International Journal of Technology 10(4): 854-861
ISSN 2086-9614

THE PREVALENCE OF MUSCULOSKELETAL COMPLAINTS AMONG HOSPITAL NURSES AND NURSING HOME CAREGIVERS IN INDONESIA

Hardianto Iridiastadi[1*], Bayuardi Anggawisnu[1], Fatin Saffanah Didin[1], Putra Alif Ramdhani Yamin[1]

[1]*Faculty of Industrial Technology, Institut Teknologi Bandung, JL. Ganesha No. 10, Bandung 40132, Indonesia*

(Received: January 2018 / Revised: April 2018 / Accepted: July 2019)

ABSTRACT

The jobs of hospital nurses and nursing home caregivers are often associated with risks of musculoskeletal disorders. Little is known, however, about the prevalence of such problems among nurses and caregivers in Indonesia. This study aims at determining the prevalence of musculoskeletal (MS) complaints experienced by caregivers in Indonesia and identifying relevant factors contributing to this problem. Standardized Nordic Questionnaires were distributed to 121 hospital nurses and nursing home caregivers, as a means of understanding the magnitude of the problem. Results of this study demonstrated that 75% of the respondents reported MS complaints (for any body parts) in the previous year. Roughly 40 to 50% of the respondents reported MS complaints of the upper and lower back. Complaints of the shoulder, neck, and right wrist were reported by about 30 to 40% of the respondents. Compared to their colleagues in the hospital, nursing home caregivers were six to eight times more likely to experience right shoulder problems and about three to four times more likely to develop lower back problems. Other working conditions resulting in an increased chance of MS problems included age, length of employment, and shift durations. It was suspected that poor working postures and excessive effort while handling the patients were two major factors that were in need of immediate attention. The findings of this study could be used as a basis for ergonomic interventions in both medical and home care settings. Such improvements may, in the long run, result in better morale, increased productivity, and a stronger bottom line for hospital and nursing home too.

Keywords: Caregivers; Hospital; Musculoskeletal complaints; Nurses; Nursing homes

1. INTRODUCTION

Regardless of the causes, physically disabled patients in hospitals and nursing homes are commonly assisted by nurses and caregivers. The majority of patient handling tasks are physical in nature (e.g., lifting, positioning, moving, transferring), and these activities are often associated with risks of musculoskeletal (MS) problems (Nelson, 2006; Warming et al., 2009). These problems have been reported in the relevant literature (e.g., Karahan et al., 2009), with poor (non-neutral) working postures and forceful exertions being important occupational risk factors. Injuries to the musculoskeletal system could recur (Cilliers & Maart, 2013), which may need a relatively long recovery time.

A number of investigations have studied the prevalence of MS complaints among workers in

*Corresponding author's email: hiridias@vt.edu, Tel: +6222 2508124, Fax: +6222 2509164
Permalink/DOI: https://doi.org/10.14716/ijtech.v10i4.1320

medical settings and noted several body parts which have especially greater prevalence (e.g., Smith et al., 2004). Ergonomic interventions and workplace improvements have been suggested (Kamioka & Honda, 2013), with varying results. While the prevalence of MS complaints among nurses and caregivers has been widely reported, the availability of such information relating to developing nations (such as Indonesia) is limited. It was also suspected that there were differences in task characteristics, when comparing nursing homes and typical public hospitals in Indonesia to those in developed countries. This investigation sought to determine the prevalence of MS complaints among nursing home caregivers and hospital nurses in Indonesia and, further, to identify factors associated with MS complaints. It was expected that the findings of this study could be used as a rationale for workplace improvements.

2. METHODOLOGY

2.1. Questionnaire

The Standardized Nordic Questionnaire (Kuorinka et al., 1987; Deakin et al., 1994; Dawson et al., 2009) was used to obtain data on MS complaints (injuries, pain, numbness, excessive soreness of body joints) among nurses and caregivers. The questionnaire consisted of three sections. The first section consisted of demographic data and questions pertaining to the daily jobs and activities of the respondents. In the second section, respondents were asked to pinpoint where the problems had occurred (over the nine body regions) in the previous seven days, as well as the past year. These body parts included the upper and lower limbs and the neck and torso regions. The third section contained open-ended questions pertaining to whether the complaint interfered with daily activities at work and how they dealt with the problems (Crawford, 2007).

2.2. Respondents

The questionnaire was distributed to 138 respondents, with an acceptable rate of return of nearly 92% (Fincham, 2008). The respondents included hospital (outpatient and inpatient) nurses (74.4%) and nursing home caregivers (25.6%). The respondents were in the adult age range (26–45 years), with normal stature (BMI values = 18.5–24.9), and worked with the right hand as the dominant hand. The nurses worked daily in shifts of 8 hours (morning shift, 06:00AM–02:00PM; afternoon shift, 02:00PM–10:00PM; and night shift, 10:00PM–06:00AM). The caregivers typically worked in morning and night shifts, but the arrangement was not formal (i.e., some could work beyond their assigned schedules).

2.3. Statistical Analysis

In this study, prevalence data were first shown as descriptive statistics. Furthermore, hypothesis testing was done to determine whether there were relationships between independent and dependent variables. The dependent variables were the presence or absence of MS complaints, while the independent variables were the grouping of respondents, including the types of health care facility, demographic, and employment variables. Hypothesis testing was done using the chi-square Mantel-Haenszel (Mantel & Haenszel, 1959; Lamothe, 2011) at $\alpha = 0.05$ from the cross tabs. Hypothesis testing was performed with the SPSS software package. This study, thus, examined whether there was a relationship between an independent variable (exposures to workplace factors) and musculoskeletal complaints on certain body parts. The odds ratio (OR) was also calculated, particularly for several body parts which had the greatest prevalence (Smith et al., 2004). Based on logistic regression calculations, the OR would demonstrate whether differences in respondent classification (e.g., age, job title, or length of employment) were associated with differences in outcomes (i.e., the prevalence of MS problems).

3. RESULTS AND DISCUSSION

3.1. Prevalence of Musculoskeletal Disorders (MSDs) among Caregivers and Nurses

Across the three jobs (nursing home caregivers, inpatient nurses, and outpatient nurses), the lower back and the upper back are the body parts with the greatest prevalence of symptoms (see Figure 1). The prevalence of MS problems for the lower back was 57%, while that of the upper back was 46%. Nearly 40% of the respondents reported problems of the right shoulder and the neck area. Note that the prevalence of left shoulder problems was significantly much lower (21%) than that of right shoulder problems. Problems relating to all other body areas were reported by less than approximately one-third of the respondents.

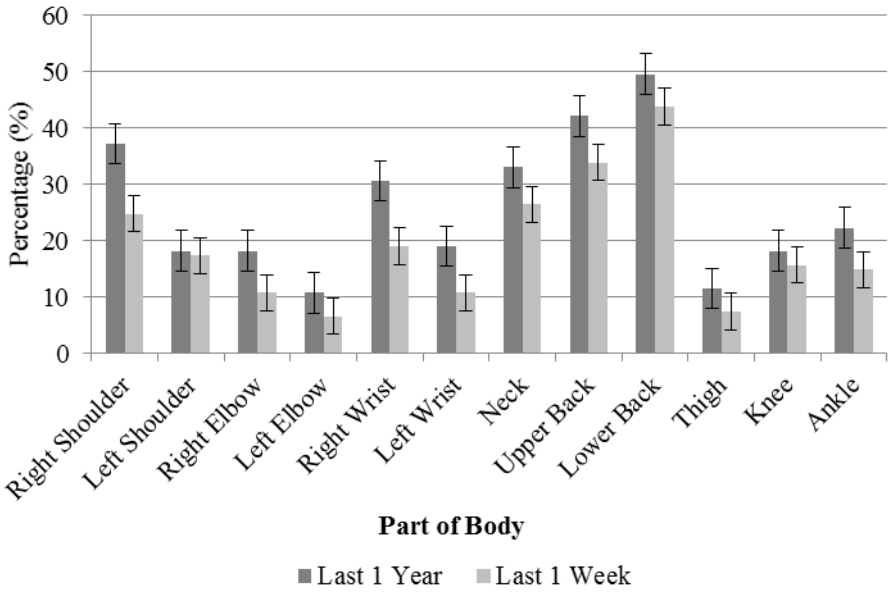

Figure 1 Prevalence data across respondents

It is worth mentioning that there were differences in the prevalence of MS problems, particularly between nursing home caregivers and hospital nurses (see Table 1). It was almost consistent differences in the prevalence of MS problems across all body parts except right shoulder and lower back.

Table 1 Prevalence of MS problems among nurses and caregivers

Part of Body	Prevalence			
	All (n=121)	Caregivers (n=31)	Nurse-Inpatient (n=51)	Nurse-Outpatient (n=39)
Right Shoulders	38.02%	70.97%	29.41%	23.08%
Left Shoulders	21.49%	25.81%	25.49%	12.82%
Right Elbow	19.83%	35.48%	19.61%	7.69%
Left Elbow	11.57%	6.45%	17.65%	7.69%
Right Wrist	33.06%	32.26%	39.22%	25.64%
Left Wrist	19.01%	16.13%	21.57%	17.95%
Neck	37.19%	35.48%	43.14%	30.77%
Upper Back	46.28%	48.39%	50.98%	38.46%
Lower Back	57.02%	77.42%	54.90%	43.59%
Thigh	12.40%	19.35%	7.84%	12.82%
Knee	21.49%	25.81%	17.65%	23.08%
Ankle	26.45%	32.26%	29.41%	17.95%

In general, nurses working at the outpatient facility reported fewer problems compared to inpatient nurses or caregivers. Comparisons between caregivers and inpatient nurses revealed mixed results. Compared to inpatient nurses, nursing home caregivers reported substantially greater prevalence of MS problems of the right shoulder (71 vs. 29%) and the lower back (77% vs. 55%). For other body parts, there were circumstances where the prevalence among inpatient nurses was greater than the caregivers.

3.2. Prevalence Odds Ratio

Odds Ratios (OR) were calculated based on logistics regression and show the likelihood of one work condition occurring compared to the other condition (Table 2). The results show that nursing home caregivers were six to eight times more likely to have experienced complaints of the right shoulder compared to their hospital counterparts. The results also show that caregivers were three to four times more likely to develop lower back complaints. Age was also found to be a discriminating factor, with older workers (> 45 years of age) having four to five times more likely to experience right shoulder complaints. Those who had been employed for more than 10 years were also associated with greater (right) wrist and neck complaints. As expected, workers with longer shift hours were characterized with substantially increased risks of right shoulder and lower back problems. It is interesting to note that body mass index (BMI) might also be related to neck problems. Compared to their colleagues with normal BMIs, workers who were obese tended to be associated with an increased risk of neck problems.

Table 2 Odds Ratio (OR) of several work factors and the body parts affected

Work Factors	Comparisons	Right Shoulder	Right Wrist	Neck	Upper Back	Lower Back
Types of Facility	Nursing Homes vs. Outpatient Facility	0.17	NS*	NS	NS	0.36
	Nursing Homes vs. Inpatient Facility	0.12	NS	NS	NS	0.23
	Outpatient vs. Inpatient Facility	NS	NS	NS	NS	NS
Age (years old)	< 26 vs. 26-45	NS	NS	NS	NS	NS
	< 26 vs. > 45	4.5	NS	NS	NS	NS
	26-45 vs. > 45	5.3	NS	NS	NS	NS
Length of Employment (years)	< 1 vs. 1-10	NS	NS	NS	NS	NS
	< 1 vs. >10	NS	13	4.8	NS	NS
	1-10 vs. > 10	NS	NS	NS	NS	NS
Shift Duration (hours)	Regular 8 hours vs. > 8 hours	5.7	NS	NS	NS	3.6
BMI	Underweight vs. Normal	NS	NS	NS	NS	NS
	Underweight vs. Overweight	NS	NS	NS	NS	NS
	Normal vs. Overweight	NS	NS	2.4	NS	NS

*NS= not significant

3.3. Musculoskeletal Problems among Nurses and Caregivers

The objective of this study was to determine the prevalence of MS problems among nursing home caregivers and hospital (inpatient and outpatient) nurses. Regardless of which body joints were affected, the findings of this study clearly demonstrated that the majority (~78%) of the nurses and caregivers who completed the questionnaire experienced musculoskeletal complaints (injuries or pain) in the preceding year. These statistics were similar to those reported by Smith

et al. (2004) but were deemed higher prevalence of MS complaints than those reported in other service and manufacturing sectors.

The greatest number of musculoskeletal complaints occurred at the upper and lower back, followed by the right shoulder and the neck area. Across all the three types of health care facilities, the prevalence of MS problems was comparable to a study done by Smith et al. (2004). They investigated the prevalence of MS problems among Chinese hospital nurses and noted similar findings (lower back = 57%; neck = 43%; and shoulders = 39%). Across the three different facilities, however, there was a somewhat different picture. It seemed that nurses in the outpatient facilities reported the fewest MS complaints. Nursing home caregivers, on the other hand, tended to report substantially more complaints, particularly for the lower back and right shoulder. In fact, these two body parts were reported by more than 70% of the caregiver respondents. In general, nursing home caregivers tended to experience the greatest prevalence of MS problems, while the outpatient nurses were associated with the least MS complaints. It is unfortunate that the prevalence of MS problems among nursing home caregivers has not been reported widely, by either industrialized nations or developing countries. Results from this study could highlight the importance of considering other health care facilities such as nursing homes, which in Indonesia are often considered as informal business entities.

Several studies have reported the ergonomic risks associated with nursing jobs. In line with the results of this study, body parts that are vulnerable to pain and injury are the lower back (Karahan et al., 2009; Bardak et al., 2012), shoulders and the upper back (Owen et al., 2012), and the neck area (Nimbarte, 2014). Causes of MS complaints of the shoulder and the back include handling heavy patients, handling those with large bodies, handling patients in emergency situations (Cilliers & Maart, 2013), inappropriate handling methods (Bardak et al., 2012), and repetitive tasks associated with patient handling (Karahan et al., 2009). Similar to the responses given by the nurses and caregivers, exerting forces and efforts beyond their capabilities during patient handling are other characteristics that increase the likelihood of musculoskeletal problems (Finneran & Sullivan, 2010).

It should be noted here that working postures during patient handling could be tremendously poor, and become a major risk factor (Holman, 2010). A trunk angle of closer to 90^{o} could be frequently observed, particularly when lifting a patient from a bed. Even when the patient is fairly light, such a trunk angle could result in excessive compression and shear force on the L5/S1 (lumbar) joint. Proper working methods could substantially reduce this risk. Moving the patient much closer to the nurse's lifting position, adjusting the height of the patient's bed to closer to (standing) elbow height, or lifting with help from other personnel are several methods that are worth considering. These techniques, however, require certain knowledge of body biomechanics that should be taught prior to job assignments.

Another issue worth discussing is the relationships between various work conditions (work exposures) and the prevalence of MS complaints. Previous studies (e.g., Bardak et al., 2012; Jellad et al., 2013) have addressed and noted several work factors that did not relate to MS problems, such as stature, a smoking habit, and gender. In this study, nursing home caregivers in general had greater likelihood of acquiring MS problems. It is usually acknowledged that these caregivers have longer work hours, non-standardized work methods, less formal job assignments, and little help from their supervisors. Their rest hours could also be limited. While the exact underlying mechanisms can be argued, such work conditions seem to be closely related to increased MS injuries and complaints. Within a hospital setting, those working in outpatient care facilities tended to be related to the lowest likelihood of MS problems. This did not seem to be a surprise, considering that the amount of physical work was probably minimal, and a good percentage of their work might be considered as administrative in nature.

In this investigation, there were also other work factors that tended to be related to an increased prevalence of MS problems. Longer working hours, senior workers, and longer length of employment were associated with an increased chance of MS problems. These conditions had been expected, but it is difficult to explain how (and to what extent) such phenomena occurred. Similarly, obese workers also seemed to be related to a greater prevalence of MS problems. In many studies, obesity has been pointed out as a factor affecting performance and quality of work.

This study clearly demonstrates that nursing home caregivers and hospital nurses are exposed to a certain number of ergonomic risks and, compared to other sectors, this job seems to have a greater prevalence of musculoskeletal injuries and complaints. Those performing patient handlings are, indeed, at risk, and workplace improvements should be conducted soon. Compared to those working in hospitals, nursing home caregivers do not have the luxury of formal, standardized work methods, job assignments, and work hours. Their jobs need to be improved as well. Various improvements may need to be conducted as a means of improving their quality of work life (Shields & Hartati, 2003). Engineering and administrative approaches should be considered, together with support from management. Otherwise, such work conditions could affect morale, productivity, and even the business bottom line.

A number of the limitations of the study are worth mentioning. First, the respondents of this study were only obtained from one major city in Indonesia, with samples of 121 nurses and caregivers. Other similar studies usually involve much larger sample sizes. Nevertheless, this (preliminary) investigation is probably one of the very few studies in Indonesia that seeks to understand the extent of MS problems among hospital nurses and nursing home caregivers. The findings from this study could still provide valuable information on the magnitude of MS problems for this particular job. Secondly, this study does not offer any plausible explanations on the relationships between the exposures to work conditions and the outcomes of the exposures (i.e., MS problems). An in-depth investigation will definitely be needed to address this issue. Lastly, task analysis that looked closely at how tasks were being performed inside a patient's room, was not conducted. This analysis might provide a useful insight, but was deemed to be outside the scope of this study. Aside from these limitations, the findings of this research can certainly be used as an important rationale for further investigations aiming at improving the quality of working life among medical and nursing home personnel.

4. CONCLUSION

This study specifically sought to understand the prevalence of musculoskeletal problems among hospital nurses and nursing home caregivers. It was concluded in this research that a large majority of the workers had experienced injuries or complaints in the previous year. The body parts with the greatest number of incidents included the lower back, upper back, right shoulder, and the neck area. Nursing home caregivers tended to be associated with an increased likelihood of MS problems, followed by nurses working at inpatient care facilities. Other work factors seeming to contribute to the problems include longer shift hours, longer length of employment, and more senior workers suffering from MS problems. Those with higher BMIs were also related to higher ergonomic risks. Although not specifically addressed, poor posture and excessive effort during patient handling could be the two major factors influencing the high prevalence of MS problems. The findings of this study could be used as a basis for ergonomic interventions and, especially, further research in Indonesia addressing musculoskeletal injuries and complaints among hospital nurses and nursing home caregivers. It is expected that such interventions could improve the quality of working life among nurses and caregivers, and also improve the hospital and nursing home's bottom line in the long run.

5. ACKNOWLEDGEMENT

This research has been partially funded by the Ministry of Research, Technology, and Higher Education (Grant #: RT-2016-0375).

6. REFERENCES

Bardak, A.N., Erhan, B., Gunduz, B., 2012. Low Back Pain among Caregivers of Spinal Cord Injured Patients. *Journal of Rehabilitation Medicine*, Volume 44(10), pp. 858–861

Cilliers, L., Maart, S., 2013. Attitudes, Knowledge, and Treatment of Low Back Pain amongst Nurses in the Eastern Cape, South Africa. *African Journal of Primary Health Care Family Medicine*, Volume 5(1), pp. 1–8

Crawford, J.O., 2007. The Nordic Musculoskeletal Questionnaire. *Occupational Medicine*, Volume 57(4), pp. 300–301

Dawson, A.P., Steele E.J., Hodges P.W., Stewan S., 2009. Development and Test-Retest Reliability of an Extended Version of the Nordic Musculoskeletal Questionnaire (NMQ-E): A Screening Instrument for Musculoskeletal Pain. *The Journal of Pain*, Volume 10(5), pp. 517–526

Deakin, J.M., Stevenson, J.M., Vail, G.R., Nelson, J.M., 1994. The Use the Nordic Questionnaire in an Industrial Setting: A Case Study. *Applied Ergonomics*, Volume 25(3), pp. 182–185

Fincham, J.E., 2008. Response Rates and Responsiveness for Surveys, Standards, and the Journal. *American Journal of Pharmaceutical Education*, Volume 72(2), pp. 1–3

Finneran, A., Sullivan, L., 2010. Force, Posture, and Repetition Induced Discomfort as a mediator in Self-Paced Cycle Time. *International Journal of Industrial Ergonomics*, Volume 40(3), pp. 257–266

Holman, G.T., Ellison, K.J., Maghsoodloo, S., Thomas, R. E., 2010. Nurses' Perception of How Job Environment and Culture Influence Patient Handling. *International Journal of Orthopedic and Trauma Nursing*, Volume 14(1), pp. 18–29

Jellad, A., Lajili, H., Boudokhane, S., Migaou, H., Maatallah, S., Frih, Z.B.S., 2013. Musculoskeletal Disorders among Tunisian Hospital Staff: Prevalence and Risk Factors. *Journal of the Egyptian Rheumatologist*, Volume 35(2), pp. 59–63

Kamioka, H., Honda, T., 2012. Low Back Pain in Female Caregivers in Nursing Homes. *In:* Low Back Pain

Karahan, A., Kav, S., Abassoglu, A., Dogan, N., 2009. Low Back Pain: Prevalence and Associated Risk Factors among Hospital Staff. *Journal of Advanced Nursing*, Volume 65(3), pp. 516–524

Kuorinka, I., Jonsson, B., Kilborn, A., Vinterberg, H., Biering-Sorensen, F., Andersson, G., Jorgensen, K., 1987. Standardized Nordic Questionnaire for the Analysis of Musculoskeletal Symptoms. *Journal of Applied Ergonomics*, Volume 18(3), pp. 233–237

Lamothe, G., 2001. *Adjusting the Mantel Haenzel Test Statistic and the Odds Ratio for Cluster Sampling*. Department of Mathematics and Statistics, University of Ottawa

Lloyd-Sherlock P., 2009. *Stroke in Developing Countries: Epidemiology, Impact, and Policy Implication*. School of International Development, University of East Anglia

Mantel, N., Haenszel W., 1959. Statistical Aspects of Analysis of Data from Retrospective Studies of Disease. *Journal of the National Cancer Institute*, Volume 22(4), pp. 719–748

McAtamney, L., Corlett, E.T., 1993. Rula: A Survey Method for the Investigation of Work-Related Upper Limb Disorders. *Journal of Applied Ergonomics*, Volume 24(2), pp. 91–99

Nelson A., 2006. *Safe Patient Handling and Movement: A guide for Nurses and Other Health Care Providers*. Springer Publishing Company, USA

Nimbarte, A.D., 2014. Risk of Neck Musculoskeletal Disorders among Males and Females in Lifting Exertion. *International Journal of Industrial Ergonomics*, Volume 44(2), pp. 253–259

Owen, B.D., Keene, K., Olson S., 2002. An Ergonomic Approach to Reducing Back/Shoulder Stress in Hospital Nursing Personnel: A Five Year Follow Up. *International Journal of Nursing Studies*, Volume 39(3), pp. 295–302

Shields, L., Hartati, E.L., 2003. Nursing and Health Care in Indonesia. *Journal of Advance Nursing*, Volume 44(2), pp. 209–216

Smith, D., Ning, R., Lin, K., Wang, R.S., 2004. Musculoskeletal Disorders among Professional Nurses in Mainland China. *Journal of Professional Nursing*, Volume 20(6), pp. 390–395

Warming, S., Precht, D.H, Suadicani, P., Ebbehoj, N.E., 2009. Musculoskeletal Complaints among Nurses Related to Patient Handling Tasks and Psychosocial Factors-based on Logbook Registration. *Journal of Applied Ergonomics*, Volume 40(4), pp. 569–576