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Work related low back pain, psychosocial, physical and individual risk factors among nurses in emergency care unit

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Abstract

Background: Work-related Low back Pain (WR-LBP) represents an important impact on the health and economic burden of workers worldwide. The wide range of risk factors have been evaluated on nurses, however, there is limited understanding of the contributions of an individual, physical and psychosocial factors with work-related low back pain among nurses in Emergency Care Unit (ECU). The aim of this study was to understand the potential risk factors of WR-LBP among ECU nurses.

Methods: This was a cross-sectional survey of healthcare workers in ECU at seven Hospitals in Manado. Questionnaires were distributed to assess the demographics, individual lifestyle and physical job characteristics, psychosocial, and self-reported low back pain. The associations between risk factors and WR-LBP were determined using multivariate logistic analysis.

Results: In total, 162 nurses in ECU participated in this research (81% response rate). A high proportion of nurses (92%) had experienced Work related – Musculoskeletal Disorder (WR-MSD) in the last 12 months, and 77% reported had experienced WR-LBP within the previous 12 months. WR-LBP was associated with older age ($p = 0.001$), being government officers ($p = 0.002$), more than 5 years of employment status ($p = 0.002$), has additional work ($p = 0.05$), psychosocial effort ($p = 0.003$), the total score of awkward position (0.000). Most of the work awkward positions measured in this study. The multivariate analysis confirmed that age (OR = 1.14, 95%CI 1.05–1.23), psychosocial effort (OR = 1.493, 95%CI 1.08–2.07), and awkward position total score (OR = 1.13, 95%CI 1.07–1.19) were significantly associated with WR-LBP.

Conclusions: This study revealed that individual, physical and psychosocial risk factors were important for work-related low back pain among nurses in ECU, especially the physical effort. It is suggested to increase attention to nurses' health and safety, in ECU. The physical load factors should be addressed when designing a prevention method for nurses in ECU.
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Introduction

Work-related Low Back Pain (WR-LBP) has a significant impact on worker's health and economic burden worldwide.[1] Work related-Musculoskeletal Disorder (WR-MSD) was common among nurses[2] and lower back was the most frequently reported body site pain.[1,2] It may has a significant impact on workers' health and well-being and in turn, reduces productivity and working performance, for instance MSDs may reduce working performance of the nurses in terms of providing health service to patients.[3]

The Sixth European Survey on Working Conditions in 2016 found that backache complaints in Europe were 44%[4] and it has a great impact on economic and workers' absence and lost a day of work.[4] In 2015, US Bureau of Labor Statistics reported that the hospital workers mostly experienced nonfatal injuries caused by overexertion and bodily reaction, including injuries by lifting or moving patients that comprised of 45% of the cases in a Private hospital and 44% in Local Government Hospital.[5] The study of musculoskeletal pain and discomfort within various workplaces including health care services in Australia found that 40% of workers experienced this disease and the most common body site were shoulder pain (47%), followed by lower back (39%).[6]

The risk factors of WR-MSDs have been attributed to a wide range of factors; including individual, psychosocial factors, physical and workplace factors.[6,7] Few studies indicated consistently that there was an interaction between these risk factors.[8,9]

Nurses, who work in Emergency Care Unit (ECU) often perform high physically demanding tasks, such as lifting patient and transferring patient, pushing and pulling a wheelchair or removable hospital bed, bending and twisting at waist level for performing the nursing task, therefore they frequently expose to work-related MSDs.[8,10] They also exposed to a stressful task including fast-paced patient services. Therefore, it is important to understand the risk factors of Work related low back pain (WR-LBP) among nurses in ECU, in order to design a suitable prevention method to reduce this disease. This study aims to understand the potential risk factors of WR-LBP of ECU nurses.

Methods

A total sampling method was used to recruit the ECU nurses in seven hospitals in Manado City. A total of 200 questionnaires were distributed to all the nurses in ECU after the study was approved by the Hospital of Prof Kandou's Research Committee (No.107/EC-KEPK/VII/2018).

Those who agreed to participate were asked to sign the informed consent. A total of 165 questionnaires were completed. Participants who did not complete the MSD questionnaires were excluded.

The questionnaires comprised a demographic characteristic, psychosocial, physical workload, and self-reported WR-LBP questionnaires. The demographic questionnaire consists of individual information. The psychosocial questionnaire used in this study was the Indonesian version of effort-reward imbalance (ERI) psychosocial assessment originally developed and was cross-culture adapted by Widanarko.[9,11] The total score of the psychosocial factor was obtained by summing up the frequency score of 16 items, the minimum score was 16 and the maximum score was 48.

This study used the modified Nordic Body Map questionnaire that originally developed to identify the low back symptoms (ache, pain, and discomfort).[14] All the questioners in this study were modified and validated to the nurses in the hospital that did not include in this study.

The Dortmunder physical workload assessment was used after being modified in this study.[12,13] This study evaluated the physical workload by considering the frequency of awkward posture performed by the nurses and gave them a score (seldom = 1, occasionally = 2, and often = 3). This physical workload for each body postures comprises of trunk physical workload, arm workload, leg workload and carrying, lifting, pushing workload, as well as overall workload. The calculation of the physical workload was obtained by summation of the score for each body posture and weights carried.

Data analysis

Distribution of demographic characteristics, psychosocial and physical workload factors and WR-LBP information were analyzed using the descriptive statistical analysis. The prevalence of any WRMSD within the past 12 months, WR-LBPs within the past 12 months, and WR-LBPs with absenteeism and seeking treatment were also obtained.

Bivariate analysis to evaluate the association between the prevalence of WR-LBPs and individual, employment, psychosocial and physical workload factors were calculated using the chi-square test and Spearman Rho test.

Multivariate logistic regression analysis was used to determine all predictive factors. Independent variables associated with WR-LBP with a p-value of less than 0.25 were included in the model.[6] Age, Awkward position score and Psychosocial-effort score were entered in the model using the continuous variable. In the final model, statistical significance was defined as a two-tailed p-value of 0.05 or less.

Table 1 The prevalence of overall WR-MSDs and WR-LBP among emergency nurses N = 162.

WR-MSD	n (%)
WR-MSDs 12 months	149 (92)
WR-MSDs 7 days	138 (85)
WR-LBP 12 Months	125 (77)
WR-LBP 7 days	113 (70)
WR-LBP 12 months with treatment	29 (18)
WR-LBP 12 months with absenteeism	18 (11)

Note: Work related-Musculoskeletal Disorder (WR-MSD); Work related low back pain (WR-LBP).

Results

Characteristics of participants

Overall, there were 162 nurses in ECU who participated in this study (81% response rate). The majority of participants were female 95 (58.6), less than 30 years old 113 (70.2), working in the hospital less than 5 years 118 (72.8), and had a working duration of fewer than 10 hours/days 120 (74.1) as shown in Table 1. The emergency nurses reported that the common tasks performed were moving or transfer patients (90%), pushing patients in wheelchair and trolley (41.7%), examine and interview the patients while standing (36%).

Prevalence of Work related low back pain and any WMSDs

A high proportion of nurses (92%) had experienced WMSDs in the last 12 months, and 77% had experienced WR-LBP within the previous 12 months (Table. 1). Whereas, 18% of respondents reported have the 'severe' WR-LBP with treatment and 11% do not work.

Factor associated with work related low back pain

Table 2 shows the associations of WR-LBP and the potential risk factors among ECU nurses. Age (*p* = 0.001), length of employment (*p* = 0.002), psychosocial effort (*p* = 0.003), and the total score of Awkward positions (*p* = 0.000) had a positive correlation with WR-LBP. It also revealed that being a government officer (*p* = 0.002), has additional work (*p* = 0.05), were significantly associated with WR-LBP.

Factor associated with work related low back pain

Table 3 presents a final model of logistic regression which confirmed the dominant factors associated with WR-LBP. The multivariate results confirmed that age (OR = 1.14, 95%CI 1.05–1.23), psychosocial effort (OR = 1.493, 95%CI 1.08–2.07), awkward position total score (OR = 1.13, 95%CI 1.07–1.19) were significantly associated with WR-LBP.

Discussion

The prevalence of work related WR-LBP of ECU nurses

Our study reported that 92% of ECU nurses experience WMSDs in all body sites and 77% of them having WR-LBPs. These prevalence were higher than those healthcare workers in other countries such as nurses in Korea 72.4%, Iran 72%, and 65%, China 56.7%, dentist in Saudi Arabia 64%, another Korean study 23%, US 28.6%, and Italy 61%.[1,2,15–20] It was not surprising since the tasks of ECU nurses are very physically demanding, compare with those nurses in other units. As it had been reported by the participants in this study that the common tasks performed were moving patients. This task is very physically demanding that may relate to low back MSD.[21] The hospitals included in our study have very limited mechanical aids for moving the patient such as sling lift and ceiling lift, most of the patient transferring task were performed manually, similar to those in Korea and Iranian studies.[18] Q3

In contrast, Korean study found that the prevalence rate of MSDs in the emergency room was the lowest compared with other rooms.[16] This could be argued that the participants who worked in the emergency room in that study was only 11% out of 162 participants, so it might not be sufficiently representative of nurses of the emergency room.

Nurses in the US, and Italy were less likely to complain about WR-LBP symptoms compare with our study and other Asian studies, due to the cross-cultural or anthropometry differences between Asian countries, US and European countries.[1,15] Another possible reason it might be the provisions of adequate mechanical aid equipment at hospitals in developed countries were more complete, and working condition was better than those in developing countries.[16,18]

However, the differences in the prevalence of WR-LBP could be also due to the variation in methods and analysis, as well as the cultural differences among the studies' population.

Factors associated with Low Back-WMSDs

The multivariate analysis confirmed that age, psychosocial-effort, and physical workload were correlated with WR-LBP. The association of age and Low Back-WMSDs shows that the age of less than 30 more likely to experience WR-LBPs than those age group of more than 30. Our study explained that most of the nurses at ECU were young people less than 30 years old, so they were in charge to serve most of the patients, therefore most of them may more likely experience Low Back-WMSDs. Previous study were in line with this study, however they found that age more than 40 years were associated with musculoskeletal pain and discomfort.[7] Conversely, few studies found that age were not associate with musculoskeletal symptoms.[15,16] These inconsistency could be explained that these studies included nurses from several units in hospital, so we could not compare them exactly.

This study also revealed that the psychosocial factors are important risk factors of WR-LBP. This result in line with several studies from Hong Kong, Australia, Korea, Thailand.[2,7,16,22] In this study, the total score of

Table 2 The distribution of nurses' characteristics in ECU and the predictors of WR-LBP: frequency and bivariate result.

Risk factors N = 162	Frequency		Bivariate	WR-LBP	
	N (%)	Mean (SD)	n (%)	r	p value
Individual characteristics					
Age[a]		29.7 (7.0)		r = 0.26	.001**
<30	113 (70.2)		83 (73.5)		
≥30	48 (29.8)		41 (85.4)		
Length employment[a]		5.39 (5.8)		r = 0.24	.002**
<5 years	118 (72.8)		88 (74.6)		
≥5 years	44 (27.2)		37 (84.1)		
Gender					
Female	95 (58.6)		74 (77.9)		0.79
Male	67 (41.4)		51 (76.1)		
Employment status					
Gov. officer	66 (40.7)		59 (89.4)		.002**
Non-gov. officer	96 (59.3)		66 (68.8)		
Additional work					
Yes	25 (15.4)		23 (92)		0.05*
No	137 (84.6)		102 (74.5)		
Work duration per day					
>8 h	42 (25.9)		35 (83.3)		0.27
≤8 h	120 (74.1)		90 (75)		
History of trauma					
Yes	9 (5.6)		6 (66.7)		0.44
No	153 (94.4)		119 (77.8)		
History of gout arthritis					
Yes	12 (7.4)		11 (91.7)		0.21
No	150 (92.6)		114 (76)		
Psychosocial characteristics					
Shift work satisfaction					
Satisfied			25 (54.3)		0.12
Unsatisfied			19 (73.1)		
Psychosocial ERI total score[a]		39.18 (4.36)			0.19
Stress level-low	8 (4.9)				
Stress level-medium	148 (91.4)				
Stress level-high	6 (3.7)				
Effort[a]		8.06 (1.5)		r = 0.24	.003**
Esteem[a]		4.56 (0.9)		r = 0.10	0.19
Job security[a]		5.11 (1.2)		r = 0.05	0.49
Job promotion[a]		6.58 (1.3)		r = −0.06	0.43
Over-commitment[a]		15.1 (2.1)		r = 0.12	0.13
Physical workload					
Awkward position total score		56.9 (9.1)		r = 0.351	.000**

[a] Spearman's rho test.
* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 3 Regression model for risk factors associated with work related LBP.

Risk factors	OR	p-Value	95% CI	
Age	1.140	0.001	1.05	1.23
Psychosocial − effort	1.493	0.016	1.08	2.07
Awkward position − total score	1.130	0.000	1.07	1.19

ERI-Psychosocial did not show significant correlation but the 'effort' psychometric scale score did. According to Siegrist, the effort psychometric scale refers to challenging aspects in a workplace that includes the quantitative and qualitative workload, as well as the overtime workload.[11] As known nurses in ECU are exposed to physical and psychological demanding workloads, where they need to do their work at the high pace. Therefore, it not surprising that 'effort' psychosocial factors contribute to the development of low back pain among nurses in the ECU.

Physical workload measured by awkward position was also found to be associated with WR-LBP. This finding similar to several Nursing WMSD studies.[16,17,23] This could be explained that the physical task demand of the nurses could develop the biomechanical tension in musculoskeletal tissue then cause micro-trauma and could develop inflammation of this tissue.[24] Barbe and Barr also suggest the three important pathway of the development of WMSD as a result of repetitive and forceful task namely: ''CNS reorganization, tissue injury and tissue reorganization''.[24] Our study found in bivariate analysis that not all the awkward position was associated with the low back MSD, such as sitting, kneeling, and squatting. This probably because these positions did not often perform by the nurses. But there are still some studies and one previous systematic review from various workplaces revealed that there was no association between awkward posture and low back MSD.[6,25] This might be due to the population and methods used in the previous studies were different from this current study.

Conclusion

Younger Age, high score of Psychosocial-Effort, high score of Physical workload were consistently correlated with WR-LBP of the nurses in the ECU. It is suggested that healthcare facilities should address the workers' age, psychosocial and physical workload when conducted the intervention for the prevention of WR-MSD. Future research should be considered to comprehensively explore the external factors such as additional work and workers' lifestyle.

Conflict of interest

The authors declare no conflict of interest.

Uncited references

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Acknowledgments

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