

## **Relationship Of Repetitive Movements With Carpal Pain Tunnel Syndrome In Cow Milking**

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### **ABSTRACT**

Manual milking is considered a trigger for complaints felt by milkmaids, such as tingling and wrist pain. This complaint is caused by pressure on the median nerve, commonly known as carpal tunnel syndrome. Method: This was an observational study with a cross-sectional design. The study population consisted of milkmaids of Cukal Pujon village cows, while the respondents were milkmaids who met the inclusion and exclusion criteria. The research instrument used is boston carpal tunnel syndrome Result: chi square test result shows *p*-Value result 0.000. Conclusion: There is a relationship between repetitive movement and carpal tunnel syndrome in milkmaids in Cukal Pujon Village. Discussion: repetitive flexi extension movement with a slightly radial deviation posture, this continuous movement is considered to cause changes in the cross-sectional area of the median nerve resulting in deformity in the carpal tunnel. Repetitive flexi extension movements can increase the risk 2 times higher causing carpal tunnel syndrome.

**Keywords:** Carpal Tunnel Syndrome, Repetitive Movement

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### **1. INTRODUCTION**

Indonesia is a developing country that has great potential in the agribusiness sector because of its large availability of resources, which causes many sectors in Indonesia. (Anggraeni et al., 2021). However, because the Covid-19 pandemic has caused a decline in certain sectors, the Indonesian government is focusing on recovery in these sectors. The government's recovery efforts are in the form of rural-based development that leads to community business activities, one of which is in the livestock sector (Ikhsan, 2021). The livestock sector plays an important role in meeting the animal food needs of the community, where the nutritional content derived from animal products is better than the protein content derived from vegetable products, one of which is milk (Anggraeni et al., 2021). The quality and quantity of milk are greatly influenced by animal feed, the storage process and the milking process (Hanani, 2020). The process of milking cows can be done in two ways, manually and using tools. Based on the survey results from the researchers, people in Cukal Pujon village still use the milking method manually. The manual milking process is considered a trigger for complaints felt by milkmaids, such as tingling and wrist (Hanani et al, 2022).

Tingling and pain in the wrist are caused by pressure on the median nerve, commonly called carpal tunnel syndrome. CTS is a compression neuropathy of the median nerve of the wrist. Anatomically, the median nerve passes through a carpal tunnel in the wrist (carpal tunnel) and innervates the palm and back of the hand from the thumb, index finger, middle finger, and 1/2 from being ring (Karjalainen et al., 2022). According to Marros et al (2017), manual milking has a thirteen times higher risk of causing carpal tunnel syndrome. Carpal tunnel syndrome affects 267 out of 10,000 people annually, with a prevalence of 9.2% in women and 6% in men, and (Prafitri et al., 2022) the prevalence of CTS is reported to be 5% in the general population. Risk factors for CTS include repetitive and excessive movements of the hands, poor posture, vibration, and other individual

factors. The prevalence of work-related injuries is around 1%-61% depending on the stressor on the wrist. (Kurtul & Mazican, 2023)

Movements that are repeated in less than 30 sare considered repetitive movements that can cause tension in the carpal tunnel (Sekarsari 2017). In cow milking activities, the position of the fingers grasps the white milk cow with a slight radial deviation of the wrist and repeatedly performs palmar and dorsal flexi movements repeatedly (Amanda *et al*, 2020). Wrist posture and repetitive movements for a long time without rest are the main risk factors for fatigue and tension in tendons, causing pinching of the median nerve, usually referred to as carpal tunnel syndrome (Hanani *et al*, 2020)). Based on preliminary studies conducted by researchers, milking was performed for 30 min on one cow and lasted for 4 h every day. In addition, it was also found that 80% of milkmaids experienced tingling and numbness in the morning and evening. Based on this phenomenon, researchers are interested in conducting research entitled "The relationship of repetitive motion with the incidence of carpal tunnel syndrome in cow milking in Cukal Pujon village".

## 2. METHOD

This study used a type of observational study with a cross-sectional design by conducting interviews, observations, and measurements without intervention. This research was conducted in Cukal, Bendosari Pujon Village, Malang. The population in this study was all cow milking in Cukal Pujon village, a sampling technique with random sampling based on the following inclusion criteria: willingness to be the subject of research by signing informed consent, aged 25-45 years, not suffering from diabetes, no history of trauma, and suffering from rheumatoid arthritis.

This study used the Boston Cartal Tunnel Syndrome questionnaire to asses the pain intensity and characteristics of respondents. Researchers will conduct interviews with each respondent to complete the questionnaire. Physiotherapy tests, such as phalen, compression, and tinel tests, were used to establish the diagnosis. All data were-tested using a computer by conducting *a chi square* correlation test.

## 3. RESULTS

The univariate analysis included characteristics of cow milking in Cukal Pujon village. The characteristics of the respondents in this study were based on age, sex, incidence of carpal tunnel syndrome, and repetitive motion.

Table 1. Univariate Analysis

Variable	F	%
Age		
≥ 35 years old	17	35,4
< 35 years old	31	64,6
Gender		
Man	28	58,3
Woman	20	41,7
Occurrence of carpal tunnel syndrome		
Positive	34	71,8
Negative	14	29,2
Repetitive wrist movement		
At risk (≥30 movement/ min)	37	77,1
Not at risk (< 30 movement/min)	11	22,9

Based on Table 1, the characteristics of the respondents were based on age, with as many as 48 respondents. Respondents were aged more than 35 years (vulnerable aged 36-45) with an accumulation of 35.4%, while respondents were aged less than 35 years (vulnerable aged 25-35). The characteristics of respondents were based on age, with a total of 48 respondents. Respondents with female sex 20 people with an accumulation of 41.7%, while male respondents 28 people, with an accumulation of 50.3%. The incidence of carpal tunnel syndrome in milkmaids was 34 people positive with accumulation (71.8%), while 14 people confirmed negative with accumulation

(28.2%). Repetitive wrist movement in respondents who were at risk ( $\geq 30$  movements/minute) comprised as many as 37 people with accumulation (77.1%) and respondents with no risk or ( $< 30$  movements/minute) comprised as many as 11 people with accumulation (22.9%).

Table 2 Bivariate Analysis

Repetitive Motion	Carpal tunnel syndrome complaints				Sum		P-Value	
	Positive		Negative		N	%		
	F	%	F	%				
At risk	32	86,5	5	13,5	37	100		
Not at risk	2	18,2	9	81,8	11	100	0,000	
Total	34	70,8	14	29,2	48	100		

Based on table 2, respondents with repetitive movements  $\geq 30$  movements / minute who experienced carpal tunnel syndrome as many as 32 people (86.5%) and respondents who did not experience carpal tunnel syndrome as many as 5 people (13.5%). As for respondents with repetitive movements  $< 30$  movements / minute who experienced carpal tunnel syndrome as many as 2 people (18.2%) and those who did not experience carpal tunnel syndrome as many as 14 people (29.2%). After statistical analysis, a P-Value of 0.000 was obtained with  $< \alpha = 0.005$ . So it can be concluded that there is a relationship between repetitive movement and the incidence of carpal tunnel syndrome in milkmaids in Cukal Pujon village.

#### 4. DISCUSSION

In a previous study conducted by Utami and Khairunnisa (2022), 96.8% of the respondents with repetitive wrist motion  $\geq 30$  movements/min experienced carpal tunnel syndrome. Repetitive movements involving hand or finger movements are a risk factor for carpal tunnel syndrome. The higher frequency of repetitive movements causes repetitive strain injury, which can cause muscle pain and damage to nerve tissue due to tears (Faradhiya & Ekawati, 2020). Genova et al (2020) Repetitive wrist movements are a significant risk factor for CTS. Damage to the nerves causes demyelination due to pressure. Demyelination develops at the site of compression and spread, while the axon remains intact. Compression that occurs for a long time causes blood flow to the endoneurial capillary system to be disrupted and changes in the blood-nerve barrier occur, resulting in ischemia and changes in local metabolism of the nerves (Hanani, 2020).

Repetitive movements of the wrist can cause increased stiffness and thickness of the transverse carpal ligament and reduced volume of the carpal tunnel, which increases carpal tunnel pressure and causes intra- and perineural fibrosis of the vascularization of the median nerve (Genova et al., 2020). In milking, there is a repetitive flexi extension movement with a slightly radial deviation posture, this continuous movement is considered to cause changes in the crosssectional area of the median nerve resulting in deformity on the carpal tunnel (Pramchoo et al., 2020). Repetitive flexi extension movements can increase the risk 2 times higher causing carpal tunnel syndrome (Oguntona et al., 2022). According Barry (2018) Repetitive movements in the hand with strong contractions can cause fatigue and muscle tension in the tendons. Damage to muscles or body tissues caused by repetitive movements in the long term can be called repetitive stress injury (RSI). RSI causes a decrease in blood pressure in tissues, lactic acid buildup, and muscle fatigue. (Sari et al., 2020).

#### 5. CONCLUSION

Milking is a job that uses repetitive hand activities, which can cause thickening and stiffening of the carpal tunnel ligament, which reduces the volume of the carpal tunnel, causes an increase in pressure in the carpal tunnel, and decreases median nerve function. This is considered a risk factor syndrome in children.

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