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Analysis of the incidence of Musculoskeletal Disorder in Weaving Workers at the Ulos Sianipar Gallery

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ABSTRACT

Introduction: Galery Ulos Sianipar is an ulos and songket manufacturing company. Ulos are created in this gallery on a non-machine loom that is operated with the feet and hands, and the weaving activity is carried out continuously while sitting. Musculoskeletal disorders can develop as a result of weaving work (MSDs). The purpose of this study was to ascertain the factors that contribute to musculoskeletal disorder complaints among weaving workers at Galery Ulos Sianipar. **Method:** This is a quantitative study conducted in a cross-sectional fashion. This study enrolled 32 individuals. Purposive sampling is a sampling technique used. The Nordic Body Map (NBM) was used to assess musculoskeletal complaints; the Rappid Upper Limb Assessment was used to assess work posture (RULA). Fisher's exact test was used in the bivariate test. **Result :** The findings indicated that 24 respondents (75%) had mild MSDs, while 8 respondents (25%) had severe MSDs. The bivariate analysis revealed a relationship between physical fitness and MSD complaints (p=0.038). There is no correlation between MSD complaints and age (p-value = 0.625), years of service (p-value = 1,000), or work posture (p-value = 0.176). **Conlusion** Weavers are encouraged to adopt a more upright posture and participate in sports and stretches prior to, during, and after work.

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1. INTRODUCTION

According to the International Labor Organization (ILO), more than 2.3 million people die each year from work-related injuries or illnesses. The ILO also estimates that every year there are 160 million cases of work-related diseases. The nature of occupational diseases is changing rapidly. Technological and social changes, along with changing global economic conditions, exacerbate existing health hazards and lead to new infections (ILO, 2015).

According to the United States Bureau of Labor Statistics, work-related musculoskeletal disorders are most prevalent in the back; in 2016, back musculoskeletal disorders accounted for 38.5% of all work-related musculoskeletal disorders (134,550 back cases out of 349,050 total points). Nursing assistants assisted in 10,330 cases of back pain, 10,660 cases of labor, and 10,660 cases of moving goods. In comparison to other occupations, heavy tractor truck drivers sustained a higher proportion of shoulder (19.2 percent) and leg injuries (16.3 percent) (*U.S Bureau of Labor Statistics*, 2018).

The results of the Labor Force Survey in the United Kingdom show that the prevalence of workers who have work-related musculoskeletal disorders in 2018/2019 was 498,000 cases of the total number of cases of occupational diseases, which was 1,354,000 cases. This figure is not statistically significantly different from the previous year; musculoskeletal disorders in the upper limbs or neck in 203,000 patients (41%), back 200,000 cases (40%), and lower limbs in 95,000 cases (19%). As a result of musculoskeletal disorders, it is estimated that 6.9 million workdays are lost; in each case, the average loss is 14 working days (Health and Safety Executive, 2019).

Most musculoskeletal disorders develop over time. This disorder can be acute or chronic and can also be caused by injuries suffered due to work accidents (BM & Dahlan, 2018;Indraswari, 2018). Musculoskeletal disorders are associated with work patterns that require a fixed or restricted body position, repetitive movements, complete strength in small body parts such as the hands or wrists, and work that does not allow for adequate recovery (Helmina, 2019; Kim, 2015). Additionally, psychosocial workplace factors such as organizational culture, health and work climate, and human factors can contribute to the development of musculoskeletal disorders (Health and Safety Executive, 2019).

Data from the Central Statistics Agency (BPS) in 2016 showed that 26.74% of the population aged 15 years and experiencing overworked complaints and health problems

(Kemenkes, 2018). Research on ulos weaving workers conducted by Butar-butar (2018) in Siantar Selatan District, Pematangsiantar City, showed that out of 30 respondents, 16 people (53.3%) had complaints of MSDs, while 14 people (46.7%) did not experience any symptoms. MSD complaints. Workers who have the most complaints of pain are located in the waist, as many as 26 people (86.7%) and workers who do not experience pain complaints in their body parts as many as four people (13.3%) (Butar-Butar, 2018). Research conducted by Adriansyah et al. (2019) on Lipa' Sa'be Mandar weaving workers in Karama Village, from 42 respondents found weavers who experienced mild MSDs complaints as many as 11 people (26.2%), experiencing moderate MSDs complaints as many as 21 people (50%), and ten people (23.8%) experienced severe MSDs (Adriansyah et al., 2019). Physical activity is said to be regular when it is done at least three times a week. Exercise can also improve quality of life, prevent osteoporosis and other skeletal diseases, as well as other conditions (Andini, 2015; Wahyuni, 2019). Sport is an activity that moves part or all of the body so that the body will feel fitter and healthier (Helmina, 2019 ; Safitri, 2017).

The Gallery Ulos Sianipar is a manufacturer of ulos and songket. Ulos are still made in this gallery using non-machine looms (ATBM), which require more human labor to operate. Non-machine looms are operated manually by feet and hands. A preliminary study conducted at the Ulos Sianipar Gallery by interviewing five weaving workers found that the five workers had complaints of musculoskeletal disorders. The body parts that feel pain are in the thighs, back, all parts of the body and calves.

Based on observations made in the preliminary survey, weaving workers do work with a bent body position; the chair used does not have a backrest and performs repetitive hand and foot movements for a long time. Working with these conditions can cause disturbances in the skeletal system. In addition, individual factors such as age, years of service and physical fitness of workers are also suspected to be associated with MSDs complaints. The researchers are interested in researching factors associated with complaints of musculoskeletal disorders among weaving workers at the Ulos Sianipar Gallery, based on the findings of a preliminary study.

2. METHOD

The type of research used is quantitative research with a cross-sectional study design, meaning that each research subject is observed only once, and measurements are made on the status of the character or variable of the issue at the time of examination. The location of the research is Ulos Sianipar Gallery which is located on Jalan AR. Hakim Gg. Pendidikan No. 130, Medan, North Sumatra. This research was conducted from December 2019 – September 2020. Starting from preparation, preparation of research proposals, proposal seminars, data collection and data analysis, preparation of research results, seminars on research results.

A population is an object or subject located within a geographic area that meets certain criteria related to research problems. The participants in this study were all ulos weaving workers at Ulos Sianipar's weaving gallery, which employed up to 32 people. Sampling technique or sampling technique is a way of taking a representative sample of the population. The sampling technique used in this research is purposive sampling. Purposive sampling is a sampling technique that considering certain or special selections. A research instrument is a tool used to measure the variables studied. The research instruments used in this research are; individual questionnaire, Nordic Body Map (NBM) sheet, Rapid Upper Limb Assessment (RULA) form, the camera was used to take pictures of respondents while working to measure work posture, arc ruler was used to measure the angle of work posture in the pictures taken.

Data collection was carried out when the Covid-19 outbreak was spreading in Indonesia. Data collection is carried out while still following the Covid-19 health protocol by washing hands or using a hand sanitiser before entering the workroom, maintaining a distance (social distancing) from workers of at least 1 meter, using masks and limiting physical interaction (physical distancing) by not shaking hands.

The univariate analysis aims to determine the distribution or frequency of each research variable. Univariate analysis was carried out on MSDs complaint variables, age, years of service, physical fitness and work posture variables. Bivariate analysis is an analysis to examine the relationship between variables, namely the independent variable and the dependent variable. This study uses the Chi-Square test to determine whether or not there is a relationship between the independent and dependent variables but does not see how great the relationship between these variables is. The way to make a decision is if

Sig> 0.05, then Ho is accepted, otherwise if Sig < 0.05, then Ho is rejected. If the expected value is found to be less than 5, an alternative test is used, namely the Fisher Exact Test. Several terms in the chi-square test are odd ratio and confidence interval or CI (confidence interval). The odds ratio is used to compare the likelihood of events occurring in one group with another group. The way to conclude is that the odds ratio >1 means increasing risk, odd ratio = 1 means there is no relationship or association, odd ratio <1 means reducing risk. The confidence interval is usually calculated at the 95% confidence level and is required to accompany the odd ratio value.

3. RESULT

Table 1. Frequenc Distribution of Age, Working Period, Economy, and Incidence of MSDS

Age	**f**	**%**
≤ 35 Years	6	18,8
> 35 Years	26	81,2
Total	32	100
Working Period	**f**	**%**
≤ 5 Years	16	50
> 5 Years	16	50
Total	32	100
Work Postures	**f**	**%**
Non-Risk Poses	9	28,1
Risk Poses	23	71,9
Total	32	100
MSDs	**f**	**%**
Low	24	75
High	8	25
Total	32	100

The results showed that the majority of weaving workers in the Ulos Sianipar Gallery were workers with the age of 35 years as many as six respondents (18.8%) while those aged> 35 years were 26 respondents (81.3%). The working period of weaving workers at the Ulos Sianipar Gallery with a service period of 5 years was 16 respondents (50%) and> 5 years as many as 16 respondents (50%). The weaving workers of the Ulos Sianipar Gallery work the most with risky work postures as many as 23 respondents

(71.9%) and workers who have non-risk poses as many as nine respondents (28.1%), 24 respondents (75%) had mild MSDs, and 8 respondents (25%).

Table. 2. Relationship of Age, Work Period and Work Posture with MSDS Complaints

Umur	**Low**		**High**		**Total**		***p* – *value***	**OR**
	n	**%**	**n**	**%**	**n**	**%**		
≤ 35 Years	4	12,5	2	6,25	6	18,8	0,625	0,6
> 35 Years	20	62,5	6	18,75	26	81,3		
Total	24	75	8	25	32	100		
Working Period	**Low**		**High**		**Total**		***p* – *value***	**OR**
	n	**%**	**n**	**%**	**n**	**%**		
≤ 5 Years	12	37,5	4	12,5	16	50	1	1
> 5 Years	12	37,5	4	12,5	16	50		
Total	24	75	8	25	32	100		
Work Postures	**Low**		**High**		**Total**		***p* – *value***	**OR**
	n	**%**	**n**	**%**	**n**	**%**		
Non-Risk Poses	5	15,6	4	12,5	9	28,1	0,176	0,26
Risk Poses	19	59,4	4	12,5	23	71,9		3
Total	24	75	8	25	32	100		

The results showed that of the 32 respondents who experienced mild MSDs complaints with age 35 years, as many as four respondents (12.5%) and period> 35 years as many as 20 respondents (62.5%), while those who experienced high MSDs complaints with age 35 years as many as two respondents (6.25%) and age> 35 years as many as six respondents (18.75%). The fisher-exact test results obtained a p-value of 0.625 (p> 0.05), meaning that there is no relationship between age and MSDs complaints in the weaving workers of the Ulos Sianipar Gallery. The odds ratio (OR) value was 0.600 (95% CI: 0.087 – 4.121), meaning that respondents aged 35 years had a 0.600 times lower risk of experiencing MSDs complaints than respondents aged> 35 years.

The results showed that of the 32 respondents who experienced mild MSDs complaints with a working period of 5 years, as many as 12 respondents (37.5%) and> 5 years of service as many as 12 respondents (37.5%). While respondents who experienced high MSDs complained with a service period of 5 years as many as four respondents (12.5%) and a service period of> 5 years as many as four respondents (12.5%).The results of the fisher-exact test analysis of the variable length of service with MSDs complaints obtained p-value = 1,000 (p> 0.05), meaning that there is no relationship between tenure and MSDs complaints in weaving workers at the Ulos Sianipar Gallery. The odds ratio

(OR) value of 1,000 (95% CI: 0.202 – 4.955) means that the respondent's tenure has no relationship with the risk of MSDs complaints.

The results of the study found that out of 32 respondents who experienced mild MSDs complaints with no-risk work postures, as many as five respondents (15.6%) and risky work postures as many as 19 respondents (59.4%). While respondents who experienced high MSDs complained about work postures with no risk, as many as four respondents (12.5%) and risky work posture as many as four respondents (12.5%). The fisher-exact test results obtained a p-value of 0.176 (p> 0.05), meaning no relationship between work posture and MSDs complaints the odds ratio (OR) value of 0.263 (95% CI: 0.048 – 1.441) implies that respondents with no-risk work postures have a 0.263 times lower risk of experiencing MSDs complaints than respondents with difficult work postures.

4. DISCUSS

The Relationship between Age and MSDs Complaints on Weaving Workers at the Ulos Sianipar Gallery

According to Tarwaka (2015), age is one of the individual factors that can cause musculoskeletal complaints. The results showed that of the 32 respondents who experienced mild MSDs complaints with age 35 years, as many as four respondents (12.5%) and age> 35 years as many as 20 respondents (62.5%), while those who experienced high MSDs complaints with age 35 years as many as two respondents (6.25%) and age> 35 years as many as six respondents (18.75%).

Based on the results of the fisher-exact test, a p-value of 0.625 (p> 0.05) was obtained, meaning that there was no relationship between age and MSDs complaints in the weaving workers of the Ulos Sianipar Gallery. The odds ratio (OR) value was 0.600 (95% CI: 0.087 – 4.121), meaning that workers aged 35 years had a 0.600 times lower risk of experiencing MSDs complaints than workers aged> 35 years. Respondents aged under and above 35 years can share MSDs complaints, but what makes the difference is the level of MSDs complaints they feel. According to Djuarsah and Herlina (2018) in their research that age is not a factor causing MSDs complaints because workers of any age can experience MSDs complaints, depending on the work attitude of each worker (Djuarsah & Herlina, 2018).

The results of this study are by the results of research conducted by Butar-Butar (2018) on ulos weavers in Siantar Selatan District, Pematang Siantar City, which obtained a p-value of 0.919 (p> 0.05), meaning that there is no relationship between age and complaints of MSDs (Butar-Butar, 2018). Another suitable study is the research conducted by Ginanjar (2018), which found no correlation between age and MSD complaints. Skeletal muscle complaints are felt at working age, namely 25-65 years. Skeletal muscle complaints are most prevalent in people of working age, between the ages of 25 and 65. The first complaint will be processed at the age of 35, and the number of complaints will continue to grow with age. This is because muscle strength and endurance begin to deteriorate during middle age, increasing the likelihood of muscle complaints (Tarwaka, 2015).

The Relationship of Working Period with MSDs Complaints on Weaving Workers at the Ulos Sianipar Gallery

The service period is a factor related to the length of time a person works in a company. Based on the results of the study showed that of the 32 respondents who experienced mild MSDs complaints with a working period of 5 years, as many as 12 respondents (37.5%) and working years> 5 years as many as 12 respondents (37.5%), while respondents who experienced MSDs complaints with a service period of 5 years as many as 4 respondents (12.5%) and a service period> 5 years as many as 4 respondents (12.5%). The results of the fisher-exact test analysis of the variable length of service with MSDs complaints obtained p-value = 1,000 (p> 0.05), meaning that there is no relationship between tenure and MSDs complaints in weaving workers at the Ulos Sianipar Gallery. The odds ratio (OR) value of 1,000 (95% CI: 0.202 – 4.955) means no relationship or association between workers' tenure and the risk of MSDs complaints. The absence of a relationship between years of service and MSDs complaints could be due to adjusting the worker's body to work activities. Workers with more than five years of service are more familiar with the work activities compared to workers with five years of service. So that workers who have a working period of> 5 years do not feel pain or pain or only handle mild MSDs complaints. According to Sari et al. (2017), the adjustment between work and the work environment positively impacts reducing complaints and improving worker performance (Sari et al., 2017).

This study is in line with the research of Suryanto et al. (2019), which obtained a p-value of 0.461 (p> 0.05), meaning that there is no significant relationship between physical fitness and MSDs complaints (Suryanto et al., 2020). And in line with the research of Mawadi and Rachmalia (2016), a p-value of 0.567 (p> 0.05) was obtained, which means that there is no relationship between tenure and MSDs complaints (Mawadi & Rachmalia, 2016).

The findings of this study contradict those of Adriansyah et al. (2019) regarding weaver Lipa' Sa'be Mandar, who asserted a link between years of service and MSD complaints. The longer a person's working period, the longer he is exposed to the time and type of work he does and causes physical complaints due to work (Adriansyah et al., 2019). Complaints of MSDs are usually chronic complaints, meaning that these complaints are often felt long after doing activities and leave residues (Tarwaka, 2015). The longer a person is exposed to risk factors for MSDs, the greater the risk of that person experiencing MSDs (Icsal et al., 2016). Mongkareng (2018) states in his research that work that performs repetitive movements of the fingers can cause stress around the carpal tunnel network, and at work> 5 years can cause carpal tunnel syndrome (Mongkareng et al., 2018).

According Widitia (2020), efforts to prevent MSDS incidence are carried out by stretching before starting work, having breakfast before work, consuming 2 litres of drinking water per day. Routine exercise activities carried out by workers are carried out by stretching before starting work; this is important for the health and comfort of workers when carrying out activities (Asri, 2019; Bobaya, 2018). According to Saleh (2018) and , one way to reduce the danger of MSDs associated with repetitive movements and uncomfortable postures is by stretching exercises. According Siregar (2020),workers cannot afford to disregard their physical well-being. Working with an ergonomic mindset and creating a comfortable work environment are critical components of efforts to reduce the risk of disease and health problems in the workplace.

Low physical fitness report having a moderate level of musculoskeletal complaints, while those with average physical fitness report having a low level (Siregar, 2020; Gloria, 2019). One of the factors that affect physical fitness is sleep and rest. People who have less sleep and rest will affect their physical fitness. Muscle complaints will occur in someone doing activities with great exertion without having sufficient rest time. As a result, it can

be concluded that individuals with less physical fitness will frequently experience muscle complaints.

5. CONCLUSIOON

The conclusions obtained based on the results of research conducted on weaving workers at the Ulos Sianipar Gallery are as follows:

1. Characteristics of weaving workers in the Ulos Sianipar Gallery, Respondents aged 35 years were six respondents (18.8%), while workers aged> 35 years were 26 respondents (81.2%). Respondents who have a working period of 5 years are 16 respondents (50%), and> 5 years are 16 respondents (50%). Respondents with poor physical fitness are as many as 13 respondents (40.6%), while those with good physical fitness are 19 respondents (59.4%). Respondents with a difficult work posture are 23 respondents (71.9%), and workers who have a non-risk posture are nine respondents (28.1%).
2. Description of complaints of musculoskeletal disorders (MSDs) among Galery Ulos Sianipar weaving workers; it was discovered that 24 respondents (75 percent) had mild MSDs and 8 respondents had moderate MSDs (25 percent).
3. There is no correlation between age and complaints of musculoskeletal disorders (MSDs) among the weavers at the Ulos Sianipar Gallery (p-value = 0.625). There is no correlation between years of service and complaints of musculoskeletal disorders (MSDs) among the Ulos Sianipar Gallery's weaving workers (p-value = 1,000). There is no correlation between work posture and musculoskeletal disorder (MSD) complaints in the weaving workers of Galery Ulos Sianipar (p-value = 0.176).
6. There is a relationship between physical fitness and complaints of musculoskeletal disorders (MSDs) (p-value = 0.038) in the weaving workers of the Ulos Sianipar Gallery.

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