

## Nursing Work Ergonomics Knowledge Relating to Musculoskeletal Complaints in Inpatient Room RSD Mangusada

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### ABSTRACT

*Musculoskeletal disorders (MSDs) are disorders of the musculoskeletal system. Incorrect ergonomics causes musculoskeletal disorder complaints. Knowledge or cognition about ergonomics is an essential domain for forming a person's behavior or actions. This study aimed to determine the correlation between associate nurses' knowledge about working ergonomics with musculoskeletal disorders in the inpatient ward of Mangusada Regional Hospital, Badung Regency. This study used an observational analytical research design with the cross-sectional approach. The number of samples was 51 respondents with the purposive sampling technique. Data was collected using a knowledge questionnaire about working ergonomics and the Nordic Body Map sheet and analyzed using Spearman's rho test. It showed a good result of associate nurses' knowledge about the working ergonomics, mainly 30 respondents (58.8%), and moderate musculoskeletal disorders of nurses in the inpatient ward (58.8%). The analysis of the correlation between associate nurses' knowledge about working ergonomics with musculoskeletal disorders obtained a p-value <0,000. It can be concluded that there was a correlation between associate nurses' knowledge about working ergonomics with musculoskeletal disorders in the inpatient ward of Mangusada Regional Hospital, Badung Regency. The recommendation of this study is expected to be an input for nurses in working using ergonomics guidelines.*

**Keywords:** ergonomics; musculoskeletal disorders; nurses' knowledge

### ABSTRAK

*Musculoskeletal disorders (MSDs) merupakan suatu gangguan pada sistem muskuloskeletal. Keluhan muskuloskeletal disorder disebabkan karena ergonomi yang salah. Pengetahuan atau kognitif tentang ergonomi merupakan domain yang sangat penting untuk terbentuknya perilaku atau tindakan seseorang. Penelitian ini bertujuan mengetahui adanya hubungan pengetahuan perawat pelaksana tentang ergonomi kerja dengan keluhan muskuloskeletal di Ruang Rawat Inap RSD Mangusada Kabupaten Badung. Penelitian ini menggunakan rancangan penelitian observasional analitik dengan pendekatan cross sectional. Jumlah sampel 51 responden dengan teknik purposive sampling. Data dikumpulkan menggunakan*

kuesioner pengetahuan tentang ergonomi kerja dan lembar Nordic Body Map. Data dianalisis menggunakan uji spearman's rho. Hasil penelitian pengetahuan perawat pelaksana tentang ergonomi kerja sebagian besar tingkat pengetahuan cukup sebanyak 30 responden (58,8%) dan keluhan muskuloskeletal pada perawat di rawat inap sebagian besar responden mengalami keluhan muskuloskeletal sedang sebanyak 30 responden (58,8%). Analisis hubungan pengetahuan perawat pelaksana tentang ergonomi kerja dengan keluhan muskuloskeletal didapatkan nilai  $p < 0,000$ . Kesimpulan penelitian ini terdapat hubungan pengetahuan perawat pelaksana tentang ergonomi kerja dengan keluhan muskuloskeletal di Ruang Rawat Inap RSD Mangusada Kabupaten Badung. Rekomendasi penelitian ini diharapkan menjadi masukan bagi perawat dalam bekerja menggunakan panduan ergonomi.

**Kata kunci:** ergonomi; keluhan muskuloskeletal; pengetahuan perawat

## INTRODUCTION

Potential hazards in the hospital and infectious diseases, other potential hazards affect the situation and conditions in the hospital, namely accidents, radiation, dangerous chemicals, anesthetic gases, psychosocial and ergonomic disorders (Ministerial Decree Health Number 432 / Menkes / SK / IV / 2007). Ergonomics is the science, art, and application of technology to harmonize or balance all facilities used for activities and breaks with human capabilities and limitations both physically and mentally so that the overall quality of life becomes better (Tarwaka, Solichul, Bakri, 2014). The application of ergonomic principles in the workplace is still not fully touched or received full attention, especially in nurses' work in hospitals. The working posture of nurses while providing services to patients is still awkward. It can lead to complaints in the musculoskeletal system.

*Musculoskeletal disorders* (MSDs) are disorders of the musculoskeletal system that cause pain due to damage to nerves and blood vessels in various body locations, such as the neck, shoulders, wrists, hips, knees, and heels (Mayasari & Saftarina, 2016). *The International Labor Organization* (ILO) in 2013 stated that every 15 seconds, there is one worker in the world who dies due to work accidents, and 160 workers experience illness due to work. In the previous year, 2012, there were 2 million deaths due to accidents and occupational diseases per year.

The results of the WHO study from Mathers (2016) states that musculoskeletal diseases in the world are currently the second-highest contributing to a global disability. *Low Back Pain* (LBP) has remained the leading cause of disability since it was first measured in 1990. In contrast, in Indonesia in 2013,

musculoskeletal disorders' prevalence rate based on existing symptoms was 24.7%. According to Infodatin 2015, 11.6% of fishermen workers in Indonesia have health problems related to work, including joint pain.

In general, work ergonomics can be applied any time in 24 hours a day and night. It can be done anywhere, either at home or in the work environment. Every activity or work that is carried out, if it is not done ergonomically, will result in inconvenience, high costs, accidents, and work-related illnesses decreased performance, resulting in a decrease in efficiency and work power. The application of ergonomics in all areas of activity is the answer to a safer work process, in this case specifically to improve the work culture of the nurse who often performs nursing care actions by burdening one of his limbs that is not good in terms of ergonomics (Tarwaka, Solichul. Bakri, 2014). Complaints of *musculoskeletal disorder* Many are caused by bad ergonomics. Several factors influence work ergonomics: work time, duration of work, age, nutritional status, smoking habits, and knowledge. In theory, knowledge or cognition is a fundamental domain for forming one's behavior or actions (*overt behavior*) (Notoatmodjo,

2014). If behavior change is based on positive knowledge and attitudes, it will lead to *long-lasting* behavior (Notoatmodjo, 2014). This theory is proven by research conducted by Widayanti in 2019, which found a relationship between knowledge and food safety behavior in women.

Research conducted by Padmanathan, Joseph, Omar, & Nawawi (2016) states that work factors related to musculoskeletal disorders can come from ergonomic exposure in the form of awkward postures, static and repetitive movements, as well as physical exposure such as temperature and vibration. Psychosocial factors in the form of monotonous work movements, little social interaction, isolated work environment, high demands for work performance, lack of work control, and the low relationship between supervisors and employees are related to the emergence of musculoskeletal complaints in workers. Based on Winihastuti's (2016) research with the title of the relationship between ergonomic risk factors and complaints of *cumulative trauma disorders* in dentists using the method *cross-sectional*, 44 respondents indicated a relationship between work duration and the incidence of CTDs complaints ( $p = 0.045$ ). Another

study by Rahul Jain *et al.* (2018) with the title *association of risk factors with musculoskeletal disorders in manual-working farmers* on 138 farmers showed that factors such as age, gender, work duration, dominant hand, fatigue, and work experience were obtained. They were associated with MSDs complaints, with the most complaints on the lower back (71.4%), fingers (62.1%), and shoulders (56.4%).

The Mangusada Regional Hospital is one of the General Teaching Hospitals with class B category, with approximately 414 health nurses. A preliminary study was conducted on June 20 - June 25, 2019, in RSD Mangusada Badung Regency. It showed that nine out of 10 nurses did not understand the ergonomics carried out at work, and eight nurses had experienced stiffness in their necks and backs after performing nursing actions or work. Prevention and treatment that can be carried out for musculoskeletal complaints that occur in nurse administrators are generally done only if the problem's size is known. Accurate research is needed to find out about the nurse administrators' knowledge about musculoskeletal complaints related to work ergonomics that occur in the Inpatient Room at RSD Mangusada, Badung Regency.

## METHOD

This research is a quantitative study with an analytic observational study design with an approach *cross-sectional*. The study population was all nurses in the inpatient room of RSD Mangusada. The sample in this study was 51 respondents with a sampling technique based on *purposive sampling*. Respondents were selected based on inclusion and exclusion criteria (Nursalam, 2013). The inclusion criteria in this study are the profession of nurses, nurses who work in the inpatient room of RSD Mangusada, nurse *associates*, and willingness to be respondents. Exclusion criteria, nurses who were on annual leave or maternity leave during the study, nurses who were training / on duty out of the hospital.

This study's dependent variable was musculoskeletal complaints, and the independent variable was knowledge of work ergonomics. The research was conducted in RSD Mangusada Badung's inpatient room from September 23, 2019, to November 22, 2019. The data collection tools used a questionnaire about nurses' knowledge of work ergonomics and a questionnaire *Nordic Body Map*. In this study, data processing will use the SPSS program, data on ergonomics knowledge, and musculoskeletal complaints with the

correlation test *Spearman's rho*. This research has been declared ethical worthy or has passed ethics in the Health Research

Ethics Commission (KEPK) STIKES Bina Usada Bali with Decree NO: 334 / EA / KEPK-BUB-2019.

## RESULTS AND DISCUSSION

Table 1. Characteristics of Respondents

Demographic Data	Frequency	Percentage (%)
<b>Gender</b>		
Male	8	15.7
Female	43	84.3
<b>Age</b>		
Late adolescence 17-25 years	3	5.9
Early adults 26-35 years	40	78.4
Late adults 36-45 years	8	15.7
<b>BMI</b>		
<i>Underweight</i> (<18.5)	2	3.9
Normal (18.5-22.9)	22	43.1
<i>Overweight</i> (> 23)	27	52.9
Length of work (years)		
Mean		5.6
Minimum		1
Maximum		15

The respondents' characteristics are as follows: female respondents 84, 3%, aged 26-35 years 78.4%, body index *overweight*

*mass* 52.9%, the average length of work was 5.6 years.

Table 2. Knowledge of Ergonomics

Knowledge of Ergonomics	Frequency	Percentage (%)
High	18	35.3
Sufficient	30	58.8
Less	3	5.9

The research results showed that the knowledge of the nurse in charge about work ergonomics in the inpatient room, most of the respondents with sufficient knowledge of ergonomics with a percentage of 58.8%. The presentation of

the amount of knowledge of ergonomics, most of the knowledge of ergonomics, is sufficient. It can be said that the level of knowledge of ergonomics is sufficient due to the lack of information obtained about ergonomics at work.

This research is in line with the research of Utami, Setyaningsih, & Hemawayanti (2018). It was found that most respondents or nurses who work in operating rooms, Emergency Agencies, ICU, and ICCU at Husada Hospital have a sufficient level of knowledge about ergonomic attitudes of as many as 39 people. (47%). This research is in line with Sutomo & Heru (2017). The results of the knowledge of ergonomics in nurses were mostly poor (51.72%). Knowledge is a result of curiosity through sensory processes, especially in particular objects' eyes and ears, an essential domain in forming *open behavior* (Donsu, 2017). Knowledge of a person is mainly obtained through the sense of hearing and the sense of sight. The more positive aspects and objects are known, it will lead in the more positive attitude towards particular objects (Notoatmojo, 2014). Knowledge about ergonomics is a science, art, and technology application to harmonize or balance all facilities used for activities and breaks with human abilities and limitations both physically and mentally so that the overall quality of life is better (Tarwaka, Solichul HA. 2014). An ergonomic design to help work more efficiently and effectively requires equipment that is adequately designed and requires a good body position in carrying

out certain activities (Ferguson *et al.*, 2011).

Knowledge is influenced by factors, namely work is an activity or activity for a person to earn income for his daily needs. Length of work is an individual experience that will determine growth in work. Following the study results, the length of work for nurses has obtained an average of 5.6 years. The age factor affects a person's perception and mindset (Wawan and Dewi, 2010). The more they get older, the more their comprehension and mindset will develop so that their knowledge is getting better. Based on the study results, most of the respondents were 26-35 years old, namely 40 people, with 78.4%, which means that early adulthood still needs information or knowledge about ergonomics at work.

Knowledge of ergonomics is an important science that every worker must have, one of which is a nurse. Nurses' duties and functions are very complex, ranging from nurses' independent duties, tasks of delegation, and documentation that must be complete. All activities or posture movements carried out by nurses require knowledge of workplace ergonomics. The knowledge of ergonomics in nurses is also influenced by the information

obtained so that the more information obtained will improve nurses' ergonomic attitude at work, of course, prevent musculoskeletal complaints. Based on the data obtained by researchers about knowledge of ergonomics on positive questions that get the most negligible value, namely the question "when working a sitting-standing position is better than using a standing or sitting position alone". The question "work

posture when doing wound care is best done with straight back position "as many as 25 people with a percentage of 49.01%. The negative questions that received the least value were "Loads that are ready to be moved to be lifted at chest level" as many as 18 people with a percentage of 35.29%. It can be concluded that the nurse administrators do not yet understand the knowledge of good posture while working.

Table 3. Musculoskeletal complaints

Complaints	Frequency	Percentage (%)
Low	21	41.2
Moderate	30	58.8
High	0	0
Very high	0	0

Complaints on nurses in this study most of the respondents experienced moderate musculoskeletal complaints as many as 30 people with a percentage of 58.8%. Musculoskeletal complaints treated with inpatient nurses are due to the wrong attitude and work posture due to a lack of understanding of ergonomics. This research is in line with Utami, Setyaningsih & Hemawayanti (2018). It was found that most respondents or nurses who worked in operating rooms, Emergency Agencies, ICU, and ICCU at Husada Hospital experienced

musculoskeletal disorders as many as 44 people (53%). This research is in line with Sutomo & Heru (2017), where the results of non-ergonomic work attitudes are 48.28%. Musculoskeletal complaints are complaints of the skeletal muscles that are felt by a person ranging from very mild complaints to very painful complaints. If the muscles receive static loads repeatedly and for a long time, it can cause complaints in damage to joints, ligaments, tendons. These complaints are called musculoskeletal complaints or *musculoskeletal disorders* (MSDs) or

injuries to the musculoskeletal system (Rizka, 2012). The risk factors for MSDs are individual factors, namely age, sex, and body mass index. Following the study results, most of the early adulthood ages 26-35 years, namely 40 people with a percentage of 78.4% where age affects a person's likelihood of experiencing MSDs. Muscles have maximum strength when they reach the age of 20-29 years. Then, after 60, muscle strength will decrease by 20% (Hernandez *et al.*, 2010).

The study results based on the sex of most women were 43 people with a percentage of 84.3% wherein all occupational groups, the prevalence rate of musculoskeletal problems was more significant in women than in men. It is influenced by physiological factors of muscle strength in women, which are about 2/3 of men's muscle strength. Based on the body mass index, individuals *overweight* or obese found that there was damage to the musculoskeletal system, which manifested as pain and *discomfort*. According to the body mass index study results, most of the respondents were *overweight*, as many as 27 people, with a

percentage of 52.9%. Musculoskeletal complaints experienced by every worker cannot be separated with an attitude at work that is not recommended and is also caused by the demands of work that must be done and completed. In this case, the nurse performs strenuous activities following the workload obtained and the often wrong work posture and lack of understanding of ergonomics. Researchers' observations on nurses mainly carried out the task of most of the wrong positions in documenting nursing care and when doing independent nursing actions.

Based on the researchers' observations with the observation sheet *Nordic Body Map*, the minor complaints complained by the nurses with the most number of answered scores were 1, namely the left forearm as many as 43 people (84.3%). The body that got the most score 2 was the left leg, as many as 19 people (37.3%). Most of the body parts with a score of 3 were on the nape, namely 24 people (47.1%). Likewise, with a score of four, that answered most of the body's nape as many as ten people (19.6%).

Table 4. Crosstabulation of Ergonomic Knowledge with Musculoskeletal Complaints  
Musculoskeletal

Knowledge of Ergonomics	Complaints										R	value P
	Low		Medium		High		Very high		Total			
	f	%	f	%	f	%	f	%	f	%		
High	18	100	0	0	0	0	0	0	18	100	-0.694	0.000
Enough	3	10	27	90	0	0	0	0	30	100		
Less	0	0	3	100	0	0	0	0	3	100		
Total	21	41.2	30	58.8	0	0	0	0	51	100		

Based on the table above, data on high ergonomic knowledge with common musculoskeletal complaints were obtained as many as 18 people with a percentage of 100%. There is no knowledge of high ergonomics with moderate, high, and very high musculoskeletal complaints. Respondents with sufficient knowledge of ergonomics with common musculoskeletal complaints were three people with a percentage of 10%. Respondents with sufficient knowledge of ergonomics with moderate musculoskeletal complaints were 27 people with a percentage of 90%. There was no sufficient ergonomic knowledge with high and very high musculoskeletal complaints. Respondents with less ergonomic knowledge with moderate musculoskeletal complaints were three people with a percentage of 100%. There was no lack of ergonomic knowledge with low, high, and very high musculoskeletal complaints.

Based on the research objectives, analyze the relationship between the nurse's knowledge of work ergonomics and musculoskeletal complaints in the Inpatient Room of RSD Mangusada, Badung Regency, which was tested *spearman rho*. Based on the test, it was *Rho Spearman* found that the significant value was  $p= 0.000$ . So the calculated significance value ( $p= 0.000$ ) is smaller than the table significance value ( $p<0.05$ ). It means that there is a relationship between the knowledge of the executive nurse about work ergonomics with musculoskeletal complaints in the Inpatient Room at RSD Mangusada, Badung Regency. Based on the test *Spearman rho*  $p>0.05$ , the data on ergonomics knowledge with musculoskeletal complaints on nurses showed the *Correlation Coefficient* with a value of 0.694, which means a strong correlation. It can be concluded that there is a strong relationship between the nurses'

knowledge of work ergonomics and musculoskeletal complaints in the Inpatient Room. The direction of the relationship is negative, which means that nurses' increasing knowledge about work ergonomics will reduce musculoskeletal complaints.

This research is in line with the research of Utami, Setyaningsih & Hemawayanti (2018). The research results are *p-value* 0.001 because the *p-value* is 0.05. It can be concluded that there is a relationship between knowledge about ergonomic attitudes and musculoskeletal disorders in surgical room nurses, emergency department agencies, ICU and ICCU Husada Hospital Jakarta. This study is in line with Sutomo & Heru (2017). The results showed a significant relationship between attitude and knowledge of ergonomics with complaints of musculoskeletal disorders with a *p-value* of 0,000.

Knowledge of a person is mainly obtained through the sense of hearing and the sense of sight. The more positive aspects and objects are known, it will lead in the more positive attitude towards particular objects (Notoatmojo, 2014). The ergonomics knowledge that nurses need to know is body position. Sitting and standing are

body positions that must be applied ergonomically to reduce musculoskeletal injuries' danger. Where make sure the back is straight, and the neck is straight. Do not bend the neck as this will create fatigue and tension in the neck, and do not stand on one leg. Hands and wrists where the hand and wrist's normal posture are in a straight line with the middle finger, not tilted or experiencing flexion or extension. There is no pressure on the wrist. Neck and shoulders where the neck's normal position is straight and not tilted or rotated to the left or right. The oblique position does not exceed 20° so that there is no emphasis on the *cervical disc* bone and back where the normal posture of the spine for the thoracic part is kiposis, and for the lumbar lordosis, tilt to the left or right. Bending posture should not be more than 20° (Ferguson *et al.*, 2011).

Errors position will raise musculoskeletal complaints, where musculoskeletal complaints are complaints of the parts of the skeletal muscles that are felt by a person ranging from very mild complaints to very painful complaints. If the muscles receive static loads repeatedly and for a long time, it can cause complaints in damage to joints, ligaments, tendons. These complaints are called musculoskeletal complaints or

*musculoskeletal disorders* (MSDs) or injuries to the musculoskeletal system (Rizka, 2012). MSDs are characterized by the following symptoms: pain, swelling, redness, heat, numbness, cracks or fractures in bones and joints, stiffness, weakness or loss of hand coordination, difficulty moving (Indrawati, Tirtayasa & Adiatmika, 2013 ). According to (Indrawati *et al.*, 2013), in general, these complaints are divided into two, namely temporary complaints and permanent complaints.

Ergonomics knowledge is essential. Knowledge of ergonomics will make workers improve their work attitude or posture, one of which is sitting or lifting heavy weights and even standing for a long time so that musculoskeletal complaints can be minimized. Severe musculoskeletal complaints will interfere with the effectiveness of nurses in carrying out service activities to patients. The ergonomic knowledge that nurses have in a suitable category will make them comfortable at work so that musculoskeletal complaints that appear can be minimized. In contrast, nurses' lack of knowledge about ergonomics will make nurses work not with good posture and bad working attitudes to cause musculoskeletal complaints that interfere with activities

service to patients and causes nurses not to work.

## CONCLUSION

There is a relationship between the nurse's knowledge about work ergonomics with musculoskeletal complaints in the inpatient room at RSD Mangusada Badung Regency. The recommendation of this study is expected to be an input for nurses in working using ergonomics guidelines.

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