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Determination of Musculoskeletal Disorders (MSDs) complaints level with Nordic Body Map (NBM)

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Abstract. UD. Ikhsan which is located in Bungkah, is one of producer of bordir Aceh souvenirs with product result that is bag and wallet with various sizes. During this process the production of souvenir Aceh is done by using sewing machine which is operated manually. Generally use a new type of sewing machine and a rather large size with the help of engine dynamo to facilitate them in sewing and accelerate the completion of stitches. In general, tailors who work with static movements for an excessive period of time in their work activities will be at risk for injuries such as muscle disorders or Musculoskeletal Disorders (MSDs) associated with ergonomic problems. This study will discuss the level of complaints of Musculoskeletal Disorders (MSDs) with Nordic Body Map (NBM), where the method used is NBM questionnaire, with characteristics data of 15 workers from factors related to MSDs complaints on tailors. The results showed that body parts subjected to subjective complaints of Musculoskeletal Disorders (MSDs) were 93% waist, 87% ass, 87% lower neck, 80% left shoulder, 80% back, and 80% wrist.

1. Introduction

Aceh is one of the areas that have souvenirs in the interest of the visitors. One of the main symbols is the embroidery of Aceh. This embroidery is made on various souvenirs like bag, clothes, hat and forth. UD. Ikhsan is one of the producers of bordir Aceh souvenirs. The production of souvenir bordir Aceh has been marketed throughout Aceh and several cities in Indonesia with the sales of each month reached 150-500 units. In the souvenir production process all the work requires human labor, in addition to running the machine workers also served as operators ranging from the initial process until the final process is completed, it is related to Ergonomics. Ergonomics is a science that regulates posture, work, proper planning and prevention of occupational diseases such as low back pain and disorders of Musculoskeletal Disorders (MSDs) because basically the work will affect health in various ways.

Musculoskeletal Disorders (MSDs) are abnormalities caused by accumulation of injury or damage to the musculoskeletal system due to repetitive trauma, thus forming considerable damage to cause pain [1-2]. MSDs are a set of symptoms related to muscle tissue, tendons, ligaments, cartilages, nervous system, bone structure, and blood vessels. MSDs initially cause pain, numbness, tingling, swelling, stiffness, shaking, sleep disturbance, and burning [3-4]. Musculoskeletal complaints are a complaint on the part of the skeletal muscle felt by a person ranging from mild complaints to painful complaints [5-6].

Symptoms of MSDs are often accompanied by complaints that are subjective, making it difficult to determine the severity of the disease. MSDs are characterized by symptoms such as pain, pain, discomfort, numbness, weakness or loss of power and hand coordination, burning sensation, mild



movements, stiffness and cracks in joints, redness, swelling, heat, and pain keeping awake in the middle of the night and feeling to massage hands, wrists, and arms [7-8].

The symptoms of MSDs commonly felt by a person are [9-10]:

1. The neck and back feels legs
2. Shoulder pain, stiffness or loss of flexibility
3. The hands and feet are painful like being pricked.
4. Elbow or ankle is sore, swollen and stiff.
5. Hand and wrist feel pain or pain accompanied by swelling.
6. The taste, cold, burning or not strong.
7. The fingers lose their mobility, stiffness and loss of strength and loss of sensitivity.
8. Feet and heels feel a tingling, cold, stiff or sensation of heat.

UD. Ikhsan is one of the producers of bordir Aceh souvenirs with products that are produced in the form of bags and wallets of various sizes. During this process the production of souvenir Aceh is done by using sewing machine which is operated manually. In general, tailors who work with static movements for excessive time periods. In his work activities will be at risk for injuries such as muscle disorders or Musculoskeletal Disorders (MSDs) associated with ergonomic problems.

The results of preliminary observation note that in the process of Aceh souvenir design conducted by workers ranging from operating machines using legs to embroidery and sewing. In performing its work the worker undergoes a posture in a non-ergonomic position with repetitive and static movements. Complaints are usually painful on the back, waist, arm and butt due to static muscle loading [11-12]. Based on this, research on "Determination of Musculoskeletal Disorders (MSDs) complaints level with Nordic Body Map (NBM)".

2. Methods

The work that became the object of the writer's observation was that of 15 tailors of bordir Aceh souvenirs. With working facilities can be seen in Figure 1.

The study was conducted on 15 workers with questionnaires distributed to obtain data of individual characteristics and description of factors related to MSDs complaints, questionnaire used is Nordic Body Map (NBM) questionnaire. Stages of research methods are the distribution of questionnaires to determine the factors associated with tailor MSDs complaints to measure the comfort level of respondents when sewing manually.

MSDs complaints consist of: Complaints of pain, tingling, cramps, heat, swelling, numbness, and other consequences. Furthermore, complaints on NBM are grouped into two categories:

- a. There are complaints, if any part of the body complained about ≥ 1 during the last 12 months and 7 days before the research done.
- b. No complaints, if no part of the body complained or any part of the body complained but not during the last 12 months and 7 days before the study.



Figure 1. Chairs are commonly used by tailors
(Source: Result of Observation at UD Ikhsan, Bungkah)

3. Result and discussion

Complaints of musculoskeletal disorders in all workers can be seen in Table 1.

From the observation results obtained that the most complaints on workers on the upper neck, waist, and right wrist. This is caused by posture when doing the job. That is on the job of making patterns and cut patterns and not fit between the height of the table with the worker's posture. So as to obtain an unsuitable state between the physical form and the worker's posture.

Based on the results of the spread of questionnaires and recapitulation Nordic Body Map (NBM) to all respondents are 15 workers. Complaints are symptoms of pain experienced by workers after or while performing their work on the body. The pain can be only one part of the body or a combination of aches, pains, tingling, heat, seizures, cramps, swelling, stiffness and numbness.

From the results of the assessment, respondents who stated musculoskeletal disorders complaints in certain sections are classified into 4 categories with the following classification:

- a. 0 - 24% of respondents claimed to have a complaint on the part illustrated in white.
- b. 25 - 49% of respondents claimed to have a complaint on the portion described in yellow.
- c. 50 - 74% of respondents claimed to have a complaint on the portion described with orange.
- d. 75 - 100% of respondents claimed to have a complaint on the part illustrated in red.

Table 1. Complaints of musculoskeletal disorders in all workers

No	Part Of Body	Musculoskeletal disorder complaints			
		Sick		Painless	
		amount	%	amount	%
0	Upper neck	11	73%	4	27%
1	Lower neck	13	87%	2	13%
2	Shoulder left	12	80%	3	20%
3	Shoulders right	11	73%	4	27%
4	Left upper arm	6	40%	9	60%
5	Back	12	80%	3	20%
6	Upper right arm	6	40%	9	60%
7	Waist	14	93%	1	7%
8	Buttocks	10	67%	5	33%
9	Butt	13	87%	2	13%
10	Left elbow	5	33%	10	67%
11	Right elbow	5	33%	10	67%
12	Left arm down	1	7%	14	93%
13	Right arm down	3	20%	12	80%
14	Left wrist	4	27%	11	73%
15	Right wrist	12	80%	3	20%
16	Left hand	6	40%	9	60%
17	Right hand	5	33%	10	67%
18	Left thigh	6	40%	9	60%
19	Right thigh	7	47%	8	53%
20	Left knee	2	13%	13	87%
21	Right knee	1	7%	14	93%
22	Left calf	7	47%	8	53%
23	Right calf	10	67%	5	33%
24	Left ankle	3	20%	13	87%
25	Right ankle	5	33%	11	73%
26	Left Foot	3	20%	12	80%
27	Right Foot	7	47%	8	53%

(Source: Result of Observation at UD Ikhsan, Bungkah)

A cross section of the Nordic body map that illustrates parts of the body that are complained of illness and body parts that have few complaints of pain can be seen in Figure 2.

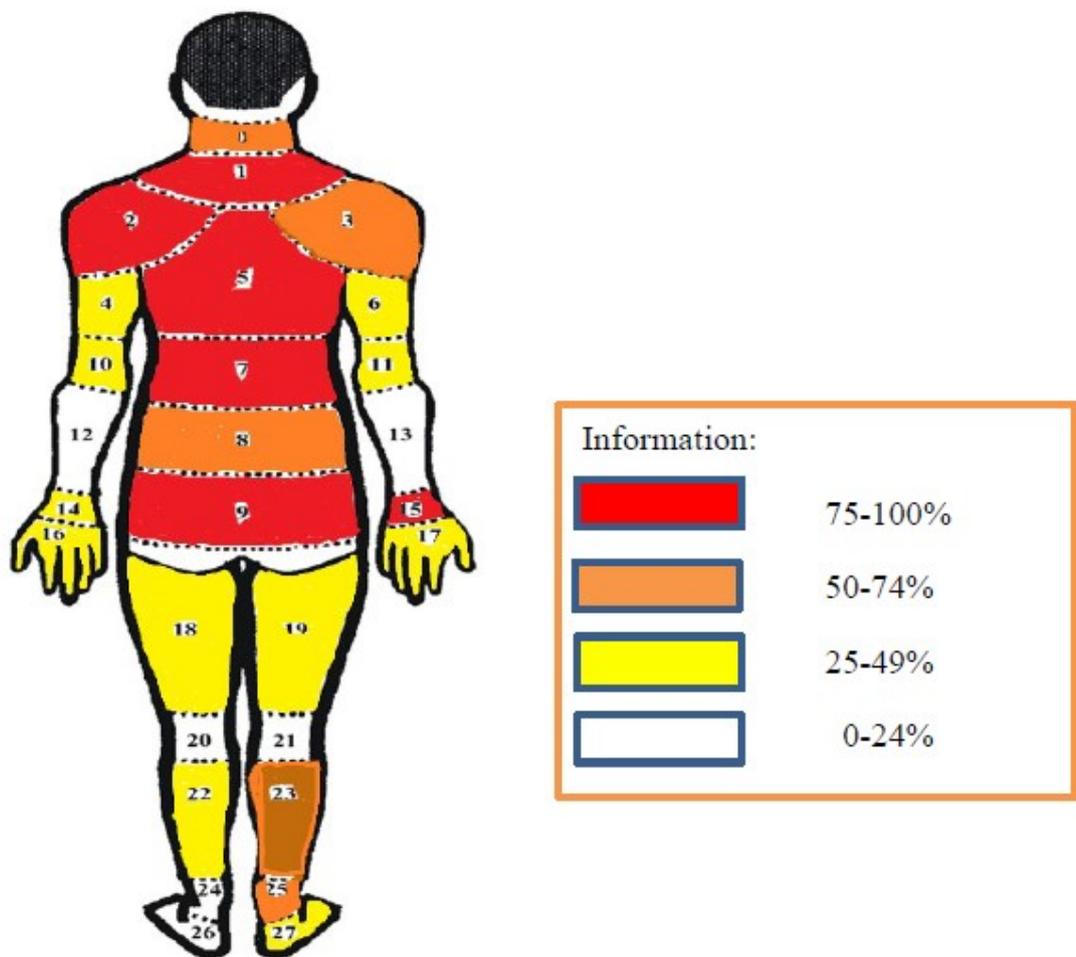


Figure 2 Pictures of pain complaints on the tailor's body

From Figure 2 it is known that the red body part of the body is the body that has the most complaints with the amount of 75%. On the NBM cross section, it is known that the body parts that most experienced pain complaints are in the lower part of the neck, left shoulder, back, waist, and right wrist. The position of the body that sits on a plastic chair without a backrest causes most of the tailor is always bent over to the sewing machine lead. The right wrist performs the activity of rotating the material, cutting the excess.

The right foot always performs repetitive movements such as stepping on the dynamo of the sewing machine, which emits vibrations from the engine dynamo towards the worker's legs from the right ankles, calves, knees, thighs to the body, so that the right calf and right ankle have complaints tailor experienced as many as 67% and 33%.

The orange colored part of the body indicates that on average 50-74% of workers have complaints on the upper part of the leash, buttocks and right shoulder. The yellow part of the body indicates that the worker has a 25-49% complaint on the upper left arm, upper arm, kana, left elbow, kana elbow, kana wrist, left hand, right hand, left thigh, right thigh, left calf and right foot.

Complaints can be caused by the work posture and layout of the table used are still not in accordance with the physical condition and worker's posture and poor lighting conditions coupled with striped or dark material motifs, so the body and eyes to be able to see the stitches in the pattern will be sewn will be difficult.

white color on the body shows that about 0-24% of the body is very rarely complained is on the left forearm, right forearm, left and right knee and left left wrist. This indicates that the body part has a fairly comfortable pedestal This can be due to the work posture and layout of the table used is still not in accordance with the physical condition and posture of the worker so that it can minimize the risk of complaints and pain of skeletal muscle or also known as musculoskeletal disorders (MSDs).

4. Conclusion

The results of the Nordic Body Map calculations of 15 tailors were subjected to subjective complaints of Musculoskeletal Disorders (MSDs) showing mixed results. Nordic Body Map recapitulation results (NBM) show that the body parts that experience the most complaints are 75%. The body parts that experience these complaints are in the lower neck, left shoulder, back, waist, and right wrist. The body parts that complain about the subjective complaints rate of Musculoskeletal Disorders (MSDs) are 93%, 87%, 87%, 87%, left shoulder 80%, 80% back, 80% wrist.

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