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Factors Influencing the Occurrence of Musculoskeletal Disorders Among Naibonat Primary Health Center Staff

Antonia Fransiska Leki Seran[1*], Teguh Dwi Nugroho[2], Herman Pieter Louis Wungouw[3], Kristian Ratu[4]
[1]Faculty of Medicine and Veterinary Medicine, Nusa Cendana University, Kupang, Indonesia
[2] Department of Surgery, Faculty of Medicine and Veterinary Medicine, Nusa Cendana University, Kupang, Indonesia
[3]Department of Radiology, Faculty of Medicine and Veterinary Medicine, Nusa Cendana University, Kupang, Indonesia
[4]Department of Obstetrics and Gynecology, Faculty of Medicine and Veterinary Medicine, Nusa Cendana University, Kupang, Indonesia

ABSTRACT:
Background: Musculoskeletal disorders indicate problems with the musculoskeletal system, which includes bones, muscles, tendons, ligaments, cartilage, and nerves. Discomfort in the musculoskeletal system is often felt in the neck, shoulders, arms, hands, back, waist, and lower body muscles. Musculoskeletal disorders (MSDs) experienced by workers in community health centers can reduce productivity, increase absenteeism, and decrease the quality of health services.
Objective: This study aimed to analyze the relationship between occupational and individual risk factors and the incidence of musculoskeletal disorders among workers at the Naibonat Public Health Center, Indonesia.This study applied an observational quantitative method with a cross-sectional design. The sample was taken using random sampling techniques with a total of 50 samples. Univariate and bivariate analyses were performed using the Contingency Coefficient test and Spearman's rank correlation test with the help of the SPSS program.
Result: The results of the analysis showed that the prevalence of musculoskeletal disorders among workers was 72% at a low-risk level, 24% at a moderate-risk level, and 4% at a high-risk level. No significant associations were found between individual factors (age, sex, and body mass index) and the incidence of musculoskeletal disorders ($p > 0.05$). In contrast, occupational factors including work posture and length of service showed significant associations with musculoskeletal disorders ($p < 0.05$), while daily working duration was not significantly associated ($p > 0.05$).
Conclusions: MSD among workers at the Naibonat Public Health Center were predominantly at a low-risk level. Work posture and length of service were significantly associated with musculoskeletal disorders, highlighting the need for periodic ergonomic evaluations, posture training, regular stretching exercises, and promotion of physical fitness among primary healthcare workers.

KEYWORDS: Musculoskeletal disorder, Naibonat primary healthcare, workers, work-related risk factors.

INTRODUCTION

Musculoskeletal disorders (MSDs) indicate problems with the musculoskeletal system, including bones, muscles, tendons, ligaments, cartilage, and nerves. Complaints can arise in the neck, shoulders, arms, back, waist, or legs, with varying degrees of severity from mild to severe and the potential to cause disability [1]. The World Health Organization (WHO) reports that 1.71 billion people worldwide suffer from musculoskeletal disorders[2]. Research in Ouarzazate, Morocco, shows a very high prevalence of MSDs among nurses (93.8%), physical therapists (85.7%), and midwives (84%)[3]. In Indonesia, RISKESDAS 2018 recorded a prevalence of joint disease of 7.30% in people aged ≥15 years, while NTT Province reported 28,430 cases, and Kupang Regency had a prevalence of 4.16% [4].

Community health centers as primary health facilities involve workers who are at risk of MSD due to non-ergonomic work postures and repetitive movements, such as bending over during examinations or lifting heavy loads. At the Naibonat Community Health Center, this risk increases with the high number of patient visits and limited workforce. The lack of ergonomics exacerbates the possibility of MSD.

Previous research by [5] shows that emergency room nurses have a high risk of MSD due to awkward and repetitive work postures. A study by[6] also found that work posture and age are related to MSD complaints, with workers aged 36–50 years and those

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who work in non-ergonomic postures experiencing these complaints more frequently. MSDs have been shown to have an impact on reduced productivity and quality of health services.

The lack of research on the relationship between occupational factors (work posture, length of service, duration of work) and individual factors (age, gender, BMI) in health center workers makes this research important. Therefore, this study aims to determine whether there is a relationship between occupational and individual risk factors and the occurrence of MSDs among staff at the Naibonat Health Center.

MATERIALS AND METHODS

- **Study design and setting**

This study employed a quantitative analytical observational design with a cross-sectional approach. The research was conducted at the Naibonat Public Health Center, Kupang Regency, East Nusa Tenggara Province, Indonesia, from August to September 2025.

- **Sample**

The study population consisted of all workers at the Naibonat Public Health Center, including healthcare and non- healthcare personnel. A total of 50 participants were recruited using simple random sampling. Workers who were actively employed during the study period and willing to participate were included, while those with a history of acute trauma or diagnosed musculoskeletal diseases unrelated to work were excluded.

- **Instruments**

Musculoskeletal complaints were assessed using the Nordic Body Map (NBM), a standardized questionnaire that evaluates discomfort in different body regions and categorizes musculoskeletal disorder risk levels[7]. Work posture risk was assessed using the Rapid Entire Body Assessment (REBA) method, which evaluates postural load involving the neck, trunk, upper limbs, and lower limbs during work activities[8]. Individual factors (age, sex, and body mass index) and occupational factors (length of service and daily working duration) were collected using a structured questionnaire. Body mass index was calculated as weight in kilograms divided by height in meters squared and classified according to the Indonesian Ministry of Health guidelines [9].

- **Statistical or analysis**

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Univariate analysis was conducted to describe participant characteristics and the distribution of musculoskeletal disorder risk levels. Bivariate analysis was performed to examine the relationships between individual and occupational factors and the occurrence of musculoskeletal disorders using contingency coefficient tests and Spearman rank correlation tests. A p-value of < 0.05 was considered statistically significant.

RESULTS

- **Respondents Characteristics**

The respondents were predominantly female, accounting for 72%. Meanwhile, male respondents only accounted for 28%. The age distribution of respondents showed that the majority were in the 30-40 age group, accounting for 52%. The <30 age group was the second largest with 30%, and the >40 age group was the smallest with 18%. The respondents in this study came from various professional backgrounds. The most dominant occupation was nurse with 28%, followed by midwife with 22%. Professions such as nurse and midwife accounted for exactly 50% of the total respondents.

- **Univariate Analysis**

Tabel 1. Univariate Analysis

Risk Factors		Frequency (n = 50)	Percentage (%)
Jenis Kelamin			
□	Laki – laki	14	28
□	Perempuan	36	72
Age			
□	< 30 Years	15	30
□	30 – 40 Years	26	52

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□ > 40 Years	9	18
Body Mass Index (BMI)		
• Malnutrition	2	4
• Normal	30	60
• Overnutrition	18	36
daily working duration	13	26
< 8 Hours		
• 8 – 10 Hours	36	72
• > 10 Hours	1	2
Length of service	29	58
• < 5 Years		
5 – 10 Years	11	22
• > 10 Years	10	20
Work Posture		
• Low Risk	15	30
• Moderate Risk	27	54
• High Risk	8	16
Musculoskeletal disorder		
• Low Risk	36	72
• Moderate Risk	12	24
• High Risk	2	4

Table 1 shows that among the risk factors, there were 14 male respondents (28%), while there were 36 female respondents (72%). Based on age group, there were 15 respondents (30%) in the < 30 age group, 26 respondents (52%) in the 30 -40 age group, and 9 respondents (18%) in the > 40 age group. In terms of Body Mass Index (BMI), most respondents were in the normal BMI category, with 30 respondents (60%), while 2 respondents (4%) were in the malnourished category and 18 respondents (36%) were in the overweight category.

The occupational risk factor of work duration showed that most workers had a workday of 8–10 hours per day (72%). In terms of length of service, 58% of respondents had worked for less than 5 years, while 42% had worked for more than 5 years. In terms of work posture, most workers were in the moderate risk category (54%), meaning that their work positions required attention and improvement to prevent long-term muscle injuries. The results of the study show that the risk level among workers at the Naibonat Community Health Center is mostly in the low-risk category (72%).

- **Bivariate Analysis**

Table 2. The Relationship Risk Factors and The Occurrence of MSD

	Correlation Coefficient	P- Value	N	Hypothesis
Gender	0.198	0.359	50	No Accepted
Age	0.242	**0.**090	50	No Accepted
BMI	0.035	0.807	50	No Accepted
Work Posture	0.312	0.027	50	Accepted
Length of Service	0.381	0.006	50	Accepted
Working Duration	-0.067	0.646	50	No Accepted

Spearman's rank correlation and contingency coefficient analysis was conducted to examine the relationships between individual and occupational factors and musculoskeletal disorders among primary healthcare workers. The analysis demonstrated

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that work posture assessed using the Rapid Entire Body Assessment (REBA) score was significantly correlated with musculoskeletal disorders (ρ = 0.312; p = 0.027). Length of service also showed a significant positive correlation with musculoskeletal disorders (ρ = 0.381; p = 0.006), indicating that prolonged occupational exposure may increase the risk of musculoskeletal complaints.

In contrast, no statistically significant associations were observed between musculoskeletal disorders and individual factors, including age (p = 0.090), body mass index (p = 0.807), and sex (p = 0.359). Additionally, daily working duration was not significantly associated with musculoskeletal disorders (p = 0.646). Overall, these findings suggest that occupational factors, particularly work posture and length of service, play a more dominant role in the occurrence of musculoskeletal disorders than individual characteristics, including sex, among workers at the Naibonat Primary Health Center.

DISCUSSION

Musculoskeletal disorders (MSD) are cumulative conditions that develop gradually as a result of repeated minor to severe injuries occurring over prolonged periods, ranging from days to years. Continuous exposure to physical workload, awkward postures, and repetitive movements may lead to progressive musculoskeletal tissue damage, manifesting as pain, numbness, muscle tension, tenderness, swelling, weakness, and restricted range of motion. In primary healthcare settings, including the Naibon at Health Center, workers are exposed to varying levels of musculoskeletal risk, and inadequate preventive measures may result in the accumulation of musculoskeletal strain and more severe disorders.

The present study demonstrated that occupational risk factors, particularly work posture and length of service, were significantly associated with musculoskeletal disorders, whereas individual factors and daily working duration were not. These findings emphasize the dominant role of ergonomic exposure in the development of MSDs among primary healthcare workers.
Regarding age, the analysis revealed no statistically significant association with musculoskeletal disorders (p = 0.090). However, the positive correlation coefficient suggests a tendency toward increased musculoskeletal complaints with advancing age. This trend may be attributed to age-related physiological changes, including reduced muscle elasticity, decreased ligament strength, and diminished physical endurance, which increase susceptibility to fatigue and joint pain. Nevertheless, the lack of statistical significance may be explained by the predominance of respondents within the productive age range (30–40 years), whose physical capacity remains relatively adaptable to occupational demands[10]. These findings are consistent with previous studies reporting that ergonomic factors exert a stronger influence on MSD occurrence than chronological age.

Similarly, sex was not significantly associated with musculoskeletal disorders (p = 0.359). This result suggests that MSD risk in this setting is not determined by biological sex but rather by occupational exposure. In the context of primary healthcare centers, job tasks are often distributed proportionally between male and female workers, resulting in comparable ergonomic demands. This finding aligns with previous research indicating that when work activities and workload distribution are similar, sex differences do not significantly influence musculoskeletal outcomes [11].

Body mass index (BMI) was also not significantly correlated with musculoskeletal disorders (p = 0.807), with a very weak correlation coefficient. This indicates that nutritional status did not substantially contribute to musculoskeletal complaints in this population. Most respondents had a normal BMI, suggesting that biomechanical and ergonomic factors outweighed the influence of body composition. Previous studies have similarly reported that BMI is not a primary predictor of MSDs when ergonomic conditions and physical work habits are adequately managed [12].

In contrast, work posture showed a significant positive correlation with musculoskeletal disorders (p = 0.027). This finding confirms that non-ergonomic postures, such as prolonged bending, sustained neck flexion, and improper lifting techniques, increase mechanical stress on the spine, neck, and shoulder regions. Repeated exposure to such postures leads to cumulative muscle strain and microtrauma, which progressively manifest as musculoskeletal complaints. In primary healthcare settings, tasks including patient handling, physical examinations requiring forward bending, and prolonged computer use may serve as major contributors to postural risk [1].

Furthermore, length of service was significantly associated with musculoskeletal disorders (p = 0.006), indicating that longer employment duration increases the likelihood of MSD occurrence. Prolonged occupational exposure to non-ergonomic work conditions may result in chronic muscle fatigue and maladaptive postural habits, particularly in the absence of ergonomic training. These findings highlight that extended work experience without preventive interventions may amplify musculoskeletal risk rather than confer protective adaptation.

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Conversely, daily working duration was not significantly associated with musculoskeletal disorders (p = 0.646). The negative correlation suggests that longer working hours per day were not directly related to increased musculoskeletal complaints. This may be attributed to relatively normal working hours (8–10 hours per day), task variation, adequate rest periods, and proportional workload distribution, which collectively mitigate static muscular fatigue and cumulative strain [10].

Overall, the findings of this study suggest that musculoskeletal disorders among primary healthcare workers are primarily influenced by ergonomic and cumulative occupational exposures rather than individual characteristics. These results underscore the importance of implementing regular ergonomic assessments, posture education, and preventive occupational health programs to reduce the long-term burden of musculoskeletal disorders in primary healthcare settings

CONCLUSION

Prevalence of Musculoskeletal Disorders, based on the Nordic Body Map assessment, 72% of participants were classified as having a low risk of musculoskeletal disorders, 24% as moderate risk, and 4% as high risk. analysis showed no statistically significant associations between individual factors, including age, sex, and body mass index, and the occurrence of musculoskeletal disorders ($p > 0.05$). Occupational factors analysis demonstrated that work posture risk assessed using REBA and length of service were significantly associated with musculoskeletal disorders ($p < 0.05$). In contrast, daily working duration was not significantly associated with musculoskeletal disorder incidence ($p > 0.05$). These findings underscore the need for periodic ergonomic assessments, posture training, regular stretching exercises, and workplace health promotion programs to prevent musculoskeletal disorders among primary healthcare workers.

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