



## Original Article

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

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## 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.

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## 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

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**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) <sup>*</sup>	Low	12 (4.9)	6 (2.8)
	Middle	108 (43.9)	79 (36.4)
	High	126 (51.2)	132 (60.8)
Somatization tendency score <sup>†</sup>	High	4 (1.6)	—
	Middle	74 (30.1)	49 (22.4)
	Low	168 (68.3)	170 (77.6)
Belief about work-causation of pain <sup>‡</sup>	Yes	181 (73.6)	—
	No	65 (26.4)	—
Belief about fear of physical activity on low back pain <sup>‡</sup>	Yes	196 (79.7)	—
	No	50 (20.3)	—
Expectation of back pain <sup>‡</sup>	Yes	86/145 (59.3)	—
Lifting weights $\geq 25$ kg by hand <sup>‡</sup>	Yes	61 (24.9)	—
	No	185 (75.1)	—

\* Mental health score: low, 0–125; medium, 125–250; and high, 250–375.

<sup>†</sup> Somatization tendency score: low, 0–9; medium, 10–19; and high, 20–28.

<sup>‡</sup> 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  $\geq 25$  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  $\pm$  standard deviation)  $33.7 \pm 0.2$  years and  $47.5 \pm 8$  hours, respectively. Of the 246 nurses, 69% had  $>5$  years' work experience, 61 nurses (25%) reported lifting weights  $\geq 25$  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 ( $n = 219$ )<sup>\*</sup>

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;  $n = 246$ )<sup>\*</sup>

Independent variables	Coefficient	Standard error	<i>p</i>	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;  $n = 219$ )<sup>\*</sup>

Independent variables	Coefficient	Standard error	<i>p</i>	Odds ratio	95% Confidence interval
Lifting weights $\geq 25$ 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  $\geq 25$  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  $\geq 25$  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 Nieuwenhuysse 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.

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