



Determinants of Musculoskeletal Disorders Complaints in Songket Weaving Processors

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ABSTRACT: Songket weaving artisans is a job that needs special attention because the process still uses traditional high-risk looms. The initial survey showed that 9 out of 10 artisans experienced muscle and skeletal complaints, known as Musculoskeletal Disorders. This study aims to determine the relationship between individual characteristics and occupational factors with MSD complaints in Pandai Sikek songket weaving artisans. This research is a quantitative study with a cross-sectional design. Conducted from December 2021 - June 2022 to 77 respondents. The sampling technique uses simple random sampling. Data processing uses univariate and bivariate analysis with a chi-square test with an α value of 5%. The results showed that 53.2% of songket weaving artisans experienced moderate risk MSDs complaints, 64.9% of artisans were classified as lack of exercise, 36% of artisans were classified as having BMI abnormal, 24.7% of artisans were classified as having risky working duration, and 76.6% of artisans' working posture is classified as high risk. The results of the bivariate analysis showed that the variables associated with MSD complaints were age ($p=0.000$), years of service ($p=0.000$), exercise habits ($p=0.020$), BMI ($p=0.012$), duration of work ($p=0.001$), and work posture ($p=0.028$). There is a relationship between age, years of service, sports habits, BMI, duration of work, and work posture with MSDs complaints. Artisans are expected to stretch before, during, and after work. Nagari is expected to reach out to artisans regarding applying K3 when weaving.

KEYWORDS: MSD, songket artisans, Woven.

INTRODUCTION

The increasing The background contains the reasons for taking the research title, and other things that underlie this research. Can come from primary data or secondary data. In addition, the background also contains research objectives and a summary of theoretical studies related to the problem under study [1]. Background length is about 2-3 pages. Typed using Arial 12 pt font, 1.5 spacing [2].

The International Labor Organization (ILO) in Suharto (2021) states that informal workers are vulnerable workers. Because they do not get the basic rights of formal workers such as work accident insurance, health insurance, working hours and other benefits. This vulnerability is increasingly evident with low productivity and low income and can increase the risk of Occupational Diseases (PAK) [1]. In fact, in Indonesia in 2021, out of a total workforce of 131.06 million people, 78.14 million workers (60.47%) work in the informal sector and in the formal sector with a total of 52.92 million workers (39.53 million). % [2].

One of the most common PAK that occurs in workers in both the formal and informal sectors is Musculoskeletal Disorders (MSD). MSD is a disorder of the skeletal muscles caused by static loads that are received repeatedly by the muscles for a long time, causing complaints to the ligaments, joints and muscles [3]. Complaints that are felt start from mild complaints to severe complaints in the joints, nerves, muscles and spine caused by unnatural working positions [4].

There are several factors that influence the occurrence of MSD complaints. Several risk factors include occupational factors, individual characteristics, environmental factors, and psychosocial factors [5]. One of the causes of skeletal muscle disorders is an awkward posture. Awkward posture is a body position that deviates significantly from the normal position while doing work. This awkward posture can cause local mechanical stress on muscles, ligaments, and joints that make the MSD system vulnerable to injury and lead to MSD complaints [6].

In Indonesia, the results of a study conducted of 9,482 workers in 12 districts/cities in Indonesia found that MSD is the biggest disorder compared to other diseases with a percentage of 16% [7]. Whereas in RISKESDAS data for 2018, based on diagnoses made by health workers, there were 7.9% of cases with the highest prevalence of MSD, namely Aceh Province with 13.3% of diagnosed cases, Bengkulu with 10.5%, and Bali Province with 8.5% of diagnosed cases. [8].

A study conducted by Rismayani et al in 2021 on woven woven craftsmen in Klungkung Regency showed that as many as 73.81% experienced MSD complaints with the most complaints felt at the waist by 73.81%, then back 69.05% and hips 54.76 % [9]. The



same results were carried out by Eva Sutrani Butar Butar in 2017 for ulos weaving workers in Siantar Selatan District, the result was that 53.3% of weavers experienced MSD complaints with the most complaints on the waist by 86.7%, then the back by 80.0% and hips by 73.3% [10].

Subsequent research conducted by Sandi et al (2015) on Masari Weaving factory workers stated that individual characteristics of 54% worked more than 5 years and the average age of more than 35 years in workers also affected MSD complaints [11]. In Kusumalinda's research in 2019 on sarong weavers in Wedani village, it was found that Body Mass Index (BMI) had a significant effect on MSD complaints, but had no significant relationship to the variables age, years of work and exercise habits with MSD complaints [12].

Individual characteristic factors are also factors that can influence the incidence of MSD in workers. In the 2021 Halfa research on Pandai Sikek woven craftsmen, the results showed that there was a significant relationship between individual characteristics and MSD complaints. As much as 61.4% of artisans aged over 35 years are at risk compared to craftsmen under 35 years. As many as 52.9% of craftsmen who have worked for more than 22 years are at risk compared to craftsmen who have worked for less than 22 years. As many as 60% of craftsmen have a history of diseases related to MSD and as many as 62.9% of craftsmen work for more than 8 hours [13].

One of the businesses in the informal sector that is developing and has a high risk of ergonomic hazards and MSD complaints is the traditional songket craft. This is due to the fact that songket weaving has awkward postures, such as bending when reaching, forming patterns (bending), and inserting threads (twisting) during weaving activities [13].

One of the areas that are famous for producing songket in Indonesia is in West Sumatra, namely Silungkang weaving and Pandai weaving.

RESEARCH METHODS

The type of research used is a quantitative method with a cross-sectional design. The research was conducted from December 2021 to June 2022 in Jorong Koto Tinggi, Nagari Pandai Sikek. The sample in this study was 77 people using simple random sampling technique. The independent variables in this study were age, years of service, body mass index, duration of work and work posture with the dependent variable namely MSD complaints. The data used in this study are primary data obtained with research measurement instruments using questionnaires, RULA assessment sheets and the Nordic Body Map (NBM) checklist. Secondary data was obtained from the archives of the number of Songket Pandai Sikek weaving craftsmen in 2021. Data processing used univariate analysis and bivariate analysis using the chi-square test with an α value of 5%.

RESULT AND DISCUSSION

Pandai Sikek is a Nagari located in Tanah Datar Regency, West Sumatra Province, which until now is still one of the producers of songket cloth [14]. Pandai Sikek's songket woven craft products are not only limited to various kinds of clothing such as baju kuning and headbands, but also various accessories for traditional ceremonies and marriages, such as: songket codecs, saruang Balapak, saruang batabua, songket shawls or shawls Batabua tingkuluak tanduak (women's head coverings).), and sisampiang (sample that is usually used by the prince). Songket for the Minangkabau people is a type of clothing that is of high value because its use is limited to certain events or activities, such as: weddings, batagak gala (the coronation of a prince), and welcoming important guests [15].

Based on the results of univariate analysis as shown in table 1, it was found that more than half (53.2%) of weaving craftsmen experienced moderate risk MSD complaints. The average age of Pandai Sikek songket weaving craftsmen is 37.04 years, with the youngest craftsmen being 18 years old and the oldest being 64 years old. The median length of service for weaving craftsmen has a median value of 10 years with the lowest being 2 years and the longest being 52 years. Most of the weaving craftsmen (64.9%) have less exercise habits. As many as (74%) weaving craftsmen have normal BMI. Most of the woven craftsmen (75.3%) have a duration of work that is not at risk and more than half of the respondents (76.6%) of the Pandai Sikek songket weavers work in high risk.

Table1. Weaver Frequency Distribution Based on MSD Complaints and Risk Factors

Variable	Category	Amount	%
MSDS complaint	Currently	41	53,2%
	Light	36	46,8%
Exercise habits	Currently	50	64,9%



	Often	27	35,1%
Body Mass Index	Abnormal	20	26%
	Normal	57	74%
Working Duration	Risky	19	24,7%
	Not risk	58	75,3%
Work Posture	Risky	59	76,6%
	No risk	18	23,4%

Based on the results of the bivariate analysis as shown in table 2, it is known that there is a significant relationship between exercise habits and MSD complaints in songket weaving craftsmen (p-value = 0.020). There is a significant relationship between BMI and MSD complaints in songket weaving craftsmen (p-value = 0.012). There is a significant relationship between work duration and MSD complaints in songket weaving craftsmen (p-value = 0.001). There is a significant relationship between work posture and MSD complaints in songket weaving craftsmen (p-value = 0.028).

Table 2. Relationship between exercise habits, body mass index, work duration and work posture with MSD complaints

Variable	MSD Complaint				Total	p-value
	Light		Currently			
	n	%	n	%		
Exercise habits						0,020
Light	32	64%	18	36%	50	100%
Often	9	33,3%	18	66,7%	27	100%
Body Mass Index						0,012
Abnormal	16	80%	4	20%	18	100%
Normal	25	43,9%	32	56,1%	57	100%
Working duration						0,001
Risky	17	89,5%	2	10,5%	19	100%
Not risk	24	41,4%	34	58,6%	58	100%
Work posture						0,028
Risky	36	61%	23	39%	55	100%
Not risk	5	27,8%	13	72,2%	22	100%

Based on the results of a study of 77 Pandai Sikek songket weaving craftsmen in Jorong Koto Tinggi, it was found that more than half (53.2%) of weaving craftsmen experienced moderate risk MSD complaints. Measuring MSD complaints using the NBM checklist showed that the body parts that weaver craftsmen complained about the most were the back (54.5%), waist (54.5%), buttocks (49.4%), hips (49.4%) and lower neck (35.1%). This research is in line with that conducted by Krismayani (2021) regarding occupational factors for MSD complaints in woven textile craftsmen in Klungkung Regency, where the body parts with the most complaints are the waist (73.81%), back (69.05%), hips (54.76%), and neck (52.38%) [9].

The work of the Pandai Sikek songket weaving craftsmen is done in a static sitting position. So that the Pandai Sikek songket weaving craftsmen experience more complaints on the upper limb, including the shoulders, upper neck, lower neck (nape), back, upper and lower arms, hands and wrists. On the back, the unnatural sitting position causes the moment of flexion in the lumbar spine to increase, the spinal ligaments in the posterior part experience pressure so that the anterior intervertebral discs will be pinched. This is what in turn causes pain [6].

There is a significant relationship between exercise habits and MSD complaints in Pandai Sikek songket weaving craftsmen (p-value = 0.020). The results of the analysis obtained a POR value of 3.556, which means that respondents who belong to the group of exercise habits who are less able to increase the risk of high-risk MSD complaints are 3.5 times greater than the respondents who belong to the group of frequent exercise habits. A low level of physical fitness will increase the risk of muscle complaints. These results are in line with Cicilia's research (2019) on traditional sarong weavers (Study in Wedani Village, Cerme District, Gresik



Regency), and Ramayanti and Koesyanto's (2021) research on convection workers in 12 districts which states that there is a relationship between exercise habits and MSD complaints [16,17]. However, these results are not in line with Tjahayuningtyas' research which states that there is no relationship between exercise habits and the incidence of MSD in informal sector workers [18]. According to Caddy's research results quoted from the NIOSH report which stated that someone with a low fitness level of 7.1%, moderate fitness of 3.2% and very low 0.8% is at risk of experiencing musculoskeletal complaints [7].

THERE IS A SIGNIFICANT RELATIONSHIP BETWEEN BMI AND MSD COMPLAINTS IN PANDAI SIKEK SONGKET WEAVING craftsmen (p-value = 0.012). The results of the analysis obtained a POR value of 5.120, meaning that respondents belonging to the abnormal nutritional status group could increase the risk of moderate risk MSD complaints by 5.1 times greater than respondents belonging to the normal nutritional status group. The link between BMI and MSD is that the fatter a person is, the greater the risk of experiencing MSD complaints. This is because someone who is overweight will try to support their weight by contracting the back muscles, if done continuously it can cause pressure on the spinal cord [1].

The results of this study are in line with research conducted by Cynthia (2017) on oil palm harvesters at PT. Perkebunan Nusantara IV Adolina Business Unit shows that there is a significant relationship between body mass index (BMI) and MSD complaints in oil palm harvesters, and in a study by Kholish et al (2023) in container crane operators in Surabaya [19,20]. However, these results are not in line with Pandu et al (2015) who stated that BMI had no effect on the incidence of MSD in Masari Pemalang Weaving Factory workers [21]. According to Vessy et al in Bukhori (2010) stated that obese women have twice the risk of experiencing MSD complaints compared to thin women. This statement was reinforced by Wrner et al (1994) who stated that obese patients (BMI > 29) had a 2.5 higher risk than thin patients (BMI < 20), especially in the leg muscles [8].

There is a significant relationship between work duration and MSD complaints in Pandai Sikek songket weaving craftsmen (p-value = 0.001). The results of the analysis obtained a POR value of 12.042, meaning that respondents belonging to the risky work duration group were able to increase moderate risk MSD complaints 12 times greater than respondents belonging to the non-risk working duration group.

These results are in line with Sutrani's research (2017) which states that there is a significant relationship between work duration and MSD complaints in ulos weaving workers [22]. These results are also in line with Daryatno's research (2019) which shows that there is a significant relationship between work duration and MSD complaints in weavers in Masalili Village, Kontunaga District, Muna Regency [23].

It is known that to complete one piece of woven cloth, craftsmen usually can finish it in one month. The more difficult the motif requested, the longer the manufacturing process will take, and vice versa. Weaving craftsmen think that the discomfort is a consequence of their work and will disappear only with a night's rest. However, according to researchers, this is a wrong assumption. This is because if it is not stopped, the complaints will get worse and can affect the work productivity of the craftsmen. This is consistent with the theory that the level of MSD disorder complaints, from the mildest to the most severe, will interfere with concentration at work, cause fatigue, and ultimately reduce work productivity.

There is a significant relationship between work posture and MSD complaints in Pandai Sikek songket weaving craftsmen (p-value = 0.028). The results of the analysis obtained a POR value of 4.070, which means that respondents who belong to the high-risk work posture group can increase MSD complaints with moderate risk as much as 4 times greater than respondents who belong to the low-risk work posture group. In line with research conducted by Daryatno (2019) on weavers in Masalili Village, work posture has a significant relationship with MSD complaints with a p-value = 0.025 [24]. The same was stated by Rivanni (2020), in the results of his research on porters at the Aur market which stated that work posture had a significant relationship with MSD complaints [25]. However, these results are not in line with research by Netasha et al (2022) on laundry workers in Jambi which stated that there was no relationship between work posture and MSD complaints [26].

This happened because the looms were not ergonomic and did not match the body anthropometry of the weavers, which resulted in some craftsmen having to maintain their body position by tiptoeing on the floor. The seat on the loom is also not equipped with a backrest so that the craftsman's back is not properly supported. This causes the spinal ligaments in the posterior part to experience pressure so that the anterior intervertebral discs will be pinched which in turn can cause pain [6].



CONCLUSION

More than half (53.2%) of Pandai Sikek songket weaving craftsmen experience MSD complaints. The parts of the body that Pandai Sikek songket weavers complain about the most are the back (54.5%), waist (54.5%), buttocks (49.4%), hips (49.4%) and lower neck (35.1%). The average age of the Pandai Sikek songket weavers is 37.04 years, with the lowest age being 18 years and the highest being 64 years. The working period of the Pandai Sikek songket weaving craftsmen has a median value of 10 years with the lowest working period being 2 years and the longest being 52 years. Most of the Pandai Sikek weaving craftsmen (64.9%) have poor exercise habits. Most of the Pandai Sikek songket weavers (74%) have a normal body mass index. Most of the Pandai Sikek songket weaving craftsmen (75.3%) have a working duration that is not at risk. More than half of the respondents (76.6%) of the woven craftsmen of Pandan Sikek work in high-risk work postures which are not ergonomic. There is a relationship between age, length of work, sports habits, BMI, duration of work, and work posture with complaints of musculoskeletal disorders (MSD) in Songket Pandai Sikek weavers.

It is expected that weaving craftsmen will always pay attention to natural working postures when working. Then weaving craftsmen are expected to stretch before and after work. Craftsmen equip looms with standard footrests so that both feet can tread properly to reduce risks and complaints to the feet. Then it is hoped that the nagari and the local health office will reactivate the UKK Post in Nagari Pandai Sikek and conduct outreach to craftsmen regarding the application of K3, especially regarding ergonomics during the weaving process.

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