

The Relationship of Age, Working Period, and Work Attitude with Complaints of Carpal Tunnel Syndrome on Workers in the Sumenep Batik Industry Indonesia

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Abstract

Making batik pattern is a job involving hand pinning the *canting* spout (a small metal cup with a wooden handle) and bending. Unnatural working position for a long time can cause a variety of health problems to workers, one of which is the hands. This can cause Carpal Tunnel Syndrome (CTS) which is closely related to repeated and excessive use of hands. The purpose of this study was to analyze the relationship of age, working period and work attitude with complaints of carpal tunnel syndrome on workers in the Sumenep Batik Industry.

This study is an analytical research using observational methods and through a cross sectional approach. The population in the study were all worker in batik who worked using *canting*. The sample was 32 workers out of 47 workers in the population. Data was collected using interview, questionnaires, panel tests, and work attitude measurements using the RULA observation sheet.

The results showed that 68.8% of respondents experienced complaints of Carpal Tunnel Syndrome. The majority of CTS complaints were from respondents aged 36-45 years, working for more than 10 years, and having high risk work attitude.

The conclusion is that there is a relationship between age, working period and work attitude with CTS complaints. Industrial owners are expected to prepare the same number of melted-wax pan and the workers, so that the workers will have more ergonomic work attitudes. Workers are suggested to take short breaks, do CTS exercises, to immediately visit to the nearest health center if they experience CTS complaints.

Keywords: *carpal tunnel syndrome, working periode, work attitude, worker in batik*

Introduction

Carpal Tunnel Syndrome (CTS) is a medical disorder that occurs due to suppression of the median nerve in the carpal tunnel with the main symptoms of tingling and pain in the fingers and hands which are innervated by the median nerve. The other symptoms are numbness, muscle weakness, stiffness and the possibility of muscle atrophy⁽¹⁾. The prevalence rate of CTS is 276 in 100,000 per year. CTS is more common in women than men and often occurs bilaterally with an increased incidence between the ages of 40-60⁽²⁾.

Based on the American Academy of Orthopedic Surgeons report (2009), the incidence of carpal tunnel syndrome in the United States was estimated to be 1-3 cases per 1,000 subjects per year. However, the prevalence of CTS in Indonesia is still unknown due to very few diagnoses of occupational complaints were reported⁽³⁾.

Manufacturing industry is a group of types of business that process materials into semi-finished goods or finished goods which have greater added value⁽⁴⁾. One of the manufacturing industries in Indonesia is the batik industry. Worker in batik are informal sector workers who traditionally process various types of

cloth into batik. They draw and design the batik, make the batik pattern using the melted wax, color the batik using dyes and dry it using traditional methods⁽⁵⁾. One of the batik industries in Indonesia, especially East Java, is the Sumenep Batik Industry. Here, worker in batik work with the position of the hands pinning the canting pen and bending in the process of making batik. This position makes the wrist bear heavy load.

Age is one of the factors that can increase the number of CTS complaints. According to Bridger (2003), the older a person is, the higher the risk of the person experiencing a decrease in bone elasticity, so that it becomes a trigger for symptoms that include MSDs, one of them is CTS⁽⁶⁾. In addition, working period and work attitudes are also among the factors that can trigger CTS complaints.

According to Budiono (2003), the working period is divided into 3 categories, namely new (less than 6 years), moderate (6-10 years), and long (more than 10 years)⁽⁷⁾. The longer the working period, there will be more continuously repeated movements of the finger for a long time, causing stress on the tissue around the carpal tunnel⁽⁸⁾. In addition, worker in batik often make sideways movements to obtain batik candles during the waxing process due to the stove position which is quite far from the workers. If this work attitude is carried out continuously, workers will easily experience the risk of Carpal Tunnel Syndrome (CTS) complaints⁽⁶⁾.

The description above shows that worker in batik have the potential danger of complaints of Carpal Tunnel Syndrome (CTS). Thus, this research was aimed to analyze the relationship of age, working period and work attitudes with complaints of Carpal Tunnel Syndrome (CTS) in workers in the Sumenep Batik Industry.

The purpose of this study was to analyze the relationship of age, working periode and work attitude with complaints of carpal tunnel syndrome on workers in the Sumenep Batik Industry.

Material and Method

This research is an observational study with a cross sectional approach. The population in this study were 47 worker in batik who worked using canting pen in the Sumenep Batik Industry. The sample in this study were 32 people.

A sample of 32 workers was taken by the Simple Random Sampling technique, which is taking samples from the population randomly drawn without regard to the strata in the population⁽⁹⁾. The sample size was determined using the following formula:

$$n = \frac{(Z_{1-\frac{\alpha}{2}})^2 \times p \times q \times N}{d^2(N-1) + (Z_{1-\frac{\alpha}{2}})^2 \times p \times q}$$

Statement:

$(Z_{1-\frac{\alpha}{2}})^2$ =The value of Z on the normal curve to $\alpha = 0,05$ confidence coefficient 95% by 1,96 ($z=1,96$)

p =The proportion of the value of 0,5

q =1-p = 1-0,5 = 0,5

d =Degree of precision

N =The total number of the population = 47 workers

n =The number of samples

$$n = \frac{(1,96)^2 \times 0,5 \times 0,5 \times 47}{0,1^2(47-1) + (1,96)^2 \times 0,5 \times 0,5}$$

$$n = \frac{45,1388}{1,4204}$$

$$n = 31,77 = 32 \text{ workers}$$

The variabels of this research were age, working period, work attitude and Carpal Tunnel Syndrome (CTS) complaints. The instruments used in collecting the data were interview, questionnaires, panel tests, and the RULA observation sheet.

To analyze the data, Kendall's Tau-b test was employed. A significance value was obtained from the test. Then, the significance value is compared with the α value, which is equal to 5% or 0.05. If the significance value obtained is less than the value of α , the two tested variables have a correlation. If the significance value is more than the value of α , then the two tested variables have no correlation.

To find out the strong of the relationship between

independent variables and the dependent variable, the contingency coefficient (CC) of the symmetric measure table was used. According to Sugiyono (2010) the category of CC value is divided into⁽⁹⁾:

Tabel 1. Contingency Coefficient

The Value of Contingency	Level of The Correlation
0,00 – 0,199	Very weak
0,20 – 0,399	Weak
0,40 – 0,599	Moderate
0,60 – 0,799	Strong
0,80 – 1,00	Very Strong

Findings

There were 32 respondents in this study. They were workers in the Sumenep Batik Industry. The descriptions of the respondents are as follows:

Based on the research, the distribution of the respondents is as shown below:

Tabel 2. Distribution of Respondents Based on Age, Working Periode, and Work Attitude in The Sumenep Batik Industry

Variable	Category	Frequency	Percentage
Age	17 – 25	0	0%
	26 – 35	6	18,8%
	36 – 45	14	43,8%
	46 – 55	7	21,9%
	56 – 65	5	15,6%
Total		32	100%
Working Periode	< 6 years	9	28,1%
	6–10 years	9	28,1%
	> 10 years	14	43,8%
Total		32	100%
Work Attitude	Low	0	0%
	Moderate	7	21,9%
	High	19	59,4%
	Very High	6	18,8%
Total		32	100%

Table 2 shows that majority of respondents (43.8%) are 36 – 45 years old and have been working in the industry for more than 10 years. This table also shows that most of the workers (59.4%) have CTS high risk work attitude.

Complaints of Carpal Tunnel Syndrome (CTS) were obtained using questionnaires and panel tests. Table 3 shows that respondents who reported CTS complaints were 22 workers (68.8%), while those who reported no CTS complaints were 10 workers (31.3%).

Tabel 3. Distribution of Complaints of CTS

No	Complaints of CTS	Frequency	Percentage
1	Yes	22	68,8%
2	No	10	31,3%
Total		32	100%

Bivariate analysis produces data relating to the relationship between independent variables consisting of age, working period and work attitudes, which are associated with the dependent variable, namely Carpal Tunnel Syndrome complaints. The statistical test used was the Kendall's Tau-b.

Statistical analysis using the Kendall's Tau-b test obtained a significance value of 0.005 at the level of error (α) = 5% for the correlation of age variable and CTS complaints. It means that there is a correlation between age and CTS complaints. Level of relationship closeness is shown by the value of the contingency coefficient, which is 0.497. This means that the correlation between age and CTS complaints is a moderate and in a positive direction.

The correlation of working period and CTS complaints has a significance values of 0.00 at the error level (α) = 5% and the contingency coefficient (CC) of 0.614. This means that the correlation between work period and CTS complaint is strong and positive.

The correlation of working attitude and CTS complaints has a significance values of 0.00 at the error level (α) = 5% and the contingency coefficient (CC) of 0.542. This means that the correlation between work attitude and CTS complaint is moderate and positive.

Discussion

Carpal Tunnel Syndrome (CTS) is a disorder caused by excessive use of hands for a long time period⁽¹⁰⁾. Age factors, working period, and work attitudes are some of the factors that can cause CTS⁽⁶⁾.

According to the Ministry of Health (2009), age categories are divided into five categories, namely⁽¹¹⁾:

- a) Late adolescence : 17-25 years
- b) Early adulthood : 26-35 years
- c) Late adulthood : 36-45 years
- d) The early elderly period : 46-55 years
- e) The final elderly period : 56-65 years

In this study, the majority of respondents who experienced CTS were in the age category of 36-45 years or 34.4%.

Statistical test found that there was a moderate and positive correlation of age and CTS complaints. This means that the more you age, the more you will experience CTS complaints. Making batik requires special creativity and expertise from workers. Therefore, at the end of their late adulthood to elderly age, workers tend to be more skilled and quite skilled in making batik as they have accustomed with the works for years. This means that respondents are at more risk of experiencing CTS complaints at this age.

This findings support Tarwaka (2015) who stated that the first muscle complaints is more likely experienced by someone at the age of 30 years. Starting from this age, the level of complaints will always increase along with the age. This happens because muscle strength and endurance begin to decrease at middle age, so the risk of muscle complaints also increases from this age⁽¹²⁾. This findings also confirm and support the findings of Ibrahim et al (2012) which stated that CTS often occurs between the age of 40-60 years old⁽²⁾. In addition, this findings is also in line with what Dhaniswara (2017) found that there is a significant relationship between age and incidence of CTS in worker in batik and those who experience a greater incidence of CTS are aged 41-60 years⁽¹³⁾.

The correlation statistical result between working period and complaints of CTS shows a positive relationship. This means that the longer the

working period, the higher the risk of experiencing CTS complaints. According to Budiono (2003), the working period is divided into 3 categories, namely new (<6 years), moderate (6-10 years), and long (> 10 years)⁽⁷⁾.

The correlation between working period and CTS complaints is a positive and strong. The majority of respondents who reported CTS complaints are the workers with more than 10 years period of working (40.6%). This is due to the repeated and excessive hand and fingers movements for a long time period, which then causes the tissue around the carpal tunnel⁽⁸⁾.

This findings is in line with the findings of Dhaniswara (2017), which stated that there is correlation between working period and CTS complaints⁽¹³⁾. This finding is also supported by Angelia (2014) who found that the correlation between working period and CTS complaints is strong. There were 74.4% of his respondents who worked for more than 10 years reported most of complaints of CTS compared to the other workers who had less working period⁽¹⁴⁾.

Another factor that can also cause CTS is work attitude. Measurements of work attitude can be done by several methods. One of them is using the RULA (Rapid Upper Limb Assessment) method. RULA is a research method for investigating disorders of the upper limb. The method was designed by Lynn Mc Atamney and Nigel Corlett (1993) who provided a calculation of musculoskeletal load levels in a job that can cause CTS complaints, a risk to body parts from the abdomen to the neck or upper limbs including the wrist⁽¹⁵⁾. This method is very suitable to be applied to a static work such as batik. According to Tarwaka (2015), the results of the RULA assessment are categorized into 4, namely low, moderate, high, and very high⁽¹²⁾.

The statistical test result shows that there is a moderate and positive correlation between work attitudes and CTS complaints. This means that the more high-risk work attitudes, the higher the risk of experiencing CTS. The work attitudes of most of respondents (46.9%) were in the high-risk category and they reported most of CTS complaints.

This findings confirms findings of Agustin (2012) which stated that there was a moderate correlation between work attitude and CTS complaints on the worker in batik⁽¹⁶⁾.

Conclusion

It can be concluded that of the 32 respondents who work in the Sumenep Batik Industry:

1. The majority of them are aged 36-45 years (14 workers), have been working for more than 10 years (14 workers), and have high risk work attitudes (19 workers)

2. It also can be concluded that there is a positive and moderate correlation between age and CTS complaints

3. Strong correlation between working period and CTS complaints.

4. Moderate correlation between work attitude and CTS complaints on the worker in batik

Recommendation

1. To apply ergonomic work attitude for the workers' wrist.

2. We suggest the industrial owners to prepare melted-wax pan the same number of workers so that workers do not need to make un-ergonomic (sideways or twisting) movement to take the wax.

3. It is recommended for the workers to take regular break every 15-20 minutes by bending and straightening the wrist. Agustin (2012) suggested batik workers to do exercises by clenching their fists, bending the wrists downward and upward and holding for 30 seconds⁽¹⁶⁾.

4. It is better for workers who experience CTS to immediately report their complaints to the nearest health care or doctor, so that their complaints are immediately followed up with medication and prevention.

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