27$), suggesting that BMI was not a determining factor in test positivity. The duration of employment was also not significantly associated with test outcomes, as demonstrated for the Phalen's test ($P > 0.05$; $Z = 0.38$) and the reverse Phalen's test ($P > 0.05$; $Z = 0.19$).

In contrast, the presence of chronic diseases was significantly associated with the results of the Phalen's test ($P < 0.05$; $\chi^2 = 4.23$; $df = 1$). Participants with chronic conditions were more likely to exhibit a positive Phalen's test compared to those without chronic diseases. This finding indicates that chronic diseases may contribute to the manifestation of CTS symptoms in this population (Figure 1).

Correlation analysis between the presence of chronic diseases and the results of the reverse Phalen's test revealed statistically significant differences between groups ($p < 0.05$; Chi-square = 4.23; df = 1). Participants with chronic conditions were more likely to exhibit a positive reverse Phalen's test compared to those without chronic diseases. This finding indicates that chronic diseases may influence the manifestation of CTS symptoms, as individuals with chronic conditions more frequently presented clinical signs indicative of CTS (Figure 2).

4.3. Boston Carpal Tunnel Questionnaire – Part A

Correlation analysis between the presence of chronic diseases and the total score for Part A of the BCTQ revealed statistically significant differences between groups ($P < 0.05$; $Z = 2.51$). Participants with chronic conditions scored higher on this section of the questionnaire, indicating that chronic diseases may exacerbate CTS symptoms. In other words, individuals with chronic conditions may experience either a greater number of symptoms or more severe manifestations compared to participants without chronic diseases (Figure 3).

Correlation analysis between participants' age and the total score of Part A of the BCTQ revealed statistically significant differences ($P < 0.05$). An increase in age was associat.ed with greater symptom severity, indicating that older participants experienced more pronounced CTS symptoms (Figure 4).

Correlation analyses between BMI and years of employment and the total score of Part A of the BCTQ revealed no statistically significant differences ($P > 0.05$). In this study, neither BMI nor duration of employment had a significant impact on the occurrence or severity of CTS symptoms.

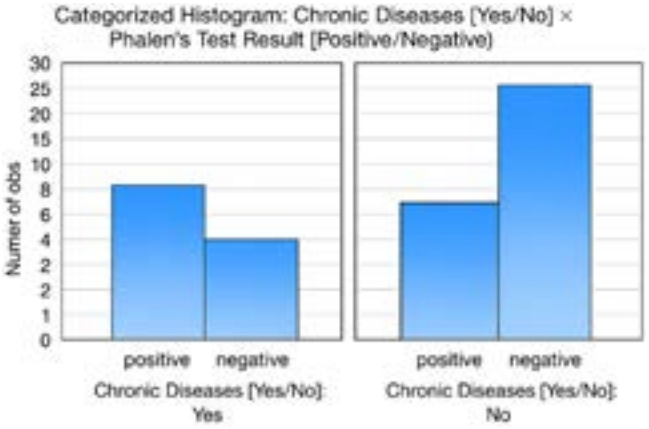

Figure 1. Correlation between the presence of chronic diseases and positive Phalen's test results among study participants.

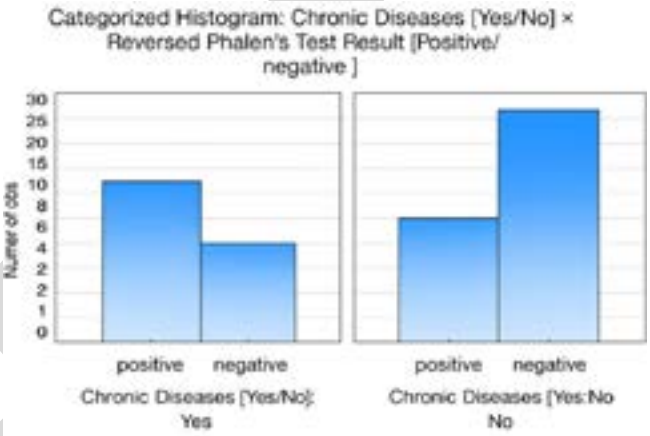

Figure 2. Correlation between the presence of chronic diseases and positive reverse Phalen's test results among study participants.

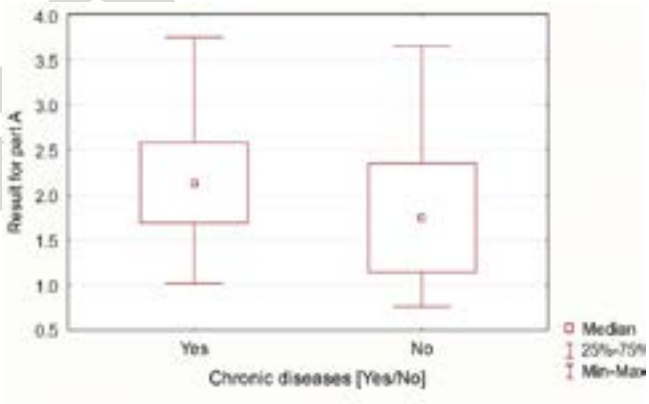

Figure 3. Correlation between the presence of chronic diseases and the total score of Part A of the BCTQ among study participants.

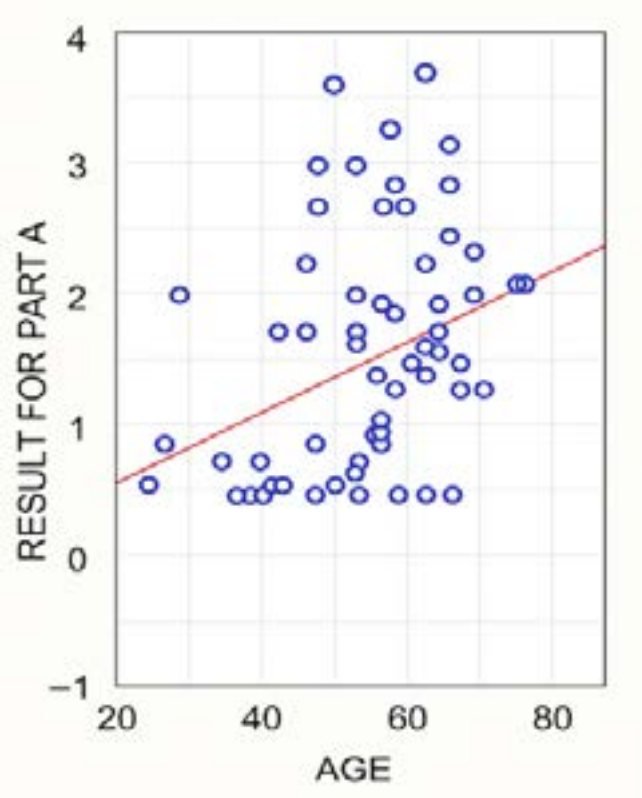

Figure 4. Correlation between participants' age and the total score of Part A of the Boston Carpal Tunnel Questionnaire (BCTQ).

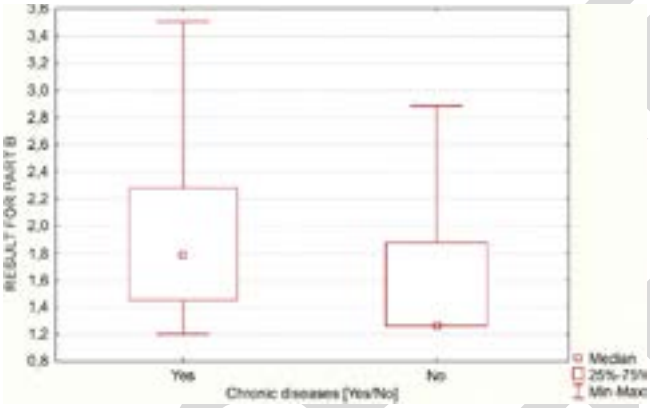

Figure 5. Correlation between the presence of chronic diseases and the total score of Part B of the Boston Carpal Tunnel Questionnaire (BCTQ).

4.4. Boston Carpal Tunnel Questionnaire – Part B

Correlation analysis between the presence of chronic diseases and the total score for Part B of the BCTQ revealed statistically significant differences between groups ($P < 0.05$; $Z = 3.02$). Participants with chronic conditions scored higher on this section, indicating that chronic diseases negatively affect functional status. In other words, individuals with chronic conditions may experience greater limitations in hand function compared to participants without chronic diseases (Figure 5).

Correlation analysis between participants' age and the total score of Part B of the BCTQ revealed statistically significant differences between groups ($P < 0.05$). An increase in age was associated with greater functional limitations, indicating that older participants experienced more pronounced impairments in hand function (Figure 6).

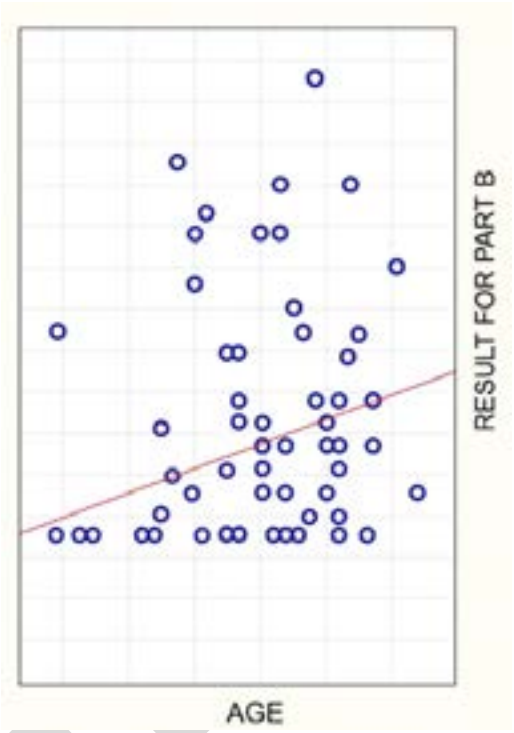

Figure 6. Correlation between participants' age and the total score of Part B of the Boston Carpal Tunnel Questionnaire (BCTQ).

Correlation analyses between BMI and years of employment and the total score of Part B of the BCTQ revealed no statistically significant differences ($P > 0.05$). In this study, neither BMI nor duration of employment had a significant impact on the occurrence or severity of functional limitations.

5. Discussion

The results of the present study reveal certain discrepancies compared with data reported in previous research. While Ulbrichtová et al. demonstrated that a higher BMI is associated with an increased risk of CTS, and that individuals diagnosed with CTS tend to have a significantly higher BMI compared to control groups,[9] this relationship was not confirmed in the current study. The lack of correlation between BMI and CTS symptoms may be attributed to the relatively small sample size and the occupational and environmental homogeneity of the study group, which likely resulted in limited variability of anthropometric parameters and other individual characteristics.

Similarly, no significant correlation was observed between years of employment and the occurrence

of CTS symptoms. These findings are consistent with those of Lewański and Walusiak-Skorupa, who reported that only 6% of CTS cases were of occupational origin, despite an average employment duration of approximately 20 years.[10] This suggests that the mere duration of employment may not be a sufficient predictor of CTS development, and that the specific biomechanical characteristics of the performed tasks may play a more critical role.

On the other hand, the significant associations identified between participants' age and the presence of chronic diseases and CTS symptoms are consistent with previously published findings. Erick et al. demonstrated that the risk of CTS increases markedly with age, showing that individuals aged 31–40 were nearly ten times more likely to develop CTS, and those over 40 years old were up to fifteen times more likely to experience the condition compared with younger participants.[11] Similarly, Möllestam et al. reported that CTS prevalence rises progressively with age, with almost 50% of diagnoses occurring in individuals aged 45–57 years.[12] These findings corroborate the results of the present study, further confirming age as a significant risk factor for CTS. In summary, the absence of statistically significant associations for BMI and years of employment may reflect the high occupational homogeneity of the sample. Most participants performed identical repetitive tasks for similar durations, resulting in limited variability in exposure and reducing the likelihood of detecting subtle associations. Additionally, years of employment may be an imprecise proxy for biomechanical load, as factors such as wrist posture, hand force, and task intensity are more predictive of CTS risk than job tenure alone. The "healthy worker effect" may also contribute, as individuals with more severe symptoms may leave the workforce earlier, leading to an underestimation of long-term exposure effects.

An important observation in this study is the discrepancy between clinical provocation tests and questionnaire-based symptom assessment. While age did not correlate with the outcomes of the Phalen or reverse Phalen tests, older participants reported more severe symptoms and functional limitations in the BCTQ. This divergence may be attributed to the different constructs measured by each tool. Clinical tests capture mechanical nerve compression at a specific moment, whereas the BCTQ reflects symptom perception over time, including nocturnal symptoms and fluctuating discomfort. Age-related changes in pain processing, comorbid degenerative conditions, or reduced neuromuscular efficiency may heighten subjective symptom burden even when clinical signs remain mild. This underscores the need to integrate both objective and subjective measures when evaluating CTS in occupational groups.

Chronic diseases were an important determinant of CTS symptoms in this study. The most commonly reported comorbidities included type 2 diabetes, hypothyroidism, hypertension, and degenerative joint disease. These conditions are known to impair microvascular circulation, increase connective tissue stiffness, or alter wrist biomechanics, thereby contributing to elevated pressure within the carpal tunnel. The present findings are consistent with large cohort studies demonstrating significantly increased CTS risk in individuals with metabolic or endocrine disorders.[13–17] When considering the influence of chronic diseases, previous research has shown a clear association between systemic conditions and the development of CTS. A large-scale British study including 401,656 participants, of whom 24,558 had diabetes, demonstrated a significantly increased risk of CTS among diabetic patients, with an odds ratio (OR) of 2.31 (95% CI: 2.17–2.46).[13] Similar observations were reported in a Swedish cohort study involving 30,466 individuals, where the hazard ratio (HR) was 2.10 (95% CI: 1.65–2.70).[14] Kuang-Ting Yeh et al. highlighted the development of CTS within nine months following distal radius fractures in diabetic patients.[15] Likewise, Jun Min Leow et al. observed that 7.8% of individuals presenting with acute CTS after distal radius fracture also had concomitant thyroid disease.[16] Furthermore, Wang et al. found that patients with end-stage renal disease who underwent parathyroidectomy were 1.7 times more likely to develop CTS compared with those who did not undergo the surgical procedure.[17] The present study aligns with these findings, indicating that chronic diseases significantly contribute to the development and severity of CTS symptoms. This association underscores the need for early screening and preventive interventions among individuals with metabolic and endocrine disorders, particularly those engaged in occupations that impose repetitive stress on the wrist and hand structures.

Study limitations

The interpretation of the study findings should take into account several methodological limitations. The most notable include the relatively small sample size (n = 70) and the homogeneity of the study group – all participants were employed at the same manufacturing facility, which limits the generalizability of the results to a broader population. Furthermore, the use of subjective assessment tools, such as self-reported questionnaires and clinical tests, introduces a potential risk of cognitive bias or response bias among participants. While these tools are valuable for screen-

ing and functional assessment, they do not provide a definitive diagnosis of CTS. Nerve conduction studies or electromyography being considered the diagnostic gold standard were not employed in the present study.

To enhance the validity and generalizability of future research, it would be advisable to increase the sample size and include participants with greater variability in age, gender, and occupational characteristics. Additionally, incorporating objective diagnostic measures (such as nerve conduction studies or electromyography) could strengthen the accuracy and diagnostic reliability of the findings.

5. Conclusions

1. The high proportion of sewing factory workers presenting CTS-related symptoms may suggest that this occupational group is exposed to conditions that increase the likelihood of median nerve irritation. These findings highlight the relevance of monitoring hand health in professions involving repetitive manual tasks.
2. In this sample, age and the presence of chronic diseases were associated with greater symptom severity and a higher likelihood of positive clinical test outcomes, whereas BMI and years of employment did not show statistically significant relationships. These results should be interpreted with caution, as the cross-sectional design does not allow causal inference.
3. The observed associations between chronic comorbidities (such as diabetes, thyroid disorders, hypertension and degenerative joint disease) and CTS symptoms indicate that systemic health conditions may play an important role in symptom manifestation among workers engaged in repetitive manual activities.
4. Although most participants were classified as overweight or obese, the lack of statistical significance for BMI in this study suggests that additional factors, including occupational homogeneity and ergonomic conditions, may modify the relationship between body weight and CTS symptoms.
5. Findings from the BCTQ indicate the presence of pain, sensory disturbances and functional limitations in a proportion of workers, which may negatively influence comfort and perceived work capacity. These observations underscore the importance of early detection and symptom monitoring in high-risk occupational groups.
6. Based on the present observational data and existing evidence from the literature, workplace-focused preventive strategies (such as ergonomic adjustments, scheduled breaks, and worker education) may be beneficial. However, interventional studies are required to determine the actual effectiveness of such measures.

CONFLICT OF INTEREST

None.

FUNDING

None.

ETHICS

The study protocol was approved by the Bioethics Committee under approval number BNW/NWN/0052/KB2/24 dated January 8, 2025. All procedures were conducted in accordance with the principles outlined in the Declaration of Helsinki.

REFERENCES

1 Osiak K, Elnazir P, Walocha JA, Pasternak A. Carpal tunnel syndrome: state-of-the-art review. *Folia Morphol.* 2022;81(4):851–826. https://doi.org/10.5603/FM.a2021.0121.

2 Šošić L, Bojnec V, Lonzarić D, Papež BJ. An advanced stage of carpal tunnel syndrome – is nighttime splinting still effective? *Int J Occup Med Environ Health.* 2020;33(6):771–780. http://dx.doi.org/10.13075/ijomeh.1896.01611.

3 Schabowska A. Assessment of the impact of physiotherapy on the functional efficiency of the hand after surgical treatment of carpal tunnel syndrome [in Polish]. Doctoral dissertation. Wrocław: Akademia Wychowania Fizycznego we Wrocławiu, Wydział Fizjoterapii; 2020.

4 Gołąbek R, Majcher P. Carpal tunnel syndrome [in Polish]. STCEJ. 2018;1(1):123–140. https://doi.org/10.16926/sit.2018.01.09.

5 Ciechanowska K, Łukowicz M. Carpal tunnel syndrome – etiology and diagnosis [in Polish]. *J Educ Health Sport.* 2017;7(4):622–638.

6 Mastej S. Polish adaptation and validation of the Boston Carpal Tunnel Syndrome Questionnaire (Boston Carpal Tunnel Questionnaire) [in Polish]. Master's thesis. Rzeszów: Uniwersytet Rzeszowski, Kolegium Nauk Medycznych; 2020.

7 Ciborowski D. *Clinical tests in physiotherapy. Musculoskeletal examination* [in Polish]. 2nd Ed. Poznań: MED-STORE; 2022:36–37.

[8] World Health Organization. *A healthy lifestyle – WHO recommendations. Fact sheets*. WHO Regional Office for Europe; 2024. https://www.who.int/news-room/fact-sheets/detail/physical-activity. Accessed: 2025.03.24.

[9] Ulbrichtová R, Jakušová V, Osina O, Zibolenová J, Kuka S, Hudečková H. Association of the role of personal variables and nonoccupational risk factors for work-related carpal tunnel syndrome. *Cent Eur J Public Health*. 2020;28(4):274–278. https://doi.org/10.21101/cejph.a6109.

[10] Lewańska M, Walusiak-Skorupa J. Etiological factors of carpal tunnel syndrome in people professionally performing monotypic wrist movements [in Polish]. *Med Pr*. 2014;65(2):261–270.

[11] Patience E, Keletso B, Raditloko S, Tapera R, Mbongwe B. Risk factors for self-reported carpal tunnel syndrome among hairstylists in Gaborone, Botswana. *Int J Occup Med Environ Health*. 2021;34(3):437–450. https://doi.org/10.13075/ijomeh.1896.01659.

[12] Möllestam K, Englund M, Atroshi I. Association of clinically relevant carpal tunnel syndrome with type of work and level of education: a general-population study. *Sci Rep*. 2021;11(1):19850. https://doi.org/10.1038/s41598-021-99242-8.

[13] Wiberg A, Smillie RW, Dupré S, Schmid AB, Bennett DL, Furniss D. Replication of epidemiological associations of carpal tunnel syndrome in a UK population-based cohort of over 400,000 people. *J Plast Reconstr Aesthet Surg*. 2022;75(3):1034–1040. https://doi.org/10.1016/j.bjps.2021.11.025.

[14] Rydberg M, Zimmerman M, Gottsäter A, Nilsson PM, Melander O, Dahlin LB. Diabetes mellitus as a risk factor for compression neuropathy: a longitudinal cohort study from southern Sweden. *BMJ Open Diabetes Res Care*. 2020;8(1):e001298. https://doi.org/10.1136/bmjdrc-2020-001298.

[15] Yeh KT, Lee RP, Yu TC, et al. Risk factors for carpal tunnel syndrome or trigger finger following distal radius fracture: a nationwide study. *Sci Rep*. 2020;10:469. https://doi.org/10.1038/s41598-020-57415-x.

[16] Leow JM, Clement ND, McQueen MM, Duckworth AD. The rate and associated risk factors for acute carpal tunnel syndrome complicating a fracture of the distal radius. *Eur J Orthop Surg Traumatol*. 2021;31:981–987. https://doi.org/10.1007/s00590-021-02975-5.

[17] Wang JS, Chen WS, Lin CL, Wang IK, Shen MY. Risk of carpal tunnel syndrome after parathyroidectomy in patients with end-stage renal disease: a population-based cohort study in Taiwan. *Medicine (Baltimore)*. 2020;99(20):e20313. https://doi.org/10.1097/md.0000000000020313.