Risk factors of Low Back Pain among Nurses Working in Sarawak General Hospital

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Abstract: Lower back pain (LBP) is a very common musculoskeletal disorder that affects nurses. Previous studies found various physical and psychosocial risk factors of LBP. This study aimed to determine the risk factors of LBP among nurses working at medical and surgical discipline at a general hospital in Sarawak, Malaysia. A cross-sectional study using self-administered, validated questionnaire was conducted. 141 nurses participated in the study. The mean age of the respondents was 29.1 (± 6.43) years with the mean of 5.9 (± 6.04) years of working experience and 16.3% of the respondents had a history of falls. LBP was significantly associated with age, years of working experience (independent t-test) and history of falls (chi-square test). There was no significant association between LBP and other physical and psychosocial risk factors. The 12-month prevalence of LBP was high and nurses need to prevent LBP from the start of career as it was found to have significant association with age and years of working experience.

Keywords: Risk factors, lower back pain, nurses, Sarawak, Malaysia

Introduction

Low back pain (LBP) is a very common musculoskeletal disorder (Lee, 2007) in which nurses are most commonly affected (Wong *et al*., 2010). Ergonomic hazards were widely known to contribute to LBP incidences among nurses (Ghilan *et al*., 2013), nevertheless, psychosocial hazards have also been implicated (Urquhart *et al*., 2013). One study in Malaysia found 50% of nurses (n=100) working in a district hospital and government clinics suffered LBP during a 12-month period of study (Rahmah *et al*., 2008). In another study, staff nurses were found to rank top in a sample of 493 healthcare workers who suffered from LBP (Wong *et al*., 2010). Studies in other countries reported prevalences ranging from 51% in Greece (Alexopoulos *et al*., 2011) to 93% in Korea (June and Cho, 2011).

LBP has many consequences. Studies found that nurses who suffered from LBP had to receive medical treatment (June and Cho, 2011), some had to change workplace (Rahmah *et al*., 2008) while others had contemplated to leave their nursing profession (Lee, 2007). Deterioration in nurses' health could also affect patient care delivery and subsequently patients' health (Letvak *et al*., 2012). In the United States, it was reported that billions of dollars were spent annually on treatment of LBP (National Institute of Neurological Disorders and Stroke [NINDS] 2014). There is still limited understanding on LBP among nurses in Malaysia especially in relations to the risk factors and its prevalence in busy general hospitals. This study aimed to determine the risk factors of LBP among nurses in one general hospital in Sarawak, an area which was not previously studied in Malaysia. Nurses working at Sarawak General Hospital, a tertiary, referred hospital for Sarawak may have higher job intensity due to the high patient loads and work expectations.

Methodology

A cross-sectional study using validated questionnaire was conducted among nurses working in one general hospital. This was a referred hospital with 32 wards or units catering for patients all over Sarawak. Using multistage sampling method, only 10 wards or units which represented medical and surgical disciplines were selected. Nurses who were pregnant or had diagnosed prolapsed inter-vertebral disc were excluded. Sample size was determined using a simple formula ($n = Z^2P (1-P)/ d^2$) to estimate the population proportion (Naing *et al*., 2006). P was determined at 0.84 based on the mean of prevalence in three previous studies (June and

Cho, 2011; Lin *et al*., 2012; Wong *et al*., 2010). The *d* was set as $\pm$ 0.05, and the level of statistical significance, α= 0.05. Based on the calculation, the sample size determined for this study was 206. Depending on the size of nurses' population in each unit or ward, 12 to 17 respondents were randomly selected. Ethical approval was obtained from Research and Ethics Committee, Universiti Malaysia Sarawak and Medical Research and Ethics Committee, Ministry of Health, Malaysia. All respondents signed an informed consent.

Data were collected via a self-administered questionnaire which consisted of five sections with a total of 39 questions. Section A focused on socio-demographic data. Section B asked about LBP complaints in the past 12 months and its related consequences. A three-item questionnaire was included in Section C that asked about the history of fall, its frequency and the location its occurrence. Section D included seven questions on patient handling tasks (Menzel, 2008) while Section E consisted of 17 items measuring work-related psychosocial factors (Centers of Disease Control and Prevent n.d.). Questionnaire items for Section D and E were adopted with permission.

Respondents were required to indicate the frequency of performing patient handling tasks in Section D. There were three subsections for work-related psychosocial factors in Section E. Devereux *et al* (1999), stated work-related psychosocial factors were categorised into "High" or "Low" level. The scoring for the five questions on mental job demands were on four point scale with 1 indicating "strongly agree", 2 "slightly agree", 3 "slightly disagree" and 4 "strongly disagree". The first three questions of mental job demands must be answered as 1 (strongly agree) and the remaining two questions as 4 (strongly disagree) in order to be categorised under high mental job demands. Answers given other than that mentioned was regarded as having low mental job demands (Devereux *et al*., 1999).

The questions on job control consisted of six questions that were rated on a five point scale with 1 indicating "very little", 2 "little", 3 "a moderate amount", 4 "much" and 5 "very much". In order to be regarded as having low job control, all six questions must be answered as 1, 2 or 3. If the respondent answered any one of the six questions on job control as scores of 4 or 5, it was categorised under high job control (Devereux *et al*., 1999).

There were six items on social support, in which three items asked about supervisor and three about colleague support. It was rated on a five point scale in which 1 indicating "very much", 2 "somewhat", 3 "a little", 4 "not at all" and 5 "Don't have any such person". All three items for supervisor support must be answered as 2, 3, 4, or 5 in order to be categorised under low supervisor support. If the respondents answered any one of the three questions on supervisor support as score of 1, it was regarded as having high supervisor support. For support from colleague, the same principle was applied as that in supervisor support. In order to be regarded as having low social support in general, the respondent must be categorised as either having low supervisor support or low support from colleague (Devereux *et al.*, 1999).

Pilot study conducted on work-related psychosocial risk-factors showed acceptable Cronbach's alpha coefficient (0.60 to 0.91) which was similar to a previous study (0.65 to 0.90) (Hurrell and McLaney, 1998). Data were analysed using Statistical Packages for Social Sciences (SPSS) version 20.0.

Results

Two hundreds and six questionnaires were distributed and only 141 respondents returned their questionnaires, yielding a response rate of 68.4%. Most respondents (n= 74, 52.5%) were from the surgical ward. **Table 1** shows the socio-demographic characteristics of the respondents. The age of the respondents ranged from 20 to 56 years with a mean age of 29.1 (±6.42) years, comprising mainly female respondents (n= 133, 94.3%). The respondents were mainly Malays (36.9%, n= 52). The working experience ranged from five months to 33 years with a mean working experience of 5.9 (± 6.04) years and more than half of the respondents worked for eight hours per day (n= 71, 50.4%).

Table 1: Socio-Demographic Characteristics of the Respondents (N=141)

Variables	Frequency (n= 141)	Percentages (%)
Age (mean =29.1 years, SD ± 6.42)		
Gender		
Male	8	5.7
Female	133	94.3
Race		
Malay	52	36.9
Iban	30	21.3
Chinese	22	15.6
Bidayuh	25	17.7
Melanau	8	5.7
Indian	3	2.1
Siamese	1	0.7
Marital status		
Single	64	45.4
Married	77	54.6
Ward		
Medical	67	47.5
Surgical	74	52.5
Years of service (mean= 5.9 years, SD ± 6.04)		
Working hours per day		
7 hours	26	18.4
≥8 hours	115	81.6

Table 2 shows the 12-month prevalence and characteristics of LBP. More than 60% (n= 89, 63.1%) of the respondents reported having LBP with a majority of them had it for one to seven days and but only 3.4% (n= 3) needed hospitalisation. Less than half of the respondents suffering from LBP had to reduce work activities (n= 43, 49.4%) and more than 50% (n= 50, 57.5%) were unable to perform their work for one to seven days.

Table 2: Prevalence and Characteristics of LBP (N=141)

Variables	Frequency	Percentages (%)
Presence of LBP (n= 141)		
Yes	89	63.1
No	52	36.9
Duration had LBP (n= 89)		
0 days	5	5.6
1 – 7 days	66	74.2
8 – 30 days	2	2.2
More than 30 days but not everyday	10	11.2
Everyday	6	6.7
Hospitalised due to LBP (n= 89)		
Yes	3	3.4
No	86	96.6
LBP caused reduce work activity (n= 89)		
Yes	43	49.4
No	44	50.6
Duration LBP prevent work done (n= 89)		
0 days	33	37.9
1 – 7 days	50	57.5
More than 30 days	4	4.6

Table 3 shows the characteristics of respondents with or without LBP. Those with LBP were older, had longer working experience, had longer working hours per day (≥8 hours) (and had history of fall. Respondents with LBP had higher mean frequency of lifting and transferring patients and repositioning patients with assistance. They also had lower mean frequency of performing lifting and transferring patients with aids. In addition, a higher percentage of respondents with LBP experienced high mental demand and low social support. In terms of risk factors, the frequency of LBP was reported to be higher in older respondents ($t= -2.029$, $df= 139$, $p= 0.04$) and those that had longer years of service ($t= -2.31$, $df= 139$, $p= 0.02$). Out of 141 respondents, approximately one-fifth of them (n= 23, 16.3%) experienced falls with a majority of them had less than three falls in the past year. The falls mainly occurred at home (n= 13, 56.5%). Chi square analysis showed a higher percentage of those with falls to have

significant higher occurrence of LBP (χ^2= 6.708, *df*= 1, *p*= 0.01). No significant difference was found for work place, working hours per day, psychosocial risk factors and patient handling tasks with LBP.

Table 3: Risk Factors of LBP

Risk factors	Respondents with LBP	Respondents without LBP	*p* value
	n(%)/mean (SD)	n(%)/mean (SD)	
Age[b]	**29.94 (6.64)**	**27.69 (5.83)**	**0.04***
Work place[a]	-	-	0.09
Medical	38(56.7)	29(43.3)	
Surgical	51(68.9)	23(31.1)	
Working experience[b]	**6.77 (6.13)**	**4.38 (5.61)**	**0.02***
Working hours[a]	-	-	0.53
7 hours	15(57.7)	11(42.3)	
≥ 8 hours	74 (64.3)	41 (35.7)	
History of falls[a]	-	-	**0.01***
Yes	20 (87.0)	3(13.0)	
No	69(58.5)	49(41.5)	
Mental demand[a]			
High	27(69.2)	12(30.8)	0.35
Low	62(60.8)	40(39.2)	
Job control[a]			
High	63(65.5)	33(34.4)	0.37
Low	26(57.8)	19(42.2)	
Social support[a]			
High	12(54.5)	10(45.5)	0.36
Low	77(64.7)	42(35.3)	
Lifting and transferring[b]			
Manually	5.23 (2.76)	4.78 (2.79)	0.36
Manually with help from others	4.67 (2.62)	4.58 (2.94)	0.84
Using mechanical equipment	1.61 (2.20)	2.06 (2.75)	0.27
Using patient handling aids	1.11 (1.84)	1.33 (2.37)	0.55

Repositioning[b]			
With assistance	3.79 (2.26)	3.62 (2.40)	0.67

[a] Chi Square test,
[b] independent sample t test,
$p = < 0.05$

Discussions

The 12-month prevalence of LBP in this study was 63.1% which was similar to that reported in Yeman (Ghilan *et al*., 2013). However, one study among nurses in Malaysia reported a higher prevalence (Wong *et al*., 2010) while another reported a lower prevalence (Rahmah *et al*., 2008). Other studies done outside Malaysia reported varied prevalence ranging from 51% (Ghilan *et al*., 2013) to 93% (June and Cho, 2011). This difference could be related to the nature of work place, such as in Intensive Care Unit where patients are highly dependent on nurses for performing most of their daily living activities(June & Cho, 2011). Different methodological approach used and cultural difference of the study sample might influence respondents' willingness to report LBP and resulted in varied prevalence reported in some studies (Ghilan *et al*., 2013).

Respondents who were older (*p*= 0.04), had longer duration of service (*p*= 0.02) and had history of fall (p= 0.01) had significantly higher 12-month prevalence of LBP in this study. Previous studies found positive relation between age and LBP, in which older workforce was found to be more prone to LBP incidence (Alexopoulos *et al*., 2011; Rahmah *et al*., 2008). Older nurses usually have longer working experience; longer exposure to physical and psychosocial hazards at work (Lin *et al*., 2012) and, thus, are at a higher risk of acquiring LBP (Feng *et al*., 2007). Many studies also found evidences of a relationship between low back pain and material handling including load lifting and carrying, frequent trunk bending forward and rotation (Habibi *et al*., 2012). Nurses who work long duration would have repeatedly performed material handling and thus sustained accumulation of wears and tears of the back muscles. With falls, muscular or ligamental injuries of the back could occur which in turn could cause strain to the muscles and the sensation of LBP (Vorvick *et al*., 2012). Fall could also injure tendons, ligaments or muscle and resulting in LBP (NINDS 2014).

Nurses working in surgical-discipline wards were found to have higher 12-month prevalence of LBP than those working in medical-discipline wards, although the difference was not significant. This might be attributed to more dependent patients in surgical wards who required higher physical workload in these wards. Previous studies showed that LBP was more prevalent among nurses working in Orthopaedic ward and Intensive Care Unit (Barkhordari *et al*., 2013). None of the work-related physical factors showed a positive relation to LBP in this study. Although respondents with LBP had slightly higher mean frequency in manual handling of patients and slight lower mean frequency of using manual equipment in the task than those without LBP, the difference was not significant. In contrast to previous studies, patient handling tasks such as lifting and transferring of patients were found to be the prominent risk factors for LBP occurrences (Feng *et al*., 2007; Schenk *et al.,* 2007). With increased manual patient transferring tasks, the risk of suffering from LBP could rose to 75% (Feng *et al*., 2007). The frequent repositioning of patients in bed up to nine times per shift was also found to be significantly associated to LBP (Schenk *et al*., 2007). Findings in this study could be due to most of these respondents were able to apply proper body mechanics while performing these physical tasks.

In this study, none of the work-related psychosocial factors was found to have a significant association to LBP. Other studies, however, had shown that high mental demands and low job control were significant risk factors to LBP (Alexopoulos *et al*., 2011; Lee, 2007). Psychosocial work factors may lead to work stress which produces physiological reactions such as increased muscle tension in the lower back causing LBP (Lee, 2007). Whether the findings in this study are due to respondents' unwillingness to report work-related psychosocial stresses or the level of these stresses are low cannot be ascertain.

The findings of this study have implication for nursing practice. There were significant associations between age, years of service and LBP, thus, indicated that nurses need to take precaution to prevent LBP from occurring. In order to prevent LBP at a later stage of their career, nurses who first join the work force have to be made aware of this potential occupational hazard and take precaution from the start of their nursing career. Nurses need to apply proper body mechanics while performing nursing tasks. They need to use assistive devices whenever possible in patient handling tasks. They have to learn and be discipline in performing back-strengthening exercises. Nurse Managers can organize participatory ergonomics intervention where nurses themselves could identify the physical demanding

work tasks, analyse their risks, find solutions, implement and evaluate solutions (Rasmussen *et al.*, 2013). Then, they can maintain the most suitable solutions to prevent LBP.

This cross sectional study could only provide information on 12-month prevalence of LBP. The tendency for self- report bias might have occurred in this study as the questionnaires relied solely upon the respondents' perceptions on LBP. Not all risk factors of LBP were investigated in this study, thus, the findings might not be conclusive. In addition, this study was conducted among staff nurses in one hospital, thus the findings may not be generalisable to staff nurses working in other public or private hospitals and health care facilities. Nevertheless, this study provides further information on LBP among nurses in Malaysia.

Conclusion

In conclusion, this study found only age, years of service and history of falls to have significant relationship with LBP. It has also demonstrated that the 12-month prevalence of LBP was high at 63.1%. This is equivalent to approximately seven nurses to suffer from LBP per month and where approximately five or six of them had to reduce work for one to seven days. Thus, it is suggested that nurses need to take good care in order to prevent future LBP from the start of their career. Nurse Managers are also encouraged to organize participatory ergonomics interventions to prevent the occurrence of LBP. Future studies including sample from multiple sites with more comprehensive risk factors are also recommended.

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