PEER REVIEWED

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Low back pain among hospital employees in Gauteng, South Africa: Point prevalence and associated factors

Abstract

Low back pain can be influenced by demographic, lifestyle and co-morbid factors, but there are few studies on the relationship between these in South African hospital employees. This cross-sectional study aimed to determine the point prevalence for low back pain and the factors associated with its presence amongst staff employed at a district hospital in Gauteng, South Africa. A self-administered questionnaire was used. Results indicated a point prevalence of 47.46%. Only female gender was associated with increased risk of low back pain (OR 1.67 CI 1.04 ; 2.69) while for the lifestyle factors, participation in physical activity especially in the form of group exercises was a protective factor (OR 1.66 CI 1.02 ; 2.70). Stress experienced at work all the time increased the risk (OR 3.47 CI 1.46 ; 8.23). Clinical recommendations include special occupational adaptation for females and the incorporation of physical activity, especially group exercise, and stress management strategies into low back pain management programmes.

Key words: low back pain, risk factors, hospital staff

Introduction

Low back pain (LBP) remains a major health problem not only in high income countries but in low income countries as well, with major cost implications.[1] World over, the one year prevalence of LBP ranges between 22% and 65% while the lifetime prevalence of LBP ranges from 11–84%.[2] In Africa, the one year prevalence of LBP among adolescents is 33% and 50% among adults.[3] Van Vuuren et al. found a LBP point prevalence rate among South African steel plant workers of 35.8% with the lifetime prevalence rate being 63.9%.[4] In South African government hospitals in the Gauteng Province, a total number of 5727 LBP cases were seen by 152 physiotherapists between the 1st of January and the 30th of August 2006.[5]

LBP influences the quality of life and causes physical and psychological distress.[4] Its consequences are far reaching and lead to a negative economic impact, including an increased absence from work and lost productivity.[4] Back pain has been found to place an enormous load on healthcare resources in the National Health Service in the UK.[6] Combined direct and indirect costs associated with LBP were more than the estimated costs for lower respiratory tract infections, Alzheimer's disease, stroke, diabetes, multiple sclerosis, and epilepsy combined.[7]

Many factors are thought to have an effect on the prevalence of LBP. The effect of gender has produced conflicting results. Burdorf and Sorock[8] reviewed 35 publications on work-related disorders and found that gender was not associated with the presence of LBP. In contrast, Alcouffe

et al.[9] reported that symptoms of LBP were more prevalent in women (58.2%) than in men (52.7%), although women seemed to be less exposed to known occupational risk factors. Kwon et al.[10] postulated that LBP in women might be associated with gynaecological conditions, and that it is important to study males and females separately. It was also shown that women tended to take longer to return to work than men after an episode of acute LBP.[11] The reason why more women than men suffer from LBP could be due to their higher reporting of somatic symptoms, better ability to recall previous incidences of LBP, poorer perceived physical health, increased pain perception and decreased inhibition.[12] In a South African study the 12 month prevalence of LBP among female nurses was 11.5% and among male nurses it was 38.9%.[13] The higher prevalence of LBP among male nurses may have been because males are perceived to be stronger and are expected to assist with lifting and transferring of heavy patients. This result could not be found elsewhere in the literature.

to take more sick leave due to LBP.[21,22]

Returning patients to optimal function after a LBP episode can be done by incorporating important changes into their lifestyle.[23] These include goal setting, activity pacing, exercise, ergonomics, education about the detrimental effects of rest and general deconditioning, and stress management.[23] Lifestyle changes are important and patients should be encouraged to participate actively in taking control of their pain in order to reduce disability and psychological distress, improve general health, improve coping mechanisms, and return to work and activities of daily living. In short, patients should be equipped with the ability to manage their own pain in everyday situations.[24] These changes can be accentuated once the role-playing lifestyle factors are determined.

A number of studies on the prevalence and determinants of LBP have been done in high income countries but little has been done in low income countries.[25] A few studies have been conducted on the incidence of LBP the South African nursing sector.[13,26] No studies on the association of LBP and demographic, lifestyle and co-morbid factors on a population of South African district hospital employees, including health and support staff, were found. Given the significance of LBP as a health problem in the workplace, it is important to search for a possible LBP high-risk population. In this regard, certain demographic, lifestyle and co-morbid factors may be the key factors for spotting such a target group.[25] If this is so, LBP prevention programmes could then be incorporated into occupational health services for these high-risk employees. In view of the lack of such studies, it was decided to mount such an investigation in the health services in South Africa. Therefore, the aim of this study was to determine the point prevalence for LBP and the factors associated with its presence amongst staff employed at a district hospital in Tshwane in Gauteng, South Africa.

"A sedentary lifestyle and insufficient physical activity is associated with the presence of LBP..."

A sedentary lifestyle and insufficient physical activity is another factor that appears to be associated with the presence of LBP. People who exercised three to four times per week as well as those who exercised five to six times per week, had a lower chance of developing LBP than those who exercised one to two times per week and those who did not exercise at all.[10] Strengthening and mobilisation exercises of the back are believed to protect the back by increasing blood supply to the spine muscles and joints, and intervertebral discs. This minimises injury and enhances repair. Exercises are also believed to alter the perception of pain by encouraging a positive frame of mind.[14]

A relationship was found between psychological stress in the workplace and LBP.[15,16] Unexpected events, dependence on others, negative perceptions of support, low job satisfaction, time pressure and deadlines were identified as work-related stressors in a South African study.[17] On the other hand, taking unscheduled breaks was found to be preventative in the development of LBP. Psychosocial factors may cause increased muscle tension which may in turn lead to altered spinal loading. As a result of the latter, nutrition of the intervertebral discs, nerve roots and other spinal tissues are affected.[18,19] It was postulated that raised plasma cortisol levels may leave muscles vulnerable to injury due to mechanical loads and hence increased susceptibility to LBP.[20] It is also believed that pain tolerance may be decreased due to stress among people living in poor psychosocial environments, and those affected may be inclined

Method

This cross-sectional study, conducted in 2007, used a self-administered questionnaire. All health care and support staff employed at a district hospital in Gauteng, South Africa were approached to participate. Only permanently employed staff were included in order to minimise the influence of activities performed when involved in other employment as well. Staff members who were not willing to participate in the study, students and casual workers were excluded. The total number of participants was 354, which

was 77.80% of the total number of permanently employed hospital employees. Reasons for non-participation included not being available as a result of leave, absence from work and refusal to participate.

The development of the self-administered questionnaire was based upon known risk indicators for LBP as described by Kwon et al.[10] The questionnaire contained questions under the following topics: demographics, recreation, occupation, perceived stress experienced at work, general health and the presence of LBP. To establish the presence of stress experienced at work, participants had to answer the following question: "In your personal opinion, do you experience stress at work?" Information on the presence of LBP was gathered by asking participants whether they were experiencing LBP at the time of the study. This section also sought information on how the pain was managed. A "mannequin" with a shaded area between T12 and above the gluteal fold was used in order to help define LBP visually.[27]

The questionnaire was validated for its content by having it scrutinised by "physiotherapy experts" in the field of back care and management and being based on literature. The repeatability of the questionnaire was established using the test re-test method for intra-rater reliability. The English questionnaire was translated into Tswana by three translators, and back translated into English again by two other translators.

Ethical clearance was granted by the University of the Witwatersrand Human Research Ethics Committee (Number M070359). Permission to conduct this study was obtained from the Hospital Superintendent. Participants were asked to voluntarily sign the consent form and were told that refusal to take part in the study would not prejudice them in any way.

The Stata Release 8.0 statistical software was used in the analysis of the data. Categorical variables were summarised using frequencies, percentages and cross-tabulations. Means and standard deviations were determined for the following demographic factors: height, weight and body mass index (BMI) (continuous variables). Fisher's exact test was used for comparison between LBP categories with respect to categorical variables and tests for trends in odds ratios employed Pearson's chi-square test. Univariate analysis (independently) and odds ratios for potential risk factors for LBP were determined and tested for trend, i.e. if prevalence of LBP increased with an increase in severity of risk (exposure).

Results

The point prevalence of LBP among the 354 participants in this study was 47.46% (n=168). Nursing staff comprised 37.57% (n=133) of the participants (Table 1) and 58.65% (n=78) of nurses suffered from LBP. Frequency distributions for the factors in relation to the presence of LBP are provided in Tables 2 and 3.

Only gender, participation in group exercise and stress perceived at work all the time were found to be statistically significantly associated with LBP (Table 4). More women than men suffered from LBP in this study and females were at greater risk of developing LBP than men (OR 1.67 CI 1.04 ; 2.69).

Participation in group exercises or team sport was found to reduce the chances of developing LBP (OR 1.66: CI 1.02 ; 2.70). It was interesting that of those who did group exercises, only 38.30% (n=36) had LBP and this was the lowest proportion of participants who had LBP for all the exercise categories. It should be noted however, that 84.04% (n=79) and 56.38% (n=53) of those that participated in group exercise or team sport also engaged in walking and running respectively. The association between frequency of physical activity and LBP was not statistically significant.

The study established that 40 (65.57%) of the 61 participants who experienced stress at work all the time, had LBP. The risk to develop LBP for this group was also elevated (OR 3.47: CI 1.46 ; 8.23) and a positive association which was statistically significant (p=0.001) was found between stress at work and the presence of LBP in this study.

Co-morbidities and time spent sitting, standing and

Table 1. Distribution of occupations in the study population (N=354)

Occupations	Males n (%)	Females n (%)	Total n (%)
Administrative staff	15 (4.24)	41 (11.58)	56 (15.82)
Nursing staff	5 (1.41)	128 (36.16)	133 (37.57)
Allied health practitioners	0 (0.00)	11 (3.11)	11 (3.11)
Medical practitioners	10 (2.82)	18 (5.08)	28 (7.91)
Drivers	3 (0.85)	1 (0.28)	4 (1.13)
Porters	10 (2.82)	5 (1.41)	15 (4.24)
Security officers	12 (3.39)	2 (0.56)	14 (3.95)
Cleaners	7 (1.98)	9 (2.54)	16 (4.52)
General assistants	16 (4.52)	36 (10.17)	52 (14.69)
Maintenance	21 (5.93)	4 (1.13)	25 (7.06)
Total n (%)	99 (27.97)	255 (72.03)	354 (100.00)

"Psychosocial factors may cause increased muscle tension which may in turn lead to altered spinal loading."

Table 2. Age, gender, body mass index, heavy physical duty and perceived stress at work in relation to low back pain (N=354)

Factor	LBP n (%)	No LBP n (%)	Total n (%)
Age			
Younger than 25	25 (7.06)	37 (10.45)	62 (17.51)
26 to 40	107 (30.23)	109 (30.79)	216 (61.02)
41 to 60	33 (9.32)	36 (10.17)	69 (19.49)
Older than 60	3 (0.85)	4 (1.13)	7 (1.98)
Total n (%)	**168 (47.46)**	**186 (52.54)**	**354 (100.00)**
Gender			
Male	38 (10.73)	61 (17.23)	99 (27.97)
Female	130 (36.72)	125 (35.31)	255 (72.03)
Total	**168 (47.46)**	**186 (52.54)**	**354 (100.00)**
Body mass index (BMI)			
< 19	7 (1.98)	4 (1.13)	11 (3.12)
19 to 27,4	76 (21.47)	106 (29.94)	182 (51.41)
27,5 to 40	74 (20.90)	68 (19.21)	142 (40.11)
> 40	11 (3.12)	8 (2.26)	19 (5.37)
Total n (%)	**168 (47.46)**	**186 (52.54)**	**354 (100.00)**
Heavy physical duty (lifting)			
No	20 (5.65)	36 (10.17)	56 (15.82)
Yes	148 (41.81)	150 (42.37)	298 (84.18)
Total n (%)	**168 (47.46)**	**186 (52.54)**	**354 (100.00)**
Perceived stress at work			
Never	15 (4.24)	28 (7.91)	43 (12.15)
Sometimes	89 (25.14)	113 (31.92)	202 (57.06)
Often	24 (6.78)	24 (6.78)	48 (13.56)
All the time	40 (11.30)	21 (5.93)	61 (17.23)
Total	**168 (47.46)**	**186 (53.54)**	**354 (100.00)**

Table 3. Low back pain in participants engaging in different types of physical activity (N=354)

Type of exercise	LBP n (%)	No LBP n (%)	Total n (%)
Walking	133 (37.57)	147 (41.53)	280 (79.10)
Running	40 (11.30)	58 (16.38)	98 (27.68)
Group exercise/sport	36 (10.17)	58 (16.38)	94 (26.55)
Other exercise	31 (8.76)	31 (8.76)	62 (17.52)
No exercise	40 (11.30)	33 (9.32)	73 (20.62)

(not mutually exclusive)

Table 4. The relationship between the presence of low back pain and other factors (n=168)

Factor	Category	LBP n (%)	Odds ratio (OR)	(95% Confidence interval)	p-value Test for trend
Age	<25	25 (14.88)	1.00		0.52
	26–40	107 (63.69)	1.45	(0.82 ; 2.58)	
	41–60	33 (19.64)	1.36	(0.66 ; 2.73)	
	>60	3 (1.79)	1.11	(0.23 ; 5.46)	
	Total n (%)	168 (100.00)			
Gender	Male	38 (22.62)	1.00		0.03
	Female	130 (77.38)	1.67	(1.04 ; 2.69)	
	Total n (%)	168 (100.00)			
Body mass index (BMI)	<19	7 (4.17)	2.44	(0.68 ; 8.71)	0.04
	19–27,4	76 (45.24)	1.00		
	27,5–39	74 (44.05)	1.52	(0.97 ; 2.37)	
	≥40	11 (6.55)	1.92	(0.73 ; 5.03)	
	Total n (%)	168 (100.00)			
Walking	Yes	133 (79.17)	1.00		0.98
	No	35 (20.83)	0.99	(0.59 ; 1.66)	
	Total n (%)	168 (100.00)			
Running	Yes	40 (23.81)	1.00		0.12
	No	128 (76.19)	1.45	(0.90 ; 2.33)	
	Total n (%)	168 (100.00)			
Group exercise	Yes	36 (21.43)	1.00		0.04
	No	132 (78.57)	1.66	(1.02 ; 2.70)	
	Total n (%)	168 (100.00)			
Other exercise	Yes	31 (18.45)	1.00		0.66
	No	137 (81.55)	0.88	(0.51 ; 1.53)	
	Total n (%)	168 (100.00)			
No exercise	Yes	40 (23.81)	1.00		0.16
	No	128 (76.19)	0.69	(0.41 ; 1.16)	
	Total n (%)	168 (100.00)			
Daily time spent sitting at work (hours)	0–1	93 (56.36)	1.00		0.55
	2–4	43 (25.60)	0.90	(0.55 ; 1.48)	
	5–6	17 (10.12)	1.19	(0.57 ; 2.49)	
	>6	15 (8.93)	1.29	(0.58 ; 2.86)	
	Total n (%)	168 (100.00)			
Daily time spent standing at work (hours)	0–1	15 (8.93)	1.00		0.26
	2–4	35 (20.83)	0.97	(0.44 ; 2.17)	
	5–6	43 (25.60)	1.30	(0.59 ; 2.89)	
	>6	75 (44.64)	1.39	(0.66 ; 2.94)	
	Total n (%)	168 (100.00)			
Daily time spent walking at work (hours)	0–1	28 (16.67)	1.00		0.04
	2–4	40 (23.81)	1.18	(0.63 ; 2.22)	
	5–6	42 (25.00)	1.61	(0.84 ; 3.09)	
	>6	58 (34.52)	1.72	(0.93 ; 3.19)	
	Total n (%)	168 (100.00)			
Heavy physical duty (lifting)	No	20 (11.90)	1.00		0.06
	Yes	148 (88.10)	1.78	(0.98 ; 3.22)	
	Total n (%)	168 (100.00)			
Stress perceived at work	Never	15 (8.93)	1.00		0.001
	Sometimes	89 (52.98)	1.47	(0.74 ; 2.93)	
	Often	24 (14.29)	1.87	(0,79 ; 4.41)	
	All the time	40 (23.81)	3.47	(1.46 ; 8.23)	
	Total n (%)	168 (100.00)			
Diabetes	No	167 (99.40)	1.00	(0.02 ; 1.53)	0.08
	Yes	1 (10.60)	1.18		
	Total n (%)	168 (100.00)			
Hypertension	No	156 (92.86)	1.00	(0.57 ; 3.22)	0.49
	Yes	12 (7.14)	1.35		
	Total n (%)	168 (100.00)			
Arthritis	No	157 (93.45)	1.00	(0.76 ; 5.84)	0.15
	Yes	11 (6.55)	2.10		
	Total n (%)	168 (100.00)			
Other conditions	No	137 (81.55)	1.00	(1.13 ; 3.96)	0.02
	Yes	31 (18.45)	2.11		
	Total n (%)	168 (100.00)			

walking at work were not statistically significant in the association with LBP (Tables 5 and 6).

Discussion

The participation rate in this study was 77.80% of the total number of permanently employed health and support staff. As a result of this high response rate, the introduction of bias is unlikely.

The LBP point prevalence rate of 47.46% found in this study is higher than the LBP point prevalence rate of 35.8% reported by Van Vuuren et al.[4] in another South African study. However, the population in that study was drawn from the semi-automated steel industry[4] and it is possible that working in this industry is less physically and emotionally demanding when compared to the tasks in a hospital setting. Naidoo et al., in another South African study on nurses, identified a similar prevalence to this study of 44.33%.[26] The incidence of LBP found in Uebel et al.'s[13] study was low (13.1%) compared with the finding for our study. This may have been because it only included nursing staff with a clinical diagnosis of mechanical LBP, whereas our study selected participants based on a self report of LBP. Since it was a prevalence study, it would also have excluded nurses who already had LBP at the start of the study and who did not seek medical attention at the staff clinic and injury-on-duty unit of the hospital. Finally, it did not investigate the psychosocial aspects such as perceptions of work stress, so the work environment may have been different.

High LBP point prevalence rates, as found in this study, may negatively impact on human resources and associated productivity at work.[4] This issue is also germane when looking at the essential human resources required in a hospital setting. The associated decrease in productivity as a result of a high prevalence of LBP may have detrimental consequences on direct and in-direct patient care in a district hospital.

The high prevalence of LBP among women found in this study is a finding supported by Burdorf and Sorock.[8] Possible explanations are the influence of gynaecological conditions,[10] domestic activities[9] and the higher reporting of symptoms by women.[12] Occupational adaptation in the form of ergonomics and kinetic handling in the hospital environment is of even more importance when one considers that female employees who suffer from LBP, tend to experience more severe symptoms[8] and take longer to return to work after an acute episode.[28] The vast majority of nursing staff were female (96.24%) and LBP in this occupational group was also much higher (58.65%) than the general point prevalence of LBP found in this study. Nursing staff are commonly seen as vulnerable to LBP given then the nature of their work.[29] Heavy physical duty, including lifting, stooping over patients and transferring patients, is part of the nursing staff's occupational activities hence the importance of proper kinetic handling and ergonomics cannot be overemphasised.[30,31] In contrast to the findings in this study, Uebel et al.[13] found that far less female (11.5%) than male nurses (38.9%) suffered from LBP. However, this study examined all categories of staff, and only five male nurses participated.

Most of the participants who took part in group exercises also took part in other activities like walking and running. Due to the physical as well as psychologically beneficial effects of physical activity on the lower back,[14,32] it should be included in LBP prevention programmes. The reason for the low percentage of LBP sufferers among those who did group exercises (38.30%) may be that group exercises are more motivating and encourage participation, and this in turn may ensure better compliance with exercise in LBP prevention programmes.

In this study perceived stress at work was not assessed by using a standardised outcome measure but by self-reporting on a four-point scale. This method was found reliable by Warming et al.[33] Hartvigsen et al.[34] also identified a similarly significant effect of work stress on LBP as found in this study. The lack of control over time as well as lack of control over stressful events is a major source of stress experienced in the hospital environment.[35] Stress causes raised blood cortisol levels which has an influence on muscle function and in this way leaves the body vulnerable to injury. Although stress management strategies may be deficient, one can easily be taught how to appropriately cope with stress. Stressful situations may also happen outside the workplace and may influence the stress experienced at work and in general. What could not be derived from this study is whether it was stress that was experienced at work which increased LBP, or if increased stress was experienced as a result of LBP. Kwon et al.[10] argued that mental symptoms such as depression occurred with chronic diseases. For this reason they doubted that mental stress is a cause of LBP, but may be a result of chronic suffering from LBP.

The study had some limitations. An in-depth exploration of household chores and leisure activities were not included in the

Table 5. The distribution of co-morbidities in the study population (n=95)

Co-morbid factors	LBP n (%)	No LBP n (%)	Total n (%)
Diabetes	1 (1.05)	6 (6.32)	7 (7.37)
Hypertension	12 (12.63)	10 (10.53)	22 (23.16)
Arthritis	11 (11.58)	6 (6.35)	17 (17.89)
Other conditions	31 (32.63)	18 (19.95)	49 (51.58)

(not mutually exclusive)

Table 6. Hours spent sitting, standing and walking by participants with and without low back pain (N=354)

Hours	Sitting n (% of N)		Standing n (% of N)		Walking n (% of N)	
	LBP	No LBP	LBP	No LBP	LBP	No LBP
0–1	93 (26.27)	104 (29.38)	15 (4.24)	20 (5.65)	28 (7.91)	43 (12.15)
2–4	43 (12.15)	53 (14.97)	35 (9.89)	48 (13.56)	40 (11.30)	52 (14.69)
5–6	17 (4.80)	16 (4.52)	43 (12.15)	44 (12.43)	42 (11.86)	40 (11.30)
>6	15 (4.24)	13 (3.67)	75 (21.19)	74 (20.90)	58 (16.38)	51 (14.41)
Total n (% of N)	168 (47.46)	186 (52.54)	168 (47.46)	186 (52.54)	168 (47.46)	186 (52.54)

questionnaire and may have influenced the presence of LBP. Self-reporting of health and the presence of LBP may influence the accuracy of information given by participants. A standardised outcome measure to clinically confirm LBP was not used. This study does not distinguish between recreational and occupational LBP, nor does it distinguish between accidental and overuse injuries. Health and LBP could have been underreported by staff for fear of negative repercussions from the employer with regards to job promotion and being prejudiced against.

Conclusion and recommendations

The point prevalence of LBP at 47.46% was high. Among the demographic factors, only female gender was associated with the presence of LBP. Among the lifestyle factors, participation in physical activity especially group exercises was a protective factor against LBP while perceived stress at work all the time was associated with the presence of LBP.

Clinical recommendations are that special adaptation of the occupational environment with regards to goal setting, activity pacing, ergonomics and stress management should be considered for females in order to curtail the development of lower back problems as females are at a greater risk of developing LBP. Physical activity especially in the form of group exercises should be encouraged in the prevention and long term management of LBP. Stress management strategies and relaxation techniques should be included into LBP prevention and management programmes. Future research should include household activities and other recreational activities when studying the influence of physical load on the lower back.

Lessons learned

- Female staff were at increased risk for LBP.
- Structured LBP prevention programmes for hospital employees should be put in place.
- Special occupational adaptation is needed for females.
- Physical activity especially group exercise should be encouraged.
- Stress management and relaxation should be part of LBP treatment programmes.

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