The Relationship between Working Postures and The Complaints of Musculoskeletal Diseases of The Fishermen in Tanjung Village, Sumenep District

Hubungan antara Posisi Kerja dengan Keluhan Musculoskeletal Diseases pada Nelayan di Desa Tanjung, Kabupaten Sumenep

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ABSTRACT

Introduction: The working activities of the fishermen in Tanjung Village are still considered as traditional works providing the works are done manually with non-ergonomic working postures, such as bending, standing, squatting, and legs bending. Accordingly, these postures trigger the complaints of musculoskeletal diseases (MSDs). Musculoskeletal diseases are diseases in the skeletal muscles, for example, pains, aches, pins and needles, and heat. Working as a fisherman means that one dedicates half of her/his time to catch fish mostly by using traditional boats and equipment. Thus, a lot of fishermen are discovered complaining about pains after completing their work. This research aims to distinguish the relationship among variables.

Methods: This research is observational research that applies the cross-sectional design. The research samples as many as 56 fishermen are chosen by implementing the cluster random sampling technique. The data are obtained by completing measurements, interview, and observation by applying the Rapid Entire Body Assessment (REBA) method and by distributing the Nordic Body Map (NBM) questionnaires.

Results: As many as 73.2% of the fishermen have a high risk of musculoskeletal diseases and 46.4% have been working in high-risk working postures.

Conclusion: The working postures have a weak relationship (r=0.407) with the complaints of musculoskeletal diseases.

Keywords: fishermen, complaints of musculoskeletal diseases, Nordic Body Map, Rapid Entire Body Assessment

ABSTRAK


Metode: Penelitian ini merupakan penelitian observasional dengan desain penelitian cross-sectional. Sampel penelitian sebanyak 56 nelayan dengan menggunakan teknik cluster random sampling. Data didapatkan dengan cara pengukuran, wawancara, dan observasi menggunakan metode Rapid Entire Body Assessment (REBA) dan pengisian kuesioner dengan metode Nordic Body Map (NBM) oleh nelayan. Analisis hubungan menggunakan uji Spearman’s rho.

Hasil: Sebanyak 73,2% nelayan memiliki tingkat risiko keluhan muskuloskeletal tinggi, dan 46,4% nelayan memiliki posisi kerja dengan tingkat risiko sangat tinggi.

Simpulan: Posisi kerja nelayan memiliki hubungan dengan keluhan muskuloskeletal dengan tingkat hubungan yang lemah (r=0.407) antara posisi kerja dengan keluhan muskuloskeletal.

Kata kunci: keluhan musculoskeletal, nelayan, Nordic Body Map, Rapid Entire Body Assessment
INTRODUCTION

The development of Indonesia influences the development of various sectors, whether it is industrial sectors or fishery sectors. Therefore, along with the improvement of those sectors, the enactment of occupational safety and health is to be implemented both in formal and informal sectors. However, the employment of occupational safety and health in informal sectors is often less noticed by the government.

The implementation of occupational safety and health is intended to protect the workers in a workplace to avoid the risk of getting occupational diseases as well as the risk of being exposed to the potential hazard in a workplace. In addition, by enacting occupational safety and health, the workers can work safely and comfortably to achieve a high productivity level. According to Ministry of Manpower and Transmigration (2003), it was disclosed that an employee is every person who is able to work or to produce goods and services to fulfill the needs of her/himself or of the society.

In completing the works as well as in increasing productivity, workers need to be able to operate working equipment and technology. Nonetheless, in order to achieve the highest productivity, workers are required to be familiar with how to adjust themselves to the working equipment, working processes, and working environment, depending on the working site (Sholihah, 2013).

Ergonomics is a multidisciplinary science that learns about the principles in designing working equipment, a machine, a working process, and a working environment in accordance with the work performed (Tarwaka, 2014). There are several objectives of this science, such as to minimize the risk of injury, to increase the working productivity, and to prevent the occurrence of occupational diseases, for example, low back pain, back pain, and musculoskeletal diseases (MSDs).

Musculoskeletal diseases (MSDs) is an ergonomic problem that often happens to workers, especially to the muscular strength and endurance while performing the work. Furthermore, MSDs may arise due to repeated working postures and movements. In consequences, a heavy workload that is completed in a non-ergonomic posture requires the workers to exert excessive energy that can result in the complaints of MSDs and early fatigue (Kurnianto, 2017).

The complaints of MSDs are reportedly suffered by every worker, whether s/he comes from the fishery section or not. However, for fishermen, they are indeed familiar with non-ergonomic working postures, such as bending, twisting, squatting, and carrying heavy goods, which can result to the pain in several parts of the body. In addition, this will affect their productivity and performance, which in the end, may trigger the risk of abnormalities in bone shape. These non-ergonomic working postures, particularly of the fishermen as the samples of this research, can be analyzed by applying the Rapid Entire Body Assessment (REBA) method.

Based on the survey conducted by the Occupational Safety and Health Administration in Europe, in 2010 alone, there were 49 reported cases of MSDs in the fishery sector only. The MSDs were mostly felt in the shoulder, arms, and neck, which is in accordance with the fact that the MSDs in the upper body is more recurring than the MSDs in the lower body is Occupational Safety and Health Administration (2016). According to the International Labour Organization (2013) during The Prevention of Occupational Diseases program, it was ascertained that the MSDs complaints are included in the Carmal Tunnel Syndrome (CTS), which was reported as the majority (59%) of the occupational diseases in Europe in 2005.

World Health Organization (WHO) in 2005 also reported that more than 10% of the registered cases on the occupational diseases were about the complaints of MSDs. In Korea, the case of MSDs experienced a significant increase from 1,634...
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cases in 2001 to 5,502 cases in 2010. Furthermore, in Great Britain, in 2011-2012, 40% of occupational diseases were related to MSDs. Moreover, in Argentina, there were allegedly 22,013 cases of MSDs. Additionally, in Japan, 7,779 cases in 2011 regarding lower back pain were recorded.

Referring to Health Research and Development Agency (2013), the highest prevalence of MSDs, 31.2%, was in the occupations of fishermen, farmers, and laborers. Meanwhile, according Ministry of Health of the Republic of Indonesia (2009) indicated that approximately, 40.5% of occupational disorders were related to the occupation. Additionally, denoting the research conducted by Jalajuwita and Paskarini (2015) to 9,482 workers in 12 districts in Indonesia, it was discovered that several occupational diseases were suffered by the workers, such as MSDs (16%), cardiovascular diseases (8%), nerve diseases (6%), breathing problems (3%), and ear, nose, and throat (ENT) disorders (1.5%).

Research regarding occupational diseases, particularly on MSDs as a disease suffered by most workers, have been carried out plenty of times. MSDs are mainly caused by non-ergonomic working postures. Working postures refer to body postures while completing a work; thus, non-ergonomic working postures will affect the productivity of the workers.

According to Ministry of Law and Human Rights of the Republic of Indonesia (2016), fishermen are every person whose livelihood is fishing. The stages carried out by fishermen when fishing consist of the preparation stage (preparing fishing equipment), the fishing stage (lowering the net), the stage of drawing the net, and the stage of collecting the catch. Those working processes require energy exertion that results in the muscle stretches that exceed the maximum limit of muscle work. If this continuously happens, it is likely that the skeletal muscle will suffer from injuries (Tarwaka, 2011)

The research authored by Krisdianto, Sujoso and Hartanti (2015) on the MSDs complaints of the fishermen showed that 83.7% of the respondents, that is as many as 92 people, undergo mild MSDs, while 16.3% of the respondents experienced moderate MSDs. Other than that, another research conducted by Budiman (2015) revealed that good working postures (47.1%) resulted in mild MSDs (43.8%). Moreover, it was discovered that low back pain was the highest case of MSDs suffered by the fishermen whose working postures are considered awkward.

The data of the Central Bureau of Statistics in 2011 exposed that around 8,090 coastal villages that spread in 300 districts in Indonesia with the number of populations as many as 7.87 million were workers in informal sectors and 30% of it were fishermen. Nonetheless, the potential manpower in Indonesia had not yet been fully employed due to low human resources of fishermen and inadequate infrastructure (Directorate General of Public Health and Occupational Health Development, 2014).

Based on the background elucidated beforehand, this research aims to discover the relationship between working postures and the complaints of MSDs of the fishermen in Tanjung Village.

METHODS

This research implemented observational method along with the cross-sectional design, providing both the independent and dependent variables were scrutinized in a certain period of time. The total population of this research was 124 fishermen from four villages. However, the sample only consisted of 56 fishermen who were chosen by using the cluster random sampling technique.

The data was collected from November 2017 until May 2018 with the variables of working postures and MSDs complaints to be analyzed. The primary data collection was completed by carrying out an observation, interview, and asking the fishermen to fill out the Nordic Body Map (NBM) questionnaire which aim is to ascertain the pain they felt. The observation was acted out from 06:00 WIB until evening. Meanwhile, the
secondary data was gathered from the village profile and an interview with the fishermen.

After all the data had been gathered, it was then analyzed through editing, coding, processing, and cleaning processes. The data obtained from the NBM questionnaire, interview, and the measurements of the fishermen’s weight and height were scrutinized in the form of the narration, table, and cross-tabulation to present, while the relationship of the variables was tested by implementing the Spearman’s rho correlation test.

RESULTS

The Distribution of Working Postures of the Fishermen

To distinguish the working postures of the fishermen, an assessment by using the REBA method was carried out. The assessment method was completed by observing each of the fishermen’s working postures when working. The results gotten from the REBA methods consisted of three groups; group A, group B, and Group C. After that, the determination of the final score was completed by adding the scores of group C to the muscle activities performed by the fishermen. The final score is presented in Table 1 as follows.

Table 1. The Distribution of Risk Level of Working Postures of the Fishermen in Tanjung Village in 2018 According to the REBA Method

<table>
<thead>
<tr>
<th>Risk Level of Working Posture</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>12</td>
<td>21.4%</td>
</tr>
<tr>
<td>High</td>
<td>18</td>
<td>32.1%</td>
</tr>
<tr>
<td>Very high</td>
<td>26</td>
<td>46.4%</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1 indicated that from the total of 56 fishermen, 26 of them (46.4%), according to the REBA method, have a very high risk of working postures. In addition, one of the working postures based on the scoring of the REBA method, for instance, the working posture which final score is 11, can be seen in Figure 1 that portrays the working posture with the highest risk level; that is when a fisherman bends to collect the catch.

By implementing the REBA method, the analysis of the working posture in Figure 1 was divided into 2 categories, namely scoring group A and scoring group B. The scoring group A consisted of the bending of the body with the flexion of 0°-60° which score is 3 with an additional change score of 1. The bending and twisting neck with the flexion of >20° obtained a score of 2 with an additional change score of 1. The leg posture attained a score of 2 with an additional change score of 2. In results, the measurement of the body, neck, and leg postures obtained a final score of 9 and was converted into Table A.

Figure 1. A Fisherman Collecting His Catch

On the other hand, the scoring group B comprised that the arm posture with the flexion of >90° attained a score of 4 with an additional score change of -1. In addition, lower arm postures with the flexion of 60°-100° obtained a score of 1, while wrist postures with the flexion of >15° acquired a score of 2. In results, it was obtained that the final score of the measurements of the upper arm, lower arm, and wrist postures was 4 before converted to Table B.

The result of Table A was then added with the weight lifted with a score of 1. Thus, the total score of A was 10. Furthermore, the result of Table B was added to the type of equipment held with a
score of 1. In the end, it was obtained that 5 was the total score of B.

Additionally, scores A and B were converted into Table C as the last stage and obtained a score of 11. In order to determine the final score of the REBA method, the score of Table C was added with the types of muscle activities performed by the fishermen, which had a score of 1 (unstable postures while working). Hence, the final score of the REBA method was 12, which belong to a high level of risk and in need of immediate actions.

The Distribution of the Complaints of MSDs of the Fishermen

The complaints of MSDs discovered in this research comprised the complaints of discomfort, pain, heat, aches, and pins and needles in the skeletal muscles. Referring to the NBM scoring instrument, the discomfort felt by the fishermen can be classified into four groups, namely mild, moderate, severe, and very severe.

Table 2. The Distribution of the Complaints of MSDs of the Fishermen in Tanjung Village in 2018

<table>
<thead>
<tr>
<th>Complaints of MSDs Level</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>15</td>
<td>26.8%</td>
</tr>
<tr>
<td>High</td>
<td>41</td>
<td>73.2%</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2 displayed that the majority of the fishermen, that is as many as 41 people (73.2%), suffer from the high-risk level of MSDs. In other words, it can be stated that this showed that most of the fishermen had been working non-ergonomically.

The Relationship between Working Postures and the Complaints of MSDs of the Fishermen

The results of the analysis by implementing the Spearman’s rho correlation test between variables can be disclosed in Table 3 below.

Table 3. The Relationship between Working Postures and the Complaints of MSDs of the Fishermen in Tanjung Village in 2018

<table>
<thead>
<tr>
<th>Risk Level of Working Posture</th>
<th>Complaints of MSDs Level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Moderate</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>High</td>
<td>7</td>
<td>38.9</td>
</tr>
<tr>
<td>Very high</td>
<td>2</td>
<td>7.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P-Value</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.002</td>
<td>0.407</td>
</tr>
</tbody>
</table>

Table 3 affirmed that as many as 24 fishermen (92.3%) who had been working with very high-risk level working postures suffered from high-level of MSDs. Furthermore, the result of the relationship strength between variables showed the number of 0.407, which indicated that working postures have a positive moderate relationship with the complaints of MSDs. Moreover, the result of the Spearman’s rho correlation test displayed the number of 0.002 with α = 0.05 as the degree of significance. In other words, this pointed out that there is a relationship between working postures and the complaints of MSDs suffered by the fishermen.

DISCUSSION

The Working Postures of the Fishermen

From the result of the analysis displayed in Table 1, it can be perceived that almost all of the fishermen are working with the very high-risk level postures. Whereas, working postures are the main factors that influence the occurrence of MSDs. Other than that, referring to the results of the working position observation in Table 1, it was obtained that more than half of the fishermen carried out their work in very high-risk level postures which the REBA score was ≥11. This score was attained by discerning the postures the fishermen made while they are working.
The postures that are usually made by the fishermen comprise the postures of bending, standing with a pedestal on both legs, bowing, squatting, twisting the wrists, and legs bending. However, it was noticed that most of the sample’s working positions were bending, bowing, squatting, and legs bending.

After the observation had been completed, the assessment by using the REBA method was carried out to determine whether the risk level of the MSDs complaints needs immediate actions. The REBA assessment method is one method that is usually used in analyzing working postures due to the fact that this method is believed sensitive to every sudden change of working postures (Tarwaka, 2014). In addition, additional scores need to be added to acquire total scores that are put into Table A and Table B if there is a change of working postures. The total result of table A is added with the workload while working to attain score A. Meanwhile, the total result of table B is added to the type of equipment to obtain score B. Both score A and score B are put into table C to be added with the type of muscle activities when the fishermen work. Thus, the final sum in table C is claimed as the final score. The final score is used to determine the risk level of the MSDs as well as the prevention required.

The result of the analysis of the working posture when the fishermen draw the catch indicated that commonly, they complete their work in a very high-risk level of working postures which score is \( \geq 11 \). The postures usually made by the fishermen when collecting the catch are bending, standing with the pedestal on the arm muscles, and legs bending. Therefore, in order to complete the work safely and comfortably, to make as comfortable and ergonomic postures as possible is indeed compulsory (Merulalia, 2010).

The Complaints of MSDs

The result of the scrutinization on the complaints of MSDs displayed in Table 2 showed that almost all of the fishermen have a high-risk level of MSDs. The MSDs complaints are complaints felt by the fishermen in the form of discomfort, pain, heat, aches, and pins and needles in the skeletal muscles, such as tendons, joints, and ligaments. Thus, a heavy workload tends to have a higher risk of the MSDs than a mild workload has (Tarwaka, 2014). Additionally, the results of this research are in line with the results of the research conducted by Putri (2017), which affirmed that most of the respondents suffered from the high-risk level of MSDs.

The analysis of the MSDs complaints was completed by referring to the NBM questionnaire to determine the pain level felt by the fishermen in the skeletal muscles, namely tendons, joints, and ligaments. The questionnaire consisted of 27 parts of the skeletal muscles that were divided into the right part and the left part of the body. The distribution of the NBM questionnaire was finished by fulfilling the scores and emphasizing body parts. The assessment of the NBM questionnaire contained 4 score categorizations, namely category 1 (no pain), category 2 (mild pain), category 3 (moderate pain), and category 4 (severe pain). The scores obtained from the right and left parts of the body were added to acquire the final score to determine the risk level suffered by the fishermen.

The body parts that suffer from the MSDs are varied. However, it was noticed that the most dominant body parts complained suffering from the MSDs were the back, upper neck, lower back, and arms. These results are plausible due to the fact that most of the times, the postures made by the fishermen comprise standing with the pedestal on both legs, bending, and bowing. Moreover, these results are in accordance with what Sastrowinoto (1985) proposed; that the works with static working postures are more familiar with the MSDs complaints around the lower back, neck, and back.

The Analysis of the Relationship between the Working Postures and the Complaints of MSDs

The analysis on the working postures and the complaints of MSDs displayed in Table 3 asserted that based on the REBA method of assessment, most of the fishermen showed the very
high-risk level of working postures along with the very high level of the MSDs complaints. Apparently, this because their working space is limited to certain postures aside from the fact that the works are performed by making awkward postures, such as bending, bowing, legs bending, squatting, and arms folding.

The results of the Spearman’s rho correlation test denoted that there is a relationship between working postures and the complaints of MSDs. The correlation score showed the number that indicates a positive moderate relationship between variables. The positive relationship means that there is a unidirectional relationship between the independent and dependent variables. In other words, it can be stated that the higher the complaints felt by the fishermen is, the higher the level of the MSDs is.

Awkward postures are postures when body parts are detached from the body gravitation, for example, arms and hands raising, bowing, head lifting, and many more. In addition, the more detached the body position from the body gravitation is, the higher the complaints of disorders are (Grandjean, 1993).

This research is in line with the theory proposed by Tarwaka (2014), which affirmed that awkward working postures are the postures that oppose natural postures. Other than that, this research is in accordance with the research conducted by Sang, Djakakusli and Russeng (2013), which stated that there is a relationship between working postures and the complaints of MSDs of the palm oil harvesters as well as with the one carried out by Jalajuwita and Paskarini (2015) that concluded if there is a relationship between working postures and the complaints of MSDs of the workers in the welding unit at PT. Duta Hita Jaya Bekasi. In addition, the result of this research is similar to the result of the research authored by Bedu, Russeng and Rahim (2013) which discovered that there is a significant relationship between working postures and the complaints of MSDs of the cleaning services in Regional Hospital of Dr. Wahidin Sudirohusodo Makassar.

CONCLUSION

From the analysis that has been carried out, it can be concluded that there is a moderate relationship between working postures and the complaints of MSDs with the moderate correlation of r=0.407.

ACKNOWLEDGMENT

The authors would like to express their gratitude to the Almighty God, the supervisor who has guided and given advice for this research, and the fishermen who have been willing to be respondents in this research so that this research can be properly completed.

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