Research Article

The Relationship Between Work Position Risk and the Level of Musculoskeletal Disorders in Private Limited Company Personnel

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Abstract.
Musculoskeletal disorders (MSDs) are abnormalities that affect the musculoskeletalsystem, triggered by various risk factors in the work environment. Commonly, MSDs occur due to non-ergonomic working conditions. It arises from chronic exposure to risk factors that can cause injury to the musculoskeletalsystem, this condition will impact on the social and economic aspects of employees. This research was conducted to determine the characteristics of employees, description of the region and the level of musculoskeletal complaints experienced, risk of work positions based on RULA assessment, and the relationship between risk of work positions and the level of musculoskeletal complaints with an analytic cross-sectional design. The study sample was 33 employees of the Engineering Section of private limited company personnel. The research instrument used was a questionnaire. The results show that the majority of the Engineering Department employees at private limited company personnel were 23 years old (36.4%) and had worked for two to three years (33.3%). As many as 48.5% of employees experienced moderate levels of musculoskeletal complaints. Of the 33 respondents, the majority of employees (63.6%) had a low-risk position, nine people (27.3%) had moderate risk, and three (9.1%) had high risk. There is a significant relationship between the risk of work position and the level of musculoskeletal complaints ($P < 0.05$). There is a significant relationship between the risk of working position and the level of musculoskeletal complaints in personnel of limited liability companies.

Keywords: employee health, musculoskeletal disorders (MSDs), level of occupational risk

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1. Introduction

Employee health problems have existed since the industrial revolution in the 18th century along with the development of the industry. One of the diseases that arise as a result of work is musculoskeletal disorders [1]. Musculoskeletal disorders (MSDs) occur as a result of work and workplace conditions that are not ergonomic [1]. MSDs are defined as disorders that affect the normal functioning of the musculoskeletal system due to repeated exposure to various risk factors in the workplace. MSDs occur as a result of the accumulation of injuries that occur continuously in the musculoskeletal system over a long period of time, also causing social problems such as increased compensation for health costs, decreased productivity, and low quality of life for workers [2]. In the 2015 Rovanaya study aimed at workers welding unit private limited company personnel. states that work postures and work positions that are not ergonomic have an impact on decreasing work productivity and work performance which can affect the health of workers with marked emergence of musculoskeletal complaints. In the results of this study there were 15 people (68%) who had a moderate risk of working positions and experienced moderate musculoskeletal complaints. This proves that non-ergonomic work positions can affect the level of musculoskeletal complaints in workers [3].

Prevalence of MSDs in 2018, based on the age of the worker, the lowest was 15 years old 1.2% and the highest was aged over 60 years 18.9% based on the type of work are farmers 9.9%, fishermen 7.40%, and laborers or housemaids 6.10% [4]. Based on Rachman's research in 2019 it stated that working period under 6 years has the most distribution, namely 25 respondents with a percentage (41.7%) and the least, namely 6-10 years of service as many as 14 respondents with a percentage (23.0%) [5]. The level of complaints assessed starts from discomfort (slight pain), pain to very pain. The NBM method uses a worksheet in the form of a body map. This body map includes twenty seven muscle regions in the human body. Interpretation of the level of complaints of MSDs is based on the total score obtained, and can be categorized into three levels of complaints, namely low, medium, high and very high. Static positions for long periods of time at work are thought to be vulnerable to the onset of MSDs in personnel. Therefore, the purpose of this study was to determine the relationship between the risk of work positions and the level of musculoskeletal disorders in private limited company personnel.

2. Materials and Methods

This study used an analytic method with a cross-sectional design, to see the relationship between the risk of work positions and musculoskeletal complaints in Engineering employees at private limited company personnel. The research population is 50 people who are employees of the Engineering division of private limited company. The research sample was taken through simple random sampling technique and obtained as many as 33 employees were measured age, years of service, level of work position risk and level of musculoskeletal complaints. Samples study were calculated using a two-proportion hypothesis test formula and formula according to the type of research, namely cross-sectional. The dependent variable in the study is the level of musculoskeletal disorders while the independent variable is the level of work position. The data used in this study are primary data using questionnaires that have previously been tested for validity and reliability before being distributed. Some of the components contained in the questionnaire are: respondent characteristic data instrument, RULA instrument for measuring human body posture, Nordic Body MAP (NBM) questionnaire instrument. Research data analysis used univariate analysis and bivariate analysis using the Statistical Product and Service Solution (SPSS) program for windows version 26.

3. Results and Discussion

The results of the research come from employees of the Engineering section of private limited company personnel totaled 33 people who met the inclusion criteria with a working duration of 6-8 hours/day.

The indicators observed by the researchers were age, years of service, level of risk in work positions and level of musculoskeletal complaints. This study used univariate analysis with the aim of knowing the characteristics of the respondents consisting of age, years of service, work position and musculoskeletal complaints, as well as bivariate analysis to examine the relationship between the level of risk in work positions and the level of musculoskeletal complaints by using the Chi-square statistical test. Univariate analysis of respondents characteristics based on age and years of service is shown in the following Table 1.

The results of the analysis in Table 1 show that the employees of the Engineering section of private limited company personnel based on age, most of them are 23 years old, namely 12 people (36.4%) and based on years of service, most of them work

Table 1: Frequency distribution of respondent characteristics.

Characteristic	Frequency (N)	Percentage
Age		
20 years	1	3.0
21 years	2	6.1
22 years	9	27.3
23 years	12	36.4
24 years	4	12.1
25 years	2	6.1
26 years	3	9.1
Work Periode		
1-2 years	8	24.2
2-3 years	11	33.3
3-4 years	8	24.2
4-5 years	4	12.1
>5 years	2	6.1
1-2 years	8	24.2

between 2-3 years as many as 11 people (33.3%). Based on the research results, it can be seen that the Engineering staff at private limited company personnel with an age range of 20-26 years, and most were 23 years old (36.4%). This result is in line with Rovanaya's 2015 study which stated that the majority of respondents were less than 35 years old with an age range between 20 years and 34 years [3]. The results showed that the employees of the Engineering section of private limited company personnel mostly worked between 2-3 years (33.3%). This result is in line with Tiara Devi T's research in 2017 which stated that a rice transport company had a working period of under 5 years [6].

Table 2: Frequency distribution of work position risk level.

Level of Risk	Frequency (N)	Percentage
Low	21	63.6
Medium	9	27.3
High	3	9.1
Total	**33**	**100.0**

The results of data analysis in Table 2 regarding the risk level of work positions show that most of the Engineering Department employees at private limited company personnel is at the low risk level criteria, namely 21 people (63.6%). Evaluation of the

respondent's posture in the assessment of work position using the Rapid Upper Limb Assessment method is a method that identifies the risk of posture, especially in the musculoskeletal system.

Table 3: Distribution of work position risk level based on length of service.

Variable	RULA						
Working Period	Low		Medium		High		Total
	N	%	N	%	N	%	
1-2 Years	7	87.5	1	12.5	0	0.0	8
2-3 years	7	63.6	3	27.3	1	9.1	11
3-4 years	2	25.0	4	50.0	2	25.0	8
4-5 years	3	75.0	1	25.0	0	0.0	4
>5 years	2	100.0	0	0.0	0	0.0	2
Total	21	63.6	9	27.3	3	9.1	33

The results of the analysis based on Table 3 can be seen based on a working period of 3-4 years on employees of the Engineering Section of PT X with a high level of risk of work position there are 2 people (25%) out of 8 people, 4 people (50%) with a medium risk level and 2 people (25%) others have a low risk level. In the results of the analysis using the RULA worksheet for workers with a working period of 3-4 years, workers have a high risk level because the workstation is not ergonomic, has no support for the feet, hands, neck. The cause of unergonomic body posture often comes from individuals and work tools and work platforms that are not suitable. employees do their work with raised hands, backs and necks that are too bent, heads raised so that, the further the position of body gravity, the greater the risk of MSDs complaints [7].

Table 4: Frequency distribution of musculoskeletal complaint levels.

Level of Complaints	Frequency (N)	Percentage (%)
Low	13	39.4
Medium	16	48.5
High	4	12.1
Total	**33**	**100.0**

The results of data analysis in Table 4 show that the level of musculoskeletal complaints of employees of the Engineering section of PT X is mostly in the criteria for moderate levels of complaints, namely as many as 16 people (48.5%). The results of this study indicate that the level of musculoskeletal complaints in engineering employees of PT X is mostly in the criteria for moderate levels of complaints, namely as many as

16 people (48.5%), 13 people (39.4%) low levels of complaints and 4 people (12.1%) high levels of complaints. Musculoskeletal complaints are complaints that are in the skeletal muscles or skeletal muscles felt by someone ranging from very mild to very painful complaints, but most often are moderate. These results are in line with Rovanaya's research in 2015 which states that the results of research on workers at the Welding Unit of PT A Bekasi regarding musculoskeletal complaints can be seen that the majority of respondents have moderate musculoskeletal complaints [3].

Bivariate analysis using the chi square test to determine the relationship between the level of risk of work position and the level of musculoskeletal complaints in Engineering Employees of PT X.

Table 5: Relationship between the level of risk of work position and the level of musculoskeletal complaints.

		NBM								
No.	**Level of Risk**	**Low**		**Medium**		**High**		**Total**		***P-value**
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	
1	Low	8	38.10	11	52.38	2	9.52	21	100.00	0.031
2	Medium	5	55.56	4	44.44	0	0.00	9	100.00	
3	High	0	0.00	1	33.33	2	66.67	3	100.00	
Total		**13**	**39.39**	**16**	**48.48**	**4**	**12.12**	**33**	**100.00**	

The results of the study in Table 5 show that of the 21 respondents with a low risk level, most had a moderate level of musculoskeletal complaints as many as 11 people (52.38%), of the 9 respondents with a medium risk level, most had a low level of musculoskeletal complaints as many as 5 people (55.56%) and of the 3 respondents with a high risk level, most had a high level of musculoskeletal complaints as many as 3 people (66.67%). The results of the study obtained a p value = 0.031 ($p < 0.05$) which means that there is a significant relationship between the level of risk of work position and the level of musculoskeletal complaints in engineering workers of private limited company personnel.

This is in accordance with the results of research from Ayu and Ratriwardhani there is a noteworthy correlation between job position and the occurrence of Musculoskeletal Disorders (MSDs) among workers in the Kerupuk Industry sector. This arises from inadequacies in work equipment, leading to an impact on the ergonomics of work

positions for employees, consequently influencing musculoskeletal issues. It is recognized that reducing biomechanical workloads increases the likelihood of recovering from musculoskeletal symptoms [8,9].

4. Conclusion

Based on the results of research conducted by researchers, it can be concluded that based on the research obtained results that most employees of the Engineering section of private limited company personnel, have an age of 23 years, namely as many as 36.4% (12 people) with a working period of 2-3 years, namely as many as 33.3% (11 people). The majority of musculoskeletal complaints are at the level of moderate complaints, namely as many as 48.5% (16 people). The risk level of the work position of employees in the Engineering section of PT X is mostly at a low risk level criteria as many as 21 people (63.6%) of 33 respondents, 9 people (27.3%) have medium risk level criteria, while 3 people (9.1%) others have a high risk level. In this study, there was also a significant relationship between the risk of work position and the level of musculoskeletal complaints in engineering employees of PT X with a value of ($p=0.03<0.05$).

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References

[1] Komarudin D, Kuswana WS, Noor RA. Kesehatan dan keselamatan kerja di SMK. Journal of Mechanical Engineering Education. 2016;3(1):46.

[2] Sekaaram V, Ani LS. Prevalensi musculoskeletal disorders (MSDs) pada pengemudi angkutan umum di terminal mengwi, kabupaten Badung-Bali. Intisari sains medis. 2017;8(2):118–24.

[3] Jalajuwita RN, Paskarini I. Hubungan posisi kerja dengan keluhan muskuloskeletal pada unit pengelasan PT. X Bekasi. The Indonesian journal of occupational safety and health. 2015;4(1):33–42.

[4] Rachman R, Suoth LF, Sekeon SA. Hubungan antara sikap kerja dan umur dengan keluhan musculoskeletal pada tenaga cleaning service di rsup prof. Dr. RD Kandou manado. Kesmas. 2019;8(7).

[5] Aprianto B, Hidayatulloh AF, Zuchri FN, Seviana I, Amalia R. Faktor risiko penyebab Musculoskeletal Disorders (MSDs) pada pekerja: A systematic review. Jurnal Kesehatan Tambusai. 2021;2(2):16–25.

[6] Devi T, Purba I, Lestari M. Risk factors of musculoskeletal disorders (msds) complaints on rice transportation activities at pt. buyung poetra pangan pegayut ogan ilir. Jurnal Ilmu Kesehatan Masyarakat. 2017;8(2):464354.

[7] Arthawani G. Digital Repository Repository Universitas Universitas Jember Jember Digital Digital Repository Repository Universitas Universitas Jember Jember. Digital Repository Universitas Jember; 2021.

[8] Ayu F, Ratriwardhani RA. Relationship of work position with complaints of musculoskeletal disoeders (MSDs) in cracker industrial worker at Kedungdoro village, Sidoarjo. In: IOP Conference Series: Earth and Environmental Science. IOP Publishing; 2021. p. 12105.

[9] Dianat I, Afshari D, Sarmasti N, Sangdeh MS, Azaddel R. Work posture, working conditions and musculoskeletal outcomes in agricultural workers. Int J Ind Ergon. 2020;77:102941.