ORİGİNAL ARTİCLE

The identification of Key Factors Predictive of Low Back Pain in Ambulance Emergency Medical Service Personnel

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ABSTRACT

Aim To identify the factors predictive of LBP among ambulance emergency medical services personnel.
Study Design: Cross-sectional study
Place and Time of Study: Emergency department in ten government hospitals in Kelantan
Methods: All ambulance personnel worked in the emergency department in ten government hospitals included assistant medical officers and nurses were included.. The respondents were excluded from the study if they had underlying rheumatic diseases or history of back surgery, trauma, malignancy or multiple sclerosis and did not complete or returned the questionnaires. A self-administered questionnaire of English version was distributed to each respondent. Simple and multiple logistic regression analysis were used.
Result: The overall response rate was 85%. Of these, 65.0% experienced LBP. The respondents' age ranged between 23 to 59 years old, with a mean (standard deviation) age of 38.27 (7.27) years old. Majority of them were male personnel (63.6%) and Malay ethnicity (98.5%). Smoking (adjusted odd ratio (OR): 3.21; 95% confidence interval (CI): 3.19, 191.70; p=0.002) and outdoor activities involvement (adjusted OR: 1.21; 95% CI: 1.56, 7.22; p=0.002) were the most important clinical variables for predicting LBP in ambulance personnel.
Conclusion: Establishment of smoking habit and physically active individuals towards back pain complaint can lead to better planning and implementation of preventative measures against LBP among ambulance personnel in government hospital.
Keywords: Ambulances, Low Back Ache, Lower Back Pain, Physical Activity, Smoking Behaviour

INTRODUCTION

Low back pain (LBP) frequently occurs in the working population worldwide. Among the adult populations, up to 85% had experienced at least one episode of LBP during their lives[1]. LBP among health care staffs was broadly studied, mostly among the doctors and nurses. The other medical professions with high risk of developing LBP are ambulance personnel, however, less attention was given to this group.

Ambulance service is characterised by the care and transportation of out-of-hospital patients mixed with waiting periods at the ambulance station[2]. Treating and transporting sick and injured patients, 24 hours per day, seven days per week exposed the ambulance personnel to many occupational hazards, mainly the musculoskeletal injuries when performing the tasks that put strain on the lower back when engaged in heavy lifting, pushing and carrying the patients[3,4] and performing cardiopulmonary resuscitation within the confined space of the ambulance.

Demographic factors, such as age and gender have been associated with the occurance of LBP in many studies[5-7]. Body mass index, education, marital status, number of pregnancies, history of falls, arthritis history, smoking behaviour, involved in physical activities, frequency of exercise and working experience were the other significant factors[5-9].

This study is the first attempt to explore the issue of LBP among ambulance personnel in Malaysia, particularly in the state of Kelantan. The current study aimed to determine the factors associated with LBP among ambulance personnel worked in emergency department in Kelantan. The result might assist ambulance administrators to stratify ambulance personnel to reduce the incidence of LBP, which not only adversely affect the staff but also the care of their patients.

METHODOLOGY

This cross-sectional study was conducted over a three-week period in ten government hospitals based in Kelantan, Malaysia where all ambulance personnel worked in those hospitals were selected using convenient sampling method.

Occupational groups that are included as ambulance personnel, as classified under the Technicians and Associate Professionals group, Health Associate Professional subgroup, in The International Standard Classification of Occupation 2008 (ISCO-08), are AMO and trained nurses.

All ambulance personnel involved in Emergency Medical Services (EMS) including assistant medical officer (AMO) and nurses were included in the study. The respondents were excluded from the study if they had underlying rheumatic diseases or history of back surgery, trauma, malignancy or multiple sclerosis and did not complete or returned the questionnaires.

A self-administered questionnaire in the English language was used in the study. The researcher elected one representative from each hospital involved in the study to facilitate in the process of data collection. The representatives were either a senior AMO or a sister (senior staff nurses). The questionnaires were given to the representative of each hospital, then subsequently distributed it to the eligible study subjects under his or her supervision. Once completed, the questionnaires were collected by the corresponding representative and submitted them to the researcher.

Questionnaires were distributed after the information of the study was explained and informed consent obtained. The questionnaire was separated into four sections. The sociodemographic data such as age, gender, marital status, the job description of either AMO or nurse, height, weight, smoking behaviour and physical activity was the first part of the questionnaire.

The second part of the questionnaire was evaluated on the presence of LBP for last 12-month and previous 7-days. The validated Nordic Musculoskeletal Questionnaire (NMQ) was used and assessed by a 'yes' or 'no' response[10].

The third part of the questionnaire regarding the risk factors of developing LBP and was assessed by using items number 6 to 14 from a 25-item LBP Risk Factor Questionnaire (RFQ) developed by M. Halpern and colleagues[11]. The fourth section used a 21-items Depression, Anxiety and Stress Scale (DASS-21) questionnaire to measure the depression, anxiety and stress among respondents.

LBP in the current study was defined as pain and discomfort that was localised below the costal margin and above the inferior gluteal fold, with or without the presence of leg pain[12]. The definition was explained in the questionnaire. Moreover, a schematic diagram with the shaded area was also inserted to enhance the understanding regarding the pain area of concerned.

The physical activity was assessed in two options; outdoor activity and indoor activity. Involvement in outdoor activity signify physically active individual, whereas preference for indoor activity may indicate sedentary life-style.

Data entry and analyses were done using Statistical Package for Social Sciences (SPSS) software version 24.0[13]. Descriptive analyses were used to describe the general characteristics of the respondents. Results were presented as frequency (percentage) for categorical variables and mean (standard deviation [SD]) for numerical variables.

Simple and multiple logistic regression analysis were used to identify the clinical variables for predicting LBP in ambulance personnel. In simple logistic regression, all variables: gender, body mass index (BMI), smoking behaviour, physical activity and duration of involvement in EMS were analysed. However, in multiple logistic regression, only two variables: smoking behaviour and physical activity were significant factors. Results of the logistic regression analysis are presented with the adjusted odds ratio (OR), along with the 95% confidence interval (CI). A $p<0.05$ was accepted as statistically significant.

All subjects participated in the study were informed regarding the purpose of the study and full voluntary consent were obtained before their participation. Ethical approval was obtained from the Human Research Ethics Committee, Universiti Sains Malaysia and Medical and Research and Ethics Committee, Ministry of Health Malaysia.

RESULTS

The completed questionnaires were returned by 143 out of 168 ambulance personnel. The overall response rate was 85%. Of these, 68.6% of AMO and 59.6% of nurses had LBP. Most of the respondents were male (63.6%), Malay ethnicity (98.5%) and in the 30-39-year old age group (51.0%). The respondents' age ranged between 23 to 59 years old with a mean (SD) age of 38.27 (7.27) years old. The mean (SD) duration of involvement in emergency medical service (EMS) was 9.68 (6.97) years with the majority of respondents (37.8%) worked in EMS for more than ten years (Table 1).

Forty-two percent of the respondents were found to have a normal BMI while 58.5% were overweight and obese, 21.0% smoked and 62.1% involved in regular sport or outdoor activity

Factors Associated with LBP: The results of the multiple logistic regression analysis are shown in Table II. It was established that smoking behaviour (adjusted OR: 3.21; 95% CI: 3.19, 191.70; p=0.002) and had an outdoor activities (adjusted OR: 1.21; 95% CI: 1.56, 7.22; p=0.002) were the most important clinical variables for predicting LBP, and that these findings were statistically significant (Table 2).

Table 1: Demographic profiles of ambulance personnel with LBP (n=143)

Characteristics	Low Back Pain, n (%)	
	Yes	No
Age (years)*	38.18 (7.03)	35.44 (7.77)
Gender		
Female	28 (53.8)	24 (46.2)
Male	65 (71.4)	26 (28.6)
BMI		
Less than 25	49 (69.0)	22 (31.0)
26 to 29	31 (60.8)	20 (39.2)
More than 30	13 (61.9)	8 (38.1)
Smoking status		
No	64 (56.6)	49 (43.4)
Yes	29 (96.7)	1 (3.3)
Physical activity		
Non-outdoor activity	31 (50.8)	30 (49.2)
Outdoor activity	62 (75.6)	20 (24.4)
Job description		
AMO	59 (68.6)	27 (31.4)
Nurse	34 (59.6)	23 (40.4)
Duration involvement in EMS		
Less than 5 years	26 (70.3)	11 (29.7)
5 to 10 years	36 (69.2)	16 (30.8)
More than 10 years	31 (57.4)	23 (42.6)

*mean (SD); BMI body mass index; EMS emergency medical services

Table 2: Associated factors of LBP among ambulance personnel (n=143)

Variables	Multiple Logistic Regression		
	Regression Coefficient (b)	Adjusted Odd Ratio (95% CI)	*p*-value
Smoking behaviour			
No	-	1.00	-
Yes	3.21	24.71 (3.19, 191.70)	0.002
Physical activity			
Non-outdoor activity	-	1.00	-
Outdoor activity	1.21	3.35 (1.56, 7.22)	0.002

DISCUSSION

The current study found only smoking and doing physical activity associated with LBP. The other factors were not significant in this study. The influence of lifestyle factors on LBP is paramount. Since the significant association between smoking behaviour and the presence of LBP has been established, it was not surprising that the current study found that smoking as a significant factor associated with LBP among ambulance personnel. Forty-seven percent of those smoker belonged to the 30 to 39 year age group. Those smokers were male personnel only.

Even though smoking was found to be significant, it was noted that the confidence interval is wider. This was due to the smaller number of respondents who were smoked. Out of 143 respondents, only 21% of them were smoker, of which 27 were AMO and three were nurses. The smaller number of AMO and nurses who were smoked due to those healthcare workers were more exposed to the knowledge of health hazards. They were more aware of the detrimental effect of smoking habits on the body's health.

The current result from Kelantan population was consistent with previous studies14-17. Active smokers have been reported to have more back pain complaints as compared to that of the non-smokers and former smokers18, 19.

LBP among smokers could be the result of osteoporosis[20, 21]. A positive relationship was found between smoking with bone thinning and fractures[22]. Smoking caused the content of bone mineral decreased, which then increased the risk of osteoporosis and micro fractures of the trabeculae of the vertebral bodies, causing an increase in degenerative changes in the spine[1,23]. Given the detrimental effect of smoking on musculoskeletal health, by stop smoking will enhances the musculoskeletal health which lowers the rate of bone loss and fractures.

Smoking also reduced the blood flow to the intervetebral discs and vertebral bodies. Thus, affected the metabolic balance of intervetebral disc and lead to disc degeneration. This will facilitate the spinal degenerative processes and makes the spine more vulnerable to mechanical abnormality and injury24.

However, in contrast to these studies' findings, Kwon et al. (2006) found no statistically significant relation between smoking and LBP[8]. The reason for the contradictory findings might be the small number of respondents suffered from LBP and at the same time being smokers. Despite this finding, it is agreed that smoking is detrimental to one's health.

The majority of respondents in the current study involved in the outdoor activity, with 65% of them had LBP. It is interesting to note that the current study found that physically active individual associated with the presence of LBP. Half of the respondents were overweight and obese. A load on the lumber spine increased as the weight increased, which consecutively increased the risk of degenerative changes to the spine, causing chronic LBP. Heavy weight leads to muscle overload, along with inflammatory processes in the bones and spinal disc damage. This can favour the onset of LBP and herniated disc compared to other back diseases.

A study of 60 respondents with LBP showed that those respondents in a group that performed daily exercise showed significant improvement in pain and disability at six months, compared to those in the inactive group[25]. Another study involved 815 LBP patients indicate that patients subjected to moderate to vigorous physical activity reported less disability and pain at 12 months, as compared to the sedentary group[26].

However, there were previous studies that showed contradict result. A Dutch cross- sectional study examined the relationship between physical activity and LBP[27]. The study concluded that physical inactivity was associated with back pain complaints. Another study among Finland young population aged between 24 to 39 years old indicated that physical inactivity was an independent factor of LBP[28].

Physical inactivity had been reported to have an association with joint degeneration as a result of lowered synovial fluid production to shield the joint surfaces[29]. LBP individuals usually walk less and less physically active compared to those individuals without back pain due to fear of pain and pain avoidance behavior[30].

CONCLUSION

The current study found that lifestyle factors; smoking behaviour and physical activity were significantly associated with LBP among ambulance personnel. Establishment of the demographic and lifestyle factors that are associated with back pain complaint can assist in better planning and implementation of preventative measures against LBP among ambulance personnel in Malaysia.

Limitation: The current study had several limitations including the data collection. The study involved the hospital-based government ambulance service only, which accounted for the majority of the pre-hospital care in Malaysia. There are other government and non-government operating ambulance services in the region such as St. John's Ambulance and Fire and Rescue Department which were not included in the current study.

This study using convenient sampling method rather than simple random sampling. Eventhough it is convenient sampling, it applied to the whole population since the study involved almost Kelantans' population.

The study used questionnaire methods among EMS only in Kelantan due to time constraints. The study took place for about three weeks, therefore the researcher did not have enough time to conduct the study among EMS in Terengganu and Pahang.

The usage of English language also limits the current study population to AMOs and nurses only, whereas

normally the ambulance team responded to emergency situation comprise of at least three members, which are one AMO or nurse, one health attendant and an ambulance driver. All of the team members are responsible to carry necessary equipment to the patient's side as well as carry the patient to ambulance, if required.

Therefore, in order to properly understand the impact of LBP among the EMS providers in Malaysia, which consists of paramedics (AMOs and nurses), health attendants and ambulance drivers, future research should use questionnaire that has been translated and validated into Malay language.

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