

Research Paper

Prevalence of Low Back Pain and Some Related Factors in the Iranian Field Staff of Prehospital Emergency Medical Services



Vahid Shirzad Cibni¹, Monir Nobahar^{1, 2, 3*}, Raheb Ghorbani^{2, 4}

1. Nursing Care Research Center, School of Nursing and Midwifery, Semnan University of Medical Sciences, Semnan, Iran.

2. Social Determinants of Health Research Center, Semnan University of Medical Sciences, Semnan, Iran.

3. Department of Nursing, Faculty of Nursing and Midwifery, Semnan University of Medical Sciences, Semnan, Iran.

4. Department of Epidemiology and Biostatistics, Faculty of Medicine, Semnan University of Medical Sciences, Semnan, Iran.



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ABSTRACT

Background: It is widely accepted that musculoskeletal injuries, especially in the lumbar region, are among the most common complaints of people working in emergency medical services (EMS). This study aimed to determine the prevalence of low back pain (LBP) and its associated factors in the field staff of prehospital EMS in northern Iran.

Materials and Methods: This cross-sectional descriptive correlational study was conducted in 2019 on 156 men selected by convenience sampling from the population of field staff of prehospital emergency medical centers in Gilan, Iran. The participants completed a questionnaire of demographic information and the numerical rating scale. Data analysis was performed in SPSS software, version 24 using unvaried logistic regression at 5%, and multiple logistic regression at 10% significance level.

Results: Of all the participants, 69.9% (n=109) had LBP. The multiple logistic regression analysis showed that workers with a higher number of calls per shift (90% CI, 1.01%-1.32%, OR=1.15, P=0.088), low income (P=0.016), history of underlying diseases (90% CI, 1.40%-54.12%, OR=8.71, P=0.051), level of education with bachelor's degree or higher (P=0.077) were more likely to have LBP.

Conclusion: The prevalence of LBP in the field staff of prehospital EMS was remarkably high. The most important factors that predispose these workers to LBP were the number of calls per shift, income level, history of underlying diseases, and bachelor's degree or higher level of education. The findings can be used to develop guidelines for reducing the prevalence of LBP among the field staff of prehospital EMS.

Keywords:

Low back pain, Medical staff, Emergency care, Prehospital, Emergency medical services

* Corresponding Author:

Monir Nobahar, Professor.

Address: Nursing Care Research Center, Semnan University of Medical Sciences, Semnan, Iran.

E-mail: nobahar43@Semums.ac.ir

1. Introduction

Low back pain (LBP) is a pain concentrated between the twelfth thoracic vertebra and the inferior gluteal fold, which may or may not be accompanied by leg pain and is non-specific in 90% of cases [1]. LBP is one of the most common health problems [2] and the most common disabling health condition and one of the most common reasons people seek medical care in the world [3]. Approximately 84% of adults experience LBP at some point in their life [4]. The global prevalence of LBP in the general population has been estimated to be 22-48% [5]. In another study, the global prevalence of LBP in the general population has been estimated to be 15 to 45% [6].

The known risk factors for LBP include smoking, obesity, female gender, intense physical activity, high-stress work, low education level, lack of workers' compensation, job dissatisfaction, psychological factors such as anxiety, depression, and disorders, and psychosomatic disorders [7].

LBP is among the most common reasons for seeking medical care. The economic impact of LBP in the United States alone has been estimated to be 86 billion dollars [8]. The cost of treating and caring for LBP patients worldwide exceeds 400 billion dollars a year [9].

Healthcare workers are at increased risk of musculoskeletal disorders and especially LBP, which is the most common work-related injury in this population [10]. People working in prehospital emergency medical services are one group of many healthcare workers who can be susceptible to such injuries [11]. Emergency medical services (EMS) is an essential part of the health care system responsible for the safe transfer of patients to emergency centers and for providing medical services that patients may need during transfer [12]. They are exposed to a variety of stressors such as work accidents, illnesses, musculoskeletal disorders, car accidents, injuries, trauma, stress syndrome, violence, exhaustion, burnout, and deaths [13]. In critical and dangerous health situations, EMS personnel are one of the major health groups for providing medical services to patients and are exposed to a variety of occupational hazards, including LBP [14]. EMS is an essential part of the health care system, which is focused on providing EMS while transferring an ill or injured patient to the hospital [11], lifting patients, carrying patients on stretchers, and transporting patients from the ambulance to the hospital are particularly, prone to LBP [15, 16]. The duties of EMS techni-

cians include moving and carrying patients and performing cardiopulmonary resuscitation when required [11]. It has been estimated that the prevalence of work-related injuries or illnesses that cause workplace absence among EMS workers is 9.4%, with the annual prevalence rate being about 8.1 per 100 EMS workers [17]. In a study in Denmark, 42% of PE technicians reported experiencing musculoskeletal pains [18].

Indeed, EMS technicians are exposed to a variety of occupational hazards [19]. However, musculoskeletal injuries, particularly in the lumbar region, are remarkably common in this population [20]. It can significantly lead to varying degrees of disability, long-term illness, high treatment costs, work restrictions, absenteeism, and impairs the quality of life [21]. LBP is one of the most common reasons a for job change, the main concern affecting work productivity, early retirement, and quality of life [22]. Past studies in this area have highlighted the need for further research on LBP in EMS workers, especially pain intensity over time, prevention and treatment methods, and causal relationships with general health and demographic characteristics [23]. In a study, the need for further studies on LBP in PE technicians was emphasized [23]. However, we are not aware of the prevalence of LBP among EMS workers. To address this research gap, this study investigated the prevalence of LBP among EMS workers and the factors associated with the prevalence of this pain in Gilan Province in northern Iran. Therefore, this study answers the following question: What is the prevalence of LBP and its related factors among EMS workers?

2. Materials and Methods

Study design

This study was a multi-center, cross-sectional descriptive correlational study.

Setting

This study was conducted in 2019 on male EMS technicians working in 68 centers as the field staff of prehospital emergency medical centers in Gilan Province, northern Iran. Out of 460 EMS technicians working in the prehospital emergency medical centers of the area, 156 who were eligible for entering the study were chosen by convenience sampling.

Participants/Population

Sample size estimation

The sample size was determined using the Equation 1:

$$1. \text{ Sample size} = \frac{Nz^2pq}{Nd^2 + z^2pq}$$

(N, population size, p, an estimate of people with LBP in the community, q=1-p, d=margin of error, Z is the critical value of the normal distribution at $\alpha/2$) for 95% confidence, 6.5% margin of error, and P=0.5. Using this formula, the sample size was calculated to be 152 people. The criterion for the definition of LBP was any pain concentrated between the twelfth thoracic vertebra and the inferior gluteal fold, with or without leg pain [1, 24].

Inclusion criteria

The inclusion criteria were male EMS technicians working as the field staff of prehospital emergency medical centers, the age 25-55 years and the absence of congenital disorders and defects in the spine, and those who were willing to participate in the study.

Exclusion criteria

The exclusion criteria were the long-term use of steroids, having infectious diseases, chronic pelvic inflammatory diseases, prostatitis, malignancy, or abdominal and pelvic vascular problems, and being on leave during the study.

Instrumentation

Data were collected with a pain measurement inventory and a questionnaire of demographic information including age, level of education, marital status, income, family size, number of children, place of residence, body mass index, smoking, medication, illnesses, physical activity, the number of calls (missions) per shift, job satisfaction, the type of station (urban/extra-urban), work experience, and the persistence of LBP. Pain intensity is measured with a numeric rating scale national readership survey (NRS) from 0–10, zero (no pain) to ten (worst pain). NRS were originally developed by NRS, but are now used by many other organizations for wider applications and have become a standard for research. The NRS questionnaire is a valid and reliable tool for measuring LBP [25].

Procedures

In this study, necessary coordination was made with the Semnan University of Medical Sciences and the Medical Emergency and Accident Management Center in Gilan Province. Firstly, the objectives of the study and the method of work were explained to participants and if they accepted to participate in the study, they were asked to read and sign the informed consent form. All subjects were informed about the aims, objectives, procedures, and outcomes of the study. The questionnaires were distributed by the first researcher. The researcher answered the participants' questions. Then, they completed a questionnaire of demographic information and NRS. They return the questionnaires to the researcher after completion. Completed questionnaires were checked by the researcher.

Data analysis

Data analysis was performed in SPSS software, version 24 via unvaried logistic regression at 5% and multiple logistic regression at the 10% significance level.

3. Results

Characteristics of study subjects

The Mean±SD of the age of participants was 39.5±8.2 (median=38) years. Of all the participants, 50% had a bachelor's or higher degree, 90.4% were married, and 66.7% had an average or higher income. The Mean±SD of the number of calls per shift was 5.5±2.5. The Mean±SD of the number of children was 1.3±0.9, the body mass index was (27.0±3.8), and the number of years of work experience was (13.3±6.3). Of the participants, 8.3% (n=13) had a history of underlying diseases, 80.8% of low-income participants, 63.2% of middle-income participants, and 77.8% of good-income participants had LBP. Other variables including marital status, location, job satisfaction, and emergency type of station had no significant relationship with the prevalence of LBP (P>0.05) (Table 1).

Pain assessment

The collected data showed that 69.9% (n=109) of the participating workers had LBP. The Mean±SD of the pain intensity rating was 4.77±1.35 (median=5).

In the univariate analysis using logistic regression, none of the variables had a significant relationship with the prevalence of LBP (P>0.05) (Table 1).

Table 1. Prevalence of low back pain by individual characteristics among field staff of prehospital emergency medical services in Gillan, North of Iran (2019)

Variables	No. (%) / Mean ± SD	LBP		Univariate Results	Analysis	
		No. (%)				
		Yes	No	OR	95% CI for OR	
Age (y)	39.5 ± 8.2	-	-	1.04	(0.99, 10.08)	
Level of education	Diploma or less	47(30.1)	32(68.1)	15(31.9)	1.0	-
	Associate degree	31(19.9)	17(54.8)	14(45.2)	0.57	(0.22, 1.45)
	Bachelor's degree or higher	78(50)	60(76.9)	18(23.1)	1.56	(0.70, 3.51)
Marital status	Married	141(90.4)	101(71.9)	40(28.4)	2.2	(0.75, 6.50)
	Others	15(9.6)	8(53.3)	7(46.7)	1.0	-
Income	Low	52(33.3)	42(80.8)	10(19.2)	1.20	(0.22, 6.68)
	Medium	95(60.9)	60(63.2)	35(36.8)	0.49	(0.10, 2.49)
	Good	9(5.8)	7(77.8)	2(22.2)	1.0	-
BMI (kg/m ²)	27.0 ± 3.8	-	-	1.05	(0.96, 1.16)	
Number of children	1.3 ± 0.9	-	-	1.09	(0.74, 1.60)	
Location	City	138(88.5)	97(70.3)	41(29.7)	1.18	(0.42, 3.37)
	Village	18(11.5)	12(66.7)	6(33.6)	1.0	-
Number of calls per shift	5.5 ± 2.5	-	-	1.14	(0.98, 1.33)	
Job satisfaction	Low or very low	41(26.3)	29(70.7)	12(29.3)	1.33	(0.49, 3.60)
	Medium	84(53.8)	60(71.4)	24(28.6)	1.37	(0.57, 3.30)
	High or very high	31(19.9)	20(64.5)	11(35.5)	1.0	-
Work experience (y)	13.3 ± 6.3	-	-	1.06	(0.99, 1.12)	
Emergency base type	Urban	98(62.8)	72(73.5)	26(26.5)	1.57	(0.78, 3.16)
	Extra-urban	58(37.2)	37(63.8)	21(36.2)	1.0	-
History of the disease	Yes	13(8.3)	12(92.3)	1(7.7)	5.69	(0.72, 45.1)
	No	143(91.7)	97(67.8)	46(32.2)	1	-

Abbreviations: CI: Confidence interval; BMI: Body mass index; OR: Odds ratio.

Table 2. Results of multiple logistic regression analysis of factors associated with low back pain among field staff of prehospital emergency medical services in Gilan, North of Iran (2019)

Variables		OR	90% CI for (OR)	P
Number of calls per shift		1.15	(1.01–1.32)	0.088
History of the disease	No	1	-	-
	Yes	8.71	(1.40-54.12)	0.051
Level of education	Diploma or less	1	-	0.057
	Associate degree	0.79	(0.33-1.90)	0.656
	Bachelor's degree or higher	2.23	(1.06-4.71)	0.077
Income	Low	1	-	0.023
	Medium	0.34	(0.17-0.71)	0.016
	Good	1.42	(0.31-6.43)	0.704

CI: Confidence interval; OR: Odds Ratio.

In the multiple logistic regression analysis conducted to examine the simultaneous association of the examined factors on the prevalence of LBP, the results showed that EMS workers with a higher number of calls per shift (90% Confidence Interval (CI), 1.01%-1.32%, OR=1.15, P=0.088), history of underlying diseases (90% CI, 1.40%-54.12%, OR=8.71, P=0.051) and low-income levels (P=0.016), and level of education with bachelor's degree or higher (P=0.077), were more likely to have LBP (Table 2).

4. Discussion

In this study, the prevalence of LBP among the male EMS technicians working as the field staff of prehospital emergency medical centers in Gilan Province, Iran, was 67.3%. Research has shown that people working in prehospital EMS experience more musculoskeletal disorders than the general workforce [26, 27]. For example, in a nationwide study in Denmark, a significant portion (42%) of 1689 ambulance workers reported musculoskeletal pain, which was significantly higher than the 29% ratio observed among the other 14,175 workers questioned [18]. In Australia, between 2003 and 2012, ambulance staff and EMS technicians had the highest rate of musculoskeletal injury among healthcare workers [28]. In a study in Portugal, Davison et al. found that 90.2% of EMS personnel suffered from LBP [29]. The results of a systematic review and meta-analysis study by Sahebi et al. showed that the prevalence of LBP among EMS personnel was 50.30% (95% CI, 37.98-62.62, I²=99.1%) [30]. Results of a systematic review and meta-analysis study by Azizpour et al indicated that the prevalence of LBP in Iranian nurses during their working life and during the last year was estimated at 63% (95% CI, 57.4%–68.5%) and 61.2% (95% CI, 55.7%–66.7%), respectively [31]. Therefore, the findings of this study seem to be consistent with the results

of other studies that show the high prevalence of LBP among the personnel of prehospital EMS.

The results of this study showed a significant relationship between the prevalence of LBP and the number of calls per shift, in the sense that people running more calls in their shifts increase the prevalence of LBP. The relationship between workload and LBP has been the subject of many studies. For example, a study by Truszczynska et al. (2013) on air force pilots in Poland also showed a significant relationship between LBP and increased flight time [32]. A study by Zhang et al. (2019) in China also showed the increased prevalence of LBP in ambulance workers who were doing more overtime [33]. In a study by Trinkoff et al. (2006) on nurses in the United States, there was a significant relationship between workdays and musculoskeletal problems in the lower back [34]. Several other studies have also shown a significant relationship between LBP and work hours [35, 36]. Since the duties of EMS personnel often involve carrying the patients, performing cardiopulmonary resuscitation, and remaining in a standing position for prolonged periods, their work often puts significant pressure on their lumbar region and spine. Research has shown that doing tasks that put pressure on the lower back is often considered a normal part of the job of prehospital emergency workers [20]. Therefore, for these workers, putting in longer work hours and running more calls per shift, which means applying more pressure on the spine, can be expected to increase musculoskeletal disorders, especially in the lumbar region.

The results of this study showed a significant relationship between LBP and income level, in the sense that people with low income increase the prevalence of LBP. This is consistent with the results of other studies [37]. To explain this relationship, one can argue that people with lower income are less willing or able to spend money

on retraining and sports and exercise classes, a tendency that increases musculoskeletal disorders. Indeed, studies have shown a significant relationship between LBP and training [38] and sports activity [39]. Also, these people have to do more overtime to compensate for their low base income, which means they have to run more calls and put more pressure on their spines. This argument is consistent with other results of this study.

In this study, the multiple logistic regression analysis of the factors associated with LBP showed a significant relationship between the prevalence of LBP and the level of education. In another study, a relationship was found between education and LBP [37, 40].

In this study, the multiple logistic regression analysis of the factors associated with LBP showed a significant relationship between the prevalence of this pain and the history of underlying diseases. Overall, not many studies have been performed on the relationship of LBP with the history of underlying diseases. In a study by Stewart Williams et al. (2007-2010), where they analyzed the data of LBP patients in different countries and examined the risk factors associated with this pain in adults, it was reported that chronic diseases do increase the prevalence of LBP [41]. A study by Alexopoulos et al. (2005) also showed that poor general health is a significant risk factor for developing LBP [42]. Taken together, these findings suggest that there is a two-way relationship between musculoskeletal health and the general health of individuals, with problems in each hurting the other. Therefore, operations, guidelines, and research priorities of EMS should be planned with due attention to the general health of EMS workers as well as their musculoskeletal disorders.

During emergencies and disasters, EMS personnel face numerous stressful and dangerous situations and have a vital role in saving patients' lives, so their physical health can affect the quality of their performance. Lack of management support, poor communication with management, fatigue, and inadequate staff factors can be influencing EMS personnel. Therefore, managers and planners must prevent the creation of unsuitable conditions and work pressures on them by planning and preparing suitable facilities, tools, and work equipment. In summary, the results of this study show the significant prevalence of LBP among EMS personnel, indicating this problem is a major occupational threat in this profession. Therefore, the significant prevalence of LBP among EMS personnel and the devastating impact of this problem on the employees' physical and mental health of worker poses a major challenge for the healthcare system. To manage the LBP, proper stretcher lifting methods

are recommended. Learning to carry patients and equipment, including regular exercise and strengthening physical strength building in the work schedule prevents LBP and redefines the tasks of the staff with a history of LBP. Also, the results of this study suggest that the number of calls per shift, income level, and history of underlying diseases is among the most important factors that predispose EMS workers to LBP and should be the basis of strategies and guidelines for prehospital EMS to reduce the prevalence of LBP among people working in this field. According to these results, raising the income of EMS workers, recruiting extra workforce, and expanding the number of prehospital emergency medical centers to reduce the work pressure resulting from a large number of calls, and monitoring the general health of EMS workers to prevent and control chronic and work-related diseases can reduce the prevalence of LBP in the field staff of prehospital EMS.

5. Conclusion

There was a high prevalence of LBP among the field staff of prehospital EMS, which can lead to significant professional, psychological, social, and medico-economic consequences. In this study, the number of calls per shift, income level, history of underlying diseases, and bachelor's degree or higher education level was significantly associated with LBP. Findings can be used to develop guidelines to reduce the prevalence of LBP among the field staff of prehospital EMS. Reducing the disability caused by the high prevalence of LBP among the field staff of prehospital EMS requires the participation of managers and multidisciplinary planning.

Limitations

The most important limitation of this study was its cross-sectional nature, which cannot establish the causative relationship between occupational exposure and LBP. Also in the study, self-reported data were gathered. The use of sample participants from a population who experienced similar work nature, sitting arrangement, and homogeneous work environment is the strength of this study. The authors recommend further studies on the relationship between musculoskeletal disorders, especially in the lumbar region, and the number of calls per shift, income level, history of underlying diseases, and general health.

Ethical Considerations

Compliance with ethical guidelines

This research was carried out in full compliance with all pertinent ethical guidelines, which included gaining approval from the Ethics Committee of [Semnan University of Medical Sciences](#) (Code: IR.SEMUMS.REC.1397.271), obtaining informed consent, protecting the confidentiality of participants' information, and obtaining a letter of introduction for the study.

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Authors' contributions

Conceptualization: All authors; Data collection: Monir Nobahar and Vahid Shirzad Cibni; Data analysis: Monir Nobahar and Raheb Ghorbani; Drafting of the manuscript, critical revision for important intellectual content, and supervision: Monir Nobahar.

Conflict of interest

All authors declared no conflict of interest.

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