

## Factors Related to Complaints Regarding Carpal Tunnel Syndrome (CTS) Among Batik Craftsmen



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**ABSTRACT:** The prevalence of complaints regarding CTS still become unknown problem due to very few people can make diagnosis and there are minimal reports of incidents from the formal and informal sectors. Batik craftsmen those who have a risk of complaints regarding CTS. This may occur due to repetitive hand movements, forceful hand movements, pressure on the hands or wrists, static hand positions, non-ergonomic hand and upper body positions, as well as flexion and extension positions. This study aims to determine the factors related to complaints regarding CTS among Batik Craftsmen. This was a cross sectional study with a quantitative approach. The study population involved all batik craftsmen in Trusmi Kulon Village, with total number of 135 people. There were 57 samples selected based on the Slovin formula and Accidental Sampling technique. The study instruments applied were questionnaire and observation sheet regarding working posture using RULA. Data were analyzed using the Chi Square test. The results that old age, long years of service and highrisk working posture were found as factors related to the incidence of CTS among batik craftsmen.

**KEYWORDS:** Carpal Tunnel Syndrome (CTS), Batik Craftsmen

### INTRODUCTION

Carpal Tunnel Syndrome (CTS) is a disorder that occurs due to compression of the median nerve in the carpal tunnel with the main symptoms of tingling and pain that radiates to the fingers and hands which are triggered by the median nerve. Such symptoms can be accompanied by numbness, muscle weakness, stiffness and possible muscle atrophy, especially of the thumb, index, and middle fingers. CTS is related to work that uses a combination of strength and repetitive movements of the fingers over a long period (Wulandari E, 2020).

CTS is influenced by several factors including age, gender, nutritional status, history of illness, work factors (years of service, length of work, wrist posture, repetitive motion), and work environment (temperature, ventilation, humidity, noise, lighting and local cleanliness) (Tarwaka, 2015). CTS rates vary between 1% and 16% depending on the diagnostic criteria used. In fact, women are 3 times more likely to experience CTS than men (Fitri Octaviana, 2022).

One of the jobs related to using the hands to carry out repetitive movements for quite a long time is making batik. Batik craftsmen are informal sector workers who draw or design, make batik, dye and dry various types of cloth as raw materials to be processed into batik cloth using traditional work methods (Hidayatulloh, 2018). Batik making process has risk factors for CTS due to repetitive hand movements, forceful hand movements, pressure on the hands or wrists, static hand positions, non-ergonomic hand and upper body positions, as well as flexion and extension positions. (Hidayatulloh, 2018).

Based on the results of preliminary study and various problems supported by previous studies, it was shown that workers who routinely used their hands to carry out repetitive movements for a long time are at risk of experiencing complaints regarding CTS. Based on the results of the preliminary study, the most common complaints among batik makers were pain sensation in the wrists and tingling sensation in the fingers. Therefore, researchers are interested in conducting a study on factors related to the incidence of CTS among batik craftsmen in Trusmi Kulon Village, Cirebon Regency.

### METHOD

This was an analytical study with a quantitative approach. The independent variables in this study included age, years of service and working posture. Meanwhile, the dependent variable in this study was Complaints regarding Carpal Tunnel Syndrome (CTS).

## Factors Related to Complaints Regarding Carpal Tunnel Syndrome (CTS) Among Batik Craftsmen

The population in this study involved 135 hand-written batik craftsmen in Trusmi Kulon Village, Cirebon Regency (Buku Profil Desa Trusmi Kulon dan Kelurahan, 2017) Based on the calculation of the number of samples using the Slovin formula, 57 samples were obtained. The study samples were obtained using the accidental sampling technique. Data regarding CTS were collected through interviews using a questionnaire developed based on the BCTQ (Boston Carpal Tunnel Syndrome Questionnaire) (CILA, 2019), while working posture measurement was performed using the RULA (Rapid Upper Limb Assessment) by means of observation (Tarwaka, 2015). Bivariate analysis was conducted using the chi square test.

### RESULT AND DISCUSSION

#### A. General Description of Age, Years of Service, Working Posture, Carpal Tunnel Syndrome (CTS)

**Table 1. Frequency distribution of respondents**

Variable	n	(%)
Age		
1. Young <35	25	44
2. Old ≥35	32	56
Years of Service		
1. New ≤5 years	18	32
2. Old >5 years	39	68
Working Posture		
1. Low risk	28	49
2. High risk	29	51
Carpal Tunnel Syndrome (CTS)		
1. No	7	12.3
2. Yes	50	87.7

Based on Table 1, it was revealed that more than half of respondents were in the old category or aged ≥35 years by 32 people (56%), years of service of >5 years by 39 people (68%), a highrisk working posture by 29 people (51%), and complaints regarding CTS by 50 people (87.7%).

#### B. Relationship between Age and Complaints regarding CTS

**Table 2. Relationship between Age and Complaints regarding CTS among Batik Craftsmen**

Age	Complaints regarding CTS				Total		p value
	No		Yes		n	%	
	n	%	n	%			
Young	7	28.0	18	72.0	25	100	0.002
Old	0	0.0	32	100	32	100	
Total	7	12.3	50	87.7	57	100	

Based on Table 2 regarding the analysis of age, it was found that more than half of respondents in the young category experienced complaints regarding CTS by 18 people (72%). Meanwhile, in the older age category, all respondents experienced complaints regarding CTS by 32 people (100%).

The results of the Chi Square test using the Fisher Exact Test value obtained a probability value (P value) of 0.002 (< 0.05). So, it can be concluded that there was a relationship between age and complaints regarding CTS among batik craftsmen in Trusmi Kulon Village, Cirebon Regency.

#### C. Relationship between Years of Service and Complaints regarding CTS

**Table 3. Relation Between Years Of Service And Complaints Regarding Cts**

Years of Service	Complaints regarding CTS				Total		p value
	No		Yes		n	%	
	n	%	n	%			
New	5	27.8	13	72.2	18	100	0.027

## Factors Related to Complaints Regarding Carpal Tunnel Syndrome (CTS) Among Batik Craftsmen

Old	2	5.1	37	94.9	39	100
Total	7	12.3	50	87.7	57	100

Based on Table 3 regarding the analysis of years of service, it was found that more than half of respondents who experienced complaints, 13 people (72.2%) were in the new worker category. Meanwhile, in the old worker category, most of respondents by 37 people (94.9%) experienced complaints regarding CTS.

The results of the Chi Square test using the Fisher Exact Test value obtained a probability value (P value) of 0.027 ( $< 0.05$ ). So, it can be concluded that there was a relationship between years of service and complaints regarding CTS among batik craftsmen in Trusmi Kulon Village, Cirebon Regency.

### D. Relationship between Working Posture and Complaints regarding CTS

**Tabel 4. Relationship between Working Posture and Complaints regarding CTS**

Working Posture	Complaints regarding CTS				Total	p value
	No		Yes			
	n	%	n	%		
Low risk	7	25.0	21	75.0	28	100
High risk	0	0.0	29	100	29	100
Total	7	12.3	50	87.7	57	100

Based on Table 4. regarding the analysis of working posture, it was found that more than half of respondents in the lowrisk category experienced complaints regarding CTS by 21 people (75%), while in the highrisk working posture, all respondents experienced complaints regarding CTS by 29 people (100%).

The results of the Chi Square test using the Fisher Exact Test value obtained a probability value (P value) of 0.004 ( $< 0.05$ ). So, it can be concluded that there was a relationship between working posture and complaints regarding CTS among batik craftsmen in Trusmi Kulon Village, Cirebon Regency.

### E. Age, Years of Service, Working Posture, and Carpal Tunnel Syndrome

Age is the period of a person's life which is calculated from birth to the present (Wahyuni ID, 2022). The results of study among 57 batik craftsmen revealed that more than half (56%) if respondents were included in the old category. The youngest age of the respondents was 23 years old and the mean age of batik craftsmen was 38 years old. Such finding is similar to a study conducted by Najmatun Nisa in 2018 regarding the description of the risk factors for CTS among editorial employees at the X Jakarta news agency in 2018, which found that CTS was more common in those aged over 30 years. In such study, 15 people (45.5%) were positive for CTS (Nisa N, 2018). The results of a study conducted by Farhan and Kamrasyid regarding factors that influenced the incidence of CTS among motorbike taxi drivers in 2018 further revealed that respondents were mostly in the  $\geq 40$  year group by 64 respondents (66.7%) and CTS was often found in the adult population at the age of 40-60 years. (FS, 2018)

In the results of the current study, more than half of respondents were aged 35 years and over, but the number was slightly different from those aged  $< 35$  years and most of the batik craftsmen were married. It seemed that young people aged  $< 35$  years old preferred to look for work outside the city.

Table 1 showed that more than half of respondents had years of service of  $> 5$  years by 39 people (68%). The newest workers had been working for 1 year and the mean years of service was 17 years. Such finding is similar to a study conducted by Elsyne in 2019 regarding the relationship between years of service and the incidence of CTS in informal sector tailors in Solo sub-district, Kupang city. In such study, 5 people were positive for CTS with years of service of  $< 4$  years. On the other hand, 23 people were positive for CTS with years of service of  $\geq 4$  years. (Lulupanda EY, 2020)

Based on this study, it was shown that more respondents fell into the long years of service category and experienced a decrease in their ability to work. In fact, the longer the years of service, the more often they performed repetitive movements. Batik craftsmen carry out repeated painting movements following the pattern depicted on the cloth. In addition, the demand to complete work on time meant that workers did not use rest time properly. So, they could not reduce repetitive movements which resulted in the risk of CTS. Respondents who had been working for a long period were those who had families. So, they felt comfortable with their work and had no desire to look for another job.

Table 1 showed that of the 57 batik craftsmen, more than half of respondents were in high risk working posture by 29 people (51%) with a score of 7, while those with low risk obtained scores of 5 and 6. Such finding is similar to a study conducted by Muthoharoh in 2018 regarding factors related to the incidence of CTS among SPBE employees in Indramayu. In this study, there

## Factors Related to Complaints Regarding Carpal Tunnel Syndrome (CTS) Among Batik Craftsmen

were 24 respondents (85.7%) who had a high risk. Furthermore, in a study conducted by Nabila in 2021 on the relationship between repetitive movements and working posture with the incidence of CTS, 31 people (91.2%) manual coconut peeling workers in traditional markets in the city of Surakarta had high RULA scores (Aprilia NP, 2021).

Most of the working postures in this study fell into the highrisk category with a score of 7. Batik craftsmen usually worked with a bent neck and had repeated flexion and extension movements of the arms and wrists. Monotonous and repetitive work will cause swelling of the tendons in the wrist. Muscle contractions that exceed 20% will reduce blood circulation to the muscles according to the level of muscle contraction carried out due to the large amount of force required. Such condition may cause the oxygen supply to the muscles to decrease and the metabolic process can be hampered, resulting in a buildup of lactic acid which further causes pain in the muscles.

Based on table 1, it was shown that of the 57 batik craftsmen, the majority of respondents experienced complaints regarding CTS by 50 people (88%) with the highest score of 3.3, the mean score was 2.2 and the lowest score of 1.0. The assessment of complaints regarding CTS among batik craftsmen was obtained by conducting interviews in the form of questions based on the CTS complaint questionnaire. The study finding is similar to a study conducted by Muthoharoh in 2018 on factors related to the incidence of CTS among SPBE employees in Indramayu. In this study, there were 30 respondents (75%) who experienced subjective complaints of regarding CTS. The study finding is also in line with a study conducted by Kirom in 2019 on the relationship between age, yeras of service and reactive movement of pressing the nozzle with subjective complaints of CTS among fuel filler operators at three gas stations in the city of Yogyakarta in 2019. In this study, there were 34 respondents (73.9%) who experienced risky complaints (CILA, 2019). The study finding is also similar to a study conducted by Isodorus et al in 2020 regarding the relationship between years of service and work attitudes with complaints regarding CTS among ulos weaving workers at the Sianipar Medan ulos gallery in 2020 which found 34 respondents (65.4%) who experienced complaints regarding CTS (Jehaman I, 2021)

CTS is a disorder on the hand that causes pain and numbness, especially in the thumb and three main fingers, namely the index finger, middle finger and part of the ring finger. Complaints regarding CTS founf in this study had the main cause of CTS which was often very difficult to determine, whether due to working conditions or due to an illness. The underlying cause of the complaints could not be found. However, due to economic pressures that required workers to continue doing this work and in the end the symptoms were considered normal conditions, the workers only treated such complaints with minimal medication. This can turn an ordinary condition into a serious illness.

### F. Relationship between Age and Complaints regarding CTS

Table 2 shows the frequency distribution of chi square test results. It was known that there was a relationship between age and complaints regarding CTS among batik craftsmen in Trusmi Kulon Village, with a p value of 0.002. Such finding is similar to previous study conducted by Erlangga, et al in 2018 regarding factors related to the incidence of CTS with a p value of 0.000 (Wardana ER, 2018). Moreover, according to a study conducted by Farhan and Kamrasyid on the factors that influenced the incidence of Carpal Tunnel Syndrome among motorbike taxi drivers, it was found that 20 respondents (62.5%) in the age group of less than 40 years and 52 respondents (81.2%) in the age group of  $\geq 40$  years experienced complaints regarding CTS with a significant level of 0.000 ( $p < 0.05$ ). Such finding revealed a relationship between age and complaints regarding CTS (Wahyuni ID, 2022).

Age is one of the risks that is closely related to the incidence of CTS. As a person gets older, the synovial fluid decreases which can cause swelling in the joints. Bone degeneration occurs starting at the age of 30 years, where degeneration occurs in the forms of tissue damage, tissue change into scar tissue, and fluid reduction, which may decrease the stability of the bones and muscles (Wahyuni ID, 2022).

The current study revealed that there was a relationship between age and complaints regarding CTS among batik craftsmen. Such work involves a lot of repetitive and monotonously movements of the hands and wrists for quite a long duration. They are likely to be improper movements. One cause of complaints regarding CTS is that the older the age, the longer the exposure to the batik making movements, and the greater the risk of experiencing complaints regarding CTS. The incidence of CTS is caused by age factors which may be related to the biological effects of aging processes or to long exposure.

Relationship between age and batik craftsmen's complaints regarding CTS is because CTS is most often found at ages  $\geq 35$  years. Based on interviews, there were several respondents who experienced complaints such as tingling, numbness and pain in the wrist due to lack of rest. This can happen because the decreasing physical abilities of the workforce.

### G. Relationship between Years of Service and Complaints regarding CTS

Based on statistical test, it was obtained the expectation value of  $< 5$ . So, the Fisher Exact Test value of 0.027 was applied, meaning that there was a relationship between years of service and complaints regarding CTS. Such finding is in line with a study conducted by Asfian et al in 2021 on factors related to complaints regarding CTS among fuel filler operators at Kendari city gas

## Factors Related to Complaints Regarding Carpal Tunnel Syndrome (CTS) Among Batik Craftsmen

stations which found that there was a relationship between years of service and complaints regarding CTS with a p-value of 0.012 (Pitrah Asfian, 2021). Such finding is also in line with a study conducted by Putri et al in 2022 on the effect of vibration levels and length of exposure to using sewing machines on signs of complaints regarding CTS among workers at Malang Embroidery Palace. It was found that there was a relationship between working period and complaints regarding CTS among workers at Malang Embroidery Palace, with a p value of 0.035. Respondents who experienced CTS had been working for  $\geq 5$  years. Such workers might experience a decrease in their ability to work and the longer the years of service, the more often they performed repetitive movements (Tarwaka, 2015).

The study finding is also similar to a study conducted by Lalupanda in 2019 on the relationship between years of service and the incidence of CTS among informal sector tailors in Solor sub-district, Kupang City, which found that there was a significant relationship between years of service and the incidence of CTS with a P-value of 0.025 (Lulupanda EY, 2020). Based on the results of the interview, respondents who had been working for  $\geq 5$  years but did not have complaints regarding CTS was due they were used to batik work as well as complaints such as pain or tingling. So, they considered such complaints to be normal problems and ignored the perceived complaints. Meanwhile, for respondents who had been working for  $\geq 5$  years, complaints regarding CTS were because more frequent and continuous flexion or extension of the wrist could increase the risk of CTS. Repetition of hand movements can double the risk of CTS since the longer the years of service, the more the repetitive movements of the fingers over a long period of time, which can cause compression of the tissue around the carpal tunnel. In addition, an increase in years of service where hands are dominant indicates repetitive work on the hands for a long time, which may lead to a higher risk of CTS.

### H. Relationship between Working Posture and Complaints regarding CTS

Based on statistical test, it was obtained the expectation value of  $< 5$ . So, the Fisher Exact Test value of 0.004 was applied, meaning that there was a relationship between working posture and complaints regarding CTS. Such finding is similar to a study conducted by Nabila in 2021 on the relationship between repetitive movements and working postures with the incidence of CTS among manual coconut peeling workers in traditional markets throughout the city of Surakarta. In such study, a significance value of 0.013 was obtained, meaning that there was a significant relationship between the working posture variable and the complaints regarding CTS variable (Pertama IG, 2023). The study finding is also similar to a study conducted by Muthoharoh in 2018 regarding factors related to the incidence of CTS among SPBE employees in Indramayu. In this study, the Fisher Exact Test regarding the relationship between working posture and the incidence of CTS obtained a probability value (P value) of 0.041 (Aprilia NP, 2021). A further study was conducted by Hanna in 2018 regarding the relationship between repetitive movements, wrist posture, years of service and age with the incidence of CTS among iron workers (case study among column reinforcement forming workers, apartment construction project by PT X). It was obtained a p-value of 0.018 which revealed a relationship between working posture and complaints regarding CTS (Mariana HV, 2018).

Unnatural working postures and unergonomic ways of working for a long time can cause various health problems for employees, one of which is difficulty moving the legs, hands, neck or head. The working posture used by batik craftsmen while making batik was one of the factors in the incidence of CTS. The worse the worker's arm position, the more severe the symptoms of CTS (Wahyuni ID, 2022).

Monotonous work and repetitive movements carried out by batik craftsmen can cause complaints regarding CTS. In general, when making batik, people use both hands. The right hand is used to paint batik and the left hand is used to hold the cloth, this depends on the craftsman's habits when making batik. Movements such as bending and straightening the forearm, bending and straightening the wrist, rotating body position, shoulder movement position, position when the hand rotates, and the number of repetitive movements can influence the value in determining the risk level. The higher the risk level, the greater the chance of the incidence of CTS. Static working positions and unergonomic hand postures on the shoulders, arms and wrists over a long period of time will cause inflammation of the muscle tissue, nerves or both. Swelling condition will put pressure on the median nerve of the hand, which can further cause CTS.

### CONCLUSIONS

Based on the study results, it was found that the majority of respondents experienced complaints regarding CTS (88%). Furthermore, age, years of service and work posture had a significant relationship with complaints regarding CTS among batik craftsmen.

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## Factors Related to Complaints Regarding Carpal Tunnel Syndrome (CTS) Among Batik Craftsmen

### REFERENCES

- 1) Aprilia NP, W. B. (2021). Hubungan Antara Gerakan Repetitif dan Postur Kerja dengan Kejadian CTS pada Pekerja Pengupas Kulit Kelapa Manual di Pasar Tradisional Se Kota Surakarta. *Jurnal Kesehatan Masyarakat*, 747-54.
- 2) (2017). *Buku Profil Desa Trusmi Kulon dan Kelurahan*.
- 3) CILA, S. (2019). Karakteristik Individu dan Faktor Pekerjaan dengan Keluhan Carpal Tunnel Syndrome (CTS) Pekerja Bagian Repair Veneer .
- 4) Fitri Octaviana, Y. P. (2022). Uji Validitas dan Reliabilitas Kuesioner Sindrom Terowongan Karpal Boston. *Kedokteran Indonesia*.
- 5) FS, F. (2018). Faktor-Faktor yang Mempengaruhi Timbulnya Carpal Tunner Syndrome pada Pengendara Ojek. *Manaj Kesehatan Yayasan Rs Dr Soetomo*, 4, 123-33.
- 6) Hidayatulloh, R. N. (2018). *Perbedaan Pemberian Ultrasound dengan Neural Mobilisasi dan Ultrasound dengan Myfosal Release Terhadap Penurunan Nyeri pada Carpar Tunnel Syndrome*.
- 7) Jehaman I, J. M. (2021). Hubungan Masa Kerja dan Sikap Kerja dengan Keluhan Carpal Tunnel Syndrome pada Pekerja Penenum Ulos di Galeri Ulos Sianipar Medan Tahun 2020. *Jurnal Keperawatan dan Fisioterapi*, 138-45.
- 8) Lulupanda EY, R. S. (2020). Hubungan Masa Kerja dengan Kejadian Carpal Tunnel Syndrome pada Penjahit Sektor Informal di Kelurahan Solor Kota Kupang. *Cendana Medical Journal*, 441-9.
- 9) Mariana HV, W. S. (2018). Hubungan Gerakan Berulang, Postur Pergelangan Tangan, Masa Kerja, dan Usia Terhadap Kejadian CTS pada Tukang Besi . *Jurnal Kesehatan Masyarakat*, 353-40.
- 10) Nisa N, A. M. (2018). *Gambaran Faktor Risiko Kejadian CTS pada Karyawan bagian Redaksi di Kantor Berita X Jakarta*. Jakarta: Berita Kedokteran Indonesia.
- 11) Pertama IG, R. A. (2023). Hubungan Postur Kerja Terhadap Keluhan CTS pada Pegawai Administrasi di RSUD Bangil. *Advanced In Social Humanities Research*, 17-26.
- 12) Pitrah Asfian, A. M. (2021). Faktor-Faktor yang Berhubungan dengan Keluhan Carpal Tunnel Syndrome (CTS) pada Petugas Operator Pengisi BBM di SPBU Kota Kendari. *Jurnal Kesehatan Masyarakat*, 669-74.
- 13) Tarwaka, S. H. (2015). *Ergonomi Industri: Dasar-Dasar Pengetahuan Ergonomi dan Aplikasi di Tempat Kerja*. Surakarta: Harapan Press.
- 14) Wahyuni ID, P. S. (2022). Pengaruh Tingkat Getaran dan Lama Paparan Penggunaan Mesin Jahit Terhadap Tanda-Tanda Keluhan CTS pada Pekerja di Istana Bordir Malang. *Jurnal Envi Science*, 137-50.
- 15) Wardana ER, W. S. (2018). Faktor-Faktor yang Berhubungan dengan Kejadian CTS pada Unit Assembling PT X Kota Semarang tahun 2018. *Jurnal Kesehatan Masyarakat*, 138-45.
- 16) Wulandari E, W. B. (2020). Hubungan Lama Kerja, Gerakan Berulang dan Postur Janggal Terhadap Kejadian Carpal Tunnel Syndrome (CTS) pada Pekerja Tahu Bakso (Studi Kasus pada Pekerja Tahu Bakso Kelurahan Langensari, Ungaran Barat). *Jurnal Kesehatan Masyarakat*, 826-31.



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