ERGONOMIC OBSERVATION: WORKING ENVIRONMENT ON HEALTH PROBLEM (MSDs) AMONG OLDER FISHERIES COMMUNITY AT MUAR, JOHOR, MALAYSIA

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Abstract

Older fisheries communities are classified as vulnerable groups with many diseases. This paper aimed to determine the impact of working tasks on safety and health among the older fisheries community at Muar, Johor through ergonomic observation. A cross-sectional study was conducted, and simple random sampling was used for data collection online. The sample size was 200 respondents from nine places involved in the fishery sector at Muar, Johor. Data were collected through a self-administered questionnaire. Data were analyzed using an SPSS software version 2.0 based on inclusive criteria. The findings show the older fisheries workers were highly potential to expose to Musculoskeletal Disorder (MSDs) when performing the working task. Therefore, older communities in the fisheries industry are encouraged to practice working tasks using an ergonomic approach to perform healthy work. From a Malaysian perspective, the implication of low awareness of ergonomics education could reflect the quality of lifestyle and health among older fisheries workers in Muar, Johor. Further research should involve all fisheries stakeholders from Malaysia's region to understand the safety of a healthy working environment for a better quality of life.

Keywords: Ergonomic; Safety; Health; Older fishermen; Fisheries; Malaysia

Introduction

Global fisheries production peaked at around 171 aquacultures, which accounted for around a million tons representing 47 per cent and 53 per cent of the total percentage used in non-food crops of fisheries and aquaculture production within five years. The USD 232 billion emerged from aquaculture production (FAO, 2018). In Malaysia, aquaculture and fisheries were more expanded since 2014 when Malaysia ranked top 15 of world manufacturers with an annual production of 521,000 tones. Aquaculture has provided up to 8 per cent of the total national gross domestic agricultural product

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(GDP), which has created an estimated more than one million jobs for Malaysians (Sharihan et al., 2018). Aquaculture is now an essential source of protein for the country of 30 million inhabitants. Fish is often on Malaysians' daily menu, and an average family spends about 20 per cent of their food spending on seafood (Department of Fisheries, 2017).

The fishing industry has formerly viewed as a hazardous and physically exhausting job. Previously in, 2008, a continuing excessive risk of certain health effects, which musculoskeletal disorders (MSD's) and injuries, were observed (Helle et al., 2016). Ergonomic noise hazards included risks like being bitten by coral, serious pressure, freezing temperatures, aquatic life bites, stinging fish, poisonous coral, and other possible dangers exposed (Dharmawirawan *et al*., 2012; Sholihah *et al*., 2016). All jobs done in their lives by humans have to be performed by their ability. That continuity is connected to preserving the balance between workstations and the condition of the human body in order to comply with the principles of ergonomics (Sholihah *et al*., 2016). According to Kim (2014), described in some circumstances and ways, older fishermen used body and body components to hold, lift, pass, sit, stand, walk, and work as a fisher. Furthermore, such activities involving working tasks may often bring too much demand on bodies and parts of the body, causing pain, discomfort, and even injury. That situation may contribute to a severe injury called an MSD's (Allina *et al*., 2017).

Musculoskeletal disorders are the most prevalent body segment and costly health problems associated with work among older fisheries (Kim & Cho, 2017). Previous research has shown that MSD's affects significant individuals worldwide, especially older people. Professions and jobs as a fisher can eventually lead to prolonged and extreme disabilities; older fisheries individuals and society may lead to high costs. There is also a link between MSD's that can affect a level of health (Yi *et al*., 2019). The most common cause of severe long-term pain and disability is MSD's leading to significant healthcare and social support costs. With aging as older fishermen, obesity, and lack of physical activity, the prevalence of many MSD's and their associated disability increases (Executive Agency for Health and Consumers). Consistent with research by McDonald and Salisbury (2019), over 80 per cent of 530 participants scanned in pain or had work-related musculoskeletal disorders (WRMSD). Their study stated that a majority (85.6%) reported a high level of physical activity from moderate work and domestic-related activities such as sitting, 69.1 per cent walked or hiked at least one to three times a week, stretching and strength exercises. These cumulative effects of everyday activities may increase WRMSD risk. Several other lifestyle activity patterns, including MSD's that are connected to lifestyle-related non-communicable diseases, are associated with chronic pain and exercise impairment (Dean & Soderlund, 2015).

Nevertheless, very few studies have comprehensively analyzed the ergonomic issues in the working environment among older fisheries community and discussed the health problem that decreases their movement ability. Therefore, the current study aimed to look into the empirical evidence regarding the impact of working tasks on safety and health among the older fisheries community and its relationship between working tasks and musculoskeletal disorder.

Literature Review

Health risk among fisheries workers

The fishery system created was a way for the population in a rural area to gain a side income for their economic activity. It will be increasing their income for household consumption and other related expenses. This system involves the plexus of subsystems between the natural and human systems and is affected by the global environment, economy, and society. However, the range in age nearly to 60 was a challenge to older fisheries workers to gain experience. The older fisheries workers have limited source of knowledge about the aquaculture since they have a limitation to a high-level education because of the financial situation and were less encouraged to continue study at a higher level by the previous government. This barrier will be a challenge for older fisheries workers to develop themselves, and it will affect their financial condition and may risk medical matters (Roslina, 2018).

Older fisheries workers also experience some issues and problems such as pain problems involving bones due to increasing age factors. However, there were restricted available data related to disability in the general working climate. Furthermore, fishers seek health care only for severe health issues such as accidents or significant health emergencies like cardiovascular incidents (Matheson *et al*., 2001; Frantzeskou *et al*., 2012). The prevalence of MSD's among older workers is usually higher than younger workers' complaints, especially of the low back. It has also been proposed that biological changes associated with the aging process, such as degenerative muscles, tendons, ligaments, and joints, lead to MSD's pathogenesis (Olanrewaju *et al*., 2010). The study has mainly concentrated on preventing accidents and vessel disasters in the fishing industry. Medical conditions, including those connected with diet, have less publicity (Frantzeskou *et al*., 2012). Several safety and health criteria must also be considered and emphasized for fisheries workers to identify from which angle the problems they face have been caused. Some findings discovered the risks of preparatory fishing practices, ergonomic noise type, slipped risk caused by slippery flooring, and mechanical hazards. When inspecting ocean currents, they also have taken risks, being bitten by coral, serious pressure, freezing temperatures, aquatic life bites, stinging fish, coral toxicity, carbon monoxide, carbon dioxide and nitrogen gas poisoning, compressor air intake shortages, poor visibility, strong winds, spinning propellers and hot temperatures (Sholihah *et al*., 2016).

The ergonomic approach also plays a role in identifying the problems faced by fishermen as a systematic measure. The equipment used has been developed, ergonomic loads have been encouraged, new vessels with improved techniques have been developed and launched, and information on the proper movement and transport of heavy loads has been implemented (Poulsen *et al*., 2014; Berg-Beckhoff *et al*., 2016). Refer to Berg-Beckhoff (2016); the most significant workload is a musculoskeletal pain indicator. There was a clear, meaningful, and pronounced correlation between high workload and pain more than 30 days in the last year for all pain locations. However, the precise figures should be carefully considered due to the large confidence intervals. The most major work-related musculoskeletal disorders (WRMD) are worldwide workplace risk factors. One of the most damaging effects of the ergonomic approach is unapplied, which affects overloading the musculoskeletal system caused by inappropriate postures at work (Lee & Han, 2013; Andre & Gilberto *et al*., 2017). Therefore, this study is focusing the indicators and the causes that could affect the severity and affect fisheries workers in their work and activities.

Methodology

Simple random sampling was used in this study for each place in the Muar, Johor district. Sample of the population of an older person involved in fisheries and their working style through ergonomic approach is randomly selected. The population for old fishermen in Muar, Johor was recommended by Muar Municipal Council (MPM), which is suitable to study in Muar due to this area having a high population of old fisheries workers. The population is 277, 800 in the year 2015 (Muar Municipal Council). Based on data provided by the Department of Statistics Malaysia, the population of fisheries community in 2017 involved in Muar district is 1 531 old fisheries workers.

The sampling criteria used is simple random sampling which refers to probability sampling, which consists of the researcher randomly selecting a subset respondent from the population and the member had a chance to be selected. In the current study, the application of simple random sampling used in this research can be generalized due to the representativeness of this sampling technique and a little relevance of bias. Furthermore, the researcher has used an online technique to reach the respondent.

The data were collected using the questionnaire and distributed to the selected release of the respondent through google form. The questionnaire's questions are structured and consist of a sealed question and multiple options. For part A, the questionnaire states the demography, residence, gender, age, race, level of study, marital status, income, number of households, and liabilities. The nominal scale used to measure data does not comprise numerical values or rank order such as place, gender, and ethnic group.

In contrast, the ordinal scale used to measure data consists of numerical values and rank order such as age, educational level, and income level. Part B is related to the working environment of old fisheries workers. For part C, Nordic Questionnaire for access health problems on the development of MSD's 'was adopted'. The goal was to establish and test a standardized questionnaire methodology for epidemiological studies to compare low back, neck, shoulder, and general complaints. For clinical diagnosis, the tool was not established (Joanne, 2017). The Nordic Questionnaire represented the most painful part of the body segment of older fisheries workers between the last seven days and the last two months. According to Rosnani *et al*. (2019), Structured Nordic Questionnaires (SNQ) to study symptoms of the musculoskeletal system are the various methods of analyzing MSD's. At the same time, part D is about the lifestyle of older fisheries workers after doing the fisheries activities. All collected data were transformed to SPSS for the data analysis to further the subsequent analysis. This analysis goes through descriptive statistics (frequency, percentile, mean and standard deviation)

Result and Discussion

Socio-demography older fisheries workers

Table 1 showed the largest district area of older fisheries workers came from Parit Jawa and Sarang Buaya, which is 26.5 per cent and 21.5 per cent out of 9 districts. Most of them were male (95.0%), and 68.5 per cent were aged between 60 to 69 years old. According to Mohd Tobi, Fathi, and Amaratunga (2017), 7.0 per cent of the older population were aged 60 years and over based on data in Malaysia which were projected to double by 2028 (14.0%). For ethnicity, 95.5 per cent of older fisheries workers at Muar, Johor were Malay. However, only 4.5 per cent were indigenous people involved in the fisheries sector. Only two ethnicities were involved in this sector: the Malay with the largest value with 190 respondents and equal to 95.5 per cent, and the indigenous community. For marital status, most of them (76.0%) were married, and the second-highest (11.5%) were single. The majority of respondents were adults and married. There were 153 respondents with one to five people of several households, with 76.5 per cent as the majority. However, majority (87.0%) of respondent's income below than RM2500 per-month and only 13.0 per cent between RM2,501.00 to RM 4,999.00 per-month. The result also showed, the higher total of members of the household were1> five people (76.5%) and followed by 6>9 people (20.0%).

Table 1: Socio-demography of Older Fisheries Workers (N = 200)

Item	n	%
District		
Parit Jawa	53	26.50
Sarang Buaya	43	21.50
Sabak Awor	38	19.00
Kesang Laut	24	12.00
Parit Perupok	9	4.50
Parit Unas	12	6.00
Sungai Balang	14	7.00
Liang Batu	4	2.00
Parit Tiram	3	1.50
Gender		
Male	190	95.00
Female	10	5.00
Age		
60 – 69 years	137	68.50
70 – 79 years	53	26.50
80 years above	10	5.00
Ethnicity		
Malay	191	95.50
Chinese	0	0.00
Indian	0	0.00
Others	10	4.50
Marital		
Single	23	11.50
Married	152	76.00
Divorce	11	5.50
Couple died	14	7.00
Income per-month		
Below RM2 500	174	87.00
RM2 501 –RM4 999	26	13.00
More than 5 000	0	0
Number of members household		
1 - 5 people	153	76.50
6 - 9 people	41	20.00
More than ten people	6	3.00

Working environment for older fishermen

The result from Table 2 showed 44.5 per cent spend within 1-6 hours per day as a fisher and 44.5 per cent work as a fisher 1>3 timer per week. The majority (52.5%) of them catch fish 31>60kg per day and in a week 1>80kg per week. The older community also reported 1>10 years' experience as a fisher, and 40.0 per cent of them take rest a week 1 to 3 days. However, 19.5 per cent of them never rest even a

day in a week. Most (55.0%) of them reported, their use their energy to lift the load from one place to another, and the majority (54.5%) use fiber boats as main transport to catch fish every day, and 52.0 per cent agreed the usual time to start catch fish in early morning or dawn. However, 52.0 per cent reported fisheries as a part-time job among the older community at Muar, Johor. The result also showed that 62.0 per cent agreed often bend over body posture during fish catch activities. The majority (65.0%) of them agreed that the body pain experience results from working as a fisher. Therefore, the result proved that there is similarity with the previous study on working tasks with technology interaction, the physical work environment, workload, work pressure, training, expertise, experience, teamwork, communication, and safety management been related to workplace safety (Thorvaldsen, Holmen, & Moe, 2015; Holen *et al.,* 2018).

Table 2: Characteristics of Working Environment among Older Fishermen (N = 200)

Items	n	%
In one day, how many hours do you spend as a fisher?		
1 > 6 hours	89	44.5
7 > 12 hours	67	33.5
> 12 hours	44	22.00
In a week, how many times do you work as a fisher?		
1 > 3 times per week	89	44.5
4 > 6 times per week	66	33.0
every day	45	22.5
In one day, what is the estimated catch of fish caught?		
1 > 30 kg	94	47.0
31 > 60 kg	105	52.5
> 60 kg	1	0.5
In a week, what is the estimated catch of fish caught?		
1 > 80 kg	93	46.5
81 > 160 kg	57	28.5
> 160 kg	50	25.0
How long have you been working as a fisher?		
1 > 10-years	80	40.0
11 >20-years	78	39.0
>20-years	42	21.0
In a week, how many days do you take a break from working as a fisher?		
1 to 3 days a week	98	49.0
4 to 6 days a week	63	31.5
Never	39	19.5
How do you lift a load from one place to another?		
Use own energy	111	55.5
Ask others to help	89	44.5

Table 2 (continues)

Items	n	%
Do you use the following vehicle?		
Fiber boat	109	54.5
Vessel	91	45.5
At what time did you start doing activities as a fisher?		
Early in the morning or dawn	104	52.0
Afternoon	59	29.5
Evening or night	37	18.5
Is a job as a fisher a permanent or part-time job?		
Permanent	96	48.0
Part-time	104	52.0
Do you often bend over when doing activities as a fisher?		
Yes	124	62.0
No	76	38.0
Do you agree that any limb-related pain you experience is the result of you working as a fisher?		
Yes	130	65.0
No	70	35.0

Body pain segment (Nordic Questionnaire) among older fishers at Muar, Johor

The result from Table 3 showed, there were 65.5 per cent of respondents were having a problem at one or both ankles or feet had the highest value for item 'Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at one or both ankles/feet. The result also showed that one or both ankles or feet were the most painful part of the body in the last 12 months. The second highest value is at the shoulder 58.0 per cent of respondents agreed on the right shoulder feeling experience pain during the past 12 months. Besides that, for the past seven days in working activities, older fishers showed that the body part at the neck was the highest (56.5%) feeling pain or discomfort and followed (55.0%) by the right shoulder and both ankles. However, for body parts, the upper back and lower back received complaints related to pain or discomfort for the past seven working days, only 37.0 per cent and 35.0 per cent For the last 12 months, the highest value of respondents had a problem at shoulder at item due to problems shoulder' are more than the majority (52.0%) older fisheries community. Hence, the shoulder was the most painful or discomfort body part during the last 12 months, preventing me from doing everyday activities. The result showed significance with the previous study, worked as fisher involves lifting, carrying, pushing, material pulling, and quality control and can cause injuries during neck flexion, shoulder flexion, forearm muscle exertion, intense wrist postures due to high load in these operations (Agrawal, Madankar, & Jibhakate, 2011). Hence, the shoulder was the most painful part during the last 12

months, preventing normal activities. According to Pugh *et al*. (2015), neck, shoulder, and lower back symptoms influenced by fixed-response items concentrate on the severity and effect on work and leisure activities in the third portion.

Table 3: Body Experience (Discomfort) Table among Older Fisheries Community at Muar, Johor (N = 200)

Item	n	%
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at the neck		
Yes	82	41.00
No	118	59.00
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at the shoulder?		
No	50	25.00
Yes, right shoulder	116	58.0
Yes, left shoulder	5	2.50
Both shoulder	29	14.50
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at the elbow?		
No	126	63.00
Yes, right elbow	27	13.50
Yes, left elbow	6	3.00
Both elbow	41	20.50
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at the wrist/hand?	112	
No	42	56.00
Yes, wrist/ right hand	9	21.00
Yes, wrist/ left hand	36	4.50
Both wrist/ hand	2	18.50
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at the upper back?		
No	119	59.50
Yes	81	40.50
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at the lower back		
No	124	62.00
Yes	76	38.00

Table 3 (continues)

Item	n	%
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at one or both hips/thighs/back?		
No	144	72.00
Yes	56	28.00
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at one or both knee?		
No	130	65.00
Yes	70	35.00
Have you at any time in the last 12 months experienced problems (such as pain, soreness, discomfort, numbness) at one or both ankles/feet?		
No	69	34.50
Yes	131	65.50
Are you having problems for the seven days at neck?		
No	87	43.50
Yes	113	56.50
Are you having problems for the seven days at the shoulder?		
No	56	28.00
Yes, right shoulder	110	55.00
Yes, left shoulder	4	2.00
Both shoulder	30	15.00
Are you having problems for the seven days at the elbow?		
No	134	67.00
Yes, right elbow	30	15.00
Yes, left elbow	5	2.50
Both elbow	31	15.50
Are you having problems for the seven days at wrist/hand?		
No	139	69.50
Yes, wrist/ right hand	31	15.50
Yes, wrist/ left hand	6	3.00
Both wrist/ hand	24	12.00
Are you having problems for the seven days at the upper back?		
No	126	63.00
Yes	74	37.00
Are you having problems for the seven days at the lower back?		
No	129	64.50
Yes	71	35.50

Table 3 (continues)

Item	n	%
Are you having problems for the seven days at one or both hips/thighs?		
No	150	75.00
Yes	50	25.00
Are you having problems for the seven days at one or both knee?		
No	129	64.50
Yes	71	35.50
Are you having problems for the seven days at one or both ankles/feet?		
No	90	45.00
Yes	110	55.00
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems at the neck?		
No	141	70.50
Yes	59	29.50
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems at your shoulder?		
No	96	48.00
Yes	104	52.00
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems at the elbow?		
No	135	67.50
Yes	65	32.50
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems at wrist/hand?		
No	140	70.00
Yes	60	30.00
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems at the upper back?		
No	134	67.00
Yes	66	33.00
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems in the lower back?		
No	129	64.50
Yes	71	35.50

Table 3 (continues)

Item	n	%
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems at one or both hips/thighs?		
No	149	74.50
Yes	51	25.50
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems at one or both knees?		
No	143	71.50
Yes	57	28.50
During the last 12 months, have you been prevented from doing normal activities (e.g. employment, household chores, hobbies) due to problems at one or both ankles/feet?		
No	163	81.50
Yes	37	18.50

Conclusion and Recommendation

The study provides a preliminary perspective among older fisheries communities and a baseline at Malaysia overview. It examines the relationship between working tasks and Musculoskeletal Disorder (MSDs) among fisheries older community at Muar, Johor through the ergonomic approach. It is also encouraged the fishery community to understand their risk in the working environment to the minimum potential problem on MSDs. The concern for reducing work style that can induce MSDs should educate the older fisheries community to avoid health problems and improve well-being. The practice of getting adequate and accurate information about MSDs should start from early involvement in the fishery to avoid the disorder probability through an ergonomic approach.

The study also gives us relevant information that influences older fishery to health problems to develop MSDs. For example, the body parts most significant impact on the working environment with a health problem are shoulder and ankle or feet that have that pain sensation while performing their work in fisheries. Therefore, the medical institution should look closely at this community in terms of health issues and long-term impact, especially in family institution wellbeing, also cost for treatment costly among the lower-income community.

Besides that, future research should involve a larger population and sample size from various states in Malaysia. Furthermore, government agencies such as the Department of Fisheries should provide current data on the implication of the working

environment among fisheries workers, especially older communities, during pandemic Covid-19 and the impact on the nation's economic and social perspective.

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