Association Of Awkward Wrist Posture With Symptoms of Carpal Tunnel Syndrome In Online Motorcycle Taxi Drivers In Palembang

Medina Putri Islamia[1], Msy. Rulan Adnindya [2], Legiran[2], Arwan Bin Laeto[2], Alfian Hasbi[2]

[1]Medical Education Study Program, Faculty of Medicine, Sriwijaya University, Palembang
[2]Medical Anatomy Division, Faculty of Medicine, Sriwijaya University, Palembang

Abstract

Carpal tunnel syndrome is a musculoskeletal disorder of the wrist caused by pressure on the median nerve as it passes through the carpal tunnel, resulting in symptoms such as pain, tingling, and numbness. One of the jobs that is at risk of causing CTS complaints is online motorcycle taxi drivers because the awkward posture of the wrist while driving can increase the occurrence of CTS. This research aims to determine there is a relationship between awkward wrist posture and Carpal Tunnel Syndrome based on the Boston Carpal Tunnel Questionnaire (BCTQ) in online motorcycle taxi drivers in Palembang City. This research used a cross sectional method. The data obtained is primary data obtained from interviews using the Boston Carpal Tunnel Questionnaire (BCTQ) to see Carpal Tunnel Syndrome, and Rapid Upper Limb Assessment (RULA) to measure awkward wrist posture. There is no significant relationship between awkward wrist posture (p=0.487) age (p=0.757), length of service (p=0.928), duration of work (p=0.761) with Carpal Tunnel Syndrome based on the Boston Carpal Tunnel Questionnaire (BCTQ). While BMI has a significant relationship (p=0.043) with Carpal Tunnel Syndrome based on the Boston Carpal Tunnel Questionnaire (BCTQ). The conclusion is there is no significant relationship between awkward wrist posture and Carpal Tunnel Syndrome based on the Boston Carpal Tunnel Questionnaire (BCTQ) in online motorcycle taxi drivers in Palembang City.

Keywords: *Awkward Wrist Posture, Boston Carpal Tunnel Questionnaire, Carpal Tunnel Syndrome*

Coresponding author: rulanadnindya.md@fk.unsri.ac.id.

Introduction

Along with the times, the interest of people in Palembang is increasing to join as part of online motorcycle taxi drivers due to flexible working hours, and unlimited income, according to the number of customers obtained so that people in Palembang are very interested in choosing this job. However, the impact of the work is that online motorcycle taxi drivers often perform static flexion and extension postures of the wrist to control motorcycle components such as controlling the throttle (gas flow on the motorbike), brakes, and adjusting gears through the handlebars or handle bar for a long period of time, causing the risk of complaints of pain in the hands and wrists as symptoms of CTS.[1–3]

Carpal tunnel syndrome (CTS) is a musculoskeletal disorder of the wrist caused by pressure on the median nerve as it passes through the carpal tunnel. The symptoms arising from CTS include tingling, burning, numbness and pain.[4,5] The incidence of carpal tunnel syndrome occurs from 276 per 100,000 annual reports, with an incidence rate of 9.2% in women and 6% in men and is more common in adults aged 40-60 years. The National Institute for Occupational Safety and Health (NIOSH) states that the percentage prevalence of CTS in Indonesia is 20.3% with an estimated 5% for women and 0.6% for men. Carpal tunnel syndrome (CTS) may manifest either unilaterally (42%) or bilaterally (58%). Specifically, 42% of CTS cases present unilaterally, with 29% affecting the right hand and 13% the left hand.[6,7]

Some previous studies have shown an association between CTS and various risk factors, including middle age, gender, especially women, body mass index (BMI), length of service, duration of work, and certain jobs that are thought to increase the incidence of carpal tunnel syndrome are jobs that can trigger the formation of awkward postures on the wrist such as driving, sewing, typing, and painting.[6–11]

Awkward posture is defined as a body position that deviates significantly from the normal position while performing work. Examples of awkward postures associated with CTS occurrence are twisting, tilting, kneeling, squatting, holding in a static position, and pinching or grasping with the hands for long durations. The mechanism of awkward posture contributing to CTS includes reduced blood supply to the hand leading to inflammation, accumulation of lactic acid, muscle tension, and mechanical trauma. Several previous studies have reported significant associations between posture and CTS. Significant associations were found for activities involving wrist flexion for 1-7, 8-19, and 20-40 hours per week, wrist extension for 1-7, 8-19, and 20-40 hours per week, as well as bending the hand or wrist for 3.5-6 and 7-16 hours per day. Other studies indicated that computer work for >8 hours per day and mouse use for >20 hours per week are associated with CTS.[12–15]

Carpal tunnel syndrome must be treated immediately before it is too late because increased pain in the hand can reduce productivity and interfere with daily activities and potentially cause paralysis. The diagnosis of CTS is clinical and can be based on the results of specific tests performed for online motorcycle taxi drivers with CTS symptoms. Based on the background, the researcher has a goal to determine the relationship between awkward wrist posture and Carpal Tunnel Syndrome based on the Boston Carpal Tunnel Questionnaire (BCTQ) in online motorcycle taxi drivers in Palembang

Methods

This study employs an observational analytic design with a cross-sectional approach, conducted among online motorcycle taxi drivers in Palembang using accidental sampling. A total of 61 respondents were included in the sample, consisting of 56 who met the inclusion criteria and 5 who met the exclusion criteria. Inclusion criteria used in this study are (1) online motorcycle taxi drivers and (2). driving is their primary occupation. While exclusion criteria are (1) respondents who are unwilling to participate in the study until

completion and (2) history of trauma. The data used is primary data obtained by conducting interviews about both hands related to identity and Carpal Tunnel Syndrome based on the Boston Carpal Tunnel Questionnaire (BCTQ) and measuring body mass index. BCTQ has been considered to be reliable in screening CTS. The questionnaire used is in Indonesian language version and has been validated by Octavia et al. Storey dkk suggested that results from these scores can be converted into the values into five categories, asymptomatic=11, mild=12–22, moderate 23–33, severe 34–44, very severe 45–55. Thus, this study has defined online motorcycle drivers with symptoms of CTS if the score exceeds 11.[16–18]

Table 1. Boston Carpal Tunnel Syndrome Questionnaire[18]

Question	1	2	3	4	5
How severe is the hand or wrist pain that you have at night?	Normal	Slight	Medium	Severe	Very serious
How often did hand or wrist pain wake you up during a typical night in the past two weeks?	Normal	Once	2 to 3 times	4 to 5 times	More than 5 times
Do you typically have pain in your hand or wrist during the daytime?	No pain	Slight	Medium	Severe	Very serious
How often do you have hand or wrist pain during daytime?	Normal	1-2 times/day	3-5 times/day	More than 5 times	Continued
How long on average does an episode of pain last during the daytime?	Normal	< 10 minutes	10-60 minutes continued	> 60 minutes	Continued
Do you have numbness (loss of sensation) in your hand?	Normal	Slight	Medium	Severe	Very serious
Do you have weakness in your hand or wrist?	Normal	Slight	Medium	Severe	Very serious
Do you have tingling sensations in your hand?	Normal	Slight	Medium	Severe	Very serious
How severe is numbness (loss of sensation) or tingling at night?	Normal	Slight	Medium	Severe	Very serious
How often did hand numbness or tingling wake you up during a typical night during the past two weeks?	Normal	Once	2 to 3 times	4 to 5 times	More than 5 times
Do you have difficulty with the grasping and use of small objects such as keys or pens?	Without difficulty	Little difficulty	Moderate difficulty	Very difficult	Very difficult

Body Mass Index is a mathematical formula expressed as weight (in kilograms) divided by the square of height (in meters). Height was measured by GEA statue meter, while weight was using Kris. Body Mass Index (BMI) is considered normal if the patient has a BMI value between 18.5 and 24.9 kg/m². Outside of this range, the BMI is considered abnormal.[19]Awkward posture refers to significantly deviated wrist positions from the normal position during work activities. Researchers instructed online motorcycle taxi drivers to ride their motorcycles as they would normally do. The researchers recorded videos of the respondents' upper arm, forearm, and wrist movements while riding, using a smartphone camera placed on a tripod in front of the respondents. Subsequently, screenshots were taken from the recorded riding videos to examine the respondents' wrist posture during riding. These screenshots, showing the movements of the upper arm, forearm, and wrist, were then measured for angles using Kinovea and Angulus applications. The angles of wrist posture measured were analyzed using the RULA analysis sheet to determine the overall score from the RULA table and interpret the awkward wrist posture. Data collection was carried out on November 26, 2023. This research has obtained an ethical clearance

certificate from the Ethics Committee of Medical and Health Research, Faculty of Medicine, Universitas Sriwijaya (No.334-2023).

Results

A total of 29 respondents out of 56 samples with symptoms of Carpal Tunnel Syndrome with a score > 11 based on the Boston Carpal Tunnel Questionnaire (BCTQ). This study found 39 respondents (69.6%) had awkward wrist postures. The research shows that most online motorcycle taxi drivers are in the age group ≥ 40 years (57.1%). All samples were male (100.0%). After going through the process of measuring height and weight, it was found that 53 respondents (94,6%) have abnormal body mass index. The highest frequency of working period are drivers who had a working period of ≥ 4 years. The highest frequency of work duration was drivers with work duration ≥ 8 hours/day.

Table 2. Frequency distribution of online motorcycle taxi drivers characteristics in Palembang

Characteristics	n	%
Symptoms of Carpal Tunnel Syndrome		
CTS	29	51,8
Non CTS	27	48,2
Awkward Wrist Posture		
At risk	39	69,6
Not at risk	17	30,4
Age		
≥ 40 years	32	57,1
< 40 years	24	42,9
Gender		
Man	56	100,0
Woman	0	0
BMI		
Normal	3	5,4
Abnormal	53	94,6
Work Period		
≥ 4 years	37	66,1
< 4 years	19	33,9
Work Duration		
≥ 8 hours/day	49	87,5
< 8 hours/day	7	12,5
Total	56	100,0

This study found that there is no significant relationship between awkward wrist posture and Carpal Tunnel Syndrome in online motorcycle taxi drivers in Palembang (p=0,487).

Tabel 3. The relationship between awkward wrist posture and Carpal Tunnel Syndrome in online motorcycle taxi drivers in Palembang

Awkward Posture	Symptoms of CTS				*p*
	CTS		Non CTS		
	n	%	n	%	
At risk	19	48,7	20	51,3	0,487
Not at risk	10	58,8	7	41,2	
Total	56	51,8	27	48,2	100,0

Discussion

The average age of online motorcycle taxi drivers in Palembang is 57.1% in the group with age ≥ 40 years. Permenaker stipulates that individuals aged 15-64 are considered productive for employment, including roles such as online motorcycle taxi riders. The results of this study are also in line with research conducted on online motorcycle taxi riders in South Tangerang which is dominated by workers aged ≥ 40 years rather than online motorcycle taxi riders who are in the age group <40 years.[10,20] Most drivers are male. Alamianti et all have stated that the profession of driving is predominantly undertaken by men, one reason being the risks associated with working on the roads.[21]

Excess BMI is known to cause the development of symptoms of musculoskeletal disorders.[22] A person who sits longer or sits for ≥ 8 hours/day is more likely to develop obesity compared to someone who sits < 4 hours/day.[23] Excessive sitting habits cause few calories to be used and lack of physical activity it can trigger obesity.[24] Oka et all have reported that there is a significant relationship between BMI with the degree of severity in CTS. Obesity will increase the production of advanced glycation end products (AGEs) due to dyslipidemia, hyperglycemia, and increased polyol pathway activity. This increase in AGEs leads to higher levels of diacylglycerol and protein kinase C, resulting in elevated angiotensin II and endothelin-1, as well as reduced nitric oxide, prostacyclin, and endothelium-derived hyperpolarizing factor. These changes cause blood vessel damage, reducing blood supply to nerve cells and ganglia, and increasing endoneural hypoxia. These conditions result in neuropathy and increased carpal pressure, which, when affecting the median nerve, lead to Carpal Tunnel Syndrome (CTS).[25]

Most online motorcycle taxi drivers in this research have a work period of ≥ 4 years and a work duration of ≥ 8 hours per day. A person with a longer working period in the range of 4-10 or more is believed to have had quite a lot of experience and has felt various complaints from various aspects such as social, economic, and even health complaints[26] Putra et all have reported that cobek maker workers who have work ≥ 4 years have more chances of experiencing CTS. This occurs because the longer a person works, the repetitive movements of the fingers over an extended period can consistently cause stress on the tissues surrounding the carpal tunnel.[27] People who have work ≥ 8 hours per day are more likely to experience CTS because long work duration can reduce productivity, cause fatigue, and cause complaints related to occupational diseases, especially on the wrist when riding a motorcycle.[10]

This study show that no significant relationship between awkward wrist posture and CTS. These results different from Wulandari et all, and Sekarsari et all who reported a relationship between awkward wrist posture and CTS. This is suspected to be due to the differences in the samples used, where they included stone breakers and meatball sellers.[28–30] However, these results are in line with research conducted by Nurdasari et all that shows no significant relationship between awkard wrist posture and incidence of carpal tunnel syndrome in online motorcycle driver.[31] Carpal tunnel syndrome can be caused by physical factors and working conditions, including repetitive and forceful movements, continuous muscle pressure, vibration, working posture, and the duration of work.[32] However, this study did not examine other risk factors and did not perform electrophysiological

confirmation tests for CTS, which is a limitation of this research. Future research could involve examining other risk factors associated with the condition, such as a history of diabetes mellitus, hypertension, and stroke, using the same group of subjects.

Conclusion dan Suggestions

The largest age group among online motorcycle taxi drivers is those aged ≥ 40 years. All drivers are male and 94.6%, of these drivers have an abnormal BMI. In terms of work period and work duration, the majority have been working for at least 4 years and work at least 8 hours per day.. There are 58,%, of online motorcycle drivers with symptoms of CTS, and 69,6% with awkward wrist posture. This research has concluded that there is no significant relationship between awkward wrist posture and symptoms of Carpal Tunnel Syndrome in online motorcycle taxi drivers in Palembang. Respondents are expected to make efforts to prevent the onset of CTS complaints by doing simple stretches on the wrist regularly.

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