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Prevalence and factors associated with low back pain among Malaysian army personnel stationed in Klang Valley

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Summary

Study aim: The aims of this study were to examine the prevalence of low back pain (LBP) and explore possible factors associated with LBP among Malaysian army personnel deployed in Klang Valley in the year 2018.
Material and methods: A self-administered questionnaire on sociodemographic data, occupational background, occupational exposure and LBP evaluation was used in this study. A total of 330 respondents participated in this study and 321 (97%) of them completed and returned the questionnaires.
Results: One hundred and fifty-seven respondents complained of LBP, giving a prevalence of 48.9%. LBP was found to be associated with smoking status, history of LBP, history of accident, military rank, category of regiment, lifting weights, pushing weights, pulling weights and job-related physical activity. Logistic regression analysis identified four associated risk factors of LBP: history of accident (OR = 4.42, 95% 2.29–8.55), history of LBP (OR=1.92, 95% 1.11–3.31), combat regiment (OR = 1.97, 95% 1.14–3.42) and high job-related physical activity (OR = 2.35, 95% 1.31–4.20).
Conclusion: Almost half of Malaysian army personnel stationed in Klang Valley reported LBP symptoms. Smoking status, history of LBP, history of accident, junior non-commissioned officers (NCOs), combat regiments, manual handling of objects and moderate/high job-related physical activity are associated with LBP, but there is no evidence of a temporal relationship in the current study. Further exploration with a longitudinal study is needed to identify a cause and effect relationship between occupational exposure and LBP among Malaysian army personnel.

Keywords: Low back pain – Army – Occupational exposure

Introduction

Low back pain (LBP) is defined as "pain and discomfort, localized below the costal margin and above the inferior gluteal folds, with or without leg pain" [1]. An alternative definition of LBP refers to acute or chronic injuries to soft tissues (ligament, fascia, and muscle) of the lumbar region which may be caused by muscle strain, quadratus lumborum sprains, hypermobility syndromes, and disk-related back problems [11]. According to Mendelek et al. [8], occupational factors have been identified as one of the primary risk factor categories for LBP. Workers with a high physical work load had a greater risk of developing LBP.

Army personnel have a high risk of developing LBP due to the demands of the job. The findings of narrative review by Waqqash et al. [20] revealed that army personnel have high occupational physical exposure as their job scope requires usage of heavy body armour for a prolonged duration, heavy carrying and lifting, standing and marching for a long duration, and undergoing rigorous physical and combat training. According to Roy et al. [16], the relative risk rates for LBP identified among army personnel are: (1) wearing a load more than 10% BW (RR = 2.00, 1.31–4.57), (2) wearing an average load for more than 1 hour (RR = 2.44, 1.30–4.57), (3) load worn more than 15% BW (RR = 5.83, 1.51–22.50), (4) wearing a backpack (RR = 1.82, 1.23–2.80), (5) wearing body armour >1 hour (RR = 1.62, 1.002–2.62), (6) Lifting objects weighing above 22.68 kg (RR = 1.96, 1.08–3.57), (7) Lifting objects one to two times (RR = 1.73, 1.002–2.97), and (8) carrying objects more than 7.62 m (RR = 2.01, 1.19–3.42).

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Studies on LBP prevalence and its associated factors among army personnel have been investigated comprehensively. Nissen et al. [9] reported that LBP prevalence in Danish soldiers deployed to Iraq was 26% and the identified LBP associated factors include: older age ($p = 0.016$), rare/absent support from leaders (odds ratio [OR] = 1.69, $p = 0.019$), psychological stress (OR = 1.71, $p = 0.009$), awkward working positions (OR = 1.98, $p = 0.001$), and working in depots or storehouses (OR = 2.60, $p = 0.041$). Hou et al. [5] reported that the LBP prevalence of soldiers in a Chinese military base camp was 26.2%, in which armoured forces have the highest prevalence (51.3%), followed by artillery (27.5%) and infantry (11.9%). Hou et al. [5] also reported that night training (OR = 1.8-2.0, CI = 1.1–3.1), 5 km cross-country race (OR = 1.6–1.8, CI = 1.1–2.3), and grenade-throwing training (OR = 1.6–1.7, CI 0.9–2.2) were associated with LBP. The prevalence of LBP in United States (US) army combat soldiers were higher compared with other studies. Roy et al. [13] reported the prevalence of LBP of 77% and identified age (OR = 1.06, 95% CI 1.02–1.09), fitness score (OR = 0.99 95% CI 0.985–0.997), history of LBP (OR = 2.94, 95% CI 1.87–4.62), equipment weight (OR = 1.008 95% CI 1.003–1.01), and time spent wearing body armour (OR = 1.13, 95% CI 1.07–1.19) as factors associated with LBP [13].

To the best of our knowledge, studies among army personnel in Malaysia related to army occupation and LBP are few [17]. Therefore, the objective of this study was to identify the prevalence of LBP and explore possible factors associated with LBP in Malaysian army personnel stationed in Klang Valley in the year 2018.

Material and methods

Research design

This cross-sectional survey was conducted among Malaysian army personnel who were active and stationed in Klang Valley, Malaysia. It was carried out from April until June 2018. Approval for the study was obtained from the Health Service Division of Malaysian Armed Forces. University Malaya Research Ethics Committee (UMREC) granted ethical approval for this study (reference number UM. TNC2/UMREC – 203) and all participants provided written informed consent prior to their participation.

Sample size calculation

The sample size for this study was derived from the descriptive cross-sectional study sample size formula by Charan and Biswas [2]:

$$n = z^2pq/d^2$$

where n = sample size; $z = z(1 - \alpha/2) = 1.96$; p = prevalence of outcome interest; $q = 1 - p$; d = absolute precision (0.05).

The minimum sample size for this cross-sectional study was 297 respondents (95% confidence interval). This calculation was based on the study by Hou et al. [5] where prevalence was 26.2% among army in a Chinese base camp.

$$n = (1.96)^2(0.262)\,(1 - 0.262)/(0.05)^2$$
$$n = 297 \text{ respondents.}$$

Description of respondents

Three hundred and twenty-one out of 330 Malaysian army personnel participated in this study. The respondents' completion rate was 97% (n = 321) with 9 respondents having incomplete data in their questionnaires. Case wise deletion (complete-case analysis) was used to remove all data for a case that has one or more missing values.

Survey questionnaire

The questionnaire consists of four sections:

Part A (sociodemographic profile): The first section includes respondents' information on their age, height, weight, gender, race, marital status, education level, smoking status, history of LBP and history of accidents.

Part B (occupational background): The second section included information on duration of service in armed forces, rank and category of regiment.

Part C (occupational exposure): The third section consists of (1) ruck march information (2) handling of manual materials (lifting, carrying, pushing, pulling), (3) working postures (standing, sitting, and kneeling) and (4) job-related physical activities. The questions in Part C were adapted from the validated Manchester Occupational Physical Demands Questionnaire [10] and the Malay version of the International Physical Activities Questionnaire (IPAQ-M) [3]. All sections of the Manchester Occupational Physical Demands Questionnaire were adapted for this questionnaire, but for the IPAQ-M, only the job-related physical activity was adapted.

According to Pope et al. [10], the self-reported Manchester Occupational Physical Demands Questionnaire has been validated with good accuracy results by comparing responses to the questionnaire with direct simultaneous observations (>60% for most of the manual handling). The IPAQ-M was reported by Chu and Moy [3] to have good reliability (ICC = 0.54–0.92; $p < 0.001$) and validity ($p < 0.001$) across intensities and domains ($\rho = 0.67$–0.98) for the evaluation of physical activity among the Malay population.

Part D (low back pain evaluation): The last section of the questionnaire accessed the prevalence and severity of low back pain based on the standardized Nordic Musculoskeletal Questionnaire (NMQ). The following features were included in the last section of the questionnaire: (1) low back pain occurrence in entire life, (2) low back pain occurrence in last 7 days, (3) low back pain occurrence in last 12 months, (4) treatment received because of low back pain, (5) functional disabilities in the last 12 months due to low back pain, (6) job/ duties affected due to low back pain, and (7) work absenteeism due to low back pain.

According to Crawford [4], the NMQ is a repeatable, sensitive and useful screening tool. Kuorinka et al. [7] reported that when clinical history was compared against the NMQ, there was only 0–20% disagreement. Furthermore, in test-retest reliability testing, the number of different answers ranges from 0 to 23%. For annual and weekly prevalence, it has been reported that the number of different answers between questionnaires was in the range 7–26% and 6–19% respectively.

Data collection procedures

The paper-based questionnaires were distributed to Malaysian army military personnel from April to June 2018 using convenience sampling in which the recruitment of respondents for the study was assigned by the Malaysian Armed Forces. The study was conducted in a hall. The respondents were briefed regarding the study by the examiners. The respondents' height and weight were also measured by the examiners using a digital weighing scale (Kalenji Scale 100, Geonaute) and wall-mounted height measuring tapeline (HL200).

Data analysis

The following variables were calculated and categorized as follows before statistical analysis was performed.

Body mass index (BMI): The BMI of the respondents was calculated using the BMI formula: BMI = kg/m^2 where kg is a respondent's weight in kilograms and m^2 is their height in metres squared. According to Zainudin et al. [21], the BMI classification (kg/m^2) for Malaysians is as follows: underweight (<18.5 kg/m^2), normal (18.5–22.9 kg/m^2), overweight (≥23 kg/m^2), pre-obese (23.0–27.5 kg/m^2), obese I (27.5–34.9 kg/m^2), obese II (35.0–39.9 kg/m^2), and obese III (≥40 kg/m^2). For bivariate analysis (chi-square cross-tabulation), the BMI was dichotomized into underweight/normal (<23) and overweight/obese (23 and above).

Manchester Occupational Physical Demands Questionnaire: For ruck march, the calculation for ruck march cumulative exposure was calculated based on the work done formula: work done = force (newtons) x distance travelled (meters). Therefore, the combined weight of reported rucksack weight and respondent's body weight (newtons) was multiplied by the reported ruck march distance (meters). For lifting with one or two hands and pushing or pulling, the questions on weight were combined with the number of activities per hour to form a cumulative exposure measure. Each of the occupational exposure variables were further dichotomized into low and high cumulative exposure using a frequency separation technique. Work posture variables were dichotomized based on the cut-off value given by Pope et al. [10]: sitting for ≥30 minutes per hour or not, standing for ≥ 30 minutes per hour or not, and kneeling in work or not.

Malay version of International Physical Activity Questionnaire (IPAQ-M): For the IPAQ-M; the following Metabolic Equivalent of Task (METs) values were used: walking = 3.3 METs, moderate activity = 4.0 METs, and vigorous activity = 8.0 METs. According to Chu and Moy [3], high physical activity (PA) level is classified as vigorous-intensity activity on at least three days achieving a minimum total physical activity of at least 1,500 MET-minutes/week or seven days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum total PA of 3,000 MET-minutes/week. Moderate PA level is defined as five or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum total PA of 600 MET-minutes/week. Respondents who does not meet the high or moderate PA level criteria are classified as low PA. In this study, only the job-related physical activity was measured. For bivariate analysis (chi-square cross-tabulation), the job-related physical activity was dichotomized into low job-related PA and moderate/high job-related PA. In further analysis of logistic regression, the job-related PA was classified as low job-related PA, moderate job-related PA, or high job-related PA.

Statistical analysis

All data analysis was conducted using the statistical package IBM SPSS Statistics version 23. For descriptive statistics, means and standard deviations were calculated for continuous variables (i.e. age, height, weight, time in service) whereas frequency distributions were computed for categorical variables (race, gender, rank, branch of service, category of regiment).

For inferential statistics, a bivariate analysis (chi-square cross-tabulation) was used to determine the determine the association of potential associated factors and low back pain. Multivariate logistic regression analysis was then used to determine the strength of associated risk factors from sociodemographic, occupational background, and occupational exposure variable predictors identified in the preliminary bivariate analysis. The backward likelihood ratio method was used to identify and remove variables with non-significant odds ratios (ORs). Multicollinearity test diagnostics was performed and the variables with multicollinearity were removed from the logistic regression model. The enter method was used to analyse the final best predictive logistic regression after all nonsignificant variables and multicollinearity variables had been removed. The p-value was considered significant if less than 0.05 ($p < 0.05$).

Results

Descriptive statistics

The sociodemographic profile and occupational background of the respondents are shown in Table 1. As shown in Table 2, 157 respondents complained of LBP, giving a prevalence of 48.9%. The prevalence of LBP was highest among combat regiments (58.2%) as compared to combat support regiments (40.7%), and service support regiments (35.4%). The traditional treatment was the preferred LBP treatment (16.5%), while only 9 respondents (2.8%) sought medical treatment from government and private clinics. Eighteen respondents (5.6%) take extra initiative to undergo both modern and traditional treatment. This could suggest that the modern treatment is ineffective and thus respondents seek other treatment alternatives. In 34% (n=109) of respondents the LBP affected their activities of daily living. Furthermore, 41 respondents (12.4%) have to modify their job due to LBP. In addition, 44 respondents (12.4%) were given medical leave due to LBP.

Table 1. Sociodemographic profile and occupational background of respondents (n = 321)

Variable	Mean ± SD	Range
Age [years]	29.44 ± 6.13	34.0
Body mass index (BMI)	24.2 ± 3.18	18.1
Years' service in armed forces [years]	9.32 ± 6.04	32.0
	Frequency (n)	Percentage [%]
Gender		
Male	294	91.6
Female	27	8.4
Race		
Malay	265	82.6
Non-Malay	56	17.4
Marital status		
Single	95	29.6
Married	224	69.8
Divorced/Separated	2	0.6
Highest educational level		
Primary school	2	0.6
Secondary school	265	82.6
Pre-university	38	11.8
Tertiary education	16	5.0
Smoking status		
Yes	194	60.4
No	127	39.6
Rank in armed forces		
Junior non-commissioned officer (NCO)	245	76.3
Senior non-commissioned officer (NCO)	55	17.2
Commissioned officer (CO)	21	6.5
Category of regiment		
Service support	48	15.0
Combat support	108	33.6
Combat	165	51.4

SD = standard deviation

Table 2. Prevalence and characteristics of LBP among respondents

	Frequency (n)	Percentage [%]
Prevalence of LBP (total)		
Yes	157	48.9
No	164	51.1
LBP among service support regiment (n = 48)		
Yes	17	35.4
No	31	64.6
LBP among combat support regiment (n = 108)		
Yes	44	40.7
No	64	59.3
LBP among combat regiment (n = 165)		
Yes	96	58.2
No	69	41.8
Types of treatment received for LBP		
No treatment	241	75.1
Modern treatment	9	2.8
Traditional treatment	53	16.5
Modern and traditional treatment	18	5.6
Activities of daily living affected by LBP		
Yes	109	34.0
No	212	66.0
Job modified due to LBP		
Yes	40	12.5
No	281	87.5
Medical leave due to LBP		
Yes	44	13.7
No	277	86.3

Association between sociodemographic data, occupational background, and occupational exposure with LBP

As shown in Table 3, there was a significant association between smoking status and LBP ($\chi^2 = 5.34$; $p = 0.021$), history of LBP and LBP ($\chi^2 = 9.89$; $p = 0.002$), and history of accident and LBP ($\chi^2 = 30.89$; $p < 0.001$). A significant association was also observed between LBP and certain occupational background factors such as military rank ($\chi^2 = 5.803$; $p = 0.016$) and category of regiment ($\chi^2 = 11.681$; $p = 0.001$). There was also a significant association between LBP and certain occupational exposures such as lifting weights with one hand ($\chi^2 = 12.42$; $p = 0.0004$), lifting weights with two hands ($\chi^2 = 11.55$; $p = 0.001$), pushing weights ($\chi^2 = 13.86$; $p = 0.0002$), pulling weights ($\chi^2 = 11.06$; $p = 0.001$), and job-related physical activity ($\chi^2 = 11.76$; $p = 0.001$).

Best logistic regression model predicting LBP

The Hosmer and Lemeshow test for the final logistic regression model was not significant, demonstrating goodness of fit (χ^2 [8] = 4.74, $p = 0.785$). In this analysis, it was noted that Nagelkerke R square (R^2) was 0.213, which means only 21.3% was explained by this model or equation. This final regression model (Table 4) identified four associated risk factors of LBP: history of accident ($p < 0.001$), history of LBP ($p = 0.02$), category of regiment ($p = 0.045$) and job-related physical activity ($p = 0.01$). Respondents with a history of accidents have 4 times greater risk of developing LBP (OR = 4.42, 95% 2.29–8.55). Furthermore, respondents with a history of low back pain have almost twice the risk of LBP (OR=1.92, 95% CI 1.11–3.31). Respondents in a combat regiment also have almost twice the risk of LBP (OR = 1.97, 95% CI 1.14–3.42). Likewise,

Table 3. Association between sociodemographic, occupational background and occupational factors and LBP

	Low back pain					
	No (n)	Yes (n)	Total	χ^2	p-value	POR (95% CI)
Socio-demographic variables						
Age [years]						
Young adults (18–35 years old)	137	136	273			
Middle aged adults (36–55 years old)	27	21	48	0.60	0.44	0.78 (0.42–1.45)
Body mass index (BMI)						
Underweight/normal (<23 kg/m^2)	61	62	123			
Overweight/obese (23 kg/m^2 and above)	103	95	198	0.18	0.67	0.91 (0.58–1.42)
Race						
Non-Malay	26	30	56			
Malay	138	127	265	0.59	0.44	0.80 (0.45–1.42)
Marital Status						
Married	114	50	224			
Single/divorced/separated	50	47	97	0.012	0.91	0.97 (0.61–1.57)
Educational level						
Secondary school and below	131	136	267			
Pre-university and above	33	21	54	2.61	0.11	0.61 (0.34–1.11)
Smoking status						
No	75	52	127			
Yes	89	105	194	5.34	0.02*	1.70 (1.08–2.68)
History of LBP						
No	133	103	236			
Yes	31	54	85	9.89	0.002*	2.25 (1.35–3.75)
History of accident						
No	150	104	254			
Yes	14	53	67	30.89	<0.001*	5.46(2.88–10.35)
Occupational background variables						
Duration of service in armed forces [years]						
<10 years	77	90	167			
10 years and above	87	67	154	3.46	0.06	0.66 (0.42–1.02)
Rank						
Junior NCO	116	129	245			
Senior NCO/CO	48	28	76	5.80	0.016*	0.53 (0.31–0.89)
Category of regiment						
Supporting (combat/service) regiment	95	61	156			
Combat regiment	69	96	165	11.68	0.001*	2.17 (1.39–3.39)
Occupational exposure variables						
Ruck march (work done/Nm)						
<13533177 Nm	83	78	161			
13533177 Nm and above	81	79	160	0.03	0.868	1.04 (0.67–1.61)

	Low back pain					
	No (n)	Yes (n)	Total	χ^2	P-value	POR (95% CI)
Lifting 1 hand (kg/per hour)						
< 15 kg/h	128	94	222			
15 kg/h and above	36	63	99	12.42	0.0004*	2.38(1.46-3.88)
Lifting 2 hands (kg/per hour)						
<25 kg/h	114	80	194			
25 kg/h and above	50	77	127	11.55	0.001*	2.19(1.39-3.46)
Pushing (kg/per hour)						
<20 kg/h	126	90	216			
20 kg/h and above	38	67	105	13.86	0.0002*	2.47(1.53-3.99)
Pulling (kg/per hour)						
<25 kg/h	130	98	228			
25 kg/h and above	34	59	93	11.06	0.001*	2.30(1.4-3.78)
Prolonged standing (min)						
<30 min	34	24	58			
30 min and above	130	133	263	1.61	0.21	1.45(0.82-2.58)
Sitting (min)						
<30 min	46	31	77			
30 min and above	118	126	244	3.03	0.08	1.60(0.94-2.67)
Kneeling						
No	128	115	243			
Yes	36	42	78	1.01	0.32	1.30(0.78-2.16)
Job-related physical activity (PA)						
Low job-related PA	62	32	94			
Moderate/high work job-related PA	102	125	227	11.76	0.001*	2.37(1.44-3.92)

Significant at p-value < 0.05*; χ^2 test; POR = prevalence odds ratio.

respondents with high job-related physical activity intensity were two times more likely to have LBP as compared to respondents who have low physical activity (OR = 2.35, 95% 1.31–4.20).

Discussion

The current study evaluates the prevalence and factors associated with LBP among Malaysian army personnel stationed in Klang Valley, Malaysia. It was found that history of LBP, history of accident, smoking status, military rank, category of regiment, lifting weights, pushing weights, pulling weights and job-related physical activity were all significantly associated with low back pain. The LBP prevalence is considered high as almost half of them reported LBP symptoms.

We observed higher LBP prevalence among respondents with a history of LBP and among those with a history of accidents. Previous studies have reported similar findings and concluded that LBP history is one of the strongest risk factors for developing recurrent LBP in the future [12, 14]. Stanton et al. [19] reported that 25 to 62 percent of LBP patients experienced recurrent LBP within one to two years' time-frame. In addition, respondents who experienced accidents in the past may develop musculoskeletal injuries, which also increases the risk of LBP. Roy et al. [14] reported that a history of previous musculoskeletal injuries significantly increases the risk of low back injuries by 330%. The LBP may originate from diseases or disorders of different anatomic structures of the body including bones, muscles, ligaments, joints, and nerves. This highlights the importance of prevention strategies in identifying modifiable factors in those with a history of injury to prevent re-injury.

Table 4. Best predictive logistic regression model for all selected variables

Variables	β	S.E.	Wald	df	Sig.	OR	95% C.I. for OR	
							Lower	Upper
History of LBP								
No **								
Yes	0.68	0.28	5.85	1	0.02*	1.97	1.14	3.42
History of accident								
No **								
Yes	1.49	0.34	19.54	1	<0.0001*	4.42	2.29	8.55
Category of regiment								
Supporting (combat/service) **								
Combat	0.50	0.25	4.01	1	0.045*	1.65	1.01	2.68
Job-related physical activity (PA)								
Low job-related PA **			9.08	2	0.01			
Moderate job-related PA	0.28	0.34	0.67	1	0.41	1.32	0.68	2.56
High job-related PA	0.85	0.30	8.31	1	0.004*	2.35	1.31	4.20
Constant	–1.23	0.26	21.81	1	<0.0001*	0.29		

β – regression coefficient; Wald – Wald statistic; df – degrees of freedom; OR = odds ratio; significant at p-value <0.05*; reference category**.

We also observed that respondents who smoke have higher LBP prevalence as compared to respondents who do not smoke. The findings of the current study are supported by the Shiri et al. [18] meta-analysis which indicated that there is a modest association between smoking and increase in LBP prevalence (OR 1.30, 95% CI 1.16-1.45). Smoking may impair blood supply to spinal structures leading to degenerative lesions in the intervertebral disc [18]. Shiri et al. [18] also suggested that individuals with physically demanding jobs may smoke more. This may indicate that physical exposures at work could confound the association between smoking and LBP. High job-related physical work activity has been found to be associated with LBP in the current study.

In terms of occupational exposure; we observed that lifting weights, pushing weights, pulling weights and job-related physical activity are also associated with LBP. Junior NCOs also have higher LBP prevalence as compared to their senior counterparts and respondents in combat regiments have higher LBP prevalence as compared to respondents in supporting regiments. The occupational exposure (lifting, pushing, and pulling weights) and occupational background (military rank and category of regiment) may be interrelated, which leads to LBP. This is likely due to the command authority in the army in which junior NCOs will have to do most of the manual handling of equipment (i.e. lifting, carrying, pushing, and pulling duties) as instructed by their senior officers. Likewise, combat regiments also may have more physically demanding duties and training as compared to supporting regiments. Military personnel who have physically demanding duties have six times greater risk of developing LBP [15]. Roy et al. [13] reported high LBP prevalence (77%) in a combat infantry regiment.

There are two main categories of workplace musculoskeletal injuries: (a) idiopathic – injury mediated through mechanical degradation; and (b) traumatic – injury associated with an incident or action [5]. The cumulative load theory by Kumar [6] proposed that "all material substances have a threshold range of load and repetition beyond which injury precipitates". This refers to ligaments, tendons and muscles, which are commonly injured as a result of exposure to biomechanical hazards [6]. We suggest that LBP occurrence in the current study may be categorized as idiopathic injury as the occupational exposure (lifting, pushing, pulling, job-related physical activity) and occupational background (junior NCOs and combat regiment) are associated with LBP. However, due to the limitation of the cross-sectional study design, there is no evidence of a temporal relationship between occupational exposure and LBP in the current study. Further exploration with a longitudinal study is needed to identify the cause and effect relationship between occupational exposure and LBP among Malaysian army personnel.

This study has several limitations. First, convenience sampling was used as the recruitment of respondents for the current study was assigned by the Malaysian Armed Forces. Furthermore, the current study only covers

Malaysian army personnel stationed in Klang Valley, Malaysia. Second, we used self-reported measures, which are prone to misclassification errors. The misclassifications are likely to be non-differential bias as variables were categorized based on norm classification (BMI and IPAQ-M) and frequency separation (Manchester Occupational Physical Demands Questionnaire). This factor was not controlled for in this study, and may further reduce the magnitude of the association observed. Finally, physical fitness, which may be a confounding factor for LBP, was not measured in this study.

Conclusion

This study is among the few studies which have explored LBP among the Malaysian army. Our study found that almost half of Malaysian army personnel stationed in Klang Valley, Malaysia reported LBP symptoms. We conclude that smoking status, history of LBP, history of accident, junior NCOs, combat regiments, manual handling of objects and moderate/high job-related physical activity are associated with LBP, but there is no evidence of a temporal relationship in the current study. Recommendations for future research include: (1) a cross-sectional study assessing LBP for all Malaysian army base camps in east and west Malaysia; (2) a longitudinal study to identify the cause and effect relationship between occupational exposure and LBP among Malaysian army personnel. Practical implications to reduce LBP prevalence in the Malaysian army include identifying individuals with a history of LBP and accidents to avoid re-injury and instil preventive measures in combat regiments such as guidance on proper manual handling of equipment and giving more rest periods in between physical activities.

Conflict of interest: Authors state no conflict of interest.

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