

ORIGINAL RESEARCH

PERIOPERATIVE MEDICINE

The prevalence and risk factors of low back pain among the nurses at Sardjito Hospital, Yogyakarta, Indonesia

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Abstract

Background: The study aimed to identify the prevalence and risk factors of LBP among the nurses at Sardjito Hospital.

Method: A cross-sectional study was conducted in Sardjito Hospital Yogyakarta. LBP was measured in nurses who had work for one year using *the Keele Start Back Screening Tool (KSBT)* and *Orebro Musculoskeletal Pain Questionnaire (OMPQ)*. A simple and multiple logistic regression was used for analysis.

Results: Of 800 valid subjects, 324 (40.5%) have the history of LBP complaint, 88.9% were suffering the pain during the data collection. The most significant variables are the history of previous spinal complaints ($p = 0.00$), slide board use for lateral transfer ($p=0.010$), gender ($p=0.026$) and current work place ($p=0.019$). Nine of the 288 patients of LBP have *high risk* in line with the KSBT stratification, while 22 of 288 patients have *High Estimated Risk of Future Work Disability* that agrees with the stratification of performance prognosis using OMPQ.

Conclusion: The prevalence of LBP among the nurses at Sardjito Hospital reaches 40.5%, with 88.9% of whom still suffer from pain during the data collection. The risk factors of LBP among the nurses are previous spinal complaint, tools for lateral transfer, work place and gender.

Key words: Risk factor; Lower back pain; Nurses; Pain; Prevalence

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1. Introduction

Pain is an uncomfortable emotional condition that can be sensed by the mind but is identified to derive from a particular part of the body. It can be called a subjective sensation. Pain is a defense mechanism

designed to make the subject protect the wounded part from further damage. Lower back pain (LBP) is accurately called lumbago pain or lumbosacral pain occurring below costa number 12 and above gluteal folds. The incidence of LBP is known to have resulted in morbidity in the industry. Some studies have

reported the incidence of LBP in the general population and workplace setting. LBP is the common cause of the incidence of morbidity in health workers. Nurses are in the professional group in health services with a high risk of LBP incidence.

Sikiru et al. reported that such mechanic dangers as LBP in hospitals, resulting from the manual transfer of patients have affected the nurses. To describe the musculoskeletal damage among the nurses, the survey shows that the nurses have lost 75 days per year due to LBP.¹ The study found that LBP is the most common cause of early retirement due to poor health, sick leaves, resignation, and slower work pace in the work population.

Nurses transfer and transport patients and medical tools. They are exposed to a difficult environment, especially in developing countries due to the lack of transfer or transport tools.

We conducted this study to find out the prevalence of LBP in the nurses of our hospital as well as the predisposing and aggravating risk factors.

2. Methodology

The study employs a cross-sectional method. The samples of the study are the nurses at Sardjito Hospital Yogyakarta, Indonesia, who work collaboratively with all departments at RSUP Dr. Sardjito. This study was conducted from April to October 2019. This study was approved by the ethics committee of FKMK-UGM with the approval number of KE/FK/0765/EC/2019.

As suggested by Beaton et al., the studies use the KSBT and OMPQ and before the questionnaires are distributed, a transcultural process in the Indonesian language must be performed and translated into English by an independent professional translator.²

Definition of Variables

Lower back pain (LBP) is the pain at the dorsal area between the area below the margo costa 12 and gluteal folds and may radiate to legs.³

Nurses are defined as nurses at Sardjito Hospital Yogyakarta, Indonesia.

Data Source

Data were collected from all willing nurses of Data were collected from all nurses at Sardjito.

A questionnaire was distributed among the nurses to be filled by those interested in and willing to complete the questionnaire.

Subject of Study

The inclusion criteria in this study are all ward nurses who have worked for minimally 1 y. The nurses were excluded from the study if they are in either delivery leaves or annual leaves.

Data Collection

The sample in this study was collected using the *total sampling technique*. Therefore, all nurses interested in and willing to get involved in the study were required to complete the questionnaires.

The instruments used in the study are the demography questionnaires of *the Keele Start Back Screening Tool (KSBT)* and *the Orebro Musculoskeletal Pain Questionnaire (OMPQ)*. The researchers have obtained the permit to use the questionnaires from the maker of the questionnaires. KSBT and OMPQ are the instruments frequently used to identify the incidence of lower back pain in the world, which has been proven to be valid in the application in different countries.

Demographic questionnaires consist of name (initial), age, gender, education level, ward/department name, position, and length of employment, the mean number of patients managed, frequency of patient transfer and transport in the last 2 weeks, pain complaint, pain quality, pain radiation, pain scale, and pain duration.

Questionnaires of KSBT have been proven valid and frequently used to identify and measure lower back pain. KSBT is a brief instrument to measure physical and psychological indicators of lower back pain. This instrument consists of nine items of questions that refer to physical aspects (items 1 – 3) and psychical aspects (items 4 – 9) due to lower back pain. Responses are available in two categories: agree (1) and disagree (0), except for the last item of question, which requires any of the five alternatives of response, i.e., not at all (0), a little (0), fairly (0), very (1), and extremely disturbing (1). To interpret, all items are summed with the range from 0 to 9, where 9 represents worsen the prognosis of lower back pain. The total scores were classified into three categories: low risk (score between 0 and 3), low risk (score \geq 4

with the total response items of 5–9 less than 3), and high risk (score ≥ 4 with the total response item 5 – 9 ≥ 4). The stratification is proven to improve the clinical output, patients' satisfaction and therapy effectiveness.^{2,4,5}

Another instrument commonly used to measure lower back pain is OMPQ. This instrument aims at identifying the psychosocial risk of work disturbance due to back and neck pains. The brief-version instrument of OMPQ has been available as a valid and reliable 10-item instrument. The brief-version OMPQ consists of five concepts, i.e., pain (items 1 – 2), self-perception function (items 3 – 4), distress (items 5 – 6), expectation to return to work as usual (items 7 – 8), and fear-avoidance attempt (items 9 – 10). Item 1 (pain duration) has 10 responses from 0 – 1 week to longer than 52 weeks, with the scales from 1 to 10. Items 2 – 10 have responses from 0 to 10, indicating the condition from “totally disagree” to “totally agree” or “no pain” to “severe pain”. In the interpretation, items 3, 4 and 8 must be reversed and summed with other items. The total score was obtained by adding all items with a range of 1 to 100. The score range of 1 to 50 indicates low risk while the score of 51 to 100 indicates an estimated high risk of developing and suffering from work disturbance due to the pain.^{6,7}

Statistical analysis

The codes in the questionnaires were input in the computer in the form of coding and were analyzed using the software of SPSS version 20. The most influential risk factors in this study were identified using the simple and multiple logistic regression multivariate analysis. The probability value of less or equivalent to 0.05 was used to determine the statistical significance.

3. Results

The study was conducted at Sardjito Hospital from June 2019 to November 2019. Data were collected from the subjects from 1 September 2019 to 31 October 2019. Eight hundred seventy-one responding nurses and midwives participating in the study met the inclusion criteria. After a consecutive data selection using the exclusion criteria, 800 respondents were validated and were accepted as eligible for further analysis. The baseline data are presented in Table 1.

Table 1: Baseline data of study

Variable	N = 800	%
LBP Complaint		
Yes	324	40.5
No	476	59.5
Age		
<21 y	2	0.3
21–40 y	491	61.4
41–60 y	306	38.3
>60 y	1	0.1
Gender		
Male	142	17.8
Female	658	82.3
Status		
Married	700	87.5
Unmarried	100	12.5
Current Work Place		
ER – Ward Room	104	13.0
Intensive Care	119	14.9
Non-ER & IC Room	577	72.1
Work Position		
Executive Nurses	536	67.0
Non-Exec. Nurses	264	33.0
BMI		
Underweight	46	5.8
Normal	409	51.1
Overweight	268	33.5
Obese	77	9.6
Pregnancy History		
0 time	248	31.0
1–3 times	487	60.9
>3 times	65	8.1
Delivery History		
0 time	263	32.9
1–3 times	513	64.1
>3 times	24	3.0
Service at Sardjito Hospital		
<10 y	347	43.4
10–20 y	224	28.0
>20 y	229	28.6

Of the 800 respondents, 324 had a history of low back pain (LBP) with different onset and duration. Of 324 LBP patients, 288 respondents had sustainable pain during the data collection, while 36 respondents had no pain after medication or self-healing. Data on the distribution of LBP are available in Table 2.

Table 2: Prevalence of LBP

Independent Variables		LBP Complaint		Total	p-value
		Yes	No		
History of previous spinal complaints	Yes	83	24	107	0.000*
	No	241	452	693	
Position	Executive Nurse	246	385	631	0.093*
	Non-Executive Nurse	78	91	169	
Current Work Place	ER – Ward Room	50	54	104	0.060*
	Intensive Care Room	51	68	119	
	Non-ER & IC Room	223	354	577	
Status	Married	287	413	700	0.444
	Unmarried	37	63	100	
Gender	Male	45	97	142	0.017*
	Female	279	379	658	
BMI Classification	underweight	16	30	46	0.178*
	normal	175	234	409	
	overweight	101	167	268	
	obese	32	45	77	
Work Length Classification	<10 y	135	212	347	0.968
	10–20 y	96	128	224	
	>20 y	93	136	229	
Pregnancy Classification	0	88	160	248	0.052*
	1–3	211	276	487	
	>3	25	40	65	
Delivery Classification	0	95	168	263	0.076*
	1–3	219	294	513	
	>3	10	14	24	
Age Classification	<21	0	2	2	0.490
	21–40	84	140	224	
	41–60	79	109	188	
	>60	1	0	1	
Easy move for lateral transfer	No	218	312	530	0.610
	Yes	106	164	270	
Slide board use for lateral transfer	No	263	349	612	0.009*
	Yes	61	127	188	
No easy move/slide board use	No	96	158	254	0.287*
	Yes	228	318	546	
Take the time to exercise	No	72	125	197	0.223*
	Yes	252	351	603	

The data underwent single or multiple logistic regressions for each independent variable to the dependent variable of LBP incidence. Single logistic regression is used to determine whether the independent variables can be included as candidates for multivariate analysis or not. The significance value of < 0.05 is eligible for multivariate analysis. Of the

variables are involved in predicting the occurrence of dependent variables, the calculation of the probability is as follows:

$$Y = -4.847 + 1.830 (1) + 0.258 (1) + 0.473 (1) + 0.481 (1) = -1.805$$

$$P = 1 / (1 + 2.7 (-1.805)) = 0.143 \text{ or } 14.3\%.$$

Table 3: Multivariate analysis

Variables	B	S.E.	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
First Step						
History of previous spinal complaints	1.833	0.249	0.000	6.254	3.842	10.181
Slide board use for lateral transfer	-0.468	0.188	0.013	0.626	0.433	0.906
Gender	0.427	0.278	0.124	1.533	0.889	2.642
Pregnancy classification	0.183	0.582	0.753	1.201	0.384	3.757
Delivery classification	-0.173	0.555	0.756	0.841	0.283	2.499
Position	-0.283	0.191	0.140	0.754	0.518	1.097
Current work place	0.264	0.111	0.018	1.302	1.047	1.619
BMI classification	-0.206	0.157	0.188	0.814	0.599	1.106
The time taken for exercise	-0.301	0.182	0.097	0.740	0.518	1.057
Final Step						
History of previous spinal complaints	1.830	0.247	0.000	6.236	3.844	10.116
Slide board use for lateral transfer	0.481	0.187	0.010	1.617	1.122	2.333
Gender	0.473	0.212	0.026	1.605	1.059	2.433
Current work place	0.258	0.110	0.019	1.295	1.043	1.607
Constant	-4.847	0.676	0.000	0.008		

independent variables, 9 independent variables eligible for multivariate analysis with multiple logistic regression are; position, current workplace, gender, BMI classification, pregnancy history, delivery history, *slide board* use for lateral transfer of patients, not including the easy move or *slide board* use for lateral transfer of patients, and the time taken for exercise.

Table 3 shows the four variables involved in multivariate analysis to the final stage. The most dominant variable associated with LBP pain complaints is a history of spinal abnormalities. The predictive modeling results of the four variables using the formula $P = 1 / (1 + \exp (-y))$ with $\exp = 2.7$ and $Y = \text{constant} + a_1x_1 + a_2x_2 + \dots + a_nx_n$, are determined from the independent variables. If all four independent

This means that if the patient has a history of spinal abnormalities, a workplace of the emergency room (ER) or the like, male gender and has used a slide board, the likelihood of the reappearance of pain complaints is 14.3%. If the four independent variables are not involved in predicting the occurrence of the dependent variable, the calculation of the probability is as follows:

$$Y = -4.847 + 1.830 (0) + 0.258 (0) + 0.473 (0) + 0.481 (0) = -3.017$$

$$P = 1 / (1 + 2.7 (-3.017)) = 0.048 \text{ or } 4.8\%.$$

This means that if the patient meets the criteria of having a history of spinal abnormalities, non-ER & IC room, female gender, and never used a *slide board*, the likelihood of the reappearance of complaints of LBP pain is 4.8%.

Of the 324 respondents with a history of LBP complaint, 288 still had a complaint until the data collection. The analysis was performed to the 288 respondents to identify the dispersion of the incidence of LBP compliant with the instruments used in the study, i.e., KSBT and OMPQ. Results of the KSBT score are represented in 3 stratifications of LBP incidence. They are *Low Risk and Medium-High Risk*. Meanwhile, the final output of OMPQ was represented in 2 stratifications of prognosis. They are *High Estimated Risk of Future Work Disability (HRWD)* and *Low Estimated Risk of Future Work Disability*.

Table 4 describes the incidence of LBP with stratification of KSBT in each ward of patient treatment at Sardjito Hospital. Eight of 288 respondents have *High Risk* of the incidence of LBP, with the largest frequency of incidence in the outpatient care or non-emergency room (ER)-Ward Room. The data also show that females have a worse performance prognosis than males when they have LBP, which is 4/8 with high risk. Meanwhile, in the variable of *lateral transfer* of patient, the rate of *high risk: medium risk: low risk* reaches 8:55:225, respectively.

Table 5 describes the incidence of LBP compliant with stratification of prognosis using the OMPQ instrument. The results of the study show that 22/288 respondents had the prognosis of HRWD. The data also show that females had a worse performance prognosis than males when they have LBP, which is 11/22 with HRWD. Therefore, this study found that

Table 4: Prevalence of LBP in each ward refers to the KSBT stratification

Current Work Place	KSBT			Total
	High Risk	Medium Risk	Low Risk	
Female				
ER – Ward Room	0	4	21	25
Intensive Care Room	2	10	32	44
Non-ER & IC Room	4	32	142	178
Male				
ER – Ward Room	0	4	15	19
Intensive Care Room	0	0	2	2
Non-ER & IC Room	2	5	13	20
Total	8	55	225	288

Table 5: Prevalence of LBP in each ward refers to the stratification of OMPQ

Current Work Place	Conversion of OMPQ		Total
	HRWD	Low Estimated Risk of Future Work Disability	
Female			
ER – Ward Room	2	23	25
Intensive Care Room	6	38	44
Non-ER & IC Room	11	167	178
Male			
ER – Ward Room	2	17	19
Intensive Care Room	0	2	2
Non-ER & IC Room	1	19	20
Total	22	266	288

22/288 respondents have HRWD due to the incidence of LBP.

4. Discussion

As a common phenomenon, LBP is believed to be suffered by approximately 70%-80% of the population, minimally one occurrence. LBP is associated with a high cost of life and may lead to lower productivity and absenteeism among workers. Mechanical stress damage among nurses in hospitals is prevalent due to the frequent transfer and transport of patients.¹ LBP is also the cause of early retirement, absenteeism, resignation, and lower work speed among the workers.¹ Owayolu et al. found that LBP

rates in nurses were very high and most of the nurses experienced low back pain.⁸ Previous study consisting of 931 healthcare workers (HCW), found that 57.8% HCW who suffered from LBP were nurses, including staff and community nurses.⁹ Another study of 203 nurses also found the prevalence of LBP over a year was 58.1%.¹⁰ Nurses are prone to such pain due to some risk factors. Shieh et al. found that a high prevalence of LBP among nurses in developed countries, especially in some Asian countries might be due to their workload. Nurses worked in patient care, conducting advanced procedures that required prolonged standing or lifting weights. The number of this prevalence is significantly increased in nurses who have worked more than 2 y.¹¹

This study employed LBP as the dependent variable and five variables of gender, pregnancy history, delivery history, use of *slide board* for patient *lateral transfer*, and lack of use of *slide board* or *easy move*. The results showed that the variables of gender and use of slide board, history of previous spinal complaints and current work place were significant.

The prevalence of LBP is high among female nurses than male nurses. Hoy et al. found that both the mean and median prevalences of LBP in women were higher than men. Other studies also found a higher prevalence of LBP in older women than older men.^{15,16} Women are more frequent to have LBP, probably due to lower pain threshold and physical changes resulting from menstruation.¹⁷ Other studies observed that women likely had more symptoms, but the physician found approximately equal abnormalities in women and men. It may also be associated with the small number of male nurses in this study. Weak back muscles and incidence of sprain and strain in the lower back are expected to result in lower back pain.^{1,8}

Boughattas et al. found that the factors significantly associated with LBP were high BMI, number of pregnancies, arthritis, poor physical condition, daily frequency of performing activities with inappropriate posture, and the layout material in the workplace.¹⁰ Moving or lifting patients and other heavy physical activities are the most important risk factor for LBP in nurses.¹² A prospective cohort study among 5017 Danish HCW found that daily patient transfer increased risk factor for LBP. It was also found that the use of an assistive device for patient transfer could reduce the risk of LBP.¹³ Vinstrup et al. found that the

use of assistive devices had various degrees of muscle activity and trunk flexion during patient transfer. Some assistive devices could decrease the physical workload that could also decrease the risk of LBP.¹⁴

5. Limitation and Suggestion

It is advisable that multicenter research in all hospitals connected with Sardjito Hospital may be conducted in the future. It is necessary to provide *easy move* tools and training for the lateral transfer of patients as the largest risk factor for this study, and service comfort is improved through policy formulation. Finally, the data can be a reference for managing Sardjito Hospital to improve empathy for caregivers, such as nurses, midwives, and other medical staff, particularly those with a high risk of the incidence of LBP and risk of poor performance prognosis.

A limitation is that the study primarily collected the data of nurses and midwives, and therefore, the findings may not be generalizable in other caregivers.

6. Conclusion

This study describes the prevalence and risk factors of the incidence of LBP among the nurses who have worked for minimum one year in Sardjito Hospital. It was found that risk factors for gender and lack of *easy move* and *slide board* for lateral transfer of the patients are one of the causes of LBP among nurses at Sardjito Hospital, in addition to other factors such as multiparity, increased age, and high BMI. With the instrument of KSBT, we can see the incidence of LBP with a high-risk of 9/288, *medium risk* of 54/288, and the remaining low risk. The instrument of OMPQ improves the performance prognosis for nurses in the future if LBP is not seriously managed.

7. Conflict of incidence

No conflict of interest declared by the authors.

8. Authors' contribution

MM: Manuscript writing

SR: Research supervision

RM: Data sampling

AW: Transcultural adaptation process

NS: Ethical clearance management

9. References

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