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PREDICTORS OF LOW BACK PAIN IN A LONGITUDINAL STUDY OF IRANIAN NURSES AND OFFICE WORKERS

Abstract

1.1 BACKGROUND—A previous survey had indicated high rates of low back pain (LBP) in Iranian nurses and office workers.

1.2 OBJECTIVE—To explore possible risk factors, we carried out a longitudinal study of the same subjects.

1.3 METHODS—Baseline information about risk factors and recent history of LBP was collected by self-administered questionnaire from 246 nurses and 182 office workers. Approximately 12 months later, 385 (90%) answered a second questionnaire about LBP in the past month. Predictors of LBP at follow-up were assessed by Poisson regression and summarised by prevalence rate ratios (PRRs) with 95% confidence intervals (CIs).

1.4 RESULTS—In a regression model that included all risk factors, the strongest predictor of LBP at follow-up was report of recent LBP at baseline. In addition, LBP was associated with older age, adverse beliefs about the work-relatedness of LBP (PRR 1.3, 95%CI 1.0-1.5), and incentives from piecework or bonuses (PRR 1.4, 95%CI 1.1-1.6). When baseline report of LBP was omitted from the model, associations were also observed with tendency to somatise, poor mental health and time pressures at work.

1.5 CONCLUSIONS—Our findings support the importance of psychosocial risk factors for LBP, including adverse health beliefs and working conditions that encourage higher output.

Keywords

Psychosocial; health beliefs; piecework; somatising; mental health

3. Introduction

Low back pain (LBP) is a common symptom among people of working age in many countries [1], and carries substantial direct and indirect costs [2]. In Iran, a survey conducted by the World Health Organisation indicated a seven-day prevalence of 15.4% among the adult urban general population [3], and high rates have been reported in nurses [4] and office workers [5]. In a large international survey (the CUPID study), which used standardised methods to ascertain symptoms from workers in 47 occupational groups from 18 countries, the one-month prevalence rates of disabling LBP in samples of Iranian nurses and office workers were 35% and 23% respectively [6]. By comparison, across all countries in the study, prevalence rates in nurses varied from 10% to 43%, and in office workers from 6% to 33% [6].

Epidemiological studies, conducted mainly in western countries, have identified various risk factors for LBP, including older age [1], female sex [1], low mood [7], tendency to somatise

[8-10], adverse health beliefs about the causes and prognosis of back disorders [6,11], physical activities such as heavy lifting [12], and psychosocial aspects of work [13,14]. However, to date there has been little research on causes of LBP in Iran. Given the large international differences in prevalence, even among workers from similar occupations, it is possible that risk factors and their relative importance differ between countries.

We therefore used data from longitudinal follow-up of Iranian participants in the CUPID study to assess risk factors for LBP.

4. Methods

During July 2008 to March 2009, a baseline cross-sectional survey was carried out among nurses and office workers from three university hospitals and four universities, all in the city of Shahroud. Workers were eligible for inclusion if they were aged 20-59 years, and had been employed in their current job for >12 months. Potential participants were identified through a nominated manager at each institution, and asked to complete a self-administered questionnaire.

The questionnaire was a Farsi translation of the English language CUPID questionnaire, checked by independent back-translation, and piloted in workers not included in the current study [15,16]. Among other things, it asked about sex, age, occupational lifting, psychosocial aspects of work, mental health, somatising tendency, health beliefs about LBP, and experience of LBP lasting a day or longer during the past month and past 12 months.

The question about lifting asked whether weights ≥ 25 kg were lifted by hand during an average working day. The questions on psychosocial aspects of work covered: working hours; time pressure; incentives from piecework or bonuses; lack of support from colleagues or supervisor/manager; job dissatisfaction; lack of choice in what work is done, how and when; and perceived job insecurity if off work for three months with illness.

Mental health was assessed using the relevant domain of the SF-36 questionnaire [17], and scores were classified to three levels (corresponding to approximate thirds of the distribution in the full CUPID study). Somatising tendency (i.e. a tendency to be aware of, and worry about, common somatic symptoms) was ascertained through questions from the Brief Symptom Inventory [18], and graded according to the number of somatic symptoms from a total of five (faintness or dizziness, pains in the heart or chest, nausea or upset stomach, trouble getting breath, hot or cold spells) that had been at least moderately distressing during the past week.

Health beliefs were assessed in three domains: work-relatedness, physical activity and prognosis. Subjects were considered to have adverse beliefs about work-relatedness if they completely agreed that back pain is commonly caused by work. Beliefs about physical activity were classed as adverse if the participant completely agreed that for someone with back pain, physical activity should be avoided as it might cause harm and that rest is needed to get better. Beliefs about prognosis were classed as adverse if the participant completely disagreed that LBP usually gets better within three months and completely agreed that

neglecting problems of this kind can cause permanent health problems. The questions about LBP were accompanied by a figure depicting the anatomical area of interest.

After an interval of 12 months, participants were asked to complete a second shorter questionnaire, which again asked about LBP in the past month, using an identical question.

Analysis was carried out with Stata Version 11.1 software. Associations between baseline risk factors and LBP at follow-up were assessed by Poisson regression with robust confidence intervals, and were summarised by prevalence rate ratios (PRRs) and associated 95% confidence intervals (CIs).

Ethical approval for the study was obtained from the Research Committee of Shahrood University of Medical Sciences.

Further information about the design of the CUPID study and methods of data collection has been published elsewhere [15].

5. Results

Follow-up questionnaires were completed by 385 subjects (219 nurses and 166 office workers) out of the 428 (246 nurses and 182 office workers) who participated at baseline – an overall follow-up rate of 90%. Table 1 summarises the distribution of the study sample according to various characteristics at baseline, and the response rate according to those characteristics. Most responders were female (287) and below age 40 years. At baseline, 212 reported LBP in the past 12 months, including 148 with LBP in the past month. There were no major differences in response rate in relation to any of the baseline characteristics assessed.

Table 2 summarises the association of LBP in the past month at follow-up according to risk factors assessed at baseline. When each risk factor was analysed separately with adjustment only for sex and age (Model 1), elevated PRRs were observed for female sex (1.3), older age (1.5), report of two or more distressing somatic symptoms (1.4), poor mental health (1.5), adverse beliefs about the work-relatedness of LBP (1.3), and four psychosocial aspects of work – perceived time pressure (1.4), incentives from piecework or bonuses (1.3), lack of support (1.3) and job insecurity (1.3). However, the strongest baseline predictor of LBP at follow-up was history of LBP in the past year at baseline, and especially in the past month (PRR 3.1, 95% CI 2.3-4.2).

When all of the risk factors apart from past history of LBP were included in a single regression model (Model 2), the associations with female sex and job insecurity were diminished, but otherwise risk estimates were much the same. When baseline history of LBP was also included (Model 3), most of the associations were weakened. Nevertheless, increased risks were still apparent for the older age groups, adverse beliefs about the work-relatedness of LBP (PRR 1.3, 95% CI 1.0-1.5) and incentives at work (PRR 1.4, 95% CI 1.1-1.6). In addition, risk was elevated in subjects who reported LBP in the past month at baseline (PRR 2.9, 95% CI 2.1-3.9), and in the past 12 months but not the past month (PRR

2.1, 95% CI 1.5-3.0), and tended to be higher in office workers than in nurses (PRR 1.2, 95% CI 1.0-1.5).

6. Discussion

In this longitudinal study of Iranian workers, the strongest predictor of LBP at follow-up was report of recent LBP at baseline, but the symptom was also associated with older age, adverse beliefs about the work-relatedness of LBP, and incentives from piecework or bonuses. In addition, associations were observed with tendency to somatise, poor mental health and time pressures at work, but these were attenuated after adjustment for baseline history of LBP.

We achieved a high follow-up rate (90%), which differed little in relation to the baseline risk factors analysed, and it is therefore unlikely that associations were importantly biased by selective participation. Furthermore, the study's longitudinal design helped to rule out reverse causation, especially in analyses that adjusted for baseline history of LBP. Against this, the total study sample was only 385, which limited the precision of risk estimates. Nevertheless, several clear findings emerged from our analysis.

That LBP at follow-up was strongly predicted by recent history of the symptom at baseline was expected. A similar association has been demonstrated previously [19], and reflects the fact that LBP is often chronic or recurrent [20]. Nor is it surprising that associations with other risk factors tended to be diminished after adjustment for baseline history of LBP. If some of the LBP that was caused by an exposure was already present in the 12 months before baseline, the impact of that exposure will not be fully reflected in analyses that adjust for earlier pain.

Nevertheless, even after adjustment for pain at baseline, associations were apparent with adverse beliefs about the work-relatedness of LBP and incentives from piecework and bonuses. In a cross-sectional analysis based on the full CUPID study (involving 18 countries), adverse beliefs about work-relatedness were significantly associated both with disabling LBP and also with disabling wrist/hand pain [6]. Our finding in this analysis strengthens the evidence that this relationship is causal.

High job demands have been linked with a higher risk of LBP in previous investigations [13], and this may explain the association that we observed with piecework or bonuses. The association might reflect more intense mechanical stresses on tissues, or it could be mediated through psychological influences on pain perception. We also found an association with perceived time pressures at work, although after adjustment for baseline LBP, it was relatively weak.

As in other studies [7-10], we found that LBP was associated with low mood and tendency to somatise, but again, risks were lower after adjustment for previous history of LBP. This could be because LBP at baseline caused somatisation and poor mental health, and independently was associated with a greater risk of continuing symptoms at follow-up. However, other longitudinal studies have found that somatising tendency and low mood predicted future musculoskeletal symptoms even after allowance for the presence of

symptoms at baseline LBP [10,21,22], suggesting that the association is not simply a consequence of reverse causation.

Unlike in many other studies [12], we found no increased risk of LBP in relation to report of heavy lifting. Within our sample, exposure to lifting was predominantly in the nurses [15], but the lack of association cannot be explained by our adjustment of analyses for occupation. Moreover, in the fully adjusted model, there was a higher risk of LBP in office workers than in nurses (PRR 1.2, 95%CI 1.0-1.5). While observational studies have generally found modest associations between heavy lifting and LBP [23], randomised controlled trials of ergonomic interventions to reduce mechanical loading of the spine have failed to prevent back pain [24]. Thus, the effects of physical stresses may be importantly modified by concomitant psychosocial risk factors, and it is possible that the lower risk of LBP that we observed in nurses as compared with office workers is attributable to unmeasured psychosocial influences. It may also be that heavy lifting was over-reported by some nurses, since at the hospitals studied, most lifting and carrying of patients is carried out by male assistants who are not nurses.

7. Conclusion

Overall, our findings are broadly consistent with those from other published research, supporting the importance of psychosocial risk factors for LBP such as adverse health beliefs and working conditions that encourage higher output. The causal impact of some risk factors may have been underestimated in the fully adjusted statistical model because they acted in part through increasing the baseline occurrence of LBP.

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Table 1
Response rate at follow-up according to characteristics at baseline

Baseline characteristic	Number of participants at baseline	Number of participants at follow-up	Response rate (%)
Sex			
Male	109	98	89.9
Female	319	287	90.0
Age (years)			
20-29	170	148	87.1
30-39	178	165	92.7
40-59	80	72	90.0
Occupation			
Nurse	246	219	89.0
Office worker	182	166	91.2
Activity in an average working day			
Lifting weights ≥ 25 kg ^b	74	63	85.1
Psychosocial aspects of work			
Work for >50 hours per week	146	135	92.5
Time pressure at work	357	322	90.2
Incentives at work	125	112	89.6
Lack of support at work	107	91	85.0
Job dissatisfaction	120	110	91.7
Lack of job control	95	87	91.6
Job insecurity	256	233	91.0
Number of distressing somatic symptoms in past week			
0	191	173	90.6
1	95	85	89.5
2+	142	127	89.4
Mental health			
Good	106	92	86.8
Intermediate	143	131	91.6
Poor	179	162	90.5
Adverse beliefs about low back pain			
Work-relatedness	122	111	91.0
Physical activity	49	45	91.8
Prognosis	16	15	93.8
Low back pain at baseline			
None	194	173	89.2
Past 12 months but not past month	72	64	88.9
Past month	162	148	91.4

Table 2
Risk factors at baseline for report of low back pain in past month at follow-up

Risk factor	Number of cases (prevalence %)	Model 1 ^a		Model 2 ^b		Model 3 ^c	
		PRR	(95 CI)	PRR	(95%CI)	PRR	(95%CI)
Sex							
Male	39 (39.8)	1		1		1	
Female	137 (47.7)	1.3	(1.0-1.7)	1.1	(0.8-1.5)	1	(0.8-1.3)
Age (years)							
20-29	56 (37.8)	1		1		1	
30-39	81 (49.1)	1.4	(1.1-1.8)	1.4	(1.1-1.9)	1.3	(1.0-1.6)
40-59	39 (54.2)	1.5	(1.1-2.0)	1.5	(1.1-2.0)	1.3	(1.0-1.7)
Occupation							
Nurse	100 (45.7)	1		1		1	
Office worker	76 (45.8)	1.1	(0.9-1.4)	1.2	(0.9-1.5)	1.2	(1.0-1.5)
Activity in an average working day							
Lifting weights ≥ 25 kg	30 (47.6)	1.1	(0.8-1.5)	1.1	(0.8-1.5)	1.1	(0.8-1.4)
Psychosocial aspects of work							
Work for >50 hours per week	57 (42.2)	0.9	(0.7-1.2)	0.9	(0.7-1.1)	0.9	(0.7-1.1)
Time pressure at work	154 (47.8)	1.4	(1.0-2.0)	1.4	(1.0-2.0)	1.2	(0.8,1.7)
Incentives at work	61 (54.5)	1.3	(1.1-1.6)	1.3	(1.1-1.6)	1.4	(1.1-1.6)
Lack of support at work	50 (54.9)	1.3	(1.0-1.6)	1.2	(1.0-1.5)	1.1	(0.9-1.3)
Job dissatisfaction	51 (46.4)	1.0	(0.8-1.3)	0.9	(0.7-1.1)	0.8	(0.7-1.0)
Lack of job control	43 (49.4)	1.1	(0.8-1.4)	1.1	(0.8-1.4)	1.0	(0.8-1.3)
Job insecurity	115 (49.4)	1.3	(1.0-1.6)	1.1	(0.9-1.5)	1.2	(0.9-1.4)
Number of distressing somatic symptoms in past week							
0	67 (38.7)	1		1		1	
1	38 (44.7)	1.1	(0.8-1.5)	1.1	(0.8-1.5)	1.0	(0.7-1.3)
2+	71 (55.9)	1.4	(1.1-1.8)	1.3	(1.0-1.6)	1.1	(0.9-1.4)
Mental health							
Good	31 (33.7)	1		1		1	
Intermediate	57 (43.5)	1.2	(0.9-1.8)	1.2	(0.9-1.7)	1.1	(0.8-1.5)
Poor	88 (54.3)	1.5	(1.1-2.1)	1.5	(1.1-2.0)	1.3	(0.9-1.7)
Adverse beliefs about low back pain							
Work-relatedness	63 (56.8)	1.3	(1.1-1.7)	1.3	(1.1-1.7)	1.3	(1.0-1.5)
Physical activity	22 (48.9)	1	(0.8-1.4)	0.9	(0.6-1.2)	0.8	(0.6-1.1)
Prognosis	7 (46.7)	1	(0.6-1.7)	0.9	(0.5-1.5)	1.0	(0.6-1.4)
Low back pain at baseline							
None in past 12 month	39 (22.5)	1				1	
Past 12 months but not past month	31 (48.4)	2.1	(1.4-3.0)			2.1	(1.5-3.0)
Past month	106 (71.6)	3.1	(2.3-4.2)			2.9	(2.1-3.9)

PRR = prevalence rate ratio; 95%CI = 95% confidence interval

^aModel 1 Each risk factor examined in a separate regression analysis with adjustment for sex, age, and occupation

^bModel 2 Risk estimates derived from a single regression model incorporating all risk factors except low back pain at baseline

^cModel 3 Risk estimates derived from a single regression model incorporating all risk factors