

THE RELATIONSHIP BETWEEN HANDGRIP STRENGTH AND PAIN COMPLAINTS MUSCLES OF FISHERMEN IN BANDENGAN VILLAGE, KENDAL DISTRICT

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ABSTRACT

Musculoskeletal pain is a common problem experienced by fishermen due to repetitive physical work activities. This study aimed to determine the relationship between hand grip strength and musculoskeletal pain complaints among fishermen in Bandengan Village, Kendal District. This research employed a quantitative design with a cross-sectional approach. A total of 79 respondents were selected using simple random sampling. Data were collected using the Nordic Body Map (NBM) questionnaire and a Hand Grip Dynamometer, then analyzed using the Spearman Rank test. The results showed that most fishermen had poor hand grip strength (44.3%) and experienced high levels of musculoskeletal pain complaints (84.8%), particularly in the lower back and right upper arm. The correlation test revealed an r-value of -0.347 with a p-value of 0.002 (<0.05), indicating a significant relationship with a negative direction and low correlation strength between hand grip strength and musculoskeletal pain complaints. Fishermen are recommended to adopt healthy work practices, including stretching before and after work, performing regular muscle-strengthening exercises, applying ergonomic work techniques, and balancing work and rest periods to reduce the risk of Musculoskeletal Disorders (MSDs).

Keywords : hand grip strength; fisherman; musculoskeletal pain

INTRODUCTION

Fishermen are one of the main livelihoods for people living in coastal areas, especially in Indonesia, which has more than 17,000 islands and a coastline of 54,716 km. This work is one of the high-risk professions, can result in injury and even death. Despite the existence of technology, fishermen are still physically challenged, because this work requires greater ability and muscle strength (Rakhmawati, 2024). For fishermen, hand grip strength is very necessary considering the heavy work of fishermen and often work beyond the daily working hours limit with a high workload, such as when pulling nets from the sea containing fish weighing approximately 3 tons, and lifting baskets containing fish weighing approximately 200 kg from the boat to the fish auction site (Andriani et al., 2023). Some fishermen said that pulling nets containing fish caught is a fishing activity that has a high intensity and heavy physical activity causes muscle complaints that impact comfort and health (Rakhmawati, 2024). Meanwhile, with 2,634 cases, Banguntapan II Health Center, Bantul, had the highest number of muscle pain cases, and the productive age group had the highest percentage (50.91%). 86.6% of Indonesians in the productive age group work as farmers, laborers, or fishermen. If not treated promptly, muscle pain will cause muscle stiffness and lead to MSDs, hindering work and other daily activities. (Sabrina, 2021). However, specific research on the relationship between handgrip strength and muscle pain complaints in fishermen in Bandengan Village is still limited.

Fishermen in Bandengan Village still use manual equipment, and there are several work processes in preparation for fishing operations, setting (spreading the net), hauling (retracting the net), and handling the catch. A single net haul typically yields around 3 tons or more, and fishermen typically retract their nets 2-4 times a day. Repeatedly performing this activity can exacerbate the fishermen's complaints (Saputra, 2024). 80% of fishermen complain of severe back pain, especially in the lower back, muscle cramps, and arm pain (Andriani et al., 2023). If this strenuous and prolonged physical activity continues untreated, it increases the risk of muscle pain and can reduce productivity (Arihta et al., 2024).

From the results of observations that have been carried out on fishermen in Bandengan Village, 13 of the 15 fishermen that researchers interviewed experienced frequent complaints of muscle pain in the arm, shoulder and lower back areas when pulling nets from the sea, this is the basis for researchers to analyze the relationship between hand grip strength and complaints of muscle pain in Bandengan Village, Kendal District.

METHOD

This research method uses an analytical survey design with a cross-sectional approach. The analytical survey method is used to examine the relationship between independent variables and dependent variables. The cross-sectional method involves measuring all variables at one point in time, making it possible to find the relationship between handgrip strength and muscle pain complaints. The research sample consisted of 40 respondents taken using the total sampling technique. The instruments in this study were sheets for measuring handgrip strength using a Handgrip dynamometer, and a Nordic Body Map (NBM) questionnaire sheet to measure muscle pain complaints. Data analysis using the Spearman rank test.

RESULT AND DISCUSSION

Table 1.
Frequency distribution of the ages of fishermen in Bandengan Village

Age	Frequency	Percentage
20 – 30 years	12	15.2
31 – 40 years	38	48.1
41 – 50 years	20	25.3
51 – 60 years	5	6.3
61 – 70 years	4	5.1
Total	79	100.0

Source : data processed 2026

Based on the data from table 1, the age distribution of fishermen in Bandengan Village shows that the majority of fishermen are aged 31-40 years, namely 48.1%.

Based on the results of the study, it was found that the age group of fishermen in Bandengan Village from the results of the frequency distribution data processing of the age group was mostly around 31-40 years old. At the age of 30-40 years, hand strength reaches its peak strength, if it exceeds that age, hand strength will tend to decrease with age. Studies report that a decrease of around 10% can occur every decade after the age of 40. This is closely related to Sarcopenia or a decrease in quality of life. Sarcopenia is a decrease in muscle mass, strength and function related to age (Tiasti et al., 2025). This is supported by the results of research conducted by Indriyani on fishermen in

Laha Village. The study found that the majority of fishermen were of productive age, 20-45 years, amounting to 54 respondents out of a total of 91 respondents (Indriyani et al., 2023)

Table 2.
Frequency Distribution of Working Period of Fishermen in Bandengan Village

Working Period	Frequency	Percentage
1 – 10 years	26	32.9
11 – 20 years	31	39.2
21 – 30 years	17	21.5
31 – 40 years	4	5.1
41 – 50 years	1	1.3
Total	79	100.0

Source : data processed 2026

Based on the results of the frequency distribution in table 2, it shows that the majority of fishermen in Bandengan Village have worked for 11-20 years, amounting to 31 respondents with a percentage of 39.2% of the total number of respondents.

Based on the results of research conducted on 79 fishermen respondents in Bandengan Village, it was found that most respondents had worked for 11-20 years. Length of service is one of the important factors that can influence complaints of muscle pain. The longer a person works, the greater the body's exposure to static workloads, repetitive movements and non-ergonomic body postures that can trigger complaints of pain in the body's muscles. This often occurs in fishermen who still use manual methods. Machine Translated by Google performing their work. According to the WHO, work duration is an ergonomic risk factor because it is closely related to the length of time the body is working under less-than-ideal conditions (WHO, 2021).

Table 3.
Frequency Distribution of Smoking Habits of Fishermen in Bandengan Village

Smoking habit	Frequency	Percentage
Yes	74	93.7
No	5	6.3
Total	79	100.0

Source : Data Processed 2026

Based on the frequency distribution data in table 3, it shows that the majority of fishermen in Bandengan Village have a smoking habit of 93.7%.

Cigarettes contain nicotine and carbon monoxide, which can thicken the blood and narrow the arteries. This impedes blood circulation to the heart, muscles, and other organs, limiting the delivery of oxygen and nutrients to them. As a result, muscles cannot work at maximum efficiency, causing smokers to tire quickly and experience muscle pain. Smokers show a 34 percent decrease in the ratio of capillaries to muscle fibers. In addition, smokers experience a decrease in fatigue resistance of up to 43 percent. As a result, they tire quickly and experience muscle pain more frequently (Nurin, 2023). Supported by previous research conducted by Hanif, it was stated that there is a relationship between smoking habits and musculoskeletal disorder complaints , with a correlation coefficient test result of 0.542 (Hanif, 2020)

Univariate Analysis

Table 4.
Frequency Distribution of Hand Grip Strength of Fishermen in Bandengan Sub-District

Classification	Frequency	Percentage
55,00 and above very good	0	0
46,50 – 55,00 : good	4	5.1
36,50 – 46,00 : moderate	21	26.6
27,50 – 36,00 : less	35	44.3
27,00 and below very less	19	24.1
Total	79	100.0

Source : data Processed 2026

Based on table 4 the frequency distribution of hand grip strength among fishermen in Bandengan sub-district shows that most fishermen have insufficient hand grip strength, as many as 35 respondents with a percentage of 44.3% of the 79 respondents.

Based on the frequency distribution results in Table 4.6, it is clear that most fishermen have low handgrip strength. This condition indicates a possible decline in muscle capacity due to high physical workloads, repetitive activities, long work durations, and accumulated work experience, with the majority having worked for 11-20 years. This is often experienced by fishermen in their daily work when doing manual work catching fish, such as pulling nets and lifting the catch. Low muscle strength is associated with muscle fatigue due to excessive and continuous muscle contractions (Fathur & Rozi, 2023). In the concept of Maximum Voluntary Contraction (MVC), if muscle contractions exceed 20% of their maximum capacity for a long time, blood flow to the muscles will decrease along with the level of contraction influenced by the amount of energy expended by the workers, this can cause a decrease in oxygen supply and a buildup of lactic acid which can lead to pain or complaints in the muscles (Manoppo et al., 2017).

Table 5.
Frequency Distribution of Complaints of Muscle Pain in Fishermen in Bandengan Sub-District

Complaint level	Frequency	Percentage
28 : low	0	0
29 – 57 : moderate	10	12.7
58 – 86 : high	67	84.8
>87 : very high	2	2.5
Total	79	100.0

Source : data processed 2026

Based on table 5. the distribution of the frequency of complaints of muscle pain shows that some fishermen have a high level of complaints, as many as 67 respondents with a percentage of 84.8% of the 79 respondents.

Based on the results of the distribution test of muscle pain complaints, it shows that the majority of fishermen have complaints of muscle pain in the high category and based on the type of complaint with the indicator of very painful (SS), most complained of pain in the back, this can occur because workers often bend to lift fish onto the boat or when transferring fish from the net to the fish storage

drums, this non-ergonomic working position is often repeated causing excessive pressure on the lower back muscles. The bent position for a long time increases the risk of disorders in the lumbar area or low back pain (Gusti, 2022). In addition to the waist, pain in the right upper arm is also complained of by many, this occurs because the right hand is the dominant hand when doing manual work for fishermen, the right hand is an important asset for work. Such as pulling nets, moving the catch, lifting drums containing wet fish where it can add a heavy load when lifting it. (Wahyudin et al., 2024).

Bivariate Analysis

Handgrip Strength with Muscle Pain Complaints in Fishermen in Bandengan Village, Kendal District.

Table 6.
Results of The Spearman Rank Statistical Test on The Relationship Between Handgrip Strength and Muscle Pain Complaints Among Fishermen in Bandengan Village, Kendal District

Correlation			Hand grip strength	Muscle pain complaint
Spearman's Rho	Hand grip strength	Correlation Coefficient	1.000	-.347**
		Sig.(2-tailed)	.	.002
		N	79	79
	Muscle pain complaint	Correlation Coefficient	-.370**	1.000
		Sig.(2-tailed)	.002	.
		N	79	79

Source : SPSS 2026 data processing

Based on table 6, the results of the Spearman's Rank correlation coefficient statistical test show that the r value = -0.347^{**} with a significant p value of 0.002 less than 0.05 means that H_a is accepted, this shows that there is a relationship between handgrip strength and complaints of muscle pain in fishermen with the opposite direction of the relationship and the strength of the relationship is low based on the guidelines for interpreting the correlation coefficient according to (Sugiyono, 2023).

Based on the results of research conducted using the Spearman Rank's test, the results obtained were a value of $r = -0.347^{**}$ with a significant value of P value 0.002 which is smaller than 0.05. The results of this study indicate a negative correlation between handgrip strength and muscle pain complaints in fishermen, with a low correlation strength. Muscle pain is not solely influenced by handgrip strength; many other factors can contribute to muscle pain. Complaints of muscle pain are multifactorial, with high physical workloads being a key factor. Machine Translated by Google such as lifting weights, pulling nets, and other repetitive activities. Unergonomic work postures such as bending, twisting, or working in static positions also contribute to pain, even in these conditions. Good muscle strength, if you continue to work with the wrong posture, you are still at risk of experiencing muscle pain. Other factors that can influence this are work duration and rest periods. Fishermen typically work for long periods without adequate rest periods, resulting in persistent muscle fatigue. This relates to the concept of Maximum Voluntary Contraction (MVC).

Prolonged muscle contractions, even at moderate intensity, can inhibit blood flow to the muscles and cause lactic acid buildup. This suggests that muscle strength plays a role not only in the magnitude of muscle strength but also in the duration of muscle use during work activities. The results of this study are in line with research by Lene et al., which found that there was a small relationship between handgrip strength and musculoskeletal complaints (Moberg et al., 2017). This is also supported by research (Beumer & Lindau, 2016) which found a relationship between handgrip strength and upper extremity pain. This study was conducted on 49 respondents located in Europe (Denmark).

CONCLUSIONS AND SUGGESTIONS

Based on the results of research that has been conducted on the relationship between hand grip strength and complaints of muscle pain in fishermen in Bandengan Village, Kendal District, the following conclusions can be drawn:

The majority of fishermen in Bandengan sub-district are aged 30-41 years, namely 48.1%. With a working period of 11-20 years, the majority (39.2%), and most admitted to having a smoking habit, namely 93.7% of the total respondents, amounting to 79 respondents.

Of the 79 respondents, the majority of fishermen have poor hand grip strength. as much as 44.3% The majority of fishermen experienced complaints of muscle pain in the high category, as many as 84.8%. With the level of complaints based on the type of complaint based on the Very Painful (SS) indicator, the most common complaints were pain in the waist, as many as 53.2%, and pain in the upper right arm, as many as 43.0%.

The results of the Spearman correlation test show a significant relationship between handgrip strength in fishermen in Bandengan Village, with a p value of 0.002 which is smaller than 0.05. The correlation coefficient value obtained is -0.347 which means the direction of the relationship is negative, and the closeness of the relationship is low.

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