J Pain Manage 2020;13(1):00-00.
Running title: LBP and military office workers

A comprehensive screening protocol to identify incidence of lower back pain in military office workers

Reza Alizadeh, MD[1], Ardalan Shariat, PhD[2], Azadeh Hakakzadeh, MD[2], Maryam Selk-Ghaffari, MD[2], Pouya Damavandi, PhD[4], Roshanak Honarpishe, PhD[5] and Lee Ingle, PhD[6]

[1]Department of Anesthesiology and Pain, AJA University of Medical Sciences, Tehran, Iran, [2]Sports Medicine Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran, [3]Department of Clinical Psychology, Zanjan University of Medical Sciences, Iran, [4]Department of Exercise Physiology, Faculty of Sport Sciences, University of Guilan, Rasht, Iran, [5]Department of Physiotherapy, School of Rehabilitation, Tehran University of Medical Sciences, Tehran, Iran and [6]Department of Sport, Health & Exercise Science, University of Hull, Kingston-upon-Hull, United Kingdom

Abstract: Military workers experience different types of lower back pain (LBP), but there is little evidence concerning the incidence of LBP in this group, especially in Asian countries. Increasing rate of LBP in this group is not considered and there is not a source to distinguish the different types of LBP. One of the most common forms of LBP is discogenic low back pain (DLBP) which is a consequence of internal disc disruption accounting for approximately 40% of LBP cases. This cross-sectional study aimed to determine the incidence of non-specific low back pain (LBP), discogenic LBP, and other forms of LBP in military office workers in Iran. 564 military office workers (303 men and 261 women, age: 20-50 years), who had worked in this setting for at least two years, were randomly selected from one military office. The Cornell Musculoskeletal Discomfort Questionnaire (CMDQ) was used as the primary screening tool. Participants who reported severe and mild LBP (graded low, mild, and severe) received a detailed physical examination including radiological magnetic resonance imaging. Based on the results of the physical examination, in conjunction with individual history, and medical opinion, mild-to-severe LBP was evident in 39% (n=220) of the participants. Of these, non-specific LBP accounted for 60%, discogenic LBP accounted for 31%, and other forms of LBP accounted for the remaining 9% of the sample. We found that LBP is highly incident in military office workers, with non-specific LBP being the most incident form. Considering these high incidence rates, a strategy for preventive health screening and exercise intervention should be considered in this population to help reduce absenteeism and increase workforce productivity.

Keywords*:* Low back pain, Cornell questionnaire, office workers, musculoskeletal

Correspondence: Reza Alizadeh, Department of Anesthesiology and Pain, AJA University of Medical Sciences, Tehran, Iran. Email: rezalizadeh@gmail.com

Submitted: August 20, 2019. ***Revised:*** September 15, 2019. ***Accepted:*** September 28, 2019.

Introduction

Low back pain (LBP) is a significant global health burden, which incurs considerable financial cost in terms of treatment pathways, and absenteeism from work (1,2). Approximately 80% of the adult population will suffer from some form of LBP during their lifetime (3). Studies indicate that particular occupations like office workers and health-care staff are more strongly associated with back disorders (4–7). Healthcare workers such as physicians and nurses, who work in hospital settings, have high physical demands placed upon them as they frequently stand for long periods, and engage in frequent activities such as trunk rotations, flexion movements, and working in uncomfortable positions during their long working shifts. High rates of LBP have been previously reported in individuals working in these occupations (8).

One of the most common forms of LBP is discogenic low back pain (DLBP) which is a consequence of internal disc disruption accounting for approximately 40% of LBP cases (9). Degeneration of the nucleus pulposus, disruption of the posterior annulus fibrosus and intradiscal changes are major causes of axial pain in DLBP (10). Posterior annular damage accelerates the migration of the nucleus pulposus into the outer annulus and consequently pathologic reactions such as nerve root compression and the development of vascularized granulation tissue (11). The diagnostic evaluation of patients with LBP can be very challenging and requires complex clinical decision-making. There is no specific effective treatment for DLBP, though surgery is one of the most effective treatments, however, post-operative complications have been reported (12). Recent studies claim that LBP is more common in females (13);(14), although there was no relation between sex and LBP in some occupations (15).

Our study aims to investigate the incidence of LBP in military health and office workers. We chose this group because they engage in daily bouts of physical activity, specifically, morning exercise drills, and we were interested to investigate whether this regular, fixed activity increased the risk of LBP. Secondly, we were able to deploy more objective screening measures to determine incidence of LBP, rather than just relying on self-report measures. We also wished to categorize LBP incidence by broad diagnostic classification including DLBP, non-specific LBP, and other forms of LBP. Therefore, the main purpose of the study was to determine the incidence of LBP stratified by sub-type in military office workers using objective assessment measures. Due to the nature of the repetitive tasks performed by this group we hypothesized that LBP would have a high prevalence among this population.

Methods

Military office workers (age: 20-50 years), with at least two years of occupational experience, were invited to participate in the study. The estimated sample size was 376 participants, but due to intended drop out, we estimated a sample size of 564 participants. Participants were informed about study details, and they provided written informed consent before participation. The principles of the Helsinki Declaration were followed (16). Clinical evaluation was conducted using the Cornell questionnaire for musculoskeletal disorders (17).

Data collection process

Afterwards, those with mild-to-severe LBP were selected for further interview. The interview consisted of questions about pain aggravation or induction by lumbar flexion (flexion pain), sitting on a chair or the floor (sitting pain), lifting objects at front (lifting pain), posture alterations, such as standing from a sitting position (pain on postural change), or standing position (standing pain) (12). Then they were asked about LBP red flag signs, including history of cancer, unexplained weight loss, prolonged use of steroids, intravenous drug use, urinary tract infection, any lumbar pain that is increased or unrelieved by rest, or affects sleep patterns, bladder or bowel incontinency, and history of recent significant trauma to the spine (18,19). If there were no red flags, then the clinical examinations was performed by a pain management physician and a sports medicine physician. The patients were asked to undertake a lumbosacral magnetic resonance imaging (MRI) after the medical history and physical examination were conducted (20).

Statistical analysis

Frequency and percentages were reported using descriptive analysis and the incidence of LBP and DLBP were determined. Statistical significance was defined at the 5% level and SPSS version 21 was used (IBM SPSS®, Armonk, NY, USA).

Results

564 individuals participated (male=303, female=261) in the study (see table 1).

Table 1. Incidence rate of musculoskeletal pain based on severity and location (n=564)

Location	Severity		
	Low % (n)	Mild % (n)	Severe % (n)
neck	68.2(385)	21.1(119)	10.7(60)
shoulder right	78(440)	15.4(87)	6.6(37)
shoulder left	80.5(454)	14.2(80)	5.3(30)
upper back	72.2(407)	17.7(100)	10.1(57)
upper arm right	87.6(494)	10.1(57)	2.3(13)
upper arm left	89.9(507)	8.5(48)	1.6(9)
lower back	61(344)	24.6(139)	14.4(81)
forearm right	87.6(494)	8.9(50)	3.5(20)
forearm left	89.9(507)	7.8(44)	2.3(13)
wrist right	81.9(462)	11.3(64)	6.7(38)
wrist left	84.2(475)	11.9(67)	3.9(22)
hip buttocks	83.2(469)	11.7(66)	5.1(29)
thigh right	80.5(454)	12.4(70)	7.1(40)
thigh left	81.7(461)	12.1(68)	6.2(35)
knee right	67.4(380)	19.7(111)	12.9(73)
knee left	69.7(393)	18.1(102)	12.2(69)
lower leg right	73.8(416)	13.3(75)	12.9(73)
lower leg left	73.6(415)	14.2(80)	12.2(69)
foot right	67(378)	20.6(116)	12.4(70)

According to clinical history and physical examination, 39% (n=220) of participants were categorized with mild-to-severe LBP; incidence of non-specific LBP was evident in 132 individuals (60%), specific-LBP (beside DLBP) accounted for 20 participants (9%), and 68 participants (31%) were categorized with DLBP (see table 2).

Table 2. Incidence of mild-to-severe LBP based on type and sex distribution

Category	Incidence (%)	Male (%)	Female (%)
Discogenic LBP	68(31%)	38(55.9%)	30 (44.1%)
Non-specific LBP	132(60%)	45 (34.1%)	87 (65.9%)
Other type of LBP	20(9%)	12 (60.0%)	8(40.0%)

LBP: low back pain

From 139 participants categorized with mild LBP, 57.6 % (n=81) were female. Amongst 81 individuals with severe LBP, 54.3% (n=44) were female (see table 3). Of 68 individuals diagnosed with discogenic LBP, 55.9 % (n=38) were male (see table 2).

Table 3. Intensity of LBP

severity	Total (%)	Gender	
		Male (%)	Female (%)
Mild	139(63.2%)	58(41.7%)	81(58.3%)
Severe	81(36.8%)	37(45.7%)	44(54.3%)

LBP: low back pain

Discussion

The aim of the study was to determine the incidence of non-specific (LBP), discogenic LBP, and other types of LBP (including spondylolysis and spinal cord stenosis) in military office workers in Iran. The Cornell questionnaire was used for primary screening and based on our data; the highest incidence of musculoskeletal discomfort was evident in the lower back. Participants with mild-to-severe LBP were selected for physical examination and followed up with MRI.

LBP is widespread and is also the most disabling musculoskeletal condition in the workplace (15). Considering the regular and repetitive activity performed by military office workers, allied to the fact that LBP is a top 5 condition contributing to disability, investigating the prevalence of LBP in this population seemed crucial (21). Occupation is one of the most important parameters for predicting musculoskeletal risk of LBP. There is not a definitive agreement about LBP prevalence (15,22-24) mainly due to differences in groups assessed, definitions used, and assessment tools used. High prevalence (32%) of musculoskeletal disorders has been shown in Malaysian office workers using the Cornell questionnaire (25). Furthermore, 58% of health care workers, and 18% of office worker suffered from LBP in the past year in Iranian workers (15), however, none of these studies included a physician examination and an objective screening tool, for example, MRI was not utilized in these studies, which is a significant strength of our study.

In the current study, 39% of participants experienced mild-to-severe LBP in the week before their evaluation. Our study showed that the most prevalent musculoskeletal pain in military office workers was LBP, with 24.6% (n=139) suffering from mild pain, and 14.4% (n=81) suffering from severe pain. We found that 60% were categorized with non-specific LBP; 31% reported DLBP; and 9% were diagnosed with other forms of LBP and. Previous reports identified DLBP as a source of chronic LBP in 39% of patients (9,26). We were unable to determine an accurate incidence of DLBP among office workers in Iran (15). In our current study, DLBP accounted for approximately 35% of participants who were categorized with mild-to-severe LBP. We found non-specific LBP accounted for 60% of our sample with LBP; based on a previous survey, the vast majority of patients seen in US primary care had non-specific LBP, meaning that patients reported LBP in the absence of a specific underlying condition that can be reliably identified (27).

When we consider incidence of LBP in males and females, some studies have reported no association (15,28), however, some studies have reported a higher incidence of LBP in females (14,22). In our study, LBP was more common among females. This is likely caused by exposure to higher musculoskeletal loads due to the pregnancy, child care, and double work day (combined domestic tasks and employment), in addition to less favorable physiological characteristics compared to make counterparts (29).

In conclusion, based on the results of a detailed physical examination, in conjunction with individual history, medical opinion and radiography, mild to severe LBP was evident in 39% (n=220) of the participants. Of these, non-specific LBP accounted for 60%, discogenic LBP accounted for 31%, and other specific LBP was evident in 9% of the sample. Considering these high incidence rates, a strategy for preventive health screening and exercise intervention should be considered in this population to help reduce absenteeism and increase workforce productivity.

Acknowledgements

The author(s) declared no potential conflicts of interests with respect to the research, authorship, and/or publication of this article. This study was supported by AJA University of Medical Sciences, Tehran, Iran. This study was approved by AJA University of Medical Sciences, Tehran, Iran (IRCT ID: IRCT20171111037388N3).
Our special thanks go to Sports Medicine Research Center, Tehran University of Medical Sciences, Tehran, Iran

References

1. van Hooff ML, Spruit M, O'Dowd JK, van Lankveld W, Fairbank JCT, van Limbeek J. Predictive factors for successful clinical outcome 1 year after an intensive combined physical and psychological programme for chronic low back pain. Eur Spine J 2014;23(1):102–12.
2. Shariat A, TC Lam E, Kargarfard MK, Tamrin SBM, Danaee M. The application of a feasible exercise training program in the office setting. Work 2017;56(3):421-8.
3. Hoy D, Brooks P, Blyth F, Buchbinder R. The epidemiology of low back pain. Best Pract Res Clin Rheumatology 2010;24(6):769–81.
4. Flodin U, Rolander B, Löfgren H, Krapi B, Nyqvist F, Wåhlin C. Risk factors for neck pain among forklift truck operators: a retrospective cohort study. BMC Musculoskel Disord 2018;19(1):44.
5. Marshall L, Villeneuve J, Grenier S. Effectiveness of a multifactorial ergonomic intervention and exercise conditioning kinesiology program for subsequent work related musculoskeletal disorder prevention. Work 2018;61(1):81–9.
6. Cheung K, Szeto G, Lai G, Ching S. Prevalence of and factors associated with work-related musculoskeletal symptoms in nursing assistants working in nursing homes. Int J Environ Res Public Health 2018;15(2):265.
7. Miedema HS, van der Molen HF, Kuijer PPFM, Koes BW, Burdorf A. Incidence of low back pain related occupational diseases in the Netherlands.

Eur J Pain 2014;18(6):873–82.
8. Masaki M, Aoyama T, Murakami T, Yanase K, Ji X, Tateuchi H, et al. Association of low back pain with muscle stiffness and muscle mass of the lumbar back muscles, and sagittal spinal alignment in young and middle-aged medical workers. Clin Biomechanics 2017;49:128–33.
9. Schwarzer AC, Aprill CN, Bogduk N. Internal disc disruption in patients with Chronic low back pain. Spine 1995;20(17):1878–83.
10. Moneta G, Videman T, Kaivanto K, Aprill C, Spivey M, Vanharanta H, et al. Reported pain during lumbar discography as a function of anular ruptures and disc degeneration. A re-analysis of 833 discograms. Spine 1994;19(17):1968–74.
11. Kloth DS, Fenton DS, Andersson GB, Block JE. Intradiscal electrothermal therapy (IDET) for the treatment of discogenic low back pain: Patient selection and indications for use. Pain Physician 2008;11(5):659–68.
12. Lee JH, Lee S-H. Clinical efficacy and its prognostic factor of percutaneous endoscopic lumbar annuloplasty and nucleoplasty for the treatment of patients with discogenic low back pain. World Neurosurgery 2017;105:832–40.
13. Williams JS, Ng N, Peltzer K, Yawson A, Biritwum R, Maximova T, et al. Risk factors and disability associated with low back pain in older adults in low-and middle-income countries. Results from the WHO study on global ageing and adult health (SAGE). PLoS One 2015;10(6):e0127880.
14. Wáng YXJ, Wáng J-Q, Káplár Z. Increased low back pain prevalence in females than in males after menopause age: evidences based on synthetic literature review. Quant Imaging Med Surgery 2016;6(2):199.
15. Mehrdad R. Prevalence of low back pain in health care workers and comparison with other occupational categories in Iran: A systematic review. Iran J Med Sci 2016;41(6):467–78.
16. Ashcroft RE. The declaration of Helsinki. In: Emanuel EJ, Grady C, Crouch RA, Lie RK, Miller FG, Wendler D, eds. The Oxford textbook of clinical research ethics. New York: Oxford Textbook, 2008;141–8.
17. Afifehzadeh-Kashani H, Choobineh A, Bakand S, Gohari MR, Abbastabar H, Moshtaghi P. Validity and reliability of Farsi version of Cornell Musculoskeletal Discomfort Questionnaire (CMDQ). Iran Occupat Health 2011;7(4):69-75.
18. Downie A, Williams CM, Henschke N, Hancock MJ, Ostelo RWJG, de Vet HCW, et al. Red flags to screen for malignancy and fracture in patients with low back pain: Systematic review. BMJ 2013;347:f7095.
19. Koes BW, Van Tulder Mw, Thomas S. Diagnosis and treatment of low back pain. BMJ 2006;332(7555):1430–4.
20. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis 2014;73(6):968-74.
21. Alizadeh R, Shariat A, Ansari NN, Kordi R, Cleland JA, Hakakzadeh A, et al. Office-based exercise therapy as a non-pharmacological treatment for discogenic low back pain among army staff. Iran J Public Health 2018;47(12):1969–70.
22. Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, et al. A systematic review of the global prevalence of low back pain. Arthritis Rheumatism 2012;64(6):2028–37.

23. Jensen JN, Holtermann A, Clausen T, Mortensen OS, Carneiro IG, Andersen LL. The greatest risk for low-back pain among newly educated female health care workers; body weight or physical work load? BMC Musculoskel Disord 2012;13(1):87.
24. IJzelenberg W, Burdorf A. Patterns of care for low back pain in a working population. Spine 2004;29(12):1362–8.
25. Shariat A, Tamrin B, Arumugam M, Ramasamy R, Danaee M. Prevalence rate of musculoskeletal discomforts based on severity level among office workers. Acta Med Bulgarica 2016;43(1):54-63.
26. Allegri M, Montella S, Salici F, Valente A, Marchesini M, Compagnone C, et al. Mechanisms of low back pain: A guide for diagnosis and therapy [version 2; referees: 3 approved]. F1000Res 2016;5:1530.
27. Chou R, Qaseem A, Snow V, Casey D, Cross JT, Shekelle P, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. Anna Intern Med 2007;147(7):478–91.
28. Rezaee M, Ghasemi M, Jafari NJ, Izadi M. Low back pain and related factors among Iranian office workers. Int J Occupat Hygiene 2011;3(1):23–8.
29. Meucci RD, Fassa AG, Faria NMX. Prevalência de dor lombar crônica: revisão sistemática. Rev Saúde Pública 2015;49:73. [Spanish]