Original Article

Frequency of Low Back Pain and its Association with Functional Ability in Engineers

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ABSTRACT

Low back pain (LBP) is the most common health problem among workers; most workers experience this issue during their lives. There are some psycho-social factors interlinked with LBP including hostile work environments, long working hours & overtime working hours. **Objective:** To determine the frequency of low back pain in engineers and to evaluate the association between functional ability and low back pain in engineers. **Methods:** A descriptive Cross-Sectional study was conducted, and the data were collected through a convenient sampling technique from Rawalpindi, Islamabad, and Malakand. The duration of the study was 6 months after synopsis approval. Data collection were done using a self-structured questionnaire containing demographic data and clinical characteristics. Visual analogue scale for pain (VAS pain) and Back pain functional scale (BPFS) were used to assess pain and functional abilities. **Results:** There were 85.9% Males and 24.1% females in this study. The point prevalence of LBP was 36.7% and the 12-month prevalence was 63.3%. There was a moderate association found between the severity of LBP and functional ability [(r=-0.59), p<0.001]. **Conclusions:** The study concluded that the prevalence of LBP is found in engineers. A moderately significant association was found between the severity of LBP and functional ability in engineers.

INTRODUCTION

LBP, which affects the majority of workers at some point in their life, is the most common medical problem impacting workers. Multiple psychosocial risk factors, such as unpleasant occupational settings, long workdays, and overtime, are linked to low back pain [1]. A sedentary lifestyle, intense physical activity, frequent bending, twisting, lifting, prolonged sitting or standing, obesity, and many ergonomics components are among the many risk factors for LBP [2]. A high correlation between these risk factors and LBP is also supported by a wealth of data. Age, gender, and physical activity are all independent factors, and it is unclear to what extent they influence back pain [2]. When seen from an ergonomics perspective, LBP has been portrayed as a condition affecting engineers due to the recognition of occupational dangers that contribute to LBP. Engineers may experience job-associated LBP due to organizational elements like heavy lifting, body vibration, and physically demanding labor, as well as individual characteristics like age, gender, smoking, and muscle strength related to working circumstances [3]. In a variety of occupations, people adopt the postures of sitting, standing, and forward head. It's important to maintain optimal ergonomics for those that require prolonged durations of posture in one position [4]. Low back pain can be minimized by weight - loss and exercising. Exercise is only effective in association with education. Patients should be given a comprehensive overview of the history, etiology, prognosis, and mechanism. A variety of drugs can

be used to treat low back pain, including opioids, muscle relaxants, and nonsteroidal anti-inflammatory drugs. Manual therapy, exercise, and superficial heating are non-invasive remedies for low back pain [5]. In addition to receiving specialized training, physical therapists can treat low back pain with electrotherapies, such as TENS, hot packs, ultrasound, and needle therapy. To increase muscle performance, isometric training is frequently performed. Correct posture promotes both bodily and psychological well-being. The physiotherapy program was discovered to be more effective at reducing chronic pain. A good care plan is beneficial in reducing back discomfort [6]. Aparajita *et al.,* concluded that most aircraft maintenance engineers (56.3%) does work with high-risk work position and 62.5% of them has low back pain with minimal disability [7]. Study by Olana reported that the prevalence of self-reported low back pain was 58.2%. It was concluded that load of work, provision of occupational health and safety training is highly significant factors for developing LBP among worker involved in ammunition engineering industry [8]. Hameed depicted that LBP is major work-related musculoskeletal disorder among IT professionals. It concluded that 54% male's employees and 48% female employees have reported LBP [9]. As per existing literature, the problem of low back pain is increasing day by day in engineers. To the best of our knowledge, at national level there is no published data found to determine the frequency of low back pain in engineers and none of the literature was published to find association between low back pain and functional ability in engineers. This study will advance the body of knowledge, and this will give context for additional research and raise awareness of the problem among engineers. The objective of the study was to determine the frequency of low back pain in engineers and to evaluate the association between functional ability and low back pain in engineers.

METHODS

A descriptive Cross Sectional study design was used. The data were collected from different work fields, Pakistan engineering councils, and software houses in Rawalpindi, Islamabad and Malakand. The duration of study were 6 months after approval by ethical review committee of Margalla institute of health sciences. Data were collected after taking written informed consent from all participants. Sample size was calculated by using Rao soft software. Recommended Sample size was 285. In this study, convenient (non-probability) sampling technique was used. Both male and female engineers with age 24 years or above and having working experience of minimum six months [10] were included in the study while participants were excluded if they have any neurological disorder,

pregnancy, history of back fracture and back surgery within last three months [11], any infectious and inflammatory or systematic diseases. Data collection were done using a self-structured questionnaire containing demographic data and participants characteristics. The study variables for this study were low back pain and functional ability. Low back pain among engineers was measured by VAS pain and is defined as pain on the posterior side of body that is localized from lower margin of 12th ribs to lower gluteal fold with or without involving legs. The VAS pain consists of a 10cm line, with two end points representing 0 ('no pain') and 10 (severe pain). It is a validated, subjective tool used for acute and chronic pain assessment [12]. For the evaluation of functional ability in engineers with back pain, Back pain functional scale (BPFS) was used. Functional ability in this study is defined as the ability to perform activities of daily living independently. BPFS was developed by Rantonen *et al.,* and consisted of 12 questions to evaluate the loss of function caused by LBP [11]. Each item has a score between 0 and 5. The total score of the scale is 60. The greater the score indicates the maximum functional ability. The BPFS has been shown to have sound reliability and validity measurement properties for assessing the functional status of LBP patients [7]. Data collected were analyzed through SPSS version 21.0 (Statistical Procedure of Social Sciences) software. Descriptive statistical analysis (mean, frequency and percentage) was used to analyze the data. The association between functional ability and severity of low back pain was assessed by Pearson coefficient.

RESULTS

A total number of 315 participants were approached for this study. They were asked to fill the questionnaires distributed to them. As a result of not meeting the study's eligibility requirements, 10 of the 315 participants were excluded. Out of 10 participants, 5 had inflammatory diseases, 2 had back fractures in the last three months, 1 had spinal cord disease, and 2 had neurological disorders; therefore, a total of 305 questionnaires were evaluated for the study. The demographics and the participant's characteristics have been shown in Table 1.

Table 1: Participants demographics and characteristics

Variables		Mean ± SD/ F (%)
Age (years)		33.8±7.90
BMI		24.54±4.38
Gender	Male	262(38.7)
	Female	43(61.3)
Fields	Civil	85 (27.9)
	Software	80(26.2)
	Mechanical	32(10.5)
	Electrical	59(19.3)

	Architecture	13(4.3)
	Chemical	16(5.2)
	Electronics	9(3.0)
	Telecommunication	8(2.6)
	Agriculture	3(1.0)
Common Position	Sitting	156 (51.1)
	Forward bending	38 (12.5)
	Standing	85 (27.9)
	Sitting and standing	26 (8.5)
Rest during working hours	Yes	257(84.3)
	No	48(15.7)

As shown in Table 2; the point prevalence of low back pain is 36.7% while 12 months prevalence is 63.9%. The mean score of pain intensity was 4.6±2.03. The mean functional ability score on BPFS was 49.03±10.82. There is moderate significant association found between severity of low back pain and functional ability in engineers. [(r= –0.59), p< 0.001]

Table 2: Prevalence of low back pain among engineers and mean score of VAS pain and BPFS

Variables	Mean ± SD/ F (%)
LBP point prevalence	112(36.7)
LBP 12-month prevalence	195(63.9)
VAS pain (0-10) cm	4.6±2.03
BPFS (0-60)	49.03±10.82

DISCUSSION

In this study, the mean age of participants was 33.82±7.90 years that is consistent with the results of previous studies (30-36 years) [13-15]. The mean value of BMI in this study was 24.54±4.38 while the study conducted by Hameed and Ekechukwu *et al.*, the mean value of BMI was 25.23±3.42 and 22.89±3.37 respectively. These results are in line with the results of our study [9, 16]. There were 85.9% Males and 24.1% female in this study. Similarly, there were mainly male participants in earlier investigations [8, 9, 16, 17]. In our study, the participants reported average total working hours per day was 8.47±1.63 while in a study conducted by Olana, the average working hours per day was 9-10 hours. In another study done by Aparajita *et al.*, the mean value of total working hours per day was ≤ 8 hours [7, 8]. The result of this study reported that 84.3% of participants take rest during working hours. The results reported by Olana stated that 78.8% of participant take rest while at work [8]. Another study done by Aparajita *et al.*, reported that 48% of the participants take rest greater than 30 minutes [7]. These results are also consistent with our results. In accordance with the findings of our study, the point prevalence of LBP was 36.7% and the 12-month prevalence was 63.3%. Hameed, depicted that 50% of their participants reported LBP during the last week [9]. Another study concluded that 12-month prevalence of LBP is 58.2% [8] and Adhikari *et al.*, reported 52% prevalence of LBP during the last year [17] while Rajguru and Mangle,

highlighted that respondents reported 85% prevalence of LBP [18]. The rate of prevalence of LBP is higher in this study because this study included only architecture engineer and as reported by author poor workstation ergonomics, site visits and remain in faulty postures are the risk factors for developing musculoskeletal disorders [18]. There is moderate association found between the severity of low back pain and functional ability [(r= –0.59), p < 0.001]. No previous study found association between severity of low back pain and functional ability in engineers however earlier studies conducted over young adults also concluded that there is significant association found between severity of low back pain and functional ability [19, 20]. As the result of this study depicted that low back pain is common in engineers so it is recommended that ergonomic assessment and proper postural awareness program should be conducted for engineers.

CONCLUSIONS

This study concluded that prevalence of low back pain is found in engineers. There is moderate significant association found between the severity of low back pain and functional ability in engineers.

Authors Contribution

Conceptualization: SN
Methodology: PN
Formal analysis: HRK, MT, ST
Writing-review and editing: HRK, PN, HS

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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