

## Association between Psychosocial Factor and Risk of Musculoskeletal Disorders in Productive Age Patient at RSUD Dr. Moewardi Surakarta

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### ABSTRACT

*Musculoskeletal Disorders (MSDs) is a form of complaint that occurs in bones, joints, ligaments, tendons, and muscles. Globally, MSDs are the biggest single cause of health complaints among workers. The purpose of this study was to analyze psychosocial factors that can increase risk of MSDs in reproductive age patients. This study used an analytic observational study with cross-sectional design. A sample of 116 subject was selected for this study by fixed disease sampling. Data were collected by questionnaire and medical record, and analyzed by path analysis. Results: Risk of MSDs was directly related to with non-ergonomic work posture (OR: 2.35; CI 95%:1.44 to 3.26; P<0.001), there was indirect association with stress level variable (OR:0.79;CI 95%:0.01 to 1.58;P=0.047) which affected by type of work variabel (OR:0.83;CI 95%:0.87 to 1.58;P=0.029) and indirectly associated with bad work environment (OR:1.07;CI 95%:0.28 to 1.85;P=0.008)*

Musculoskeletal disorders (MSDs) are a complaint when muscles receive a static load repeatedly over long period of time, it will cause complaints in the form of damage to joints, ligaments and tendon (Dwiseli *et al.*, 2019). Musculoskeletal disorders (MSDs) are the leading cause of absence at work in

the United States with the most common musculoskeletal injuries are sprains and strains. A similar problem also occurs in workers in Brazil, with MSDs being the most common complaints on the shoulder (49%), neck (47%) and spine (39%) (Kim, 2017).

Study in Arab Saudi found that at least 13% workers take time off due to MSDs, 22% have to reduce their work-related hours and 46% have to undergo regular medical treatment due to MSDs (Iqbal and Alghadir, 2015). Study in Hongkong found that in 2016, 39,2% of workers suffer from musculoskeletal pain (Yi and Chan, 2016).

Study from Prasetya *et al.*, (2017) showed that 62,5% of workers complained of high musculoskeletal disorders. Result from a preliminary study conducted on outpatients at the Dr. Moewardi Hospital Surakarta showed that in 2017 there were 650 patients or more than 40% of cases in physiotherapy clinic complaining of MSDs.

MSDs can affect decreasing of productivity and cause an increasing of economic burden on a company due to the expenditure of additional funds for health compensation an insurance for workers.

Psychosocial factors that can increase the risk of MSDs are work posture, work environment, type of work, and stress level (Romadhoni, 2018).

Work-related stress may result in decreased concentration and ability to make decisions so that workers become confused, forgetful and doubtful which can affect

accidents and injuries so that it is easy for workers to experience the risk of MSDs (Sharma and Singh, 2015). Stress levels can affect pain rather than physiological responses associated with pain and also affect pain in certain parts when the psychological condition is bad (Bergsten *et al.*, 2015).

Stress levels can be measured using the perceived stress scale (PSS), PSS assesses external demands that play a role beyond the ability of an individual so that an individual is unable to overcome it (Nielsen *et al.*, 2016).

PSS originally consisted of 14 items scale and developed into 10 items and is often used to measure stress level due to external factors (Khalili *et al.*, 2017).

Psychosocial factors that increase the risk of MSDs include the heavier work, the higher level of pain that is felt, makes the person more at risk of developing MSDs (Bergsten *et al.*, 2015). Type of work affects how high the risk of MSDs. Workers with excessive physical activity 76,2% at risk of MSDs (Yi and Chan, 2016). Work identifies an activity that on average takes a lot of time in each day so that it is physically demanding to work excessively which has an impact and impacts on the risk of MSDs (Blackwell and Clarke, 2016).

Work environment is defined as everything that is in the workplace or state of workplace, such as ventilation system, room temperature, dust, humidity, workspace lighting (lighting intensity), noise level and workplace design (Joseph, 2016). Non-ergonomic work environment may increase risk of MSDs by 20%, other research suggest that poor work environment increase 34,4% risk of MSDs (Prasetya *et al*, 2017).

Work environment can be assessed using the PLIBEL checklist that was designed by Dr. Kemmlert in 1995. PLIBEL checklist have been widely used in measuring work environment related to ergonomic risk on five limbs: neck, shoulder, upper back, elbows, forearm and hand then added with knees, hips, and low back (Kusmasari *et al.*, 2018).

Work posture is the position of the body during the performance of work. Work posture has a very significant impact on the efficiency and performance of workers so that it affects health problem of workers. Work posture is divided into three type, easy posture, fatigue posture and rigid posture (Rahmayati and Kasmini, 2020), non-ergonomic work posture in a fixed body position for several hours can increase risk of MSDs by 62,8% (Chinyere, 2014).

This study aimed to examine association between psychosocial factors and risk of MSDs in terms of the direct and indirect association of the independent variable to the dependent variable.

## METHODS AND MATERIALS

This study used an analytic observational study with cross-sectional approach. The target population in this study were outpatient with MSDs in the medical rehab clinic of Dr. Moewardi Surakarta hospital in 2017/2018. Subject of this study were outpatients of Physiotherapy clinic Dr. Moewardi Hospital Surakarta with a diagnosis of MSDs. This study used fixed disease sampling, number of samples was taken based on the representation of 15 samples on the independent variables in order to obtain 116 samples.

The inclusion criteria are patients who work as workers/employee, work time  $\geq 8$  hours, willing to be respondents for the study and at productive age (30-60 years). The exclusion criteria included patients who had a history of fractures, had spinal abnormalities and had a history of smoking. Type of work is a form of activity carried out by research subjects to earn income, such as factory workers, employees, police, and teacher.

The work environment was analyzed using the PLIBEL checklist. Work posture was measured by rapid entire body assessment (REBA) method. The stress level was assessed using PSS. MSDs data were taken based on the medical record.

Bivariate analysis aims to analyze the association of two variables using chi-square test and calculating the odds ratio (OR) with a confidence level (CI) of 95%. Multivariate analysis was done using path analysis to determine direct and indirect associations.

## RESULT AND DISCUSSION

Characteristic description of the respondents based on primary and secondary data is described in table 1. Subjects that tend to have more moderate type of work (56.9%) than the heavy type of work (43.1%), subjects who had severe stress level (52.6%). More than 50% of the subject's work environment is in the high-risk category of MSDs with a high work posture as much as 45.7% and very high as much as 8,6%. Subjects with acute MSDs (57.8%) were higher than those with chronic MSDs (42.2%).

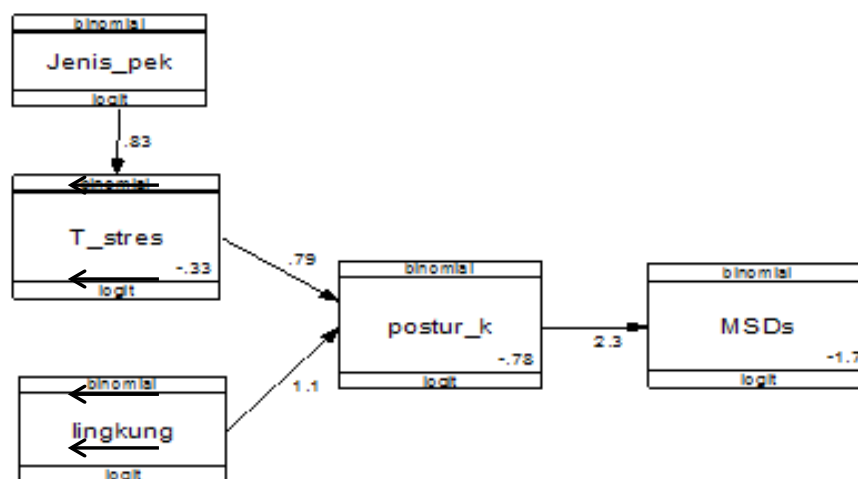
**Table 1.** Characteristics of the Subjects

Characteristics	Criteria	Frequency	(%)
<b>Type of work</b>	Heavy work type	66	56,9
	Hard work type	50	43,1
<b>Work Environment</b>	<43%	56	48,3
	>43%	60	51,7
<b>Work Posture</b>	≤4	53	45,7
	≥4	63	54,3
<b>MSDs</b>	Acute	67	57,8
	Chronic	49	42,2

The results were analyzed using STATA 13 with 5 variables, 3 endogenous variables and 1 exogenous variable, so that the degree

of freedom (df) value is 10 where path analysis can be carried out. The results of the path analysis are described in Figure 1 below:

**Gambar 1.** Structural Model of Path Analysis with Estimation



**Table 2.** The Results of Path Analysis Association of Psychosocial Factors of MSDs

Variable	Independent Variable	CI (95%)	P		
			Upper Limit	Lower Limit	
Direct Effect					
MSDs	Work Posture	2.35	1.44	3.26	<0.001
Indirect Effect					
Work Posture	Work Environment	1.07	0.28	1.85	0.008
Work Posture	Stress Level	0.79	0.01	1.58	0.047
Stress Level	Type of work	0.83	0.87	1.58	0.029
Log likelihood	-214.049				

Table 2 showed a direct positive association between non-ergonomic work posture on MSDs and is shown to be statistically significant (OR: 2.35; CI 95%: 1.44 to 3.26; P<0.001).

This finding was in accord with a previous study which explained that an

ergonomic work posture will increase the risk of MSDs such as factory workers lifting large quantities of goods simultaneously and involves excessive movement of work such as turning right and left or bend more than 60 degrees. This causes an increase in the risk of MSDs in factory workers, especially in the

upper extremities such as CTS, torticollis, and in lower extremities such as LBP and OA (Romadhoni, 2018).

Ansari and Sheikh, (2014) research on handicraft workers where there are about 53% of workers with high level of risk. Based on their study, if workers continue to work in the same posture then they may have the risk of MSDs in the neck, shoulders and wrists in the near future, this is due the twisting of the arm and bending over while working.

Previous studies that are in line with this result are research conducted on restaurant workers. This study explained that some servants will carry multiple items using one hand, others open the door, while others will share same weight on both hands. The result showed that 59% cases of musculoskeletal disorders in female servants and 40% in male worker (Laperrière *et al.*, 2017).

The type of work is very influential on the risk of MSDs because they require continuous strength and repetition while working and lack of rest period so that the limbs are very vulnerable to MSDs (Hembecker *et al.*, 2017).

The risk of MSDs does not only affect heavy-duty workers, but even moderate type of work may at risk of MSDs due to discomfort when doing work, both psychologically and

mental and work posture (Laal *et al.*, 2017)

Table 2 also explained that there was indirect positive association and statistically significant with the high stress level variable (OR: 0.79; CI 95%: 0.01 to 1.58; P=0.047). Stress level are associated with MSDs risk through work posture. Subjects with high stress level are more likely to develop MSDs. This occurs as a result of the tension in the back muscles which can affect their posture when working, who have high stress level tend to bend over and looking down so that they form a non-ergonomic work posture. Subjects who have high stress levels tend to develop LBP and myalgia.

Study conducted by Charles *et al.*, (2017) stated that work closely related to job demands, low social support, low work control and monotonous work. This can affect stress level of workers so that many workers complain of pain in the neck and shoulders, this complaint is also associated with poor work posture such as non-ergonomic work postures that cause the neck to flex for too long with repetitive movements so that it will be very vulnerable to the risk of MSDs.

The results of table 2 showed an indirect association with a bad work environment (OR: 1.07; CI 95%: 0.28 to 1.85; P=0.008). Work environment associated with risk of MSDs

through work postures. Non-ergonomic work environment may increase the risk of MSDs. The subject will adjust their work posture with the work environment. For example, employees with a narrow work space and uncomfortable chairs will form a non-ergonomic work posture, because the narrow work space makes the subject experience limitation in movement so that it will form a dynamic work posture throughout working hours.

This finding was in accord with the result from previous study in medical profession, especially dentist. There was a significant result where dentists tended to have higher cervical MSDs complaints than other areas, which was due to the fact that dentists had to flex their neck and sit for hours while doing treatment on their patients (*Taylor et al., 2018*).

Study from Park *et al., (2017)* on manufacturing workers showed that 38% of workers were at risk of MSDs due to bad work posture caused by a bad work environment. In this study, respondents were asked to do work with heavy loads and carried out repeatedly with a work posture that was not in accordance with the work equipment.

Table 2 showed a direct positive association between the type of work and

level of stress (OR: 0.83; CI 95%: 0.87 to 1.58; P=0.029). Result from Amin *et al., (2018)* study showed that worker stress level of 51,6% was significant with the risk of MSDs. This caused due to high work demands that affect the psychological responses that can increase pain and musculoskeletal disability of the musculoskeletal system.

Previous study suggested that occupational groups including community workers, office workers, specialized health workers, and mining workers, may indicate multifactorial MSDs, one of these factors is stress level (*Fulmer et al., 2017*).

## CONCLUSSION AND SUGGESTION

Based on the result of path analysis of the relationship between psychosocial factor an the risk of MSDS, there was direct association between non-ergonomic work posture with an increased risk of MSDs and there was indirect association between stress level, work environment and type of work with an increased risk of MSDs.

This study is expected to be developed by analyzing MSDs using a case control approach to spesifically examine factors that realated to MSDs and analyzed other factors that have not been studied in this study.

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