

Risk Factor Analysis of Carpal Tunnel Syndrome Complaints Among Informal Sector Tailor Workers in Cimahi City

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ABSTRACT

Carpal tunnel syndrome (CTS) is a prevalent musculoskeletal disorder resulting from compression of the median nerve in the wrist, leading to symptoms such as pain, tingling, and weakness in the hands. Workers in the informal sector, particularly tailors, are at significant risk due to repetitive hand movements, prolonged static postures, and suboptimal ergonomic conditions. This study aims to analyze the occupational risk factors associated with CTS complaints among informal sector tailors in Cimahi City, focusing on age, smoking habits, and working hours. Using a cross-sectional design, data were collected from 107 tailor respondents through purposive sampling and assessed via structured questionnaires. The findings revealed a statistically significant association between age and CTS complaints (p -value = 0.001), indicating that older workers are more susceptible to the disorder. However, no significant correlation was found between smoking habits and CTS complaints (p -value = 0.269). Conversely, a strong association was identified between working hours and CTS complaints (p -value = 0.001), suggesting that prolonged working time increases the risk of developing symptoms. This research contributes valuable insights into occupational health risk factors for tailors, emphasizing the need for improved workplace ergonomics and targeted preventive interventions.

Keywords: *Carpal Tunnel Syndrome, Tailors, Risk Factors, Age, Working Hours*

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INTRODUCTION

Carpal tunnel syndrome (CTS) or *Sindrom Terowongan Karpal* (STK) is one of the most common musculoskeletal disorders caused by compression of the median nerve in the wrist. This disorder results in symptoms such as pain, tingling, and weakness in the hands and fingers, which can interfere with daily activities and reduce work productivity (Guan et al., 2018; Setyowati et al., 2015). A higher prevalence of STK has been found in occupations involving repetitive hand movements, use of vibrating tools, and prolonged static postures (Aroori & Spence, n.d.).

Informal sector workers, such as tailors, are among the groups particularly vulnerable to STK (Selviyati et al., 2016; Suharsimi, 2010). Informal seamstresses are exposed to multiple STK risk factors from repetitive cutting and sewing movements and prolonged sitting or static postures. In addition, many sewing workers in the informal sector operate under poor ergonomic conditions and endure long working hours without adequate rest (Lalupanda et al., 2019).

In 2013, STK cases reached 8,346 patients, suggesting that approximately 28 out of every 10,000 people suffer from STK. Compensation costs for workers affected by STK exceed \$20 billion annually (Farhan, 2018). A cross-sectional study involving 59 garment workers in Denpasar City reported an STK prevalence as high as 79.2%, with the highest distribution among workers aged over 40 years and those working ≥ 8 hours per day (Paramita et al., 2021).

A prior observation conducted in January 2024 on tailor workers in Cimahi City involved interviews with 15 workers regarding hand complaints. Results showed that 11 tailors (73%)

experienced tingling in the fingers or wrists, 6 tailors (40%) experienced numbness, and 9 tailors (60%) experienced pain in these areas. Notably, all complaints were reported in the right hand (Sastroasmoro & IS, 2014; Ulbrichtová et al., 2020; Unit et al., 2016).

Based on the description and previous observations, it is evident that tailor workers are at potential risk of experiencing complaints consistent with Carpal Tunnel Syndrome (STK) (Kadarusman et al., 2019; Suharsimi, 2010). Therefore, this study aims to analyze the risk factors associated with carpal tunnel syndrome complaints among informal sector tailor workers in Cimahi City (Aboonq, 2015; Wiperman & Goerl, 2016).

Complaints were reported by 15 workers, with 73% experiencing tingling, 40% numbness, and 60% pain in the fingers or wrists—symptoms that could pose significant occupational health risks. Based on this background, the research question formulated is: "What are the risk factors contributing to carpal tunnel syndrome complaints among informal sector tailor workers in Cimahi City?"

The objectives of this study are to determine the risk factors related to carpal tunnel syndrome complaints in informal sector tailor workers in Cimahi City; describe the distribution of risk factors such as age, smoking habits, and working hours among tailor workers; document the types and frequencies of carpal tunnel syndrome complaints; and analyze the relationship between these risk factors and the complaints (Duncan & Kakinoki, 2017).

This research is expected to provide both theoretical and practical contributions. The results can enrich the development of Occupational Safety and Health (OSH) knowledge, particularly concerning occupational diseases related to Carpal Tunnel Syndrome. Furthermore, the findings can serve as input for stakeholders, especially workers who perform intensive manual labor, to enhance preventive measures and improve workplace ergonomics.

METHOD

The author compiled a conceptual framework that was used in this study. The research hypothesis was the proportion tested for validity, with the hypotheses proposed including the relationships between age, smoking habits, and working time with carpal tunnel syndrome complaints. This study was analytical observational research using a quantitative approach to analyze the relationships between variables, with data collected in a cross-sectional manner. The research population consisted of tailor workers in Cimahi City, and samples were taken by purposive sampling, resulting in a minimum sample size of 97 people. Inclusion and exclusion criteria were established to ensure sample representativeness. Operational definitions of variables included age, smoking habits, length of employment, and carpal tunnel syndrome, which were measured using questionnaires. Data sources comprised primary data from questionnaires and observations, as well as secondary data from books and journals. Data processing was carried out through editing, coding, data entry, and tabulation, with analysis conducted using IBM SPSS Statistics to determine the relationships between variables through univariate, bivariate, and multivariate analyses.

RESULTS AND DISCUSSION

Characteristics of respondents

Age

Table 1. Age of Tailor Respondents in Upper Town

Age	Total	
	F	%
Young (< 40 years)	74	69.2
Old ($\geq$ 40 years)	33	30.8
Total	107	100.0

Based on table 1, it shows that most of the respondents in the young category have an age of less than 40 years as many as 74 people (69.2%).

Smoking Habits

Table 2. Smoking Habits of Tailor Respondents in Cimahi City

Smoking Habits	Total	
	F	%
No	19	17.8
Ya	88	82.2
Total	107	100.0

Based on table 2, it shows that 88 people (82.2%) of respondents who have a smoking habit are 88 people.

Tenure

Table 3. Hours of Work for Tailor Respondents in Cimahi City

Tenure	Total	
	F	%
$\leq$ 5 years	27	25.2
> 5 years	80	74.8
Total	107	100.0

Based on table 3, it is known that 80 respondents who have worked for more than 5 years (74.8%).

Carpal Tunnel Syndrome Complaints

Table 4. Complaints of STK Tailor Respondents in Cimahi City

Complaints	Total	
	F	%
Minor complaints	47	43.9
Moderate complaints	43	40.2
Heavy complaints	12	11.2
Very heavy complaints	5	4.7
Total	107	100.0

Based on table 4, it was found that the most minor complaints were experienced by respondents, namely 47 people (43.9%).

The relationship between age and complaints of carpal tunnel syndrome

Table 5. Age Relationship and STK Complaints

Age	STK Complaints	N	%	Total		<i>p-value</i>
				N	%	
Seedling	Minor complaints	46	62.2	74	69.2	0,001
	Moderate complaints	28	37.8			
	Heavy complaints	0	0			
	Very heavy complaints	0	0			
Your	Minor complaints	1	3.0	33	30.8	
	Moderate complaints	15	45.5			
	Heavy complaints	12	36.4			
	Very heavy complaints	5	15.2			
Total				107	100	

Based on table 5, the results of statistical analysis using *Chi Square* show that the *p-value* is $0.001 < 0.05$, then it can be interpreted that H_0 is rejected and H_a is accepted, so that there is a relationship between age and carpal tunnel syndrome complaints.

Smoking Habits

Table 6. Relationship between Smoking Habits and STK Complaints

Smoking Habits	STK Complaints	N	%	Total		<i>p-value</i>
				N	%	
No	Minor complaints	7	36.8	19	17.8	0,269
	Moderate complaints	8	42.1			
	Heavy complaints	4	21.1			
	Very heavy complaints	0	0			
Ya	Minor complaints	40	45.5	88	82.2	
	Moderate complaints	35	39.8			
	Heavy complaints	8	9.1			
	Very heavy complaints	5	5.7			
Total				107	100	

Based on table 6, the results of statistical analysis using *Chi Square* show that the *p-value* is $0.269 > 0.05$, so it can be interpreted that H_0 is accepted and H_0 is rejected so that there is no relationship between smoking habits and carpal tunnel syndrome complaints.

Tenure

Table 7. Relationship between Employment Period and STK Complaints

Tenure	STK Complaints	N	%	Total		<i>p-value</i>
				N	%	
≤5 years	Minor complaints	25	92.6	27	25.2	0,001
	Moderate complaints	2	7.4			
	Heavy complaints	0	0			
	Very heavy complaints	0	0			
>5 years	Minor complaints	22	27.5	80	74.8	
	Moderate complaints	41	51.2			
	Heavy complaints	12	15			
	Very heavy complaints	5	6.3			
Total				107	100	

Based on table 7, the results of statistical analysis using *Chi Square* show that the *p-value* is $0.001 < 0.05$, then it can be interpreted that H_0 is rejected and H_a is accepted, so that there is a relationship between the working period and carpal tunnel syndrome complaints.

Discussion

Age Relationship with Carpal Tunnel Syndrome Complaints

This study showed that there was a relationship between age and complaints of carpal tunnel syndrome ($p\text{-value} = 0.001$). It is possible that collagen related to ligaments and tendons in the wrist in the process of aging causes their elasticity to decrease, thereby reducing the ability of tissues to adjust. This reduced ability will increase the risk of stress and make you more susceptible to carpal tunnel syndrome (Duncan & Kakinoki, 2017; Guan et al., 2018).

Studies show that the volume of carpal bones can decrease with age. Bone changes such as increased bone turnover and changes in density can contribute to changes in volume. This can affect the stability and space in the carpal tunnel, thus contributing to the risk of carpal tunnel syndrome (Lampainen et al., 2022). This is in line with research on tailors at Busana Mawar Banjarmasin, there is a relationship between age and the incidence of carpal tunnel syndrome. This can happen because the physical ability of the workforce is declining and strong hormonal changes in each respondent allow carpal tunnel syndrome to occur (Nadhifah et al., 2019).

The Relationship between Smoking Habits and Complaints of Carpal Tunnel Syndrome

This study showed that there was no significant relationship ($p\text{-value} = 0.269$) between smoking habits and carpal tunnel syndrome complaints. Smoking is associated with reduced blood supply, oxidative stress, and systemic inflammation, which can damage peripheral nerves and make them more susceptible to compression neuropathy so smoking can also increase the risk of median nerve damage through toxins. A meta-analysis of control case studies showed no association between previous smoking, past smoking, and current smoking with CTS. Smoking is judged subjectively, not objectively, which makes it susceptible to bias (Sugiyono, 2013).

Biologically, smoking can cause vasoconstriction and tissue hypoxia, which could theoretically affect peripheral nerves. However, there is no strong evidence to suggest that this effect directly causes compression of the median nerve in the carpal tunnel, which is a major mechanism of CTS. Therefore, although smoking has systemic effects, there is no clear pathophysiological mechanism linking it directly to CTS.

The Relationship of Working Time with Carpal Tunnel Syndrome Complaints

This study showed that there was a significant relationship ($p\text{-value} = 0.001$) between working time and carpal tunnel syndrome complaints. The longer the working period, the greater the risk of carpal tunnel syndrome complaints. This is caused by the process of accumulating pressure and repeated stress on the median nerve in the wrist over many years of working with monotonous and repetitive activities. Convection workers are generally involved in the process of creating patterns, cutting fabrics, and sewing for a long time.

In this study, it is known that more workers with a working period of more than 5 years. A long working life signifies longer exposure to other risk factors such as high frequency of

movement. This accumulation of pressure not only causes muscle fatigue, but also triggers nervous disorders. This is in line with previous research, the results of the study show that respondents who experienced CTS complaints mostly had a working period of more than 4 years. The occurrence of CTS increases with the increase in working time, because if the longer the work lasts, there will continue to be repetitive movements in the hands or wrists continuously for a long duration, which can cause stress on the tissues around the carpal tunnel.

CONCLUSION

This study examined the risk factors associated with carpal tunnel syndrome (CTS) complaints among informal sector tailors in Cimahi City and found that age and prolonged working hours significantly increased the prevalence of CTS symptoms, while smoking habits showed no significant effect. The findings emphasize the critical need to improve ergonomic conditions and implement preventive workplace measures to reduce CTS risk in this vulnerable population. For future research, it is recommended to explore the effectiveness of specific ergonomic interventions and incorporate longitudinal designs to better understand the development and progression of CTS over time among informal sector workers.

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