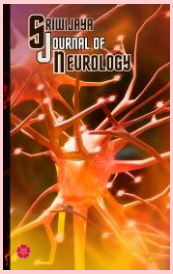

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Analysis of Risk Factors for Carpal Tunnel Syndrome (CTS)

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A B S T R A C T

Introduction: Carpal tunnel syndrome (CTS) is one of the musculoskeletal disorders most frequently reported in hospitals. Research on risk factors for CTS in Indonesia is still limited. Therefore, this study aims to analyze the risk factors for CTS at Dharma Husada Hospital, Probolinggo, Indonesia. It is hoped that this research can provide more complete information about the risk factors for CTS in Indonesia. **Methods:** This study is an analytical observational research with a cross-sectional. This study uses secondary data obtained from the medical records installation at Dharma Husada Hospital, Probolinggo, Indonesia. **Results:** A total of 300 research subjects took part in this study. Female gender, age ≥50 years, work with repeated use of hands and wrists and length of work with wrists more than 6 hours per day are risk factors that play a major role in the incidence of CTS at Dharma Husada Hospital Probolinggo Indonesia. **Conclusion:** Jobs that require repetitive use of the hands and wrists are one of the main risk factors for CTS. This is caused by repeated pressure on the median nerve in the carpal tunnel.

1. Introduction

Carpal tunnel syndrome (CTS) is a disorder of the median nerve located in the carpal tunnel at the wrist. This disorder is characterized by symptoms of pain, tingling, and numbness in the fingers, especially the thumb, index, and middle finger. CTS is one of the most common musculoskeletal disorders, especially in adults aged 40 years and over. Risk factors for CTS can be divided into two, namely modifiable risk factors and non-modifiable risk factors. Risk factors that can be modified include jobs that require repetitive use of the hands and wrists, such as factory workers, construction workers, and office workers. Repetitive movements, such as using a keyboard, typing, or operating machines. Postures that are not ergonomic, such as bending wrists down or to the side, Obesity, and Smoking. Risk factors that cannot be modified include age, gender, genetics, and trauma to the wrist.[1-3]

In Indonesia, CTS is one of the musculoskeletal disorders most frequently reported in hospitals. Based on data from Dharma Husada Hospital Probolinggo Indonesia, in 2023, there will be 234 CTS cases treated at this hospital. Research on risk factors for CTS in Indonesia is still limited. Therefore, this study aims to analyze the risk factors for CTS at Dharma Husada Hospital, Probolinggo, Indonesia.[4-7] It is hoped that this research can provide more complete information about the risk factors for CTS in Indonesia.

2. Methods

This study is an analytical observational research with a cross-sectional. This study uses secondary data obtained from the medical records installation at

Dharma Husada Hospital, Probolinggo, Indonesia. A total of 300 subjects study participated in this study, where the research subjects met the inclusion criteria. The inclusion criteria for this study are patients who received treatment at the neurology polyclinic at Dharma Husada Hospital Probolinggo, Indonesia, for the period 1 - 31 October 2023 and have agreed to participate in this study, which was indicated by signing informed consent. This study has received approval from the medical and health research ethics committee of Dharma Husada Hospital Probolinggo Indonesia. This study observed sociodemographic data and risk factors related to carpal tunnel syndrome (CTS). Data analysis was carried out using SPSS 25 software. Univariate and bivariate analyses were carried out in this study. Univariate analysis was carried out to present the frequency distribution of each test variable. Bivariate analysis was carried out to present the relationship between test variables, with $p<0.05$.

3. Results and Discussion

Table 1 presents the frequency distribution of each risk factor variable. The majority of the subjects in the study were male and over 50 years old. Subject The study numbered 300 people, of which 200 people were not CTS patients and 100 people were CTS patients. The majority of research subjects did not have a job without using their hands and wrists repeatedly. The majority of subjects in the study did not have a history of wrist trauma and had work time with the wrist < 6 hours. The majority of research subjects had a non-obese BMI.

Table 1. Frequency of CTS risk factors.

No.	Risk factors	Frequency
1.	Gender	
	Male	180
	Female	120
2.	Age	
	< 50 years	90
	≥ 50 years	210
3.	Work	
	Work involving repetitive use of the hands and wrists	90
	Work without repetitive use of hands and wrists	210
4.	History of wrist trauma	
	Yes	80
	No	220
5.	Length of work with wrist:	
	< 6 hours per day	220
	≥ 6 hours per day	80
6.	Body mass index (BMI):	
	Obesity	120
	Non-obesity	180
7.	CTS patients:	
	Yes	100
	No	200

Table 2 presents the relationship between risk factors and the incidence of CTS. Female gender, age ≥ 50 years, work with repetitive and prolonged use of hands and wrists work with the wrist for more than 6 hours per day is a risk factor that plays a major role in the incidence of CTS. The female gender has a risk of around 3.12 times experiencing CTS. Meanwhile, those aged ≥ 50 years have a risk of around 2.25 times experiencing CTS. Work with repetitive use of the hands and wrists has a risk of 3.76 times experiencing CTS, and working with the wrist for more than 6 hours per day has a risk of around 2.22 times experiencing CTS.

Table 2. Analysis of the relationship between risk factors and CTS.

Risk factors	Patient		p-value*	95%CI
	CTS	Non-CTS		
Gender			0,001	3,12 (1,65-6,67)
Female	65	100		
Male	35	100		
Age			0,001	2,25 (1,32-5,98)
< 50 years	40	115		
≥ 50 years	60	85		
BMI			0,12	1,13(0,87-3,45)
Obesity	45	100		
Non-obesity	55	100		
History of wrist trauma			0,13	1,22(0,76-1,47)
Yes	25	80		
No	75	120		
Work			0,001	3,76(1,87-7,87)
Work involving repetitive use of the hands and wrists	85	60		
Work without repetitive use of hands and wrists	15	140		
Length of work with wrist:			0,001	2,22(1,45-5,55)
< 6 hours per day	40	150		
≥ 6 hours per day	60	50		

*Chi-square test, p=0,05.

The prevalence of CTS in women is 3-6 times higher than in men. Women experience significant hormonal changes during puberty, pregnancy, and menopause. These hormonal changes can cause inflammation and swelling of the carpal tunnel, which can narrow the space for the median nerve. Women have smaller wrists than men. This can cause the median nerve to be compressed more easily.[8-12]

The risk of developing CTS increases with age. The tissue around the carpal tunnel becomes less elastic as we age. This can narrow the space for the median nerve. Blood flow to the carpal tunnel may decrease with age. This can slow down the healing of a compressed median nerve. The carpal tunnel is a narrow channel in the wrist that contains the median nerve, tendons, and blood vessels. The median nerve is responsible for providing sensation to the thumb, index finger, middle finger, and half of the ring finger. In adults aged 50 years and over, the tissue around the carpal tunnel begins to become less elastic. This can cause the carpal tunnel to become narrower, which can compress the median nerve. This pressure can cause CTS symptoms, such as pain, tingling, and numbness in the fingers.[13-16]

Jobs that require repetitive use of the hands and wrists are one of the main risk factors for CTS. This is caused by repeated pressure on the median nerve in the carpal tunnel, such as factory workers, construction workers, and office workers. Repetitive movements, such as using a keyboard, typing, or operating machines. Unergonomic postures, such as bending the wrist downwards or to the side. Working time with the wrist for more than 6 hours is also a risk factor for CTS. This is caused by a longer time of exposure to pressure on the median nerve. People who work with repetitive use of their hands and wrists, such as factory workers, construction workers, and office workers, are at higher risk of developing CTS.[17-19]

4. Conclusion

Female gender, age ≥50 years, work involving repetitive use of the hands and wrists, and working with the wrists for more than 6 hours per day are risk factors that play a major role in the incidence of CTS at Dharma Husada Hospital, Probolinggo Indonesia.

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