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CHARACTERISTICS OF CARPAL TUNNEL SYNDROME SUFFERERS IN TAILORS AT PT. ELITE

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Abstract

Carpal Tunnel Syndrome (STK) is a condition of the median nerve in the wrist area compressed by the surrounding structure resulting in a tingling and numbness sensation in the hand. Risk factors such as occupational and non-occupational factors. There are still many cases in Indonesia because many tailors use manual sewing machines. Based on data from Basic Health Research (Riskesdas) in 2018, the prevalence of joint disease in Indonesia is 7.3%, especially in upper limbs as much as 32.7%. To determine the prevalence of STK incidence in employees at PT. Elite and assess the relationship of STK incidence with influencing factors. This research is an analytical research with a cross-sectional research design. Sampling is carried out using a non-random sampling technique of purposive sampling type. Data taken using questionnaires and physical examinations were then processed using SPSS statistical tests. The prevalence of STK incidence in employees of PT. Elite as many as 40 respondents from 107 respondents. Age factors ≤40 and >40 years, normal body mass index and obesity II and rheumatoid arthritis p value <0.05. Pregnancy status, diabetes mellitus, length of service and smoking history p value >0.05. There are <50% of STK incidents in PT. Elite employees. There is a significant relationship between the ages of ≤40 and >40 years. Normal body mass index and obesity II and rheumatoid arthritis were significantly associated with the incidence of STK. There was no significant relationship between pregnancy status, diabetes mellitus, length of service and smoking history with the incidence of STK in PT employees. Elite.

Keywords: Carpal Tunnel Syndrome, STK Prevalence, STK Factors

INTRODUCTION

Carpal Tunnel Syndrome (CTS*) is* a condition in which the median nerve in the wrist area is compressed by the surrounding structure, resulting in neuropathy, infection, idiopathic, edema, blood vessel abnormalities or other factors that can cause pinching or compression of the median nerve (Volkert et al., 2018). The clinical symptoms of STK are related to many factors such as age, duration of symptoms and degree of compression. Carpal tunnel syndrome itself has been recognized as an occupational hazard or occupational hazard in 9 out of 12 EU countries (Agustin, 2014). Carpal tunnel syndrome is caused by occupational factors, such as repetitive

actions, work posture, years worked, working hours, vibration, organization and non-occupational factors (individual characteristics), such as gender, age, nutritional status as seen from body mass index (BMI), smoking history, medical history, and pregnancy status (ASTRINA, 2015). According to ASTRINA, (2015) research on *packing plant* workers in Indarung, West Sumatra, it is known that 65.2% of workers suffer from STK (Rambe, 2004). Carpal tunnel syndrome caused by occupational factors is caused by repetitive movements and wrong work positions for a relatively long time that can affect the nerves, blood supply to the hands and wrists (Genova et al., 2020).

The National Health Interview Study (NIHS) estimates that the prevalence of STK in adults is 1.55% (2.6 million). Carpal tunnel syndrome is more common in women than men with ages ranging from 25-64 years, the highest prevalence in women aged >55 years, generally between 40-60 years (Badan penelitian dan pengembangan kemenkes RI, 2018). Based on data from Basic Health Research (Riskesdas) in 2018, the prevalence of joint disease in Indonesia is 7.3% and the proportion of injuries is 9.2%, especially in the upper limbs (including upper arms, forearms, backs of hands, palms, and fingers) as much as 32.7%.[6] The prevalence of injuries to workers/drivers/domestic helpers is 10.1% with a proportion of workplace injuries of 9.1%.[6] The prevalence of STK in the general population has been estimated at 5% for women and 0.6% for men. Carpal tunnel syndrome is the most common type of trap neuropathy. Unilateral carpal tunnel syndrome in 42% of cases (29% right, 13% left) and 58% *bilateral* (Badan penelitian dan pengembangan kemenkes RI, 2018).

Generally, in this modern era, some developed countries have used sewing machines that are programmed automatically in making clothes so that they no longer use manual techniques (hands) or operated by humans, but the tailors at PT. Elite still uses sewing machines completely manually so some tailors have the same complaint of tingling and numbness in the hands and wrists. This technological advancement shortens the time needed compared to using manual techniques (hands), but manual techniques using hands are still needed in several ways, including the completion of clothing making (*fitting*) clothes that require hand touch in perfecting stitches or giving decorative accents to clothes (Yassi & Lockhart, 2013). Along with the development of technology, the incidence of STK in Indonesia is still high due to the vibration produced by sewing machines.

Vibrations in machines and production equipment in the workplace can cause health problems because they can radiate to workers through the arms of the hands (Sarah, 2014). Regarding the value of vibration intensity produced by the machine in the production section, the average value is 4.3 m / sec2 where the value exceeds the vibration threshold set under KEP.51 / MEN / 1999, which is 4m / sec2 for 8 working hours and if exposed for a long period of time, it will cause health problems, one of which is STK (Agustin, 2014). Carpal tunnel syndrome can be identified using labor examination tests performed by hyperhealth doctors which include the tinel test *and phalen test* where the worker is said to have an STK if one of the tests, namely, p = *tinel* test or *phalen* test gives a positive result (Damjan et al., 2017).

Based on the above background, a study will be conducted that examines the incidence of STK in employees at PT. Elite who work in the sewing department and in this study researchers wanted to see whether the length and length of time a person worked could aggravate the incidence of STK or there were other supporting factors such as gender, age, smoking, history of other diseases such as diabetes and

rheumatoid arthritis. Researchers hope that the results of this research can provide education for workers related to risk reduction that can aggravate the incidence of STK.

RESEARCH METHODS

This study is an analytical study with a *cross-sectional* research design to determine the characteristics of patients with carpal tunnel syndrome in PT tailors. Elite and influencing factors (Zangirolami-Raimundo et al., 2018). Sampling was carried out at PT. Elite, Tangerang Regency from December 2021 to March 2022. The sample in this study was a tailor of PT. Elite that meet inclusion and exclusion criteria. Furthermore, respondents filled out *informed consent*, filled out questionnaires as well as anamnesis, weight and height measurements for calculating Body Mass Index (BMI), tested blood sugar levels and saw signs of rheumatoid arthritis then carried out *phalen* tests and *tinel tests.* The next stage of research is carried out and data processing is carried out, so it can be known the evaluation of STK on these respondents based on the test results.

RESULTS AND DISCUSSION

The research subjects needed in this study based on the calculation results were as many as 107 respondents taken using a non-random sampling technique *type of purposive sampling* and from a number of 400 employees, employees with odd attendance were taken as research samples.

Table 1 Characteristics of Research Subjects Based on STK Factors

Subject Characteristics	Category	Sum	Presentase (%)
Age	≤40	64	59.8
	>40	43	40.2
	Total	107	100
IMT (kg/m^2)	Underweight	4	3.7
	Normal	37	34.6
	Overweight	0	0
	Risk of obesity	19	17.8
	obesity I	39	36.4
	obesity II	8	7.5
	Total	107	100
Pregnancy Status	Yes	3	2.8
	No	104	97.2
	Total	107	100
Diabetes Melitus	Diabetes	12	11.2
	Pre-diabetes	22	20.6
	Normal	73	68.2
	Total	107	100
Artritis rematoid	Yes	27	25.3
	No	80	74.7
	Total	107	100
Mass	<2 year	17	15.9
Work	2 – 4 year	12	11.2
	>4 year	78	72.9
	Total	107	100

Subject Characteristics	Category	Sum	Presentase (%)
History	Smoke	8	57.5
Smoke	No Smoking	99	92.5
	Total	107	100

The age factor was divided into ≤40 years as many as 64 respondents with a percentage of 59.8% and >40 years as many as 43 respondents with a percentage of 40.2%.

The results of research on BMI based on the calculation of body weight per height according to Asian Pacific are underweight (<18.5 kg / m2) as many as 4 people, normal (18.5 - 22.9 kg / m2) as many as 37 people, overweight (>23 kg / m2) as many as 0 people, the risk of obesity (23 - 24.9 kg / m2) as many as 19 people, obesity I (25 - 29.9 kg / m2) as many as 39 people and obesity II (>30 kg / m2) as many as 8 people.

Data based on pregnancy status in respondents were divided into pregnant and non-pregnant and obtained the results were pregnant as many as 3 people and not pregnant as many as 104 people. Rheumatoid arthritis in respondents as many as 27 people and 80 other people did not have rheumatoid arthritis. Blood sugar examination when carried out to assess respondents' blood sugar levels as a parameter for diagnosing diabetes mellitus was carried out at the time of data collection and obtained the following results, namely respondents with diabetes as many as 12 people, pre-diabetes as many as 22 people and 73 other normal people. Data regarding the working history of each worker at PT. Elite as tailors vary greatly, namely <2 years as many as 17 years, 2-4 years as many as 12 people and >4 years as many as 78 people. The data obtained was based on smoking history and did not make respondents smoke as many as 8 people while the majority of respondents were found not to smoke, which was as many as 99 people.

Based on the results of the history and physical examination that has been carried out, then the data was processed and it was found that from 107 respondents showed 40 people or 37.4% diagnosed with STK and those who were not diagnosed with STK were as many as 67 people or 62.6%. Here is a table showing the factors that can cause STK:

Table 2 Relationship between STK Incidence and Influencing Factors

STK Factors	Positive STK	Negative STK	Total	OR	95% CI		P value
					Lower	Upper	
Age							
≤40	21	43	64	0.672	0.566	0.797	<0.001
>40	19	24	43	0.784	0.703	0.875	0.026
IMT (kg/m^2)							
Underweight	1	3	4	0.595	0.060	5.923	0.654
Normal	5	32	37	0.319	0.110	0.927	0.030
Overweight	0	0	0	0	0	0	0
Risk of obesity	8	11	19	1.855	0.673	5.112	0.228
Obese I	14	25	39	1.096	0.480	2.500	0.828
Obese II	5	3	8	4.933	1.099	22.142	0.024
Pregnancy Status	1	2	3	1.580	0.137	18.168	0.711
Diabetes Melitus	5	7	12	2.000	0.582	6.878	0.265

STK Factors	Positive STK	Negative STK	Total	OR	95% CI		P value
					Lower	Upper	
Artritis rematoid	12	15	27	0.556	0.396	0.778	<0.001
Period of Service							
<2 year	4	13	17	0.896	0.266	3.026	0.860
2 – 4 year	7	5	12	4.383	1.268	15.144	0.137
>4 year	25	53	78	1.238	0.482	3.179	0.657
Smoke	3	5	8	1.630	0.440	8.934	0.889
No Smoking	18	81	99	0.862	0.120	0.276	0.813

The processed data was then analyzed using the *Chi-Square* test to assess *the p value* between respondents who tested positive for STK with factors that can influence the emergence of STK obtained based on each factor which can be seen in Table 4.2. The age of ≤40 to >40 years with the highest prevalence is the age range of ≤40 years as much as 59.8% of 107 respondents, with each *p value* < 0.05 which means age is one of the significant factors for the emergence of STK incidence. Body mass index is also categorized into underweight as much as 25% of STK incidence, normal as much as 13.51% of obesity risk events as much as 42.10% of STK incidence, obesity I as much as 35.89% of STK incidence and obesity II as much as 62.5% of STK incidence. The results obtained p value in each category of BMI underweight, overweight, risk of obesity and obesity I is p value > 0.05 which means there is no significant relationship between the incidence of STK , but in normal BMI and obesity II has a p value of < 0.05 which means there is a significant relationship between the incidence of STK. Similarly, pregnancy obtained 33.33% incidence of STK with p value > 0.05 and diabetes mellitus as much as 41.70% with p value > 0.05 which means there is no significant relationship between the incidence of STK, with pregnancy and diabetes mellitus . In rheumatoid arthritis, 40.44% of respondents experienced STK events, with a p value of < 0.05 which means there is a significant relationship between STK events and rheumatoid arthritis. The working period of < 2 years is 23.53% of STK events, 2-4 years is 58.33% of STK events and >4 years is 23.36% of STK events, with the p value of each is > 0.05 which means there is no significant relationship between STK events and <2 years, 2-4 years or >4 years. The smoking factor found the incidence of STK as much as 37.5% of the total 8 respondents who had a history of smoking and did not smoke, the incidence of STK was obtained as much as 18.18% of 99 respondents who did not smoke with the p value of each > 0.05 which means there is no significant relationship between STK events and smoking or not smoking history. This study was an analytical observational study using a cross-sectional research design. Respondents who participated in this study were respondents with an age range of ≤40 to >40 years. While in a study conducted by Guan et al., (2018) in China the age range of respondents was 41 – 70 years which was dominated by the age range of 41 – 50 years from the total number of respondents as many as 3223 respondents.[33] It was concluded that respondents who were positive for STK in this study were obtained <50%. Similarly, in the research conducted by Guan et al., (2018) in China, results were obtained in line with this study because 1512 respondents were positive for STK

from 3223 respondents, which means <50% of respondents were positive for *STK* in the research of Guan et al., (2018) *in* China.

Researchers also examined the incidence of STK with risk factors for STK such as age which has a significant relationship between the incidence of STK. In accordance with the theory that shows that STK often occurs in middle age and old age because the sample in this study is dominated by young and middle-aged so that age and STK factors show meaningful results (Sarah, 2014).

Body mass index which is categorized into underweight*, the risk of obesity and obesity I get each result p value is > 0.05 which means there is no significant relationship between the incidence of STK* , but in normal BMI and obesity II has a p value of < 0.05 which means there is a significant relationship between the incidence of STK. This result is because the link between BMI and STK seen from the thickening and swelling of tenosynovium must be reviewed further and can not only be assessed through BMI.

In pregnant women*, the p value* > 0.05, which means there is no significant relationship between the incidence of STK and pregnancy, because of the small number of samples in this study so that pregnancy factors cannot be a benchmark for the incidence of STK. In theory, pregnancy related to STK occurs due to hormonal changes that cause fluid absorption and tissue swelling (Cagdas et al., 2023). These hormonal changes cause an increase in the volume of extracellular fluid in the body, so STK is experienced by many pregnant women.

The incidence of STK in diabetes mellitus risk factors *p value* > 0.05 which means there is no significant relationship between STK events and diabetes mellitus. This meaningless result may be caused by the weakness of establishing a diagnosis that is only through one criterion, namely checking blood sugar during so that sensitivity is less. In relation to STK diabetes mellitus must be reviewed from the length of time the patient has diabetes mellitus.

Risk factors for rheumatoid arthritis with *a p value* of < 0.05 which means that there is a significant relationship between STK and rheumatoid arthritis. This incident is in line with the theory of rheumatoid arthritis that causes tingling just like the symptoms caused by STK.

Other risk factors are also in the form of working period which is divided into three categories, namely <2 years, 2-4 years and >4 years, with *the p value of* each is > 0.05 which means there is no significant relationship between the incidence of STK and working period of <2 years, 2-4 years and >4 years. This result is in line with the facts in the field and the theory that the factory employs tailors with a young age who are experienced in their fields.

Other risk factors in the form of smoking and not smoking obtained *p value of* each is > 0.05 which means there is no significant relationship between STK activity and smoking or non-smoking history, due to the small number of samples for smoking and needs to be reviewed again for cigarette types, cigarette brands and cigarette consumption per day, so that smoking factors cannot be a benchmark for the occurrence of STK events (Cahyo et al., 2012).

Research conducted by Lampainen et al., (2022) in Finland was found in the same direction, namely there was no significant relationship between the incidence of STK with diabetes mellitus and smoking, but the BMI factor obtained results that were not in the same direction because in this study there was a meaningful relationship between normal BMI and obesity II on the incidence of STK but in

research conducted Lampainen et al., (2022)in Finland found no relationship between BMI and the incidence of STK.There are differences in research results that can occur due to differences in the BMI classification used, in this study using the Asia Pacific classification while in Lampainen et al., (2022) in Finland using the WHO classification.

Research conducted by Al Shahrani et al., (2021) in Saudi Arabia obtained unidirectional results, namely there is no significant relationship between the incidence of STK with diabetes mellitus and smoking, and there is a relationship between BMI and the incidence of STK. The incidence of STK with pregnancy obtained results that are not unidirectional because research conducted by Al Shahrani et al., (2021) in Saudi Arabia regarding the incidence of STK with pregnancy is a meaningful relationship (Al Shahrani et al., 2021). This happened because the number of samples in this study was very small, not asked about gestational age and previous pregnancy history.

Research conducted by Guan et al., (2018) in China is also not in line with this study because research conducted by Guan et al., (2018) in China found a significant relationship between the incidence of STK and diabetes mellitus.The limitations of the researchers in this study are the possibility of information bias when respondents fill out the questionnaire given, do not examine other risk factors that can affect the results of the questionnaire and only use simple criteria for diagnosis.

CONCLUSION

Based on the results of the study, it was found that there was a significant relationship between the age of ≤40 p value <0.001 and the age of >40 p value 0.026 with the incidence of carpal tunnel syndrome (STK) in employees of PT. Elite. It was found that there was a significant relationship between normal body mass index p value 0.030 and obesity II p value 0.024 with the incidence of carpal tunnel syndrome (STK) in employees of PT. Elite. There was no significant relationship between pregnancy status p value 0.711 and the incidence of carpal tunnel syndrome (STK) in PT employees. Elite. There was no significant relationship between diabetes mellitus p value 0.265 and the incidence of carpal tunnel syndrome (STK) in PT employees. Elite. There was a significant relationship between rheumatoid arthritis p value <0.001 and the incidence of carpal tunnel syndrome (STK) in employees of PT. Elite. There was no significant relationship between the working time of p value <0.001 and the incidence of carpal tunnel syndrome (STK) in PT employees. Elite.There was no significant relationship between smoking history p value 0.813 and the incidence of carpal tunnel syndrome (STK) in PT employees. Elite.

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