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ORIGINAL RESEARCH

Low back pain: prevalence and associated risk factors among hospital staff

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Abstract

Title. Low back pain: prevalence and associated risk factors among hospital staff.

Aim. This paper is a report of a study conducted to describe the prevalence and risk factors for lower back pain amongst a variety of Turkish hospital workers including nurses, physicians, physical therapists, technicians, secretaries and hospital aides.

Background. Hospital workers experience more low back pain than many other groups, the incidence varies among countries. Work activities involving bending, twisting, frequent heavy lifting, awkward static posture and psychological stress are regarded as causal factors for many back injuries.

Method. A 44-item questionnaire was completed by 1600 employees in six hospitals associated with one Turkish university using a cross-sectional survey design. Data were collected over nine months from December 2005 to August 2006 and analysed using Chi square and multivariate logistic regression techniques.

Findings. Most respondents (65·8%) had experienced low back pain, with 61·3% reporting an occurrence within the last 12 months. The highest prevalence was reported by nurses (77·1%) and the lowest amongst secretaries (54·1%) and hospital aides (53·5%). In the majority of cases (78·3%), low back pain began after respondents started working in the hospital, 33·3% of respondents seeking medical care for 'moderate' low back pain while 53·8% (n = 143) had been diagnosed with a herniated lumbar disc. Age, female gender, smoking, occupation, perceived work stress and heavy lifting were statistically significant risk-factors when multivariate logistic regression techniques were conducted ($P < 0·05$).

Conclusion. Preventive measures should be taken to reduce the risk of lower back pain, such as arranging proper rest periods, educational programmes to teach the proper use of body mechanics and smoking cessation programmes.

Keywords: hospital staff, low back pain, occupational risk, prevalence, questionnaire, risk factors, Turkey

Introduction

Hospital workers experience more occupational health problems than other professional groups, the most common being low back pain (LBP), which is the commonest reason for hospitalization amongst this group of workers (Lahad *et al.* 1994, Retsas 1998, Omokhodion *et al.* 2000, Yip 2001, Lusk & Raymond 2002). However, the prevalence of reported LBP among hospital workers varies between different countries. For instance, the lifetime prevalence of LBP is reported as 76% in the Netherlands (Bos *et al.* 2007), 70·9% in Kuwait (Landry *et al.* 2008), 57·7% in Tunisia (Bejia *et al.* 2005), 46% in Ireland and Nigeria (Omokhodion *et al.* 2000, Cunningham *et al.* 2006) and 39% in Hong Kong (Yip 2004). Besides individual factors, work activities involving joint loading, extreme flexion of the trunk, frequent heavy lifting, maintaining an awkward or static posture, bending, twisting, hard physical work and psychological stress are reported as causal factors for back injuries in a number of studies (Engels *et al.* 1994, 1996, Lagerström & Hagberg 1997, Smedley *et al.* 1997, Trinkoff *et al.* 2003, Yip 2004).

Background

Low back pain has been described as one of the main occupational problems among healthcare workers and nurses frequently have the highest incidence (Bejia *et al.* 2005, Bos *et al.* 2007, Landry *et al.* 2008). Nurses frequently have to lift or transfer patients who may move suddenly and carry out repetitive procedures with incorrect or poor body posture, which subsequently cause LBP (Engkvist *et al.* 1998, Ando *et al.* 2000, Karahan & Bayraktar 2004, Yip 2004). Based on a review of more than 80 papers on LBP in nurses, Hignett (1996) reported an annual incidence of LBP of between 40% and 50%, while a review of various studies conducted in Italy showed a 12-month LBP prevalence ranging from 33% to 86% among Italian nurses (Lorusso *et al.* 2007). The higher range reported in Lorusso *et al.*'s paper is consistent with a number of Turkish studies, which suggest that approximately 65% to 88% of nurses have LBP (Karadag 1994, Karahan & Bayraktar 2004, Karahan 2005, Tezel 2005).

The working lives and psychological state of hospital workers are severely affected by LBP as their productivity and job-satisfaction decrease and some may experience financial loss as a result of their injury (Duguesnoy *et al.* 1998, Oksuz 2006). These problems are reflected in the work environment and may lead to deficiencies in care (French *et al.* 1997, Scheldenfrei 1998, Karahan & Bayraktar 2004). Individuals with LBP also have difficulty fulfilling their responsibilities and meeting their own needs and may feel inadequate in the workplace (Duguesnoy *et al.* 1998, Karahan & Bayraktar 2004). LBP has been studied most frequently amongst nurses, nursing aides and other direct caregivers (Yassi *et al.* 1995, French *et al.* 1997, Omokhodion *et al.* 2000, Yip 2001, Bejia *et al.* 2005, Bos *et al.* 2007, Feng *et al.* 2007), but despite the high reported prevalence of LBP among hospital staff in these studies, very little information is available on the comparative prevalence of LBP among different hospital workers in Turkey. Specific information on risk factors and LBP in different professional groups is needed for preventive interventions to aim at reducing musculoskeletal complaints to be better targeted.

The study

Aim

The aim of the study was to describe the prevalence and risk factors for lower back pain amongst a variety of Turkish hospital workers including nurses, physicians, physical therapists, technicians, secretaries and hospital aides.

Design

A cross-sectional survey design was adopted. Questionnaires were administered between December 2005 and August 2006.

Participants

Participants were drawn from a total of six hospitals in four Turkish cities using a convenience sampling method. All hospital staffs at risk for LBP, including nurses, physicians, physical therapists, technicians, secretaries and hospital aides, were eligible to complete the questionnaire. Researchers explained the study to the managers of each team/professional group and asked them to identify the number of staff who was not on holiday or sick leave. Available staffs were then invited to participate in the study. Written consent was obtained from each of those replying in the affirmative and they were then asked to return the questionnaires to the researcher after completion.

Data collection

Researchers visited each hospital to collect data. The questionnaires were hand-delivered to each member of staff and collected the next day. Completed questionnaires were checked by the researchers on receipt and respondents were invited to answer any questions, which remained unanswered.

Defining low back pain

For the purpose of this study, LBP was defined as discomfort in the spinal area (between the lower costal margins and gluteal folds) with or without radiation into the leg to below the knee for at least 1 day during the preceding 12 months (Lau *et al.* 1995).

Questionnaire

The study questionnaire was based on previous work undertaken by Karahan (Karahan & Bayraktar 2004, Karahan 2005) and other authors (Engels *et al.* 1996, French *et al.* 1997, Duguesnoy *et al.*1998, Retsas 1998, Scheldenfrei 1998, Smith *et al.* 2004, Yip 2004) and consisted of 44 questions. Seventeen questions had multiple-choice responses and the rest were open-ended questions. Questions elicited data on respondent demographics (age, height, weight, gender, educational status, place of work, position, length of service, hours worked per week and previous work experience). Associated risk factors were smoking, the total time spent standing/sitting in a typical working day, the frequency and amount of heavy lifting undertaken, perceived work-stress levels, work-related practices that may cause LBP and information on the amount of exercise or sporting activity engaged in. Risky work activities such as lifting objects above the waist, bending to lift an item, transferring patients, pulling objects, positioning and ambulating patients were listed and respondents asked to identify how often they did them. Respondents were also asked about the incidence, mode of onset, triggering factors, duration, intensity, impact, treatments sought and their effectiveness for those experiencing LBP and whether they had received any education about its prevention. Respondents were also asked for suggestions as to how LBP could be avoided in their workplace. The questionnaire was tested with 15 hospital staff working in another hospital, and adaptations made to improve its clarity and ease of use as a result of their comments.

Ethical considerations

The study was approved by the appropriate research ethics committee. Respondents received written information explaining the aims of the study and were invited to take part on a voluntary basis. Respondent confidentiality was protected at all times.

Data analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 11.5 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to describe the general characteristics of the sample. Relationships between LBP, work-related and lifestyle risk factors (smoking and exercise) were evaluated using the Chi-squared test. Multivariate logistic regression analysis using the backward stepwise method was used to identify associations between the onset of LBP and possible risk factors, such as age, gender, occupation, educational status, years worked, body mass index, smoking behaviour, exercise patterns, perceived stress levels, time spent standing and the frequency of lifting, supporting, pulling and positioning heavy objects in a typical working day. Results of the logistic regression analysis are presented with odds ratios (OR) along with the 95% confidence interval (CI). A probability level of $P < 0{\cdot}05$ was accepted as statistically significant.

Results

Completed questionnaires were returned by 1600 out of 2540 hospital staff (overall response rate 63%) including nurses (72%), medical staff (20%), physical therapists (65%), technicians (70%), secretaries (68%) and hospital aides (81%). Most respondents were female (68·8%) and in the 25–34-year old age group (62·5%). The mean age was 28·02 ± 5 years. Mean hours worked per week were 45 hours and duration of employment was 6·04 ± 5·2 years. Mean length of employment at present place of work was 3·5 ± 2·9 years, with more than half (53·5%) working in their hospital for more than 4 years. Of those participating in the study, 41·3% were nurses and more than half (51·5%) were university graduates; 27·9% had at least one health problem, the most common being musculoskeletal problems (44·4%), cardiovascular problems (12·3%) and gastrointestinal problems (9·5%).

When conditions that could affect hospital workers' back health were examined, 69·3% were found to have a normal body mass index (BMI) whilst 20·5% were overweight, 37·4% smoked, the lowest rate being amongst physical therapists (27·3%) and the highest in hospital aides (44·2%). Only 18·3% participated in regular sporting or exercise activities. Nearly half of the respondents (48·3%) stood for 5 to 8 hours per day and 40·9% reported that they had a moderate level of stress in their work environment. The majority (78·4%) reported that they had to lift heavy objects (mean 36·3 ± 37·09 kg) during their working day.

The characteristics regarding LBP are shown in Table 1. LBP had been experienced by 65·8% of respondents, with 68·2% reporting pain lasting at least 1 day; 78·3% reported that their LBP had begun after starting their job or profession and in 61·3% of cases, it had occurred within the last 12 months. 'Moderate' back pain was reported by 63% of respondents and this led to them seeking medical care in

Table 1 Characteristics of low back pain among hospital staff

Findings about low back pain	*n* (*n*: 1600)	%
Low back pain experienced in the past		
Experienced	1052	65·8
Not experienced	548	34·3
Duration of low back pain		
1 day	717	68·2
2–7 days	202	19·2
over 1 week	86	8·2
Don't recall	47	4·5
Time when back pain first occurred		
Before starting the profession/job	228	21·7
After starting the profession/job	824	78·3
Occurrence of low back pain in the past year		
Pain experienced	981	61·3
Pain not experienced	619	38·7
Severity of low back pain* (*n* = 1050)		
Mild	117	11·1
Moderate	662	63·0
Severe	243	23·1
Very severe	28	2·7
Medical care sought for low back pain (*n* = 1052)		
Yes	350	33·3
No	702	66·7
Diagnosed as low back pain by physician (*n* = 350)		
Diagnosed as low back pain	266	75·0
Not diagnosed as low back pain	84	24·0
Receiving treatment for low back pain (*n* = 266)		
Receiving treatment	205	77·2
Not receiving treatment	61	22·8

*Based on respondent self-reports.

Table 2 Association between demographic characteristics and low back pain (LBP)

Demographic characteristics	Occurrence of LBP					
	LBP		No LBP		Total	
Occupation	*n*	%	*n*	%	*n*	%
Nurse	509	77·1	151	22·9	660	41·3
Physician	57	63·3	33	36·7	90	5·6
Physical therapist	16	72·7	6	27·3	22	1·4
Technician	112	69·6	49	30·4	161	10·1
Secretary	105	54·1	89	45·9	194	12·1
Healthcare aide	253	53·5	220	46·5	473	29·6
Total	1052	65·8	548	34·2	1600	100·0
χ^2: 83·111, $P < 0·001$						
Gender						
Female	770	70·0	330	30·0	1100	68·8
Male	282	56·4	218	43·6	500	31·3
Total	1052	65·8	548	34·2	1600	100·0
χ^2: 28·233, $P < 0·001$						
Age						
17–24	286	69·4	126	30·6	412	25·8
25–34	657	65·7	343	34·3	1000	62·5
35–52	109	58·0	79	42·0	188	11·8
Total	1052	65·8	548	34·2	1600	100·0
χ^2: 7·504, $P < 0·05$						
Educational level						
Primary school	53	50·5	42	49·5	105	6·6
Secondary school	72	57·6	53	42·4	125	7·8
High school	347	63·6	199	36·4	546	34·1
University	580	70·4	244	29·6	824	51·5
Total	1052	65·8	548	34·2	1600	100·0
χ^2: 23·607, $P < 0·001$						

33·3% of cases. Of these, 75·6% were diagnosed with LBP and 53·8% (*n* = 143) with a herniated disc. More than half (59·2%) were treated with medication, whilst 4·2% had undergone a surgical procedure as a result of their LBP. The most common interventions to relieve LBP were rest (43·7%) and analgesia (37·6%) (not shown in this table).

Primary work-related factors for LBP were standing for a long time (28·7%), carrying patients (15·7%) and lifting heavy objects (12·6%). More than half (60·4%) of respondents reported that LBP had a negative impact on their daily lives, with 53·6% saying that it affected their work. In addition, 48·1% said that LBP decreased their performance, 21·0% that it limited their movement and 5·7% that it caused difficulty doing their job properly (5·7%). Suggested measures to reduce LBP included giving staff sufficient time for rest (19·4%), increasing the number of nurses or other personnel in post (17·2%) and careful observation of body mechanics (15·6%). Table 2 shows the association between demographic characteristics and the prevalence of LBP. Among the six professional groups, the highest prevalence was in nurses (77·1%) and physical therapists (72·7%), and the lowest in secretaries (54·1%) and hospital aides (53·5%). When the prevalence of LBP by educational level, gender and age were examined the highest prevalence was found in university graduates (65·8%), women (70·0%) and in the 17–24 year old age range (69·4%).

Table 3 shows the occurrence of LBP and known risk factors. The prevalence of LBP was 70·1% in smokers compared to 63·2% for non-smokers, which is statistically significant ($P < 0·05$). In examining the relationship between LBP and the length of time spent standing in any 1 day, it was determined that 55·1% of those standing for 1 to 4 hours and 73·6% of those standing for more than 8 hours had LBP ($P < 0·001$). LBP was reported by 69·2% of those lifting heavy objects compared to 53·3% of those who did not ($P < 0·001$). As can be seen from Table 3, there was a positive relationship between perceived stress level and the occurrence of LBP ($P < 0·001$). No statistically significant difference was found in the prevalence of LBP according to

Table 3 Comparison of the risk factors and occurrence of low back pain (LBP)

	Occurrence of LBP					
	LBP		No LBP		Total	
Risk factors	*n*	%	*n*	%	*n*	%
Smoking behaviour						
Smoker	419	70·1	179	29·9	598	37·4
Non-smoker	633	63·2	369	36·8	1002	62·6
χ^2: 7·902, $P < 0·05$						
Participation in sport/exercise activities						
Yes	198	67·8	94	32·2	292	18·3
No	854	65·3	454	34·7	1308	81·8
χ^2: 0·672, $P > 0·05$						
Body Mass Index						
< 18·5	77	67·0	38	33·0	115	7·2
18·5–24·9 (normal)	732	66·5	368	33·5	1100	69·3
25–29·9 (overweight)	208	63·8	118	36·2	326	20·5
30 and over (obese)	28	60·9	18	39·1	46	2·9
χ^2: 1·414, $P > 0·05$						
Overall standing time in a work day						
1–4 hours	166	55·1	135	44·9	301	18·8
5–8 hours	498	64·5	274	35·5	772	48·3
Over 8 hours	388	73·6	139	26·4	527	32·9
χ^2: 30·059, $P < 0·001$						
Perceived stress level						
Mild	33	38·8	52	61·2	85	5·3
Moderate	394	60·2	261	39·8	655	40·9
Severe	438	71·5	175	28·5	613	38·3
Very severe	187	75·7	60	24·3	247	15·4
χ^2: 56·207, $P < 0·001$						
Lifting heavy objects						
Lifting/carrying	868	69·2	387	30·8	1255	78·4
Not lifting/carrying	184	53·3	161	46·7	345	21·6
Total	1052	65·8	548	34·2	1600	100·0
χ^2: 30·113, $P < 0·001$						

Body Mass Index (BMI) or participation in sporting or exercise activities ($P > 0·05$).

The relationship between some of the activities causing LBP in the work environment and the prevalence of LBP is shown in Table 4. Respondents were asked whether or not they engaged in eight at-risk activities identified from the literature and, if they did, how often they engaged in them. More staff with LBP reported being engaged in one or more of these activities than those without LBP, the difference being statistically significant for each activity ($P < 0·05$).

The results of the multivariate analyses of risk factors for LBP are shown in Table 5. Responses from medical staff were removed from this analysis because of their low response rate. Logistic regression modelled the association between LBP and risk factors, such as age, gender, occupation, educational status, years worked, body mass index, smoking and exercise behaviours, perceived stress levels, standing time, lifting and other risk related activities. When submitted to multivariate analysis, ten of these risk factors reached statistical significance ($P < 0·05$), with self-reported 'very high stress' levels being the strongest risk factor with an odds ratio of 3·85 (range 2·19 to 6·79). Taking secretarial staff as a reference group, nurses were found to be more at risk than other occupational groups (OR 1·64, 95% CI 1·1–2·46). Female gender (OR 1·79, 95% CI 1·34–2·41), smoking (OR 1·52, 95% CI 1·19–1·95) and the number of years worked (OR 1·02, 95% CI 1·005–1·05) were other significant risk factors. Activities such as lifting, pulling, bending to lift an item from floor level, ambulating and positioning patients were also identified as statistically significant risk factors (Table 5), the overall accuracy of the logistic regression model being 70·1%.

Table 4 The relationship between some activities that can cause low back pain in the work environment and occurrence of low back pain (LBP)

	Mean number of activities per day	LBP (*n*: 1052)				No LBP (*n*: 548)				
		Yes		No		Yes		No		
Performing risky activities as below		*n*	%	*n*	%	*n*	%	*n*	%	χ^2, *P*
Lifting objects above the waist	7·02	657	62·5	395	37·5	222	40·5	326	59·5	χ^2: 70·069, $P < 0·001$
Rotating torso while bearing weight	7·95	569	54·1	483	45·9	204	37·2	344	62·8	χ^2: 41·021, $P < 0·001$
Bend to lift an item from floor level	6·94	474	45·1	578	54·9	159	29·0	389	71·0	χ^2: 38·782, $P < 0·001$
Transfer patient from bed to chair/chair to bed	6·48	633	60·2	419	39·8	234	42·7	314	57·3	χ^2: 44·299, $P < 0·001$
Transfer patient onto a stretcher	5·95	607	57·7	445	42·3	237	43·2	311	56·8	χ^2: 30·191, $P < 0·001$
Ambulating patient	6·57	625	59·4	427	40·6	224	40·9	324	59·1	χ^2: 49·698, $P < 0·001$
Pulling a patient up the bed	8·24	612	58·2	440	41·8	210	38·3	338	61·7	χ^2: 56·852, $P < 0·001$
Repositioning a patient in bed	9·11	568	54·0	484	46·0	206	37·6	342	62·4	χ^2: 38·810, $P < 0·001$

Table 5 Multivariate* logistic regression analysis of risk factors and prevalence of low back pain among hospital staff (n = 1510)

Risk factors	OR (95% CI)	*P value***
Occupation		
Secretary	1·00	
Nurse	1·64 (1·1–2·46)	0·015
Technician	1·33 (0·81–2·20)	0·251
Physical therapist	1·73 (0·60–4·96)	0·308
Healthcare aids/clerical staff	0·76 (0·51–1·14)	0·192
Gender		
Male	1·00	
Female	1·79 (1·34–2·41)	< 0·001
Working years (continued)	1·02 (1·005–1·05)	0·018
Smoking	1·52 (1·19–1·95)	0·001
Exercise (continued)	1·31 (0·95–1·79)	0·09
Perceived stress level in work environment		
Mild	1·00	
Moderate	2·18 (1·32–3·6)	0·002
High	3·02 (1·81–5·02)	< 0·001
Extremely/very high	3·85 (2·19–6·79)	< 0·001
Performing risky activities as below		
Lifting objects above the waist	1·80 (1·39–2·34)	< 0·001
Bending to lift an item from floor level	1·33 (1·02–1·74)	0·033
Ambulating a patient	1·39 (1·01–1·93)	0·048
Pulling a patient up the bed	1·74 (1·09–2·77)	0·020
Repositioning a patient in bed	0·62 (0·39–0·99)	0·047

OR: odds ratio; CI: confidence interval.
*Backward stepwise logistic regression analyses.
**The *P* values were based on the Wald chi-squared test.

Discussion

Study limitations

Some methodological weaknesses within the study should be mentioned in the first instance. Of those invited to take part in the study, 37% did not complete or return the questionnaire and the low response rate from physicians was particularly disappointing. We were unable to perform a non-response analysis because of a lack of data about non-respondents. For this reason, bias resulting from selective non-responses cannot be excluded. Another limitation was the use of a previously invalidated questionnaire, although attempts were made to test its ease of use and clarity in a non-study sample of respondents. Recall bias may have been present, however, as this may occur especially when respondents are asked to report on events occurring over such a long time span as 1 year and respondents' experiences of LBP may also have influenced their assessment of the perceived risk factors in the questionnaire. Respondents with LBP may recall or perceive their exposure to risk factors more acutely than those without LBP leading to an overestimation of their risk.

Discussion of results

The majority (65·8%) of respondents had experienced LBP during their professional career and more than half (61·3%) had suffered from LBP within the last year. These statistics are greater than those for the general population in Turkey, which show a 44·1% lifetime risk and 12-month recall rate of 34% (Oksuz 2006). The results of previous studies reporting back pain prevalence in hospital workers are lower than those in our study, the annual LBP prevalence being 46% in Nigeria (Omokhodion *et al.* 2000), 54·7% in Japan (Ando *et al.* 2000), 51% in Tunisia (Bejia *et al.* 2005) and 30% in Ireland (Cunningham *et al.* 2006).

Nurses experience more LBP than other hospital workers (Omokhodion *et al.* 2000, Corona *et al.* 2005) and most researchers agree on the high prevalence of musculoskeletal complaints among nursing personnel (Engels *et al.* 1996, French *et al.* 1997, Ando *et al.* 2000, Smith *et al.* 2004, 2005, 2006a, Yip 2004, Alexopoulos *et al.* 2006, Vieria *et al.* 2006, Bos *et al.* 2007). A literature review on studies conducted in Italy showed an LBP prevalence ranging from 33% to 86% among Italian nurses (Lorusso *et al.* 2007), whilst a Dutch study by Bos *et al.* (2007) showed rates as high as 76% among non-specialized nurses in the Netherlands. Smith *et al.* (2006b) reported a 71% prevalence of LBP among Japanese nurses, whilst Alexopoulos *et al.* (2006) indicated that LBP was the most prevalent musculoskeletal complaint amongst both Dutch (62% n = 393) and Greek (75% n = 351) nurses. These results are similar to our own, which suggests that nurses have the highest prevalence of LBP of all hospital workers.

The physical therapists in our study had the second highest prevalence for LBP after nurses, LBP being the primary occupational health problem in this group (Cromie *et al.* 2000, Rugelj 2003). Cromie *et al.*'s Australian study (n = 536) showed that the rate of work-related LBP was 48% amongst this group, one in six physical therapists changing their specialty area or leaving the profession because of work-related musculoskeletal problems, whilst another study from Slovenia (n = 113) showed a lifetime prevalence of 73·7% for LBP amongst this group (Rugelj 2003). These findings are consistent with our results, but not those of another, smaller study (n = 120) carried out in Turkey by Salik and Ozcan (2004), which revealed a lower (26%) incidence of LBP amongst Turkish physical therapists in Izmir.

In the literature, hospital aides are reported to have a high prevalence of LBP (Eriksen 2003, Feng *et al.* 2007), but our

What is already known about this topic

- Low back pain has been described as one of the main occupational problems among healthcare workers.
- The highest prevalence is generally reported by nurses.
- Work activities involving bending, twisting, frequent heavy lifting, awkward static posture and psychological stress are regarded as causal factors for many back injuries.

What this paper adds

- The prevalence of low back pain was higher among hospital staff in comparison to studies conducted in other countries and the general population in Turkey.
- Age, female gender, smoking, occupation, perceived work-related stress, standing for long periods of time and heavy lifting were identified as statistically significant risk factors.
- The incidence of low back pain seemed to increase, the greater the levels of stress reported, indicating the need for further studies of the psychosocial concomitants of lower back pain.

Implications for practice and/or policy

- Preventive measures should be taken to reduce the risk of lower back pain, such as arranging proper rest periods, educational programmes to teach the proper use of body mechanics, together with smoking cessation programmes for staff members.
- Ergonomic assessment of work place risk factors and the greater use of back care interventions are recommended.

study demonstrated a lower prevalence than in other occupational groups. One possible explanation for this may be the gender of the aides in our study, who were predominantly male (69%). Although varying results have been found in other studies of the relationship between LBP prevalence and gender, LBP was more commonly reported in women than men in our study, findings similar to those of Bejia *et al.* (2005), Menzel *et al.* (2004) and Yassi *et al.* (1995).

Bejia *et al.* (2005) found that 61·9% of the hospital workers who had experienced LBP had needed medical care and a similar number had received such treatment in our study, 59·2% ($n = 143$) having been diagnosed with a herniated disc. Awkward posture can increase flexion of the spine, induce disc rupture and produce changes similar to those seen in natural disc degeneration (Smedley *et al.* 1997), herniated discs being the most common diagnosis in those with LBP in one Australian study (Retsas 1998).

In examining the relationship between age and LBP, we found that younger individuals had a higher prevalence of LBP than those in older age ranges. This finding may be a result of younger and less experienced staff being allocated more physically demanding work and their relative inexperience in undertaking such tasks. This view would seem to be supported by Yassi *et al.* (1995), who also found younger nurses to have a higher prevalence of LBP than older nurses. Yassi *et al.'s* study also suggests an inverse relationship between the prevalence of LBP and an individual's educational status; however, an individual's risk of LBP decreased the higher their educational status as perhaps they delegate more physical care to others. However, we found that better educated staffs were more likely to be involved in direct patient care and this may account for a higher prevalence of LBP amongst the graduates in our sample. Our multivariate analysis suggests, however, that this difference was not statistically significant and may be explained by the differing academic qualifications required for such disparate professional roles.

There are many factors that may be related to an individual's risk of developing LBP. Cigarette smoking, an inactive lifestyle, standing for long periods of time and level of perceived work-related stress are among the many factors, which have been determined to play a role in the occurrence of LBP (Omokhodion *et al.* 2000, Violante *et al.* 2004, Bejia *et al.* 2005, Mohseni-Bandpei *et al.* 2006). These factors were found to have statistically significant relationships with LBP in our study. Activities such as lifting patients or heavy objects are known to cause serious injury/damage to the back (Engkvist *et al.* 1998, Omokhodion *et al.* 2000, Smith *et al.* 2004) and lifting heavy objects is the most important factor leading to LBP in hospital workers, primarily nurses. Previous studies in Hong Kong have shown that transferring and lifting patients without assistance were perceived by nurses to be the two main factors contributing to their LBP (French *et al.* 1997) and in our study, those carrying out such activities whilst failing to pay attention to body mechanics and their back health experienced more LBP as a result.

Conclusion

We recommend that hospital managers arranged for proper rest periods for at-risk staff and for smoking cessation programmes to be developed for staff members. We also recommend the development of educational programmes, which teach the proper use of body mechanics when lifting

patients and heavy objects. Our results also show, however, that LBP increases in relation to the individual's perception of work-related stress indicating the need for further research into the relationship between psychosocial factors and the development, severity and symptom response to musculoskeletal disorders. In addition, more research is required to explain continuing differences in the reported prevalence of LBP amongst hospital staff internationally, so that best practice can be disseminated, and the personal, professional and social costs of LBP amongst society's carers reduced.

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Author contributions

AK, SK, AA and ND were responsible for the study conception, design and data collection; obtained funding. AK and SK performed data analysis and drafting of the manuscript; made critical revisions to the paper for important intellectual content; provided statistical expertise; supervised the study. AA provided administrative, technical or material support.

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