Safety and Health at Work 5 (2014) 13–16

Contents lists available at ScienceDirect

Safety and Health at Work

journal homepage: www.e-shaw.org

Original Article

Do Psychological Factors Increase the Risk for Low Back Pain Among Nurses? A Comparing According to Cross-sectional and Prospective Analysis

Farideh Sadeghian [1], Samaneh Hosseinzadeh [2], Roqayeh Aliyari [3,*]

[1] Department of Occupational Health, Faculty of Health, Shahroud University of Medical Sciences, Shahroud, Iran
[2] Biostatistics Department, Social Welfare and Rehabilitation Sciences University, Tehran, Iran
[3] Department of Biostatistics and Epidemiology, Faculty of Health, Shahroud University of Medical Sciences, Shahroud, Iran

ARTICLE INFO

Article history:
Received 30 September 2013
Received in revised form
11 November 2013
Accepted 18 November 2013
Available online 9 January 2014

Keywords:
longitudinal study
low back pain
nurse
psychological
risk factors

ABSTRACT

Background: This study assesses influences of baseline psychological risk factors on prevalence of low back pain (LBP) at baseline and follow-up among nurses.
Methods: A prospective longitudinal study was performed at two phases, baseline and 1-year follow-up among 246 nurses of university hospitals in Shahroud, Iran. A standardized Cultural and Psychosocial Influences on Disability questionnaire was used for data collection. Logistic regression was performed for analysis.
Results: At the baseline of the study, 58.9% of nurses reported back pain in the previous 12 months. Age ($p = 0.001$), belief that work causes pain ($p = 0.022$), and somatization tendency ($p = 0.002$) significantly increased risk of LBP. At 1-year follow-up, prevalence of LBP was 45.7% and expectation of back pain at baseline ($p = 0.016$) significantly increased risk of LBP in this phase ($p < 0.05$).
Conclusion: Results indicate that risk factors for prevalence of back pain at baseline and 1-year follow-up are different. At baseline, the risk factors are age, belief that work causes pain, and somatization tendency, and at follow-up, expectation of pain is the major risk factor.

1. Introduction

Low back pain (LBP) is a prevalent health problem among nurses [1,2]. The highest rate of lost workdays and compensation claims related to nurses are because of LBP [3]. Epidemiological research has shown that LBP is connected to individual, physical, and psychosocial risk factors [4–6]. Furthermore recent studies have indicated that health beliefs and culture affect musculoskeletal complaints and its disability as much as physical activity and mental health [7,8] and individual beliefs and expectations are significant predictors for LBP [9,10]. Also, studies have indicated that prolonged disability and absence from work among patients with LBP is related to fear-avoidance beliefs [11] and positive health beliefs about LBP reduce disability due to LBP [12]. Moreover, some researchers have shown that somatization tendency should be considered as a confounding variable on occupational risk factors for musculoskeletal disorders [13].

This study was conducted because very few studies have investigated psychological risk factors of LBP especially among nurses in Iran. Furthermore, health beliefs about LBP and cultural factors differ significantly in various countries. It is unclear whether the results of cross-sectional analysis are similar to longitudinal researches, so this study compares psychological risk factors of LBP at baseline along with individual, physical, and psychosocial factors for the prevalence of LBP at baseline with LBP at follow-up among nurses.

2. Materials and methods

A longitudinal study with 1-year follow-up was performed among all nurses with at least 1-year's employment at three

* Corresponding author. Department of Biostatistics and Epidemiology, Faculty of Health, Shahroud University of Medical Sciences, Shahroud 3614773955, Iran.
E-mail address: r_aliary@yahoo.com (R. Aliyari).

2093-7911/$ – see front matter © 2014, Occupational Safety and Health Research Institute. Published by Elsevier. All rights reserved.
http://dx.doi.org/10.1016/j.shaw.2013.11.004

Table 1
Characteristics of the study population at baseline and follow-up

Characteristics	*N* (%)	At baseline ($n = 246$)	At follow-up ($n = 219$)
Sex	Male	45 (18.3)	41 (18.7)
	Female	201 (81.7)	178 (81.3)
Age (y)	<30	80 (32.5)	55 (25.1)
	30–39	115 (46.8)	116 (53.0)
	40–49	44 (17.9)	39 (17.8)
	50–60	7 (2.8)	9 (4.1)
Back pain: (baseline: previous 12 months), (follow-up: past month)	Yes	145 (58.9)	100 (45.7)
	No	101 (41.1)	119 (54.3)
Disabled by back pain/back pain		27/145 (18.6)	17/100 (17)
Mental health score (SF-36)*	Low	12 (4.9)	6 (2.8)
	Middle	108 (43.9)	79 (36.4)
	High	126 (51.2)	132 (60.8)
Somatization tendency score†	High	4 (1.6)	—
	Middle	74 (30.1)	49 (22.4)
	Low	168 (68.3)	170 (77.6)
Belief about work-causation of pain‡	Yes	181 (73.6)	—
	No	65 (26.4)	—
Belief about fear of physical activity on low back pain‡	Yes	196 (79.7)	—
	No	50 (20.3)	—
Expectation of back pain‡	Yes	86/145 (59.3)	—
Lifting weights ≥25 kg by hand‡	Yes	61 (24.9)	—
	No	185 (75.1)	

* Mental health score: low, 0–125; medium, 125–250; and high, 250–375.
† Somatization tendency score: low, 0–9; medium, 10–19; and high, 20–28.
‡ This question was not on the follow-up questionnaire.

university hospitals in Shahroud, Iran in 2008 and 2009 and 1 year later. The aim of the study was explained to each potential participant, and those who agreed to continue answered the baseline questionnaire in their workplace. The follow-up questionnaire was shorter and 1 year later asked about LBP in the past month. In total, 246 eligible nurses consented to participate at baseline (response rate was 94% among those enrolled).

The baseline questionnaire was a standardized Cultural and Psychosocial Influences on Disability (CUPID) questionnaire [7] including seven sections. (1) Individual factors (sex, age, smoking status, work hours/week, job history, etc.). (2) Physical and psychosocial risk factors at work (lifting weights ≥25 kg by hand, working with the hands above shoulder height; repeated bending and straightening of the elbow and kneeling or squatting for longer than 1 hour in an average working day, piecework or bonuses, time pressure, lack of choice in work, lack of support from colleagues or manager, job dissatisfaction and job insecurity). (3) LBP lasting 1 day or more in the previous 12 months and 1 month (Nordic questionnaire) [14] and its consequences; sickness absence, medical cares, and disability in addition a question about expectation of pain: "Do you expect your LBP would be a problem for you in the next 12 months?" The question about disabling pain was: "During the past month, has LBP made it difficult or impossible to carry out any of a specified list of everyday activities (getting dressed, doing normal jobs around the house, or cutting toe nails)". Pain was categorized as disabling if it had made all of these three activities impossible or difficult. (4) Awareness of other people with LBP at work and outside. (5) Somatizing tendency (dizziness, pains in the heart or chest, upset stomach or nausea, trouble getting breath, hot or cold spells, or all during the past week; Brief Symptom Inventory questionnaire) [15]. (6) Beliefs about work causation and fear of physical activity in LBP (Fear Avoidance Beliefs questionnaires) [16]. (7) Mental health [SF-36 (MH) questionnaire] [17]. Final relevant scores of somatizing tendency and mental health were graded to three levels, representing high, middle, and low.

The questionnaires were translated to Farsi, back-translated to English independently, amended as necessary, and then piloted.

Statistical associations between independent variables and LBP were initially evaluated using univariate and multiple logistic regression models. Two models were used for data analysis. LBP at baseline were assessed with risk factors at baseline (individual, physical, and psychosocial risk factors at work, awareness of other people with LBP at work and outside, somatizing tendency, beliefs about work causation and fear of physical activity in LBP, mental health) at the first model (cross-sectional model, $n = 246$). LBP at follow-up also were assessed with risk factors at baseline at the second model (longitudinal model, $n = 219$). The level of significance was set at 0.05. Statistical analysis was carried out with SPSS version 17 software.

The ethical approval for the study will be sought from the research committee of Shahroud University of Medical Sciences.

3. Results

The baseline questionnaire was completed by 246 nurses (response rate was 94%). Mean age and work hours/week were (mean ± standard deviation) 33.7 ± 0.2 years and 47.5 ± 8 hours, respectively. Of the 246 nurses, 69% had >5 years' work experience, 61 nurses (25%) reported lifting weights ≥25 kg by hand at work. Prevalence of LBP at baseline in previous 12 months was reported by 145/246 (58.9%). Among them, 27/145 cases (18.6%) led to

Table 2
Back pain at follow-up according to lower back pain status at baseline ($n = 219$)*

Baseline back pain	Follow-up back pain, *N* (%)			Total
	No	Yes (not disabled)	Yes (disabled)	
No	69 (77.5)	17 (19.1)	3 (3.4)	89
Yes (not disabled)	45 (42.1)	58 (54.2)	4 (3.7)	107
Yes (disabled)	5 (21.7)	8 (34.8)	10 (43.5)	23
Total	119	83	17	219

* Pain was categorized as disabling if it had made three relevant activities impossible or difficult.

Table 3
The results of multiple logistic regression between low back pain and covariates at baseline (cross-sectional model; $n = 246$)*

Independent variables	Coefficient	Standard error	p	Odds ratio	95% Confidence interval
Age	0.07	0.02	0.001	1.07	1.03–1.11
Belief about work-causation of back pain (no = reference category)	0.71	0.31	0.022	2.04	1.11–3.75
Somatization tendency score (low = reference category)	0.99	0.31	0.002	2.69	1.46–4.95

* Independent variables entered to the model: individual, physical, and psychosocial risk factors at work; awareness of other people with back pain at work and outside; somatizing tendency; beliefs about work causation and fear of physical activity in low back pain; and mental health.

Table 4
The results of multiple logistic regression between low back pain and covariates at follow-up (longitudinal model; $n = 219$)*

Independent variables	Coefficient	Standard error	p	Odds ratio	95% Confidence interval
Lifting weights ≥25 kg or more by hand (no = reference category)	0.92	0.48	0.054	2.25	0.98–6.44
Expectation of back pain (no = reference category)	0.94	0.39	0.016	2.57	1.19–5.54
Somatization tendency score (low = reference category)	0.68	0.41	0.097	1.99	0.88–4.46

* Independent variables entered to the model: individual, physical, and psychosocial risk factors at work; awareness of other people with back pain at work and outside; somatizing tendency; beliefs about work causation and fear of physical activity in low back pain; and mental health.

disability. At follow-up 219 of 246 nurses who participated at the baseline, answered the second questionnaire (response rate at follow-up was 89%). In this stage, prevalence of LBP in nurses was 45.7% (100/219), and 17.0% (17/100) reported disability (Table 1). Among nurses with disability due to LBP at baseline, 43.5% reported this disability at follow-up but among nurses without disability due to LBP at baseline only 3.7% reported disability at follow-up (Table 2).

At cross-sectional model, backward multiple logistic regression analysis showed age, belief that work causes pain and somatization tendency had a statistically significant effect on LBP in the previous 12 months ($p < 0.05$). The odds of LBP in nurses who believed about work causation of LBP, was about 2 times more than the odds in nurses who did not. The odds of LBP were about 2.7 times more in nurses with high and middle somatization tendency than nurses with low somatization tendency (Table 3).

On application of the longitudinal model, backward multiple logistic regression analysis indicated that expectation of LBP in the future at baseline was significantly associated with LBP at follow-up. The risk of LBP among nurses who expected that LBP would be a problem for them in the coming year was 2.6 times more than others who did not. Lifting weights ≥25 kg by hand at work and somatization tendency had a borderline p value ($p > 0.05$) but because of their importance these were included in the model. The odds of LBP among nurses who reported lifting weights of ≥25 kg by hand at work was 2.5 times more than the others. Also, risk of LBP among participants who reported high/middle somatization tendency was 2 times greater than participants with a low score (Table 4).

4. Discussion

The objective of the present study was to compare psychological risk factors for LBP among nurses at baseline with 1-year follow-up.

According to the results, LBP was reported by 59% of nurses in the previous 12 months at baseline, which is lower than similar reports among nursing personnel in Greece (75%) [18], The Netherlands (62%) [18], Nigeria (73.5%) [19], Malaysia (79.4%) [20], and higher than research in Italy (44%) [21], Hong Kong (40.6%) [22], and New Zealand (57%) [23]. Two studies among nurses in Iran have shown LBP prevalence is 54.9% and 73.2% [24,25].

In cross-sectional analysis, prevalence of LBP in the previous 12 months at baseline was associated with age, belief that work causes LBP, and somatization tendency.

Our results agree with those published by Solidaki et al [26] among three occupations including nurses, they found significant association between musculoskeletal disorders and belief about work causation of pain. In several cross-sectional researches fear-avoidance beliefs have been recognized as an important psychosocial variable in chronic LBP, Fritz et al [11] and Coudeyre et al [27] indicated that fear-avoidance beliefs are present in patients with acute LBP.

A strong association with somatization tendency has been found in other cross-sectional studies [13,28]. A study among nurses in Italy indicated that prevalence of back disorders associated with stress-related psychosomatic symptoms [21]. Mehrdad et al [25], in a cross-sectional study among 347 Iranian nurses, showed a higher odds ratio for LBP in nurses with middle and high stress than in nurses with low stress. However, in a similar study in New Zealand association with somatization tendency was weak [23].

On the basis of longitudinal analysis, prevalence of LBP in the previous month at follow-up was associated with expectation of pain at baseline. Boersma and Linton [9], in a study among (sub) acute LBP patients showed negative expectations related to pain and its disability at 1-year follow-up. Van Nieuwenhuyse et al [29] also indicated that pain-related fear was a risk factor for LBP after 1 year among young health care workers.

Research has shown that expectation has a greatly variable definition [30], related to individual factors such as, age, sex, race, education level, and psychological factors for instance emotional distress, fear, depression, and coping. Furthermore, in other studies expectation has been introduced as a significant predictive indicator for people with musculoskeletal disorders [31].

A systematic review of 913 studies with a prospective design by Linton [32] indicated that psychological variables, anxiety, mood, cognitive functioning, stress, and distress are significantly associated with LBP. However, in our study, apart from the expectation of pain no association was found between psychological factors at baseline and LBP at follow-up. For example, association with fear avoidance belief and mental health were not significant and for somatization tendency was borderline.

Our study had some limitations: (1) misclassifications of exposure and disease in the questionnaire-based survey; (2) self reporting and absence of clinical measures of pain or disability; (3) lack of scale for determining the intensity of the reported pain; and (4) unclear direction of causation for somatization tendency and belief in work causing pain as major demonstrated associations in the cross-sectional model. The strength of our study was its longitudinal design and standardized questionnaire.

The novel feature of our study was identification of different psychological risk factors for LBP at baseline and follow-up. Somatizing tendency and belief that work causes pain have been

found to be major determinants of LBP at baseline but they did not predict future LBP within our study population. Also, high persistence of reported disability due to LBP is one of the major concerns of our study.

In conclusion, our study indicates that results of cross-sectional analysis are not similar to longitudinal researches. In cross-sectional analysis, risk factors for the prevalence of LBP are age, belief that work causes pain and somatization tendency, and in the longitudinal model, the major risk factor is expectation of pain. For the future, interventional studies on health belief, aspects of expectation and cognitive behavior therapy, and exploring the direction of causation for somatization tendency among nurses with LBP are suggested.

Conflicts of interest

No potential conflict of interest relevant to this article was reported.

Acknowledgments

This study (No. 8724) was supported financially by the Vice Chancellor for research of Shahroud University of Medical Sciences. The authors would like to thank Professor David Coggon from the UK for designing and managing the CUPID study. Thanks also to participants of this study and Fateme Arab Asadi, Mitra Lashkari, Akram Hassani, and Fateme Ally for data collection.

References

[1] Lin PH, Tsai YA, Chen WC, Huang SF. Prevalence, characteristics, and work-related risk factors of low back pain among hospital nurses in Taiwan: a cross-sectional survey. Int J Occup Med Environ Health 2012;25:41–50.
[2] June KJ, Cho SH. Low back pain and work-related factors among nurses in intensive care units. J Clin Nurs 2011;20:479–87.
[3] Edlich RF, Woodard CR, Haines MJ. Disabling back injuries in nursing personnel. J Emerg Nurs 2001;27:150–5.
[4] Devereux J, Vlachonikolis I, Buckle P. Epidemiological study to investigate potential interaction between physical and psychosocial factors at work that may increase the risk of symptoms of musculoskeletal disorder of the neck and upper limb. Occup Environ Med 2002;59:269–77.
[5] Lorusso A, Bruno S, L'Abbate N. A review of low back pain and musculoskeletal disorders among Italian nursing personnel. Ind Health 2007;45:637–44.
[6] Eriksen W, Bruusgaard D, Knardahl S. Work factors as predictors of intense or disabling low back pain; a prospective study of nurses' aides. Occup Environ Med 2004;61:398–404.
[7] Coggon D, Ntani G, Palmer KT, Felli VE, Harari R, Barrero LH, Felknor SA, Gimeno D, Cattrell A, Serra C, Bonzini M, Solidaki E, Merisalu E, Habib RR, Sadeghian F, Kadir M, Warnakulasuriya SS, Matsudaira K, Nyantumbu B, Sim MR, Harcombe H, Cox K, Marziale MH, Sarquis LM, Harari F, Freire R, Harari N, Monroy MV, Quintana LA, Rojas M, Salazar Vega EJ, Harris EC, Vargas-Prada S, Martinez JM, Delclos G, Benavides FG, Carugno M, Ferrario MM, Pesatori AC, Chatzi L, Bitsios P, Kogevinas M, Oha K, Sirk T, Sadeghian A, Peiris-John RJ, Sathiakumar N, Wickremasinghe AR, Yoshimura N, Kielkowski D, Kelsall HL, Hoe VC, Urquhart DM, Derett S, McBride D, Gray A. The CUPID (Cultural and Psychosocial Influences on Disability) study: methods of data collection and characteristics of study sample. PLoS One 2012;7:e39820.
[8] Burnett A, Sze CC, Tam SM, Yeung KM, Leong M, Wang WT, Tan BK, O'Sullivan P. A cross-cultural study of the back pain beliefs of female undergraduate healthcare students. Clin J Pain 2009;25:20–8.
[9] Boersma K, Linton SJ. Expectancy, fear and pain in the prediction of chronic pain and disability: a prospective analysis. Eur J Pain 2006;10:551–7.
[10] Palmer KT, Calnan M, Wainwright D, Poole J, O'Neill C, Winterbottom A, Watkins C, Coggon D. Disabling musculoskeletal pain and its relation to somatization: a community-based postal survey. Occup Med 2005;55:612–7.
[11] Fritz JM, George SZ, Delitto A. The role of fear-avoidance beliefs in acute low back pain: relationships with current and future disability and work status. Pain 2001;94:7–15.
[12] Buchbinder R, Jolley D, Wyatt M. Population based intervention to change back pain beliefs and disability: three part evaluation. BMJ 2001;322:1516.
[13] Madan I, Reading I, Palmer KT, Coggon D. Cultural differences in musculoskeletal symptoms and disability. Int J Epidemiol 2008;37:1181–9.
[14] Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, Jørgensen K. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon 1987;18:233–7.
[15] Ware Jr JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. Med Care 1992;30:473–83.
[16] Derogatis LR, Melisaratos N. The Brief Symptom Inventory: an introductory report. Psychol Med 1983;3:595–605.
[17] Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. Pain 1993;52:157–68.
[18] Alexopoulos EC, Burdorf A, Kalokerinou A. A comparative analysis on musculoskeletal disorders between Greek and Dutch nursing personnel. Int Arch Occup Med Environ Health 2006;79:82–8.
[19] Sikiru L, Hanifa S. Prevalence and risk factors of low back pain among nurses in a typical Nigerian hospital. Afr Health Sci 2010;10:26–30.
[20] Rahmah M, Rozy J, Halim I, Jamsiah M, Shamsul A. Prevalence of back pain among nurses working in government health clinics and hospital in Port Dickson, Malaysia. Jurnal Kesihatan Masyarakat 2008;14:11–8.
[21] Violante FS, Fiori M, Fiorentini C, Risi A, Garagnani G, Bonfiglioli R, Mattioli S. Associations of psychosocial and individual factors with three different categories of back disorder among nursing staff. J Occup Health 2004;46:100–8.
[22] Yip YB. A study of work stress, patient handling activities and the risk of low back pain among nurses in Hong Kong. J Adv Nurs 2001;36:794–803.
[23] Harcombe H, McBride D, Derrett S, Gray A. Physical and psychosocial risk factors for musculoskeletal disorders in New Zealand nurses, postal workers and office workers. Inj Prev 2010;16:96–100.
[24] Choobineh A, Rajaeefard A, Neghab M. Association between perceived demands and musculoskeletal disorders among hospital nurses of Shiraz University of Medical Sciences: a questionnaire survey. Int J Occup Saf Ergon 2006;12:409–16.
[25] Mehrdad R, Dennerlein JT, Haghighat M, Aminian O. Association between psychosocial factors and musculoskeletal symptoms among Iranian nurses. Am J Ind Med 2010;53:1032–9.
[26] Solidaki E, Chatzi L, Bitsios P, Markatzi I, Plana E, Castro F, Palmer K, Coggon D, Kogevinas M. Work related and psychological determinants of multi-site musculoskeletal pain. Scand J Work Environ Health 2010;36:54–61.
[27] Coudeyre E, Tubach F, Rannou F, Baron G, Coriat F, Brin S, Revel M, Poiraudeau S. Fear-avoidance beliefs about back pain in patients with acute LBP. Clin J Pain 2007;23:720–5.
[28] Carugno M, Pesatori AC, Ferrario MM, Ferrari AL, Silva FJd, Martins AC, Felli VE, Coggon D, Bonzini M. Physical and psychosocial risk factors for musculoskeletal disorders in Brazilian and Italian nurses. Cad Saúde Púb 2012;28:1632–42.
[29] Van Nieuwenhuyse A, Somville P-R, Crombez G, Burdorf A, Verbeke G, Johannik K, Van den Bergh O, Masschelein R, Mairiaux P, Moens GF., BelCo-Back Study Group. The role of physical workload and pain related fear in the development of low back pain in young workers: evidence from the BelCo-Back Study; results after one year of follow up. Occup Environ Med 2006;63:45–52.
[30] Thompson AG, Suñol R. Expectations as determinants of patient satisfaction: concepts, theory and evidence. Int J Qual Health Care 1995;7:127–41.
[31] Bialosky JE, Bishop MD, Cleland JA. Individual expectation: an overlooked, but pertinent, factor in the treatment of individuals experiencing musculoskeletal pain. Phys Ther 2010;90:1345–55.
[32] Linton SJ. A review of psychological risk factors in back and neck pain. Spine 2000;25:1148–56.