De Quervain’s Disease among Motorcycle Repair Mechanics and Related Factors

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De Quervain's Disease among Motorcycle Repair Mechanics and Related Factors

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Abstract

Introduction: Work-musculoskeletal disease is still an occupational health problem worldwide that needs to be investigated in every different type of work.

Objectives: Identify De Quervain's disease (DQD) prevalence on motorcycle repair mechanics and it's risk factors.

Methods: A cross-sectional study on 60 motorcycle repair mechanic in Samarinda city of Indonesia. To determine DQD, a Finkelsteins test was performed. Age, education background, working period, working time per day, and frequency of repetitive motion of the mechanic were collected by direct interview. The number of samples using the Lemeshow formula. Phi coefficient test is applied to identify the correlation between DQS prevalence and other parameters.

Results: the DQD prevalence of 63.3% was found, occurred in right and left hands, 36 and 24%, respectively. It correlates significantly with age *(p=0.047, r=0.346)*, working period *(p=0.000, r=0.861)*, education background *(p=0.045, r=0.367)*, working time per day *(p=0.055, r=0.616)*, and frequency of repetitive motion *(p=0.004, r=0.374)*.

Conclusions: The prevalence of DQD in motorcycle repair mechanics is quite high and requires attention, prevention and control from stakeholders so that the prevalence does not increase.

Keywords: *De quervain's desease; Motorcycle repair mechanic; age; working period; educational background; working time per day; repetitive motion.*

Introduction

Work-related musculoskeletal disorders (WMSDs) are still a common occupational health problem around the world and have caused considerable losses. In the US, WMSDs contributed 29-35% of all occupational injuries and illnesses, and were the main cause of work disability and decreased work productivity.[1] In Europe, WMSDs accounted for 53% of all work-related diseases, and are the leading cause of work disability, sickness absence from work, presenteeism, and loss of productivity across all the European Union (EU) member states.[2]In Asia (such as in Japan and Korea), WMSDs are one of the most important problems in the occupational

health system and constituted the fifth rank of diseases that cause disability, 42.2 million (41.2%) Japanese adults suffered WMSDs.[3]In Indonesia, a survey by the Ministry of Health of 9,482 workers in 12 districts/cities showed that the highest rate of work-related disorders is WMSDs (16%), followed by cardiovascular disorders (8%), nervous disorders (5%), respiratory disorders (3%) and ear nose throat disorders (1.5%).[4]

The most common of WMSDs is De Quervain's disease (DQD), a repetitive stress condition located at the first dorsal compartment of the wrist at the radial styloid. DQD is a stenosing tenosynovitis of the first extensor compartment containing abductor pollicis longus (APL) and extensor pollicis brevis (EPB). Pain is felt over those tendons at the radial border of the wrist, mainly with thumb and along with wrist movement.[5,6]It is reported that the prevalence of DQD in the working population worldwide is 0.7-36%, but the epidemiological information regarding this disease is still scant,[7] and the prevalence rate and cause-specific risks of these three tendinopathies have not yet been clarified.[8] No long-term epidemiologic study has been done of the prevalence of de Quervain disease, but it is known to be relatively common.[9]

Some of the DQD risk factors that have been identified include: in the working population in France the risk factors consist of repetitive movements, forceful manual exertion, the sustained and awkward posture of the wrist;[7] in the general population of women in Taiwan, risk factors consist of chronic disease and using hormone antagonist during the prior 3 years;[8]for general workers, risk factors consist of repetitive motion, forceful, and ergonomically stressful manual work;[10]in cell phone users, DQD is significantly associated with frequent text messaging;[11]for tailors, DQD is significantly related to the working pattern;[12]and in medical student, gender, and repeated/sustained bending of the wrist in extreme posture were risk factors of developing the DQD.[13] To determine the risk factors for DQD in a specific job, this study aims to determine the prevalence of DQD in motorcycle repaid mechanics and analyze related factors.

Methods

A cross-sectional study has been conducted on motorcycle repair mechanics in Samarinda city of Indonesia. The number of samples used in this study was 60 respondent using the Lemeshow formula.[14]The inclusion criteria consisted of willingness to be a respondents, aged 18 to 57 years, working as a motorcycle repair mechanic and not having any other job, and the exclusion criteria consisted of a history of trauma/fracture/dislocation of the hand and wrist, a history of arthritis and a history of medication of quinolone/ofloxacin antibiotics.

To determine De Quervains disease in mechanics, a Finkelsteins test was performe.[15,16] Age, education background, working period, working time per day, and frequency of repetitive motion of the mechanic were collected by direct interview. Questions included in the question were feelings of pain or discomfort in the area around the thumb and wrist before work, at work, and after work; the voice of crackles on the finger joints and wrists; swelling around the thumb and wrist; thick feeling of the thumb; thumb stiff and difficult to move.

The Phi coefficient test[17] was applied to see the correlation between DQD and independent variables (age, working period, educational background, working time per day, and repetitive motion). Interpretation of the correlation power (r) between variables as follows, ≤ 0.35 are generally considered to represent low or weak correlation, 0.36 to 0.67 modest or moderate correlation, and 0.68 to 0.89 strong or high correlations, and ≥ 0.90 very high correlations.[18]

Results

The age category of motorcycle repair mechanics in this study was mostly less than 40 years (76.7%) and 23.3% were more than 40 years old. All motorcycle repair mechanics in this study were male. Senior high school (graduated 12th class) is the dominant education background level of the mechanic (56.7%) and 61.7% of the mechanic has working experience of more than 3 years. Most of the mechanics have working time per day for more than 8 hours (93.35%) and have repetitive motion more than 20 times per minute (68.3%). Most of the motorcycle repair mechanics (63.3%) have DQD in right and left hand of 60 and 40% respectively. Analysis by Phi correlation coefficient showed that all characteristics observed on motorcycle repair mechanics are significantly associated with DQD prevalence (Table 1.).

Table 1. Characteristics of motorcycle repair mechanic (n=60) and Association between It's Variables and DQD prevalence

Variables	Number	(%)	Correlation*	
			r	p
Age (years)			0.346	0.047
< 40	46	76.7		
≥ 40	14	23.2		
Gender			-	-
Male	60	100		
Female	0	0		
Education background			0.367	0.045
Never go to school	5	(8.3)		
Elementary school (graduated 6th class)	7	(11.7)		
Secondary high school (graduated 9th class)	11	(18.3)		
Senior high school (graduated 12th class) Diploma/Bachelor	34 3	(56.7) (5)		
Working experience (years)			0.681	0.000
< 3	23	(38.3)		
≥ 3	37	(61.7)		
Working time per day (hour)			0.616	0.055
< 8	4	(6.7)		
≥ 8	56	(93.3)		
Repetitive motion per minute (times)			0.374	0.004
< 20	19	31.7		

Cont **... Table 1. Characteristics of motorcycle repair mechanic (n=60) and Association between It's Variables and DQD prevalence**

≥ 20	41	68.3		
De Quervains disease				
Yes (+)	38	63.3		
No (-)	22	36.7		
De Quervains disease locations				
Right hand	36	60		
Left hand	24	40		

*) Phi correlation test

Most of the main complaints of DQD experienced by motorcycle repair mechanics are pain/discomfort around the thumb and wrist after work, the joint of the thumb feels stiff when moved, thick feeling on the thumb, and pain/discomfort around the thumb and wrist while work, adn pain/discomfort around the thumb and wrist before work with a percentage of 53.3, 50, 45, 41.7% and 37.7, respectively (Table 2.)

Table 2. The main complaint of De Quervains disease felt by motorcycle repair mechanics (n = 60)

No	Complaints	Yes		No	
		∑	%	∑	%
1	Pain/discomfort around the thumb and wrist before work	23	37.7	38	62.3
2	Pain/discomfort around the thumb and wrist while work	25	41.7	35	58.3
3	Pain/discomfort around the thumb and wrist after work	32	53.3	28	46.7
4	Crepitus/crackles on the finger joints and wrists	16	26.5	44	73.3
5	Thick feeling on the thumb	27	45	33	55
6	The joint of the thumb feels stiff when moved	30	50	30	50
7	Difficulty moving the thumb	12	20	48	80

Discussion

De Quervains diseasee (DQD) Prevalence

De Quervains disease (DQD) prevalence among motorcycle repair mechanics found relative high (63.3%), dominate by right hand (60%), with the main complaint of pain/discomfort around the thumb and wrist after work (53.3%). The results of this study complement research in other types of work, including pianists, a prevalence of 59.9% (n = 200),[19] in medical students it was found that the prevalence of DQD was 44% (n=137),[13] In tailors, 75% had De Quervain's

Tenosynovitis, 72% had in right hand and 28% had in left hand (n=100),[12] and among the regular computer operators, found 99 (67.3%) showed the Finkelstein's test positive, while 48 (32.7%) showed the pain in Finkelstein's test as being negative (n = 147).[5]

Factors affected DQD Prevalence

Age of motorcycle mechanic

We found that age of motorcycle repair mechanics has associated with the DQD prevalence with low/ weak correlation *(p=0.047, r=0.346)*. In accordance with the previous research that the age of workers is a factor that can increase the risk of developing De Quervain's disease, this is due to degenerative changes in the aging tendon,[7] and De Quervain disease is a result of an intrinsic degenerative mechanism rather than an inflammatory one.[9] The results of this study confirm previous research by Wolf et al,[20] who concluded that age greater than 40 was also a significant risk factor for DQD in a young active population. The results also complement previous studies which concluded that age is an individual risk factor for DQD.[7,21] Based on this result, it is recommended along with increasing mechanical age, it is recommended to reduce workload and reduce work time.[22]

Working period

The motorcycle repair mechanics are mainly divided into two different categories i.e. mechanics with working period < 3 years (38.3%) and ≥ 3 years (61.7%). The working periode is associated with the DQD prevalence *(p=0.000)* with strong/high correlation *(r=0.681)*. More working experience affected significantly the DQD prevalence. More working experience gave lower MSDs prevalence. According to Luttman et al,[22] working period indicate the length of time the worker is exposed to hazards at work. The longer the working period, the higher the risk of that person experiencing occupational diseases. Repetitive and monotonous work without job rotation can cause the muscles and soft tissues in the body part to be burdened and result in injury to that part of the body. Prevention of DQS from getting worse/ increasing due to the working period is similar with the effect of age of the motorcycle repair mechanics as described above.

Working time per day

In this study, the working time of mechanical motorcycle repair is categorized into 2 (more than 8 hours and less than 8 hours per day). The results showed that most of the mechanics worked more than 8 hours per day (93.3%) and were shown to be significantly associated with DQD *(p = 0.055)* with strong/high correlation *(r=0.616)*. According to ILO,[23] (and this standard has been ratified by the government of the Republic of Indonesia) the allowed working time for industry is a maximum of 8-hours day or of the 40-hours week. Working more than standard working hours without being properly managed will adversely affect workers' health. The increase in working time reflects the increased frequency of repetitive motion by the mechanics. According to Foye's,[24] repetitive minor trauma or excessive use of the fingers (overuse) generally contributes/aggravates the development of DQD disease.

Repetitive motion

Repetitive motion of the mechanics in this study is associated significantly with DQD prevalence *(p=0.004)* with moderate correlation *(r=0.374)*. These data confirm previous reports showing that repetitive motionis associated significantly with DQD prevalence for computer operators,[5] in Frech working population,[7] for general workers,[10] for phone cell user,[11] for tailors,[12] and in Germany workers.[21]

In accordance with the basic theory of the occurrence of DQD, repeated movements of the wrist and thumb extension over a long period of time cause repeated microtrauma, leading to DQD.[25] Excessive

repetitive movements that overload the carpethacarpal I joint can cause rupture and inflammation due to friction, pressure, and lack of blood flow (ischemia) in the joint area. Very long periods of repetitive hand movements (at a frequency of> 20 times per minute) can cause inflammation of the tendon sheaths.[21] Le Manach[7] concluded a significant correlation between De Quervain's Syndrome with repeated and continuous bending and twisting movements using the wrist. Repetitive and continuous wrist bending in extreme positions for> 2 hours per day and continuous and repetitive screw-turning movements for> 2 hours per day are risk factors for De Quervain's Syndrome.

The results of this study support the previous conclusion that bending of the wrist with repetitive hand movements is also considered a significant factor contributing to diseases such as *tendinitis*, *synovitis*, *tenosynovitis*, *DeQuervain* and *epicondylitis.*[26] The implication of these results, so that DQD in motorcycle repair mechanics does not get worse is advice to reducing repetition frequency, using various tools to facilitate/lighten the work, avoid manual handling of the heavy objects, repeat change between activation and relaxation of the hand.[22]

Limitation of the study

This study only uses the Finkelstein test to determine the incidence of DQD. Although this method is superior to Eichhoff's Test in the Investigation of de Quervain's Disease,[15] however, Finkelstein's test alone does not appear to validly and reliably assist in the assessment and diagnosis of De Quervain's disease.[27] Therefore further tests are recommended to combine with other tests such as Eichhoff's test, and/ or the wrist hyperflexion and abduction of the thumb (WHAT) test.[6]

Conclusions

Among 60 motorcycle repair mechanics studied, DQD prevalence was found at about 63.3%, dominate by right hand (60%), with the main complaint of pain/discomfort around the thumb and wrist after work (53.3%). These DQD were associated with age *(p=0.007, r=0.346)*, working period *(p=0.000, r=0.861),* education background *(p=0.045, r=0.367)*, working time per day *(p=0.055, r=0.616),* and frequency of repetitive motion *(p=0.004, r=0.374)*. To solve this problem, it is necessary to reduce workload and work time, introducing a training to increase the interest on prevention DQD, reducing repetition frequency, using various tools to facilitate/lighten the work, avoid manual handling of the heavy objects, repeat change between activation and relaxation of the hand.

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