The Correlation between Body Mass Index and Lifting Frequency with Low Back Pain Complaints on Rice Transport Workers in Warehouse of Perum BULOG Subdivre Pematangsiantar

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Abstract

Introduction: Rice transport workers are at risk for Low Back Pain (LBP) complaints because their work is lifting heavy loads repeatedly and affected by individual characteristics. This research aimed to analyze the strength of the correlation between body mass index and lifting frequency with LBP complaints on rice transport workers in Perum BULOG Pematangsiantar Subdivre.

Methods: This type of research was an observational research with a cross sectional design. The sampling technique used total populated sampling with 30 respondents. The variables researched included body mass index, lifting frequency, and LBP complaints.

Data were collected by observation, filling out research questionnaires, and Nordic Body Map (NBM). The data analysis used was the Spearman correlation.

Results: The strength of the correlation between body mass index with low back pain complaints had a value of r = 0.203, the strength of the correlation between the lifting frequency with low back pain complaints had a value of r = 0.415.

Conclusion: Body mass index with LBP complaints had a weak and positive correlation. The lifting frequency with LBP complaints had a moderate and positive corelation.

Key words: *body mass index, lifting frequency, low back pain complaints*

Introduction

Occupational diseases are diseases caused by work or the work environment, including work-related diseases. The work-related disease has several causative agents with occupational factors or the work environment playing a role together with other risk factors[12]. Musculoskeletal disorders are one of the occupational diseases. Musculoskeletal disorders are complaints of parts of the skeletal muscles that are felt by a person ranging from very mild to very painful complaints[18].

In a survey conducted on workers in the UK, it was found that 498,000 workers had work-related musculoskeletal disorders, and as many as 40% had work-related musculoskeletal disorders on the back[6]. Low Back Pain (LBP) is often reported in jobs that require routine heavy lifting, especially when combined with other stressors, such as unnatural positions (awkward positions) or exposure to whole-body vibrations. Truck

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drivers, nurses, construction workers, cleaners, and warehouse workers are at high risk for back pain due to work[9].

The prevalence of LBP in Indonesia is 18% and increases with age[5]. Low Back Pain is a complaint that can reduce human productivity. Around 50-80% of workers worldwide have experienced low back pain, which has a negative impact on socio-economic conditions by decreasing working day and decreasing productivity[2].

Factors that can affect the emergence of low back pain include individual factors, namely age, gender, body mass index (BMI), work period, smoking habits, and physical activity, as well as work factors, namely workload, work position, repetition, and duration[17]. Based on the results of research conducted by Mayasari on fishers in the Kangkung Village, Bandar Lampung showed that there is a correlation between the lifting frequency with LBP complaints[11].

Musculoskeletal disorders in the back generally arise due to manual material handling[8]. Manual handling is any activity of lifting or supporting a load by hand or body strength in lifting, putting, pushing, pulling, carrying, or moving activities[15].

Badan Urusan Logistik (BULOG) is a state-owned public company engaged in food logistics[13]. Perum BULOG Subdivre Pematangsiantar is assigned to carry out public service activities, plan and develop business activities, especially in the rice sector. Perum BULOG Subdivre Pematangsiantar is located at Asahan Street KM. 3,5, Pematangsiantar, North Sumatra, Indonesia.

Perum BULOG Subdivre Pematangsiantar had two warehouses. The warehouse of Perum BULOG Subdivre Pematangsiantar was used to store commodity items. There were activities carried out manually at the Perum BULOG Subdivre Pematangsiantar, namely the loading and unloading processes. This loading and unloading processes were carried out where the workers place the rice sack on the workers back. The workers will walk towards the truck, arriving at the truck the workers will lower the rice sack by dumping it down on a low pile of rice or asking other workers for help if the rice pile is high, and vice versa when transporting rice from trucks to warehouses. Transport workers take turns carrying out this activity.

There were 30 transport workers at Perum BULOG Subdivre Pematangsiantar and were daily workers. Transport workers worked when there were items in and out, in a week the rice transport workers work for about four days. Rice transport workers start at 8 am and stop working when the unloaded or loaded rice runs out. Transport workers can carry 50 kg of rice sacks with a transport distance of approximately 20 meters.

Transport workers had complaints of pain in the lower back, neck, shoulders, knees, and calves. From observations, it was known that the transport workers' work position when lifting rice, such as the bent neck, raised arms, slightly bent back, and alternately bent legs. The loading and unloading work was done repeatedly, and this could result in excessive exertion and could cause body aches. Based on the problems explained in the introduction above, the researcher has carried out the strength of the correlation analysis between body mass index and lifting frequency with low back pain complaints on rice transport workers in warehouse of Perum BULOG Subdivre Pematangsiantar.

Materials and Methods

This research was an observational research with a cross-sectional design. This research was conducted on rice transport workers in the warehouse of Perum BULOG Subdivre Pematangsiantar, North Sumatra, Indonesia, in May 2020. The sampling technique in this research used total population sampling and obtained a sample of 30 people.

Measurement of Body Mass Index (BMI) was carried out by filling out a research questionnaire. Before filling out the research questionnaire, respondents were given an explanation of the research conducted and asked to fill out an informed consent if the respondent agreed to take part in the research. Measurement of the lifting frequency was carried out by observation, then categorized into two according to the median data. BMI was categorized into severe underweight (BMI <17), mild underweight (BMI 17-18.4), normal (BMI 18.5-25), mild overweight (BMI 25.1-27).) and severe overweight (BMI> 27) 7. Then the lifting frequency was categorized into <103 times and ≥ 103 times.

Nordic Body Map (NBM) method was used to assess LBP complaints. NBM has been used to assess LBP complaints in several studies including research conducted by Setyawan with the title of the correlation between work attitudes and transport loads on low back pain (LBP) complaints in fish transport workers (manol) in Muncar Beach Fishing Port (PPP), Banyuwangi District[16]. In addition, NBM was also used by Riningrum in her research titled the influence of work attitude, age, and work period on low back pain complaints, with garment sewing workers of PT. Apac Inti Corpora, Semarang District as respondents[14]. In the research, NBM method used was only on lower back. This research was also used part of NBM which was on lower back part, because this research focused on low back pain.

The data analysis technique in this research was univariate and bivariate analysis. Univariate analysis was conducted to determine the frequency distribution of each variable. Meanwhile, bivariate analysis was carried out to analyze the strength of the correlation between BMI and lifting frequency with LBP complaints using the Spearman correlation test.

Result and Discussion

Body Mass Index

Table 1. Distribution of Transport Workers Based on BMI

BMI	Frequency	Percentage (%)
Mild Underweight (BMI 17–18,4)	3	10
Normal (BMI 18,5-25)	18	60
Mild Overweight (BMI 25,1-27)	7	23,3
Severe Overweight (BMI>27)	2	6,7
Total	30	100

Table 1 showed that transport workers' BMI in Warehouse of Perum BULOG Subdivre Pematangsiantar mostly were in normal category as many as 18 workers with a percentage of 60%.

Lifting Frequency

Table 2. Distributon of Transport Workers Based on Lifting Frequency

Lifting Frequency	**Frequency**	**Percentage (%)**
<103 Times	14	46,7
≥103 Times	16	53,3
Total	30	100

Table 2 showed that most lifting frequency of transport workers in Warehouse of Perum BULOG Subdivre Pematangsiantar was in ≥103 times category amounted to 16 workers with a percentage of 53,3%.

Low Back Pain Complaints

Table 3. Low Back Pain Complaints in Rice Transport Workers

Low Back Pain Complaints	Frequency	Percentage (%)
Painless	5	16,7
Slightly Hurt	10	33,3
Hurt	11	36,7
Very Hurt	4	13,3
Total	30	100

Table 3 showed that LBP complaints in transport workers in Warehouse of PERUM BULOG Subdivre Pematangsiantar mostly were on hurt category as many as 11 workers with a percentage of 36,7%.

Correlation between Body Mass Index with Low Back Pain Complaints

Table 4. Cross Tabulation of BMI with Low Back Pain Complaints

BMI	Low Back Pain Complaints										r
	Painless		Slightly Hurt		Hurt		Very Hurt		Total		
	n	%	N	%	n	%	n	%	n	%	
Mild Underweight	0	0	2	66,7	1	33,3	0	0	3	100	0,203
Normal	3	16,7	6	33,3	6	33,3	3	16,7	18	100	
Mild Overweight	2	28,6	1	14,3	4	57,1	0	0	7	100	
Severe Overweight	0	0	1	50	0	0	1	50	2	100	
Total	5	16,7	10	33,3	11	36,7	4	13,3	30	100	

Table 4 showed that most transport workers with normal BMI had slightly hurt LBP complaints as many as six workers (33,3%) and hurt LBP complaints as many as six workers (33,3%). Based on the statistical analysis result with the Spearman Correlation test, it was obtained correlation coefficient value of 0,203 which means that the correlation between BMI of transport workers with LBP complaints had a weak strength of correlation. Based on the direction of correlation, it was obtained that the correlation between transport workers' BMI with LBP complaints have a positive correlation which means that the higher transport workers' BMI, then the level of LBP complaints experienced by

workers in Warehouse of Perum BULOG Subdivre Pematangsiantar would increase.

When body weight increases, the spine will be pressured to receive the burdens that weigh so can lead to easily occurred damage and danger to the structure of the spine. One of the areas in the spine most at risk from the effect of obesity is lumbal verterbrae[1].

This was in accordance with the research conducted by Mayasari which states that there is a correlation between BMI with LBP complaints on fisherman in Kangkung Village, Bandar Lampung[11]. This research was also in line with research carried out by Maulana which indicates that there is a correlation between BMI with level of pain in patients with Low Back Pain (LBP) in Poliklinik Saraf RSUD Dr. Zainoel Abidin, Banda Aceh[10].

Correlation between Lifting Frequency with Low Back Pain Complaints

The following is cross tabulation of data between lifting frequency with low back pain complaints.

Table 5. Cross Tabulation between Lifting Frequency with Low Back Pain Complaints

Liftng Frequency (times)	Low Back Pain Complaints										r
	Painless		Slightly Hurt		Hurt		Very Hurt		Total		
	n	%	N	%	n	%	n	%	n	%	
<103	5	35,7	4	28,6	4	28,6	1	7,1	14	100	**0,415**
≥103	0	0	6	37,5	7	43,8	3	18,8	16	100	
Total	5	16,7	10	33,3	11	36,7	4	13,3	30	100	

Table 5 showed that the majority of transport workers with lifting frequency of ≥103 times that had hurt LBP complaints were as many as seven workers (43,8%). Based on the results of statistical analysis with the Spearman Correlation test, it was obtained correlation coefficient value of 0,415 which means the correlation between lifting frequency with low back pain complaints had a moderate strength of correlation. Based on the direction of correlation, it was obtained that the correlation between lifting frequency with LBP complaints had a positive correlation which means the more transport workers lift weight then LBP complaints experienced by transport workers in Warehouse of Gudang Perum BULOG Subdivre Pematangsiantar would increase.

The movement frequency that is too often will encourage fatigue and muscle tensions in the tendon. Muscle tensions in the tendon can be relieved when there is a rest period used to stretch the muscle. The impact of repetitive movements will increase if the movement is performed in awkward positions with heavy loads repeatedly. The occurrence frequency of posture is related to the number of times repetitive motion in doing work. Muscle complaints happen because muscle receives pressure caused by loads repeatedly without having a chance to relax[3].

This result is in accordance with research conducted by Mayasari which states that there is a correlation between lifting frequency with low back pain complaints in fisherman in Kangung Village, Bandar Lampung[11].

In research done by Coenen states that there is a correlation between lifting frequency with low back pain occurrences [4].

Constant repetitive movements give cumulative workloads, can lead to a sense of pain in impaired muscles function and other soft tissues. Problems arising from repetitive work or excess muscle pressure include muscle fatigue, changes in tissue density, and tissue tension. Physiological evidence suggests that the level and degree of tissue damage depends on the amount of force, repetition, and duration of exposure[17].

Conclusion

Based on the research result, it can be seen that most rice transport workers in Warehouse of Perum BULOG Subdivre Pematangsiantar had normal body mass index (18,5-25) and lifting frequency of ≥103 times. The majority of rice transport workers in Warehouse of Perum BULOG Subdivre Pematangsiantar had LBP complaints category of hurt.

There is a weak and positive correlation between body mass index with LBP complaints in rice transport workers in Warehouse of Perum BULOG Subdivre Pematangsiantar. There is a moderate and positive correlation between lifting frequency with LBP complaints in rice transport workers in Warehouse of Perum BULOG Subdivre Pematangsiantar.

It is suggested that rice transport workers, specifically who have worked for a long time to do some exercise or muscle stretching before doing any lifting and transport activities for at least 10 minutes because stretching muscles is very good for flexibility of the spinal muscles. The recommended exercise to prevent low back pain complaints is ≥3 times per week. Transport workers was expected to have enough rest and meet their nutritional needs before working.

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