

RESEARCH ARTICLE

Work-related physical factors and low back pain among policemen in Kelantan: A cross-sectional study

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Abstract:

Low back pain (LBP) is a commonly reported musculoskeletal disorder among policemen or active-duty officers. Policemen are exposed to a high risk of developing LBP due to their nature of work and strenuous activities. The aims of this study were to determine the prevalence of LBP and the association between LBP with sociodemographic and work-related physical factors. A cross-sectional study was conducted among 101 policemen in one police center in Kelantan, Malaysia. A set of self-administered questionnaires including the sociodemographic form, Nordic Musculoskeletal Questionnaire (NMQ) and International Physical Activity Questionnaire (IPAQ) was used as the research instrument. The prevalence of LBP among policemen was 18.8%. The associations between LBP with sociodemographic and physical activity factors were not statistically significant ($p > 0.05$). However, Cramer's V coefficient showed strong associations between LBP with gender, age, marital status, educational level, ranks, duration of work per week and break time (Cramer's V > 0.15). Although this study found non-significant results between LBP and all study variables, the police workforce should be educated with information regarding LBP and its risk factors in order to encourage preventive measures and minimize LBP prevalence. More studies are also warranted for this population.

Keywords: Low back pain, policemen, work-related physical factors, physical activity

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1. INTRODUCTION

Low back pain (LBP) or lumbago is a very common symptom that affects people of all ages (Hartvigsen et al., 2018). LBP is considered a symptom rather than a disease and the most common form of LBP would be non-specific low back pain (Maher et al., 2017). LBP is normally related with pain in one or both legs and accompanied with neurological symptoms in the lower limbs. Almost every single person diagnosed with LBP are unable to identify the specific nociceptive source therefore they are classified to have non-specific low back pain (Hartvigsen et al., 2018).

Several physical factors have been identified to be associated with LBP such as occupational work requiring heavy lifting, twisting, vibration, sedentary work, and poor posture (Balague et al., 2012). Policemen around the globe face the risk of LBP due to their nature of work and strenuous activities. A cross-sectional study conducted in Mumbai City of India showed that LBP is the most common musculoskeletal disorder among 270 traffic police (Fiaz et al., 2018). In a study on the population of police officers in Quebec, Canada, the prevalence of LBP in the past 12 months was 67.7% while 28.7% of the total participants reported chronic LBP (Douma et al., 2017). An epidemiology study on the prevalence of LBP before and

after working shift found 58.8% of police officers from the 8th Military Police Battalion of Rio Grande do Norte complained of LBP before their work shift and the number increased to 89.7% of police officers after work shift (Cardoso et al., 2018).

The job requires policemen to wear uniforms according to the specifications given such as using heavy ballistic protection vests and carrying equipment belts which could lead to LBP (Ramstrand et al., 2016). The job scope also requires strenuous physical demands from the policemen. These could be the fundamental causes of low back pain among policemen.

According to Larsen et al. (2018), police have compulsory equipment and are considered a workload factor that policemen are exposed to. The items that are carried on police duty belts are negatively affecting their movements. Upon removing certain items from the duty belt in the front and back areas, policemen begin to feel more comfortable (Derafshi, 2018). White (2018) claimed a duty belt that is loaded can lead to muscle fatigue and overexertion injuries and reduced performance causing injuries from violence.

Policemen are in need of arresting suspects, driving, getting in and out of a vehicle with body armor and gun belts. Load

carriage plays an important part in physical activities among police (Larsen et al., 2016). All of these are considered physical stress gained from occupational stressors. Occupational stress from police work is connected with the first onset of LBP as body armor usage and vehicular exposure were related to a higher chance of rapid onset of back pain. The length of service is also connected to the progression from acute to chronic back problems instead of prolonged exposure to the stressors (Anderson et al, 2011).

Policemen are crucial in maintaining safety in our nation. Policemen need to be fit and strong to overcome any obstacles in their day-to-day job. Unfortunately, to the best of our knowledge, no studies were found to investigate the occurrence and associated factors of LBP among this working population in Malaysia setting. Therefore, the objective of the current study was to determine the prevalence of LBP and its association with sociodemographic and working variables. This study also aimed to assess the difference in physical activity between policemen who had LBP and those without LBP.

2. MATERIALS AND METHODS

2.1 Study Design and Participants

The study was conducted using a cross-sectional design. The study subjects were policemen from the 8th Battalion of the General Operations Force (Pasukan Gerakan Am), Pengkalan Chepa, Kelantan, Malaysia. The inclusion criteria for study participants were: (i) aged between 18 to 60 years old; (ii) male and female; and (iii) able to understand Malay language. Policemen who had undergone low back surgery and do not cooperate with the study were excluded.

The study participants were selected by using the convenience sampling method. They were selected due to their availability according to the investigator's desired place and time. Convenience sampling was also used in this study to cope with the Covid-19 pandemic which limits interactions between individuals and the inability to gain the name list for all personnel from the department due to their confidentiality.

The sample size was calculated using the single proportion formula. With the 95% confidence interval and 5% margin of error, the estimated prevalence (P) for LBP which is 50% and 10% margin of error, the total sample size was estimated 96 participants. After considering 20% non-response rate by using the formula of $n / (1 - 20\%)$, therefore the final sample size was 120 policemen.

2.3 Data Collection and Ethical Consideration

Approval from the UiTM Research Committee was received before the data collection was commenced (Reference No. REC/09/2021). Data collection began in October 2021 until January 2022.

The researcher made site visits twice. The first visit was intended to obtain approval from the Head of Department. On the next visit, the questionnaires were distributed by hand to the policemen. Prior to completing the questionnaires, participants filled in the consent form. The participants were instructed to fill in their background information and complete the questionnaires given which took approximately 15 minutes to complete.

2.4 Research Instrument

A set of self-report questionnaire in Malay language was used as research instrument which consists of sociodemographic form, Nordic Musculoskeletal Questionnaire, and International Physical Activity Questionnaire (IPAQ) Short Form. Socio-demographic form was used to collect information regarding participants' age, gender, weight, height, marital status, education status, work experience, work duration and smoking or drinking habit.

Nordic Musculoskeletal Questionnaire (NMQ) was used to assess LBP. LBP was defined as self-reported pain in the region of the lower back that lasted for at least one day with a binary response (yes/no) in the last seven days and 12 months. The content validity had high relevancy according to I-CVI index computation in a study in Malaysia (Alias et al., 2020). International Physical Activity Questionnaire (IPAQ) Short Form was used to measure the levels of physical activity. This questionnaire consists of four domains including leisure time physical activity, domestic and gardening (yard) activities, work-related physical activity, and transport-related physical activity. The total physical activity score was classified into three categories as low, moderate and high based on IPAQ scoring guidelines (IPAQ, 2005). The Malay version of IPAQ has been validated and showed good reliability and validity in the Malay adult population (Chu & Moy, 2015).

2.4 Data Analysis

IBM Statistical Package for Social Studies (SSPS) version 27 software was used to analyze the statistics. Descriptive statistics were used to depict the participants' socio-demographic characteristics and working information, the prevalence of LBP and the level of physical activity. Chi-Square test or Fisher's Exact test V were used to determine the association between the presence of LBP with sociodemographic characteristics and working information while Cramer's V was used to measure the strength of the association between the variables. Cramer's V was interpreted according to Akoglu (2018). Mann-Whitney U test was performed to assess the difference in physical activity between policemen who had LBP and those without LBP. The significance level was set at 0.05.

3. RESULTS AND DISCUSSION

3.1 Sociodemographic Characteristics and Working Information

A total of 101 participants from the 8th Battalion of the General Operations Force (Pasukan Gerakan Am), Kelantan took part in this study with the response rate of 84.1%. The distribution of sociodemographic characteristics and working information of the policemen can be seen in Table 1.

Table 1. Sociodemographic characteristics and working information of policemen (n=101)

Variables	n (%)	Mean (SD)
Gender		
Male	100 (99)	
Female	1 (1)	
Age		
		41.4 (9.79)
Weight (kilograms)		
		77.57 (11.15)
Height (metres)		
		1.69 (0.04)
BMI		
Normal weight	13 (12.8)	
Overweight	34 (33.7)	
Obese	51 (50.5)	
Missing data	3 (3.0)	
Marital status		
Single	4 (4.0)	
Married	96 (95.0)	
Partner deceased	1 (1.0)	
Education level		
SPM	79 (78.2)	
STPM	13 (12.9)	
Diploma	4 (4.0)	
Degree	5 (5.0)	
Rank		
KONSTABEL	3 (3.0)	
L/KPL	14 (14.0)	
KPL	66 (66.0)	
SJN	10 (10.0)	
SJN/M	1 (1.0)	
S/INSP	2 (2.0)	
INSP	4 (4.0)	
Missing data	1 (1.0)	
Monthly income (RM)		3702.38 (1203.23)
Income classification*		
B40 (RM1 - RM4850)	80 (79.2)	
M40 (RM4851 - RM10970)	13 (12.9)	
Missing data	8 (7.9)	
Duration of employment (years)		18.73 (10.68)
Duration of work per week (hours)		46.44 (14.38)
Rest time		
Yes, not frequent	74 (73.3)	
Yes, often	25 (24.7)	
Missing data	2 (2.0)	

*Income was classified according to the Household Income

and Basic Survey Amenities Report 2019 by the Department of Statistics Malaysia (DoSM) (DoSM, 2020).

3.2 Prevalence of LBP

The prevalence of LBP for the past 12 months was reported by 18 (18.8%) participants, while 14 (14.3%) participants complained they had LBP during the last 7 days. When asked if the pain or discomfort had hindered them from engaging in normal activities such as professional, home, or recreational activities within the last 12 months, only six (6.5%) of the policemen responded ‘Yes’ (Table 2).

Table 2. Prevalence of LBP during last 12 months and 7 days among policemen

LBP	Prevalence during last 12 months (n=96)	Prevalence during last 7 days (n=98)	Pain interferes normal activities within last 12 months (n=93)
	n (%)	n (%)	n (%)
Yes	18 (18.8)	14 (14.3)	6 (6.5)

3.3 Level of Physical Activity

The distribution of physical activity according to its domain can be observed in Table 3. The median (IQR) score for total physical activity was 20172 (21207.5) MET-minutes/week. Out of 101, only 93 participants responded to all items in the IPAQ Short Form questionnaire. Therefore, eight participants were excluded from the analysis. All 93 participants (100%) were found to have high physical activity throughout the week.

Table 3. Descriptive statistics of physical activity (n = 93)

Physical Activity (MET-minutes/week)	Median (IQR)	Frequency (%)
Total physical activity	20172 (21207.5)	
Work domain	7212 (9882.0)	
Active transportation domain	3492 (3169.5)	
Domestic and garden (Yard work) domain	3180 (4385.0)	
Leisure-time domain	4464 (4482.7)	
Physical activity level		
Low (0-599)		0 (0)
Moderate (600-2999)		0 (0)
High (≥3000)		93 (100)

3.4 Association between Sociodemographic Characteristics and Working Information with LBP

The results were shown in Table 4. Based on the sociodemographic characteristics, only association between BMI and LBP was analysed using Chi-Square test while the others were analysed using Fisher’s Exact test. To understand the strength of the relationships between two variables, Cramer’s V was used. There was no statistically significant association between all sociodemographic characteristics and working information variables with LBP based on the Pearson Chi-Square test and Fisher’s Exact test. However, according to Cramer’s V, there were seven variables that had strong association with low back pain which were gender, age, marital status, education, rank, duration of work per week, and break time with coefficients of more than 0.15.

Table 4. The association between sociodemographic characteristics and working information with LBP

Variables	Low back pain (%)	No low back pain (%)	X ² statistic (df)	P-value	Cramer’s V
Gender (n=96)					
Male	17 (17.9)	78 (82.1)	0.187	0.036 ^b	0.214
Female	1 (100)	0 (0)	(1)		
BMI (n=93)					
Normal weight	3 (30)	7 (70)	1.849 (2)	0.397 ^a	0.141
Overweight	4 (12.5)	28 (87.5)			
Obese	11 (21.6)	40 (78.4)			
Age (n=95)					
25-34 years old	1 (14.3)	6 (85.7)	2.587	0.463 ^b	0.169
35-44 years old	11 (25.0)	33 (75.0)			
45-54 years old	2 (8.7)	21 (91.3)			
55-64 years old	4 (19.0)	17 (81.0)			
Marital status (n=96)					
Single	2 (50.0)	2 (50.0)	3.093	0.319 ^b	0.173
Married	16 (17.6)	75 (82.4)			
Widow/er	0 (0)	1 (100)			
Education level (n=96)					
SPM	15 (20.0)	60 (80.0)	3.726	0.249 ^b	0.219
STPM	1 (7.7)	12 (92.3)			
Diploma	0 (0.0)	4 (100.0)			
Degree	2 (50.0)	2 (50.0)			

Rank (n=95)					
KONST	1 (33.3)	2 (66.7)	4.251	0.622 ^b	0.206
L/KPL	2 (14.3)	12 (85.7)			
KPL	12 (19.0)	51 (81.0)			
SJN	1 (12.5)	7 (87.5)			
SJN/M	0 (0.0)	1 (100.0)			
S/INSP	0 (0.0)	2 (100.0)			
INSP	2 (50.0)	2 (50.0)			
Duration of work per week (hours) (n=96)					
20-29	9 (16.4)	46 (83.6)	5.008	0.145 ^b	0.228
30-39	6 (30.0)	14 (70.0)			
40-49	2 (40.0)	3 (60.0)			
50-59	1 (50.0)	15 (93.8)			
Duration of employment (years) (n=96)					
0-9	4 (17.4)	19 (82.6)	1.960	0.608 ^b	0.148
10-19	9 (23.7)	29 (76.3)			
20-29	1 (6.7)	14 (93.3)			
30-39	4 (20.0)	16 (80.0)			
Income classification (n=88)					
B40	16 (21.3)	59 (78.7)		0.448 ^b	0.123
M40	1 (7.7)	12 (92.3)			
Break time (n=95)					
Yes, not frequent	11 (15.3)	61 (84.7)		0.130 ^b	0.166
Yes, often	7 (30.4)	16 (69.6)			

^a Pearson chi-square test, ^b Fisher’s Exact test/Fisher-Freeman-Halton Exact test

3.5 Difference in Physical Activity Score between LBP and No LBP

Table 5 shows the result of Mann-Whitney U test. The total physical activity score was analysed using Mann-Whitney U test as it was not normally distributed. The result indicated that there was no significant difference in physical activity score between the policemen who had LBP and those who had no LBP [U = 560.00, p = 0.736].

Table 5. The difference in physical activity between LBP and no LBP (n=90)

Variable	Low back pain (n=16) Median (IQR)	No low back pain (n=74) Median (IQR)	U	P-value
Total physical activity (MET-minutes/week)	20724.00 (31103.5)	20043.00 (19679.2)	560.00	0.736 ^a

^a Mann-Whitney U test

3.6 Discussion

This study researched the prevalence of low back pain among policemen in Kelantan, Malaysia. Only 18.8% of the policemen were reported to have LBP in the past 12 months while 14.3% reported the occurrence of LBP in the past 7 days. A study on car-patrol police officers in Quebec showed 40.7% of subjects had acute/subacute LBP while 28.1% suffers chronic low back pain (Douma et al., 2018). In Brazil, 47% police officers reported to have low back pain in the past 12 months (Serra et al., 2020). Another study by Diyana et al. (2019) showed that 34.3% of the male traffic policemen presented LBP within 12 months. In contrast to previous studies in other countries, the prevalence in this present study was relatively low. This could be due to social desirability bias and recall bias. The policemen were more likely to minimize or deny their pain, which might underreport the LBP. They also probably could not recall their symptoms which caused them not to answer the questions.

The results gained from Chi-Square test or Fisher’s Exact test revealed none of the sociodemographic characteristics and working information characteristics had statistically significant associations with LBP. However, when analysing the strength of the association by using Cramer’s V, there were strong associations between gender, age, marital status, educational level, rank, durations of work each week and break time with LBP. Non-significant results might be due to the small sample size and many missing data.

Mann-Whitney U test also showed no significant difference in total physical activity score between policemen who had LBP and those without LBP. The findings of the current study are contrary to past work in Malaysia which found a significant relationship between high job-related physical activity and LBP among army personnel (Chan et al., 2019), however parallel to the study in Saudi Arabia which found no significant correlation between physical activity and non-specific chronic LBP (Sidiq et al., 2021). It was also noted that all the participants in this study engaging in a vigorous level of physical activity, and no participants engaged in mild or moderate levels of physical activity. It could be the possible reason behind a lack of significance between physical activity level and LBP status.

There are many limitations in this cross-sectional study. Due to the self-reported instruments used in this study, there were chances of recall bias and social desirability bias had occurred. Nonetheless, reliable results can be obtained even more through physical assessments and examinations. The data were also retrieved from a single location, therefore, the results could not be generalized for the entire Kelantan policemen. In addition, participants left crucial information and provided insufficient data regarding the characteristics of pain, duration and frequency of physical activity which limit the valid findings.

4. CONCLUSION

The results indicate that the prevalence of low back pain is relatively low (18.8%) among policemen working in Kelantan as compared to the previous studies. The analysis of the association between LBP and sociodemographic and working information variables were not statistically significant. Also, no significant difference of physical activity between policemen with LBP and those without LBP. Future studies should involve physical assessments and examinations for more accuracy of the data. Data collection should also be done at other police stations around Kelantan for a bigger sample size.

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