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Effects of Musculoskeletal Disorders, Workload, and Work Fatigue oN Radiographers' Work Performance in Kediri:A Cross-Sectional Study

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ABSTRACT

Poor radiographer performance may be associated with various occupational health issues, including Musculoskeletal Disorders (MSDs), excessive workload, and work-related fatigue, all of which can adversely affect both health and professional performance. This study aimed to examine the effects of Musculoskeletal Disorders (MSDs), workload, and work fatigue on the job performance of radiographers in Kediri. This research employed a quantitative observational analytical design using a cross-sectional approach. The study population consisted of all radiographers registered as members of the Indonesian Radiographers Association (PARI) in Kediri, as many as 150 individuals. A sample of 108 radiographers was selected using simple random sampling based on the Krejcie and Morgan sample size determination table. The dependent variable in this study was job performance, while the independent variables included Musculoskeletal Disorders (MSDs), workload, and work fatigue. Data were collected using a structured questionnaire and analyzed using multiple linear regression. The findings indicated that Musculoskeletal Disorders (MSDs), workload, and work fatigue collectively had a statistically significant effect on radiographers' job performance ($p < 0.05$). Hospital management should implement strategies to enhance radiographers' performance by improving workplace conditions and promoting occupational health programs. In addition, radiographers are encouraged to maintain healthy lifestyles and pay close attention to their physical well-being in order to prevent work-related fatigue and reduce the risk of Musculoskeletal Disorders (MSDs) and other occupational health problems.

Keywords: *Musculoskeletal Disorders (MSDs), Workload, Work fatigue, Performance*

INTRODUCTION

In Indonesia, there are still radiographers whose performance is not good and has not met the targets set by the hospital. The poor performance of radiographers is partly caused by various complaints of Musculoskeletal Disorders (MSDs), workload, and work fatigue, which affect the health of radiographers. Workload has an impact on radiographer performance, increasing the possibility of retaking images (Hasaneen et al., 2023). In 2019, the percentage of health worker performance was 72.34%, then in 2020 it became 67.50% and in 2021 the performance of health workers decreased again to 62.60%. In a study on the design of radiographer performance assessments in Makassar against 13

radiographers and 3 experts consisting of direct superiors and a quality assurance team. The results of the instrument trial showed that there were still 2 radiographers with the learn performance achievement category (<50%), 8 radiographers with good performance achievement (50-75%) and 3 radiographers with excellent performance achievement (>75%) (Salma, 2021).

The high number of Musculoskeletal Disorders (MSDs) complaints is caused by work fatigue. Work fatigue is a condition where a person experiences a decrease in work capacity which results in decreased production. Work fatigue has an impact on decreased work productivity. One of the factors causing work fatigue is workload. Workload itself is an important contributor to work stress, depending on how each individual faces it. For radiographers, tasks, risks, and responsibilities in efforts to improve the quality of health services are very important (KMK No.316, 2020). Activities in handling patients require radiographers to perform physical activities, such as sitting statically, carrying X-ray cassettes, positioning X-ray cassettes, rotating the X-ray tube to a horizontal position, taking X-ray cassettes, lifting patients, adjusting patient positions, shifting the X-ray tube on the examination table and positioning the X-ray tube on the patient's bed, resulting in many complaints of Musculoskeletal Disorders (MSDs) in radiographers. The physical activities of radiographers as mentioned above are the workload that must be borne by a radiographer every time they do their job. Thus, it causes a lot of work fatigue.

There are several differences between this study and previous research, including the use of three independent variables: Musculoskeletal Disorders (MSDs), workload, and work fatigue. Furthermore, the dependent variable is performance. The urgency of this research is to analyze how much influence Musculoskeletal Disorders (MSDs) complaints, workload and work fatigue have on the radiographers performance especially in the Kediri area.

METHODS

The research design used was a cross-sectional study. The type of research used was quantitative observational analytic research. The population in this study were all radiographers who were members of PARI in Kediri, totaling 150 people. The sample size in this study was 108 radiographers who were members of PARI Kediri using the simple random sampling technique based on the Krejcie & Morgan table. The dependent variable in this study was performance, while the independent variables were complaints of Musculoskeletal Disorders (MSDs), workload, and work fatigue. The instrument in this study was using a questionnaire as follows; Musculoskeletal Disorders (MSDs) complaints were measured using the Nordic Body Map (NBM) questionnaire taken from the research of Zahra & Prastawa (2023), the workload questionnaire was an adaptation of the questionnaire used in the research of F Husaini (2020), work fatigue was measured using the Industrial Fatigue Research Committee (IFRC) questionnaire, the performance questionnaire was an adaptation taken from the questionnaire used by Silaen, et al (2021). Data analysis used multiple linear regression analysis.

RESULTS

Table 4.1 Frequency Distribution of Musculoskeletal Disorders (MSDs) Complaints

Total Score	Risk Level	Frequency	Percentage
28-49	Low	98	90,70%
50-70	Medium	10	9,30%
71-91	High	0	0%
92-112	Very High	0	0%
Total		**108**	**100%**

Based on table 4.1 above, it can be seen that almost all respondents had a total score of 28-49, namely 98 respondents (90.70%), and were included in the low risk level of Musculoskeletal Disorders (MSDs) complaints and therefore did not require improvement. Meanwhile, the remaining had a total score of 50-70, namely 10 respondents (9.30%), and were included in the moderate risk level of Musculoskeletal Disorders (MSDs) complaints and therefore, may require improvement in the future.

Table 4.2 Workload Frequency Distribution

Total Score	Workload Level	Frequency	Percentage
10-19	Low	59	54,62%
20-29	Moderate	46	42,60%
30-39	Somewhat high	3	2,78%
40-49	High	0	0%
≥50	Very High	0	0%
Total		**108**	**100%**

Based on table 4.2, it can be seen that most respondents have a total score of 10-19, namely 59 respondents (54.62%), so they are included in the low workload category. Furthermore, almost all respondents have a total score of 20-29, namely 46 respondents (42.60%), so they are included in the medium workload category, and the rest have a total score of 30-39, namely 3 respondents (2.78%), so they are included in the rather high workload category.

Table 4.3 Frequency Distribution of Work Fatigue

Total Score	Work Fatigue Level	Frequency	Percentage
30-52	Low	71	65,74%
53-75	Moderate	37	34,26%
76-98	High	0	0%
99-120	Very High	0	0%
Total		**108**	**100%**

Based on table 4.3, it can be seen that most respondents had a total score of 30-52, as many as 71 respondents (65.74%) who were categorized as having a low level of work fatigue, and the rest had a total score of 53-75, as many as 37 respondents (34.26%) who were categorized as having a moderate level of work fatigue.

Table 4.4 Frequency Distribution of Performance

Total Score	Performance Category	Frequency	Percentage
10-19	Less	0	0%
20-29	Somewhat less	0	0%
30-39	Enough	14	12,96%
40-49	Good	88	81,48%
≥50	Very good	6	5,56%
Total		**108**	**100%**

Based on Table 4.4 above, it can be seen that almost all respondents had a total score of 40-49, namely 88 respondents (81.48%) who were categorized as having good performance. The remaining 14 respondents (12.96%) had a total score of 30-39 who were categorized as having fair performance, and 6 respondents (5.56%) had a total score of ≥50 who were categorized as having very good performance.

Table 4.5 Results of Hypothesis Testing of Musculoskeletal Disorders (MSDs), Workload, and Job Fatigue on Performance

Variable	Sig.	Information
Musculoskeletal Disorders (MSDs) complaints	0.001	Reject H_0 dan Accept H_1
Workload	0.001	Reject H_0 dan Accept H_1
Work Fatigue	0.010	Reject H_0 dan Accept H_1

Based on Table 4.5 above, it can be seen that the significance value for the Musculoskeletal Disorders (MSDs) complaint variable is 0.001, the significance value for the workload variable is 0.001,

and the significance value for the job fatigue variable is 0.010. Therefore, the significance value for all three independent variables is less than 0.05. Therefore, in accordance with the basis for making decisions for hypothesis testing, if the significance level obtained is less than 5% or 0.05, then H1 is accepted. Therefore, it can be concluded that there is a significant influence between the variables Musculoskeletal Disorders (MSDs), workload, and job fatigue on performance.

DISCUSSION

Based on the results of the study, it shows that there is a significant influence between Musculoskeletal Disorders (MSDs) complaints and performance with a sig. 0.001. Thus, it can be said that there is a negative and significant influence between Musculoskeletal Disorders (MSDs) complaints and performance. If the number of Musculoskeletal Disorders (MSDs) complaints is low, then performance will increase. Conversely, if the number of Musculoskeletal Disorders (MSDs) complaints is high, then performance will decrease. Almost all respondents had a total score of 28-49, which is 90.70% and is included in the low risk level of Musculoskeletal Disorders (MSDs) complaints so that they do not require improvement. While the rest had a total score of 50-70, which is 9.30% and is included in the moderate risk level of Musculoskeletal Disorders (MSDs) complaints so that they may require improvement in the future. Musculoskeletal Disorders (MSDs) complaints in radiographers can arise due to factors such as the radiographer's work posture, when positioning the patient, moving the x-ray tube which is quite heavy, pushing the mobile x-ray device which is also heavy into the room during Cito or emergency patient conditions, carrying cassettes, and when sitting in an unergonomic posture when post-processing radiography results. To overcome these Musculoskeletal Disorders (MSDs) complaints, radiographers can routinely exercise or stretch before work, implement a healthy lifestyle and regulate a correct and healthy diet. In this case, hospitals need to provide education regarding good work posture to avoid various Musculoskeletal Disorders (MSDs) complaints.The research results indicate a significant relationship between Musculoskeletal Disorders (MSDs) and performance.

The results of the study indicate that there is a significant influence between workload and performance with a sig. 0.001. Thus, it can be said that there is a negative and significant influence between workload and performance. If the workload experienced is high, the performance carried out by the radiographer will be low and if the workload experienced is low, the performance carried out by the radiographer will be high, so it will also have a positive impact on the quality of service to patients. Most respondents have a total score of 10-19, namely 54.62%, so it is included in the low workload category. This means that the workload received by radiographers in Kediri is in accordance with the rules or SOPs that apply in hospitals and has been adjusted to the Radiographer Professional Standards Law so that it does not burden the obligations and responsibilities of radiographers. The implementation of management systems such as good shift division, a conducive work environment, and cooperation between radiographers in accordance with job descriptions are also driving factors in reducing workload.

The results of the study showed a significant correlation between work fatigue and performance, with a significance value of 0.010. Therefore, it can be concluded that there is a negative and significant correlation between work fatigue and performance. Most respondents (65.74%) had a total score of 30-52, categorized as having a low level of work fatigue, and the remaining 34.26% had a total score of 53-75, categorized as having a moderate level of work fatigue. In this case, a high workload can lead to work fatigue. One sign of work fatigue is the appearance of Musculoskeletal Disorders (MSDs), such as back pain, headaches, neck pain, and others. Fatigue also causes decreased focus and difficulty thinking, decreased ability or drive to work, and reduced efficiency and productivity in physical and mental activities. Therefore, this can impact a radiographer's performance. Performance will decline if the radiographer is in poor health. If performance declines, the quality of radiographer service will also decline, leading to decreased patient satisfaction.

In this regard, the hospital management system is required to provide good service to patients. Therefore, the hospital must always be able to ensure that all employees work according to applicable working hours and in accordance with their respective professional standards, according to their

expertise and educational background, so that work is completed on target, can create a comfortable work environment, and does not cause boredom or work stress.

CONCLUSION

Based on the results of the study that have been explained above, it can be stated that the variables of Musculoskeletal Disorders (MSDs) complaints, workload, and work fatigue together have a significant influence on performance with a sig. $p<0.05$. It is hoped that hospital management can continue to improve the performance of radiographers in the radiology installation. Radiographers must always pay attention to their health and maintain a healthy lifestyle to avoid work fatigue and various health problems such as Musculoskeletal Disorders (MSDs).

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