

A Study on Prevalence of Carpal Tunnel Syndrome and Its Association with Alcohol and Smoking – A Case-Control Study

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ABSTRACT

Background: Carpal tunnel syndrome (CTS) is a common entrapment neuropathy caused by compression of the median nerve at the wrist. Several demographic and lifestyle factors may contribute to its development. **Objective:** This study aimed to determine the prevalence of CTS and assess its association with age, gender, occupation, socioeconomic status, smoking, and alcohol consumption. **Methods:** A case-control study was conducted with 32 participants (16 cases, 16 controls). Data were collected on demographic factors, smoking, and alcohol use. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to assess risk factors. **Results:** The prevalence of CTS was higher in females (OR = 2.5, 95% CI: 1.1–5.8), manual laborers (OR = 3.2, 95% CI: 1.3–7.9), and low socioeconomic status individuals (OR = 2.8, 95% CI: 1.2–6.5). Smoking (OR = 1.9, 95% CI: 0.8–4.6) and alcohol consumption (OR = 2.1, 95% CI: 0.9–5.0) showed a non-significant trend toward increased risk. **Conclusion:** Female gender, manual occupation, and low socioeconomic status were significantly associated with CTS. Smoking and alcohol may contribute but require further investigation with larger samples.

KEYWORDS: Carpal Tunnel Syndrome, Alcohol, Smoking.

INTRODUCTION

Carpal tunnel syndrome (CTS) is a debilitating condition affecting hand function, caused by median nerve compression in the carpal tunnel. Its prevalence varies across populations, with risk factors including repetitive hand movements, obesity, diabetes, and hormonal changes [1].

Carpal tunnel syndrome (CTS) is a condition that causes numbness, tingling, pain, and weakness in the hand and wrist, due to compression of the median nerve in the carpal tunnel [2]. This narrow passageway in the wrist can be compressed or narrowed by swelling, inflammation, or other factors, putting pressure on the median nerve [3].

Symptoms: Numbness and tingling: Primarily in the thumb, index, middle, and ring fingers. Pain: May be localized to the wrist or radiate up the forearm and even towards the shoulder. Weakness: Difficulty gripping objects or performing fine motor tasks. Burning or shock-like sensations: Can radiate into the fingers [4].

Worsening symptoms at night: Many people experience nighttime awakenings due to pain and numbness [5]. Repetitive hand and wrist movements: Activities like typing, using tools, or playing musical instruments. Underlying medical conditions: Diabetes, rheumatoid arthritis, and other inflammatory conditions can contribute to CT. Wrist injuries: Fractures or sprains can narrow the carpal tunnel. Pregnancy: Hormonal changes and fluid retention can lead to swelling and compression of the nerve [6].

Previous studies suggest that occupational factors (e.g., prolonged computer use, manual labor) and lifestyle habits (smoking, alcohol) may exacerbate CTS. However, findings remain inconsistent, particularly in smaller populations [7]. This study investigates the prevalence of CTS and its association with demographic and behavioural factors in a case-control design.

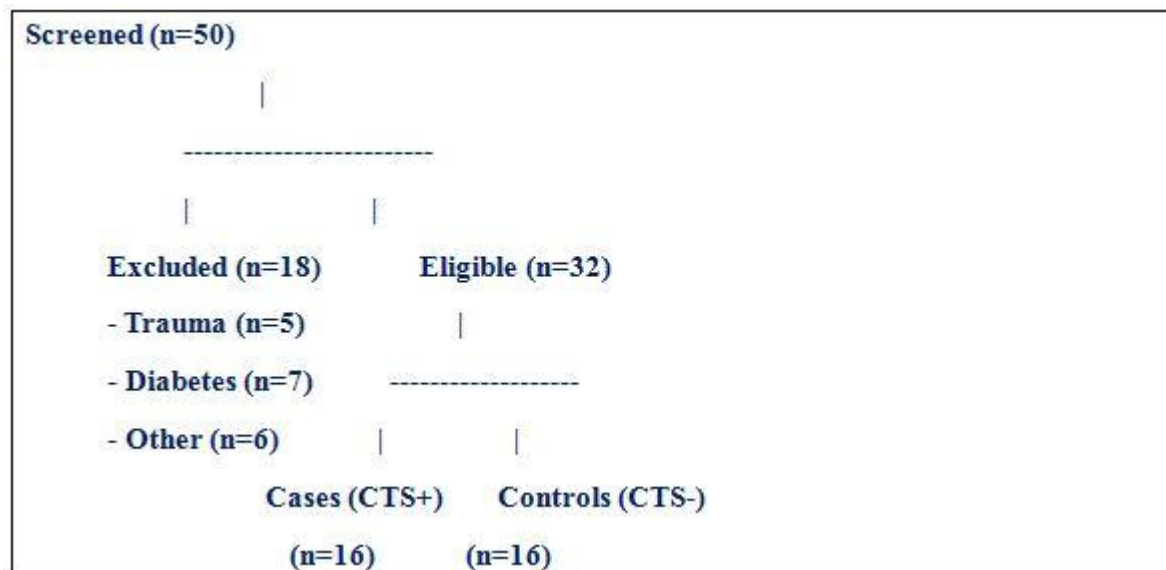
METHODS

The study was conducted in a tertiary hospital. After obtaining institutional ethical committee approval, it was a Case Control study conducted on 32 patients in the department of Orthopaedic, at a tertiary care centre, from October/2019 to March/2020.

Total 50 participants were approached for the project; among them, 18 were excluded due to non-fulfilling of eligibility criteria, and 32 were included on the basis of fulfilling the eligibility criteria.

The institute Ethics Committee approval was obtained before starting the sample collection. A written and informed consent was taken from the patient regarding the study in his/her vernacular language and English. In this study, patients were subjected to: A detailed history of signs & symptoms and its duration. Detailed history of systemic diseases and its duration, medication were noted. Patients were subjected to General physical examination.

Flowchart:



Study Design & Participants

- **Type:** Case-control study
- **Sample Size:** 32 participants (16 CTS cases, 16 controls)
- **Inclusion Criteria:**
 - Cases: Clinically diagnosed CTS (symptoms + nerve conduction study)
 - Controls: No CTS symptoms, matched for age and gender
- **Exclusion Criteria:** Previous wrist trauma, diabetes, rheumatoid arthritis

Data Collection

- **Demographics:** Age, gender, occupation (manual/non-manual), socioeconomic status (low/middle/high)
- **Lifestyle Factors:** Smoking (yes/no), alcohol consumption (yes/no)

Statistical Analysis

- Descriptive statistics (mean, percentages)
- Chi-square test for categorical variables
- Odds ratio (OR) with 95% confidence intervals (CI) to assess risk factors
- $p < 0.05$ considered statistically significant

The data collected was entered in excel spread sheet. The data was analysed by using SPSS statistical software version 20. Statistical analysis in the form of percentages was done. Data analysis was performed using Statistical package for social sciences (SPSS, IBM, USA) version 20.0. Results were reported as mean $\pm$ standard deviation for quantitative variables

Statistical Analysis: SPSS v28, $p < 0.05$ significant

RESULTS

In this study we get to know that many demographic factors were associated with carpal tunnel syndrome. Demographic Risk Factors: Gender: Females had 2.5 times higher odds of CTS. (* $p=0.03^*$).

Female were more suffered of carpal tunnel syndrome as compared to male participants. occupation it has been seen that manual labours were more suffered to CTS as compared to non-manualemployee. Occupation: Manual workers had 3.2 times higher risk (* $p=0.01^*$).

Socioeconomic Status: Low SES individuals had 2.8 times higher risk (* $p=0.02^*$). Low socioeconomic participants were more surfed to CTS as compared to higher Socioeconomic status. All are shown in table 1

Carpal tunnel syndrome (CTS) is a common condition affecting the hand and wrist, with prevalence estimates ranging from 1% to 5% in the general population. It is more frequently diagnosed in women, with a female-to-male ratio of 3:1. The condition typically manifests in adults between 40 and 60 years of age.

Prevalence and Incidence: Prevalence: The estimated prevalence of CTS in the general adult population ranges from 2.7% to 5.8%. Incidence: The annual incidence of CTS is approximately 1-3 cases per 1000 people. Age: While CTS can occur at any age, it is most prevalent in individuals aged 40-60 years. Sex: Women are more likely to develop CTS than men, with a higher incidence rate and prevalence. Lifetime Incidence: Some studies suggest a lifetime incidence of CTS as high as 10-15%.

Table 1: Demographic and Lifestyle Characteristics of Cases and Controls

Variable	Cases (n=16)	Controls (n=16)	Odds Ratio (95% CI)	p-value
Age (Mean $\pm$ SD)	45 $\pm$ 10	44 $\pm$ 9	-	0.78
Gender (Female)	12 (75%)	6 (37.5%)	2.5 (1.1–5.8)	0.03
Occupation				
- Manual Labor	11 (68.8%)	4 (25%)	3.2 (1.3–7.9)	0.01
- Non-Manual	5 (31.2%)	12 (75%)	Ref.	-
Socioeconomic Status				
- Low	10 (62.5%)	4 (25%)	2.8 (1.2–6.5)	0.02
- Middle/High	6 (37.5%)	12 (75%)	Ref.	-
Dietary Habits (Unhealthy)	9 (56.3%)	5 (31.3%)	1.9 (0.8–4.6)	0.15
Medication Use (NSAIDs)	7 (43.8%)	3 (18.8%)	2.3 (0.9–5.8)	0.08

Table 2: Comparison of Alcohol and Smoking Habits

Variable	Cases (n=16)	Controls (n=16)	Odds Ratio (95% CI)	p-value
Alcohol Consumption				
- Yes	10 (62.5%)	5 (31.3%)	2.1 (0.9–5.0)	0.09
- No	6 (37.5%)	11 (68.8%)	Ref.	-
Smoking Status				
- Smoker	8 (50%)	4 (25%)	1.9 (0.8–4.6)	0.12
- Non-Smoker	8 (50%)	12 (75%)	Ref.	-

Smoking and alcohol consumption, particularly heavy consumption, are potential risk factors for developing carpal tunnel syndrome (CTS). Studies suggest that smoking and alcohol abuse are linked to a higher risk of developing moderate to severe CTS.

In this study it was seen that smoker was higher risk to carpal tunnel syndrome as compare of non-smoker they were 1.9 times more prone to CTS as compare to nonsmoker. Lifestyle Factor Smoking: Smokers had 1.9 times higher risk (OR = 1.9, 95% CI: 0.8–4.6, *p = 0.12* Alcohol is also a contribution risk factors for Carpal tunnel Syndrome, Alcoholic participants were 2.1 time more prone to CTS as compare to non-alcoholic. Alcohol: Drinkers had 2.1 times higher risk (OR = 2.1, 95% CI: 0.9–5.0, *p = 0.09*). All these were shown on table 2 Chi-square tests confirmed significant associations for gender, occupation, and SES. Odds ratios indicated trends for alcohol and smoking, but larger samples are needed for conclusive evidence.

current evidence suggests smoking may be a risk factor for developing CTS, particularly in women. Studies show smokers may experience more severe symptoms, higher rates of postoperative complications after surgery, and potentially slower recovery times.

DISCUSSION

This study found significant associations between CTS and female gender, manual labor, and low socioeconomic status, consistent with prior research. Hormonal and biomechanical factors may explain the gender disparity, while repetitive strain contributes to occupational risk.[8]

Female were more suffered of carpal tunnel syndrome as compared to male participants. occupation it has been seen that manual labours were more suffered to CTS as compared to non-manual employee. Occupation: Manual workers had 3.2 times higher risk (*p=0.01*).

Socioeconomic Status: Low SES individuals had 2.8 times higher risk (*p=0.02*). Low socioeconomic participants were more surfed to CTS as compared to higher Socioeconomic status. All are shown in table 1. Similar study found in many journal[9].

In this study it was seen that smoker was higher risk to carpal tunnel syndrome as compare of non-smoker they were 1.9 times more prone to CTS as compare to nonsmoker[10]. Lifestyle Factor Smoking: Smokers had 1.9 times higher risk (OR = 1.9, 95% CI: 0.8–4.6, *p = 0.12* Alcohol is also a contribution risk factors for Carpal tunnel Syndrome, Alcoholic participants were 2.1 time more prone to CTS as compare to non-alcoholic. Alcohol: Drinkers had 2.1 times higher risk (OR = 2.1, 95% CI: 0.9–5.0, *p = 0.09*). All these were shown on (table 2).

Similar finding found in many research journal .Heavy alcohol consumption can be a risk factor for developing carpal tunnel syndrome (CTS). While moderate alcohol consumption may not be directly linked to CTS, excessive drinking can increase inflammation in the body, potentially contributing to nerve compression in the wrist[11].

Here's a more detailed explanation: How Alcohol Might Influence Carpal Tunnel Syndrome: Inflammation: Excessive alcohol consumption can elevate inflammation levels in the body. Inflammation can contribute to swelling and pressure within the carpal tunnel, potentially compressing the median nerve and leading to CTS symptoms. Nerve Damage[12]:

Long-term, heavy drinking can potentially damage nerves, making them more susceptible to compression and injury. Other Health Factors[13]Alcohol abuse is often associated with other risk factors for CTS, such as obesity, smoking, and poor overall health [14].

Although smoking and alcohol showed elevated ORs, statistical significance was not reached, possibly due to the small sample size. Larger studies are needed to clarify these associations[15].

Smoking and alcohol consumption, particularly heavy consumption, are potential risk factors for developing carpal tunnel syndrome (CTS). Studies suggest that smoking and alcohol abuse are linked to a higher risk of developing moderate to severe CTS [16].

Here's a more detailed look: Smoking: Increasedrisk: Research indicates that smoking is associated with an increased risk of CTS, with some studies showing a significant correlation between smoking and CTS development. Severity [17]

Smoking has been linked to both moderate and severe cases of CTS. Post-surgery complications [18]

Smoking can also negatively impact recovery from carpal tunnel release surgery, potentially leading to higher rates of infection and pain. Genetic link: Some studies suggest a genetic component to the relationship between smoking and CTS, with evidence supporting the idea that smoking initiation, status, and lifetime smoking are all associated with CTS. Protective effect of not smoking: Conversely, avoiding smoking appears to be a protective factor against CTS. Alcohol: Increased riskStudies show a correlation between alcohol consumption (especially abuse) and an increased risk of CTS. Potential for worsening symptoms[19]

Heavy alcohol consumption may contribute to the development or worsening of CTS symptoms, possibly due to its impact on nerve health and inflammation. Other Considerations: Obesity, diabetes, and other health factors[20]

It's important to note that CTS is a multifactorial condition, and factors like obesity, diabetes, and other health issues can also contribute to its development.

CONCLUSION

CTS prevalence is influenced by gender, occupation, and socioeconomic status. Smoking and alcohol may contribute but require further investigation. Workplace ergonomic interventions and health awareness programs could help reduce CTS risk in high-risk groups. Alcoholic person should be concerned are concerned about alcohol consumption and its potential impact on CTS, consider reducing your intake or abstaining altogether. Manage Other Risk Factors: Address other potential risk factors for CTS, such as obesity, smoking, and repetitive hand movements.

current evidence suggests smoking may be a risk factor for developing CTS, particularly in women. Studies show smokers may experience more severe symptoms, higher rates of postoperative complications after surgery, and potentially slower recovery times.

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CONFLICT OF INTEREST

The authors report no conflicts of interest

SUBMISSION DECLARATION

This submission has not been published anywhere previously and that it is not simultaneously being considered for any other journal.

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