

A MODEL OF PREDICTORS FOR WORK RELATED LOW BACK PAIN AMONG MALAYSIAN NURSES WORKING AT HOSPITAL UNIVERSITI SAINS MALAYSIA

SAMER KHADER ALNAWAJHA¹, WAN AASIM WAN ADNAN², MOHD NAZHARI MOHD NAWI³ &
CHE RABIAAH MOHAMED⁴

^{1,4}Degree Programme in Nursing, School of Health Sciences,
Universiti Sains, Pulau Penang, Malaysia

²BRAI Network Centre for Neurocognitive Science, School of Health Sciences,
Universiti Sains, Pulau Penang, Malaysia

³Environmental and Occupational Health Programme, School of Health Sciences,
Universiti Sains, Pulau Penang, Malaysia

ABSTRACT

Work related Low back pain (LBP) is distressing and is a major cause of work-related disability among nurses. The main objective of this study is to provide a model of predictors for work related LBP among Malaysian nurses working at Hospital University Sains Malaysia (Hospital USM). Validated interview questionnaire was applied with a stratified random sample among an equal (300) nurses working at HUSM through a cross sectional design. SPSS® (v20) was used for data analysis through multiple logistic regression (MLR). The results of MLR showed that the nurses who were assuming incorrect body posture have increased odds of having LBP by 243 times than who did not ($p < 0.001$), nurses without work organization strategies have increased odds of having LBP by 32 times than who did not ($p < 0.001$). The nurses who perceived health status as poor have increased odds of having LBP by 0.072 times than who did not ($p = 0.040$). Null hypothesis for Hosmer Lemeshow goodness-of-fit test of the model is fit. Classification table showed 97.3% of cases were correctly predicted, the model can accurately discriminate 98.0% of the cases. The study provided a model Predictors of work related LBP reasonably fits well, it will be utilized for further in-depth studies in relation to LBP.

KEYWORDS: Low Back Pain, Model, Nurses

INTRODUCTION

Low back pain (LBP) disability is a serious and costly problem that affects the nursing profession (McAdams *et al.*, 2011). LBP is reportedly an escalating health issue among individuals worldwide, with a lifetime prevalence that ranges from 60% to 90% (Brennan *et al.*, 2007; Burdorf and Jansen, 2006). LBP predominantly affects the working population in developed and developing nations, leaving a number of individuals disabled (Roffey *et al.*, 2010; Sanya and Ogwumike, 2005; Naude *et al.*, 2009). Nurses report the highest level of work-related back injuries (Burdorf and Jansen, 2006). This prevalence is attributed to the great amount of physical work involved in their profession, such as the manual handling and transfer of patients and occupation-related psychological stress (Vieira *et al.*, 2006; Yip, 2004). The problem of the ignorance of this issue will provide bad consequences on Hospital USM. These consequences will be on the nurse, patient and on the hospital. The consequences to the nurses include, but not limited to, guilt and blame for the injury, chronic pain, fear of re-injury or permanent disability, deleterious impact on quality of life, and unwanted

career changes. The consequences for the patient include, but not limited to, deterioration in the quality of care and patient comfort and safety. The consequences for the hospital include, but not limited to, productivity, recruitment and retention of nurses, and increased organizational costs (Nelson, 2006).

On the other hand, the direct and indirect costs of LBP that may be happen to Hospital USM nurses, it leads to reduced income and quality of life, decrease productivity, and leads to absenteeism of nurses and it is responsible for a major economic burden on the health care system (Henchoz *et al.*, 2010) because of poor working conditions and rising demands leading to back pain.

MATERIALS AND METHODS

Work related LBP in this study was defined as the proportion of the nurses with LBP that extends from below the scapulas and to both legs at anytime of their work over 12 months. The design for this study was a quantitative analytical cross-sectional which involved a questionnaire regarding work related LBP that evaluates different potential etiologic factors that are related to the specific disease and calculates the prevalence and the associated factors. Based on inclusion and exclusion criteria, 300 nurses were selected from the above-mentioned hospital as participants. This hospital was selected because it is a tertiary referral center located in the health campus of the university and is a teaching hospital with an 800-bed capacity.

Stratified random sampling was applied on the respondents who met the inclusion criteria. The population was divided into different strata based on homogeneity. Each strata represented ward in Hospital USM. The questionnaire consisted of seven sections which was developed and retested under factor analysis using SPSS software version 20,

- Socio-demographic characteristics of the respondents,
- Workload status of the nurses,
- Questions related to LBP,
- Associated factors of LBP,
- Assessment of work environment characteristics,
- Assessment of general knowledge of nurses regarding LBP, and
- Suggestions to reduce LBP from the nurses' point of view. The Oswestry LBP scale was used to describe the severity of pain. The associated factors of work-related LBP were categorized into five groups, based on the results of previous studies (Ando *et al.*, 2006).

RESULTS

Socio-Demographic Characteristics of the Sample

The study participants consisted of 300 nurses, 278 (92.7%) were females and 22 (7.3%) were males. There were 288 (96.0%) of the study participants were Malays, 10 (3.3%) were Chinese and only 2 nurses (0.7%) were Indians. Regarding age groups, 110 (36.7%) were from (23 – 30) years and 97 (32.3%) were from (31 – 40) years. The majority (76.7%) of the study participants were married, 56 (18.7%) were single, 9 (3.0%) were widowed. Based on the qualifications; 246 (82.0%) of the study participants were from diploma holders, and 27 (9.0%) having

degree certificate. Moreover, the majority 287 (95.7%) of the study participants were working as staff nurses and 8 (2.7%) were working as head nurses. The table also shows that there were 252 (84.0%) of study participants perceived their health status as good, 42 (14.0%) perceived it as moderate and only 6 (2.0%) perceived their health status as bad. The majority 145 (48.3%) of the study participants were dissatisfied from their job, 69 (23.0%) were satisfied from the job and 86 (28.7%) were moderately satisfied. Regarding body mass index; the majority 155 (51.7%) having normal BMI, 87 (29.0%) are overweight (pre-obese), 38 (12.7%) are obese and 20 (6.7%) are underweight (Table 1).

Table 1: Socio-Demographic Characteristics of the Sample (N=300)

Variable	N	(%)	
Gender	Male	22	7.3
	Female	278	92.7
Race	Malay	288	96.0
	Chinese	10	3.3
	Indian	2	0.7
Age Group	(23 – 30) years	110	36.7
	(31 – 40) years	97	32.3
	(41 – 50) years	66	22.0
	(51 – 57) years	27	9.0
Marital Status	Single	56	18.7
	Married	230	76.7
	Divorced	5	1.7
	Widow/Widower	9	3.0
Qualification	Master degree	1	0.3
	Degree	27	9.0
	Diploma	246	82.0
	Nursing certificate	26	8.6
Job Title	Nursing Supervisor	2	7.0
	Head nurse	8	2.7
	Staff nurse	287	95.7
	Nursing assistant	2	0.7
	Community nurse	1	0.3
Perceived Health Status	Good	252	84.0
	Moderate	42	14.0
	Bad	6	2.0
Job Satisfaction	Satisfied	69	23.0
	Moderately satisfied	86	28.7
	Dissatisfied	145	48.3
BMI	Underweight	20	6.7
	Normal	155	51.7
	Over weight (pre-obese)	87	29.0
	Obese	38	12.7

The results showed that there are 160 (53.3%) of nurses were complaining of work related LBP during the past 12 months (period prevalence). Multiple logistic regression analysis was employed to predict the probability that a nurse in Hospital USM would suffer from LBP. Variables with $p < 0.25$ by bivariate analysis and which applied to all nurses were selected as predictors. They were (gender, age, ward, occupation, duration of work in the present word, perceived health status, work posture, work control, work organization, patient condition, work psychosocial factors, sufficient working area in nursing station, sufficient recording area in nursing station, enough lighting, good ventilation, comfortable chairs, much furniture, the height of working tables, disks, machines, crowded work place and general knowledge of nurses about back safety measures, receiving any training course about safety during nursing education and receiving any educational course

regarding occupational health during study).

Table 2 shows that the nurses who are assuming bad body posture during their work such as frequent bending forward or half sitting, much static work posture, frequent lifting and handling of objects and frequent repetitive work using shoulders, arms, hands or fingers have increased odds of having work related LBP by 85.952 times than nurses who don't ($p < 0.001$).

The table also shows that the nurses who don't have work organization strategies such as extra work due to poor physical condition of colleagues, work after sick leave, maternity leave, and childcare leave, difficulties in acting on one's own ideas, difficult human relations at work, lack of frank discussion about work problems, responsibilities other than tasks at work, role ambiguity in the workplace, inexperienced in handling tasks and many admissions and discharges have increased odds of having work related LBP by 34.414 times than nurses who don't ($p < 0.001$). The nurses who perceived health status as a bad have increased odds of having work related LBP by 0.066 times than nurses who don't ($p < 0.05$).

None of the interactions are significant, therefore weren't included in the model. Multicollinearity was checked by linear regression by looking at VIF for the variables (body posture, work control and good ventilation in the work place), all the values were less than 10, which is acceptable (Norsa'adah Bachok, 2011). Model fitness was checked by Hosmer Lemeshow goodness-of-fit test, classification table and area under ROC (Receiver operating characteristics) curve. The null hypothesis for Hosmer Lemeshow goodness-of-fit test of the model is fit, p value is 0.805 which is not significant. Classification table shows 97.3% of cases are predicted correctly whether they have work related LBP or not. The area under the curve of ROC is 0.980, the model can accurately discriminate 98.0% of the cases (it is significantly discriminate more than half of the cases).

Table 2: Final Model of the Factors Associated with 12 Months Work Related LBP among Nurses Working in Hospital USM (N=300)

Variables		Crude OR ^a (95%CI)	Adjusted OR ^a (95%CI)	Wald Statistic ^s (df)	P Value ^b
Perceived Health Status	Good	1.00	1.00		
	Moderate	2.00(1.006, 3.977)	6.467(0.901, 46.521)	3.448 (1)	0.063
	Bad	5.00(0.576, 43.407)	0.066(0.005, 0.882)	4.223 (1)	0.040
Factor (A):Work Postures	No	1.00	1.00		
	Yes	995.428(252.424, 3925, 451)	85.952(12.480, 591.988)	20.463 (1)	0.000
Factor (C):Work Organization	No	1.00	1.00		
	Yes	573.750(180.762, 1821.115)	34.414(5.559, 045)	14.472 (1)	0.000

^aSimple logistic regression, ^bMultiple logistic regression

The model reasonably fits well. Model assumptions are met. There are no interaction and multicollinearity problems

DISCUSSIONS

The current study focused on nurses and nursing care because nurses are more prone to work-related LBP than the general population. The results of this study are consistent with those of Sopajareeya *et al.* (2009), who determined the

prevalence and risk factors of LBP among nurses in a Thailand public hospital and showed a 61.5% prevalence rate of LBP based on the nurses' report in the previous 12 months. Given that Sopajareeya *et al.* (2009) conducted their study at a Thailand public hospital, their results support our results as our study was conducted at a universiti hospital and a similar sample was investigated, that is, the participants were prone to the same risks and dangers during work.

The results of the multiple logistic regression analysis show that three factors contributed to the occurrence of 12 months of work-related LBP among Malaysian nurses working in Hospital USM. The three factors are perceived health status, work posture, and work organization. Sikiru and Hanifa (2010) revealed that gender and poor knowledge of back care and ergonomics are major factors for work related LBP. In the study of Sopajareeya (2012) in a Thailand public hospital, the results of logistic regression analysis show that the moving of patients in bed without assistance and the lack of back muscle exercise were the significant risk factors that caused LBP among the nurses.

The results of our study show that poor body posture is critical to the occurrence of work-related LBP among nurses. This finding can be attributed to the fact that teaching proper body posture, the creation of occupational settings that are "spine-friendly," and other health care settings are needed to lower the suffering of the nursing staff and this indicates that the nurses are working hardly without evidence on how to work safely without breaking their backs. The factor of work posture includes frequent bending forward or half sitting, high static work posture, frequent lifting and handling of objects, and frequent repetitive work using shoulders, arms, hands, or fingers. These results show the positive correlation between lower back disorders and work-related awkward postures (Hoogendoorn *et al.*, 1999). This posture exposure increases the risk of back disorder.

Static work posture is a risk factor associated with the tremendous increase in the number of static work because of technological innovations (e.g., office work and control tasks). Hales and Bernard (1996) concluded that prolonged sitting is a potential risk factor for the development of LBP. This factor can be attributed to the process during sitting, which results in a prolonged compression force that may increase the risk of disc problems and to the continuous activity of some type-I motor units of (back) muscles that may contribute to the development of fatigue (Videman *et al.*, 2005). Several investigations mentioned an increased risk for low back disorders when jobs have to be performed in a sitting position. These jobs increase the development of new types of chairs that promote "dynamic sitting". A dynamic sitting pattern that can have a positive prevention effect on work-related LBP is created by allowing movement in the back support and/or chair seat. Conflicting results are also mentioned in several reviews (i.e., Hoogendoorn *et al.*, 1999).

Work organizational factors that affect the occurrence of work-related LBP include extra work due to the poor physical condition of colleagues, work after sick leave that changes the health status of the nurse during the work itself, difficulties in acting on one's own ideas, difficult human relations at work that have a positive impact on the psychosocial aspect of the individual, lack of frank discussion about work problems, many admissions and discharges during nursing work, responsibilities other than the tasks at work, role ambiguity in the workplace that confuses the nurses in their work area, and inexperience in handling tasks.

These findings are in accordance with those of Sikiru and Hanifa (2010), who showed that poor knowledge of back care ergonomics is a risk factor of work-related LBP. The eight factors associated to current complain of work-related LBP among nurses include work posture, work organization, crowded work place, height of working tables, lack of good ventilation, lack of mechanical devices for patient lifting, lack of wheels and other devices to move heavy

equipment, and overtime hours. Results show that the lack of control over work is a risk factor. Many unplanned work and the lack of organization during work lead to the confusion and stress of nurses. Excessive different tasks and responsibilities lead to a heavier than usual workload on the human body, resulting in a lack of rest during work. A general consensus exists regarding the association of LBP and heavy work (Bernard *et al.*, 1997).

CONCLUSIONS AND RECOMMENDATIONS

The study produced a biologically sound models for the predicting factors associated with work-related LBP among Malaysian nurses. The present study fills the research gap by identifying the relationship between working overtime and severity of pain among Asian nurses. Previous studies failed to identify the significant correlations between working hours and severity of back pain.

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