KnE Medicine

HSIC
Health Science International Conference
Volume 2023

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Research Article

Is the Duration Of Riding Vespas Related To The Risk Of Carpal Tunnel Syndrome?

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Abstract.
Vespa is a popular scooter vehicle in Indonesia. The Vespa rider tends to use their wrist in flexion and extension positions while driving, especially when pulling vespa gas, controlling the brakes, and changing the gears. This repetitive movement could affect the suppression of the median nerve and cause the risk of carpal tunnel syndrome. The observational, analytic descriptive design was used to see the relationship between the duration of a Vespa ride and the risk of carpal tunnel syndrome in Vespa riders. 50 respondents were chosen using purposive sampling with inclusion and exclusion criteria in the Vespa Motorbike community of Malang City. A Carpal Tunnel Syndrome questionnaire was used to assess the risk of carpal tunnel syndrome. The Spearman Test was used to examine the relationship between both variables. All statistical analyses were performed using SPSS. The normality test showed the failure of the number of rearing data ($p<0,05$). The Spearman test revealed that both groups had a significant relationship ($p=0,002$). We concluded that there is a relationship between the duration of riding and the risk of carpal tunnel syndrome in Vespa riders.

Keywords: Duration of riding, Vespa riders, Carpal Tunnel Syndrome

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Published 23 June 2023

Publishing services provided by Knowledge E

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Selection and Peer-review under the responsibility of the HSIC Conference Committee.

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1. INTRODUCTION

Carpal tunnel syndrome is common peripheral nerve entrapment syndrome among world population. Previous study showed a growth of carpal tunnel syndrome cases over period 1993 and 2013 with particular increase between 2000 and 2004 (1). The etiology of CTS is multifactorial. It can involve either personal and occupational factor, including personal history of diabetes mellitus, obesity and work-related activities that necessitate a great deal of repetition and force when using hand or wrist (2). The prevalence and the severity also increase with age. In addition, some studies reported that gender also take a role in the probability of CTS (3).

Carpal tunnel syndrome is the compression and traction of median nerve at the level of carpal tunnel in the wrist joint (4). Carpal tunnel syndrome is caused by a narrowing of the canal or swelling of the palmar tendons or tendon sheaths (5). This condition

cause numbness, tingling, paraesthesia and pain (6). Constriction on the median nerve causing symptoms of disturbed sensation, typically in the radial 3 1/2 digits and may progress to weakness of the thenal muscles and led to decrease of wrist or hand (5). During activities that involve wrist or hand in prolonged repetition, symptoms could be worse (7).

CTS is one of work-related musculoskeletal disorders that occurs in various community, including motorcyclist (8). Previous research showed that motorcyclist have a risk of carpal tunnel syndrome since they experienced repetitive movement, particularly on the wrist in flexion and extension position (9,10). However, the research that focus on specific type of motorcycle drivers, vespa riders is unclear. Vespa is a popular classic scooter in Indonesian society that still exist nowadays (11). Every city has a vespa community to facilitate information sharing and provide a gathering place for vespa riders. They regularly held many events including a vespa tour from one city to another. In this study, we would like to investigate the relationship between duration of riding and the risk of carpal tunnel syndrome in vespa riders community of Malang city.

2. METHOD

2.1. Study Design

This study used an observational analytic descriptive method with a cross sectional approach to find the relationship between the duration of riding and the risk of carpal tunnel syndrome in Vespa riders.

2.2. Subjects

The population consist of the member of Vespa community on Malang city. Purposive sampling with inclusion and exclusion criteria was used to select the sample. The inclusion criteria are as follow: 1). Vespa riders in Vespa community of Malang City; 2) The sample is willing to be the subject of research and have signed informed consent; 3) Phalen Test, Tinel Test, Pressure Test are positive. The exclusion criteria are as follow: 1) Deformities in the hand and upper extremities joints; 4) Taking pain relievers regularly. According to inclusion and exclusion criteria, there were 50 respondents were involved in this study.

2.3. Duration of Riding

In this study, the respondents were given a questionnaire to collect information about the duration of riding. The duration of riding was divided into two categorize; less than 5 years and more than 5 years.

2.4. The risk of Carpal Tunnel Syndrome measurement

The Carpal Tunnel Syndrome Questionnaire, which is referred from Hand Clinic Dartmouth Hitchcock Medical Center was used to measure the risk of Carpal Tunnel Syndrome. This questionnaire was created by conducting validity and reliability tests on the BCTQ (Boston Carpal Tunnel Syndrome Questionnaire). The questionnaire consists of 11 questions with 5 options of answer. There are 5 categorizations of the result: no symptom, slight symptom, moderate symptom, severe symptom and very serious symptom.

2.5. Statistical Analysis

Due to the failure of the number of rearing data in normality test using Kolmogorov Smirnov, Spearmen test was used to assessed relationship between the duration of riding and the risk of carpal tunnel syndrome in vespa riders. All statistical analysis were performed using IBM SPSS for windows version 20.0.

3. RESULT

Data of the relationship between duration of riding and the risk of CTS in vespa riders are presented in Table 1. Due to the failure of the number of rearing data in normality test using Kolmogorov Smirnov test ($p<0,05$), the Spearman test was used.

TABLE 1: The relationship between duration of riding and the risk of CTS in vespa riders' community.

	n	*p*	*R*
Duration of riding	50	0,002	0,252
The risk of CTS			

Spearman Test: n= number of samples; *p* =p-value; *R* = correlation coefficient value

The Spearman test revealed that there is a significant correlation between the duration of riding and the risk of CTS in vespa riders' community of Malang city with p-value

0,002. The analysis data also showed the moderate positive correlation between both variable with correlation coefficient value 0,252.

4. DISCUSSION

In this study, vespa riders experienced prolonged repetitive movements with high intensity when pulling gas particularly when they are traveling. Therefore, they are vulnerable to the risk of CTS. Repetitive movements with high intensity result in inflammation or hypertrophy in the synovial of the tendons and median nerves and will reduce blood flow in the peripheral vessels located extending around the carpal tunnel (12). The emphasis on the carpal tunnel will inflict damage both reversible and irreversible. In vespa riders, the presence monotonous activity in a wrist, particularly in flexion and extension position when pulling a gas might causes the increase of pressure in carpal tunnel and led to compression of median nerve. Continuous compression interrupts blood flow to the endoneurial capillary system, causing changes in the blood-nerve barrier and the development of endoneurial edema (13). As a result, the symptoms of CTS such as numbness, tingling and pain are occurred (14). Therefore, repetitive wrist movement especially in a long period are significant risk factors for CTS incidences (13,15)

The driving duration in motorcyclists shows a high risk of carpal tunnel syndrome (9). Motorcycle riders who have been driving for a long timeill experience repetitive motions on the right wrist that control the gas intake and brakes and the left wrist to change vehicle gears (10,16). Perhaps it also applies to vespa riders in this study. The long activity in wrist when riding a vespa motor might causing the carpal tunnel to be damaged due to the compression and traction of the nerves. It is supported by a prior study that found CTS symptoms in motorcycle riders, despite the fact that the sample was not limited to vespa riders (16,17).

The volume of carpal tunnel is greater in neutral position of wrist compared with flexion or extension. Hence, keeping therist near neutral position in daily activity (18). Previous study revealed evidence of the association between non-neutral position of wrist in flexion or extension and carpal tunnel syndrome (19). Median nerve shows different response to biomechanical stress including compression stress due to non-neutral (20). This compression associated with a long period of low force and repetitive joint movements and alters longitudinal diameter of median nerve (18). Reducing exposure duration of non-neutral wrist position would mitigate the risk of CTS in individual.

Prolonged posture with repetition hand motions and different wrist position could change the fluid pressure in carpal tunnel (21). Intense pressure in the carpal canal causes both reversible and irreversible damage. Rising intensity and duration will also reduce blood supply to peripheral blood vessels. In a long period of time, it also affects capillary blood circulation, which influence the permeability of blood vessels in the wrist area (22). People who perform repetitive movements for extended periods have a threefold increased risk of developing carpal tunnel syndrome compared to those who do not(23). Another study on 78 OJEK online workers revealed that those who have worked for more than four years are 16,561 times more likely to develop CTS than those who have worked for less than four years (24). From 78 OJEK online workers, several OJEK online workers deliver orders per day over a distance of more than 100 km per day. They also perform repetitive movements on their hands with limited rest time.

5. CONCLUSION

There is a relationship between the duration of riding and the risk of carpal tunnel syndrome in vespa riders' community of Malang city. Prolonged repetitive movements with flexion and extension position particularly when pulling a gas could cause the compression and squeezed of median nerve. As a result, the symptoms such as pain, tingling, numbness and tingling in distribution of median nerve appear and led to reduction in grip strength and hand function.

References

[1] Burton CL, Chen Y, Chesterton LS, van der Windt DA. Trends in the prevalence, incidence and surgical management of carpal tunnel syndrome between 1993 and 2013: An observational analysis of UK primary care records. BMJ Open. 2018;8.

[2] Wipperman J, Goerl K. Diagnosis and Management of Carpal Tunnel Syndrome [Internet]. 2016;94. Available from: www.aafp.org/afp

[3] Lee IH, Kim YK, Kang DM, Kim SY, Kim IA, Kim EM. Distribution of age, gender, and occupation among individuals with carpal tunnel syndrome based on the National Health Insurance data and National Employment Insurance data. Ann Occup Environ Med. 2019 Nov;31(1):31.

[4] Aboonq MS. Pathophysiology of carpal tunnel syndrome [Internet]. Neurosciences. 2015;20. Available from: www.neurosciencesjournal.org

[5] Newington L, Harris EC, Walker-Bone K. Carpal tunnel syndrome and work. Vol. 29, Best Practice and Research: Clinical Rheumatology. 2015;29:440-https://doi.org/10.1016/j.berh.2015.04.026.

[6] Wright AR, Atkinson RE. Carpal Tunnel Syndrome: An Update for the Primary Care Physician. 2019;78

[7] Fernández-de-Las-Peñas C, Arias-Buría JL, Ortega-Santiago R, De-la-Llave-Rincón AI. Understanding central sensitization for advances in management of carpal tunnel syndrome. F1000 Res. 2020 Jun;9:9.

[8] Evayanti LG, Retayasa SD, Indonesia SH. The difference of musculoskeletal disorders between taxi drivers and taxi motorcyclists in Kuta District. https://doi.org/10.4108/eai.11-2-2020.2302032.

[9] Studi Kesehatan Masyarakat P, Kesehatan Masyarakat F, Muhammadiyah Jakarta Jl Ahmad Dahlan UK, Tangerang Selatan K. Faktor-Faktor yang Berhubungan dengan Potensial Kejadian Carpal Tunnel Syndrome (CTS) pada Pengendara Ojek Online di Kota Tangerang Selatan 1 Athifah Nurdasari, 2 RR. Arum Ariasih [Internet]. Available from: http://jurnal.iakmitangsel.id/

[10] Farhan FS, Kamrasyid AA. Faktor-faktor yang Mempengaruhi Timbulnya Carpal Tunnel Syndrome pada Pengendara Ojek Factors Influencing Carpal Tunnel Syndrome Among “Ojek” Driver.

[11] Vildayanti RA. Analisis Strategi Brand Awareness (Top Of Mind, Brand Recall, Brand Recognition, Unaware Of Brand) Sepeda Motor Piaggio Vespa Di Jakarta. RELASI : JURNAL EKONOMI. 2019 Feb;15(1):113–34.

[12] Wulandari E, Widjasena B, Kurniawan B. Peminatan Keselamatan dan Kesehatan Kerja M, Kesehatan Masyarakat F, Diponegoro U, et al. 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). 2020;8(6). Available from: http://ejournal3.undip.ac.id/index.php/jkm

[13] Genova A, Dix O, Saefan A, Thakur M, Hassan A. Carpal Tunnel Syndrome: A Review of Literature. Cureus. 2020 Mar;12(3):e7333.

[14] Singjam A, Charoentanyarak K, Saengsuwan J. Prevalence and predictive factors for bilateral carpal tunnel syndrome by electrodiagnosis: A retrospective study. PLoS One. 2021;16(December).

[15] Tri Utamy R, Kurniawan B, Wahyuni I, Keselamatan MP, Kerja K, Masyarakat K, et al. LITERATURE REVIEW : FAKTOR RISIKO KEJADIAN CARPAL

TUNNEL SYNDROME (CTS) PADA PEKERJA. 2020;8(5). Available from: http://ejournal3.undip.ac.id/index.php/jkm

[16] Manes HR. Prevalence of carpal tunnel syndrome in motorcyclists. Orthopedics. 2012 May;35(5):399–400.

[17] Sabeti-Aschraf M, Serek M, Pachtner T, Auner K, Machinek M, Geisler M, et al. The Enduro motorcyclist's wrist and other overuse injuries in competitive Enduro motorcyclists: a prospective study. Scand J Med Sci Sports. 2008 Oct;18(5):582–90.

[18] Loh PY, Muraki S. Effect of wrist angle on median nerve appearance at the proximal carpal tunnel. PLoS One. 2015 Feb;10(2):e0117930.

[19] You D, Smith AH, Rempel D. Meta-analysis: association between wrist posture and carpal tunnel syndrome among workers. Saf Health Work. 2014 Mar;5(1):27–31.

[20] Topp KS, Boyd BS. Peripheral nerve: from the microscopic functional unit of the axon to the biomechanically loaded macroscopic structure. J Hand Ther. 2012;25(2):142–51.

[21] Ibrahim I, Khan WS, Goddard N, Smitham P. Carpal tunnel syndrome: a review of the recent literature. Open Orthop J. 2012;6(1):69–76.

[22] Setyowati DL, Dwijayanti D, Sultan M. RELATED FACTORS OF CARPAL TUNNEL SYNDROME (CTS) AMONG ONION SKIN PEELER WORKER AT SEGIRI SAMARINDA, EAST KALIMANTAN. Volume 9. KESMAS; 2015.

[23] Riccò M, Signorelli C. Personal and occupational risk factors for carpal tunnel syndrome in meat processing industry workers in Northern Italy. Med Pr. 2017 Mar;68(2):199–209.

[24] Chairunnisa S, Novianus C. Hidayati dan, Ilmu-Ilmu Kesehatan F, Studi Kesehatan Masyarakat Universitas Muhammadiyah HAMKA P. FAKTOR-FAKTOR YANG BERHUBUNGAN DENGAN GEJALA CARPAL TUNNEL SYNDROME PADA KOMUNITAS OJEK ONLINE DI KOTA TANGERANG SELATAN TAHUN 2021. Vol. 1 ifi-bekasi.e-journal.id/jfki Jurnal. 2021.