



Relationship between lifting load and shoulder pain complaints in material transport workers

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ABSTRACT

Background: Many workers have experienced increased shoulder pain due to lifting and transporting materials. Workers who lift too heavy a load can cause unhealthy body conditions and experience pain complaints in the shoulder area. This study aimed to determine the relationship between lifting weights and shoulder pain complaints of material transport workers in Gianyar.

Methods: This research used the cross-sectional design. The research was conducted offline or directly in the field. The sampling technique used is using total sampling with a total of 64 people. The

Spearman rho test was used to analyze the data.

Results: The research results on lifting weights with shoulder pain were obtained from research samples with complaints of shoulder pain. Namely, there were 62 people, 99% without complaints of shoulder pain, as much as 1%. Through the Spearman test, the pain value $p = 0.000$, and the r -value in the relationship of shoulder pain complaints is $r = 0.551$.

Conclusion: There was a relationship between lifting weights and shoulder pain complaints in material transport workers in Gianyar.

Keywords: material lifting, shoulder pain, weight lifting.

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INTRODUCTION

The workload is a set or number of activities an organizational unit must complete.¹ Workload that is too excessive will result in an unfavorable impact, which will cause fatigue both physically and mentally and emotional reactions such as headaches, indigestion, and irritability.²

The workload of workers must be balanced between physical and cognitive abilities by the limitations of the worker's workload. Workers who lift weights beyond the specified conditions cause discomfort, including shoulder pain. The resulting complaints affect production, and damage to production materials, which in turn causes production deadlines and unfulfilled and unsatisfactory services. The cost of employee absenteeism can cause a decrease in company profits.³ Musculoskeletal problems can occur because the load lifted exceeds its carrying capacity. In general, muscle pain disorders can be divided into two categories—firstly, temporary (reversible) complaints. Muscle disorders occur when the muscles are subjected to static loads. The second is permanent complaints (persistent). These complaints are muscle complaints that continue even after the load ends.

Lifting materials manually with loads that exceed human labor capacity can cause various problems in occupational safety (OHS) and occupational diseases (PAH) due to limited human

work capacity. Therefore, it is necessary to improve occupational health and safety (K3) to reduce the number of occupational accidents or diseases and increase or maximize labor productivity. PAH can be caused by several factors, namely work-related and lifestyle diseases caused by different lifestyle risk factors.⁴

In 2002, the World Health Organisation (WHO) stated that occupational risks ranked the tenth leading cause of mortality and morbidity.⁵ Unergonomic working practices are cited as a significant trigger in MSDs.⁶ Unergonomic working practices include lifting weights that exceed the body's capacity, prolonged static sitting, working at extreme temperatures, and excessive vibration from work tools.⁷

The World Health Organisation estimates that the prevalence of MSDs accounts for nearly 60 percent of all occupational diseases.⁸ The European Supervisory Commission estimates that MSDs are responsible for 49.9 percent of working days lost over three days and 60 percent of cases of permanent disability. In Argentina, 22,013 cases of occupational diseases were reported in 2010, with MSDs being the most common.⁹ According to the 2013 Basic Health Research Report (Riskasdas), work-related MSDs were 31.6 percent among contractors, 31.4 percent, and 29.5 percent among farmers, fishermen, or laborers, respectively, with employee cases.¹⁰ According to the results of Riskasdas (2018), the prevalence of musculoskeletal complaints based on

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a doctor's diagnosis in Indonesia was 7.9%. Several studies have shown that MSDs can occur due to various contributing risk factors and are categorized into three categories: individual factors, age, gender, length of work, and anthropometry. Occupational factors are derived from the work itself, including work postures, repetitive movements, use of force, object characteristics, and work environment factors consisting of vibration, macroclimate, and lighting.¹¹

In Tulikup Village, Gianyar Regency, the prevalence of MSDs in masons was 100% of all workers who met the criteria, and a sample of 52 people was taken. The biggest musculoskeletal problems were found in the lower back (84.6%), shoulders (61.5%), knees (48.1%), wrists (25.0%), calves, and feet (21.2%). From observations of red stone factory employees, several working conditions emerged that could be risk factors for musculoskeletal disorders, such as lifting and carrying functions, nutrition, work position, and working conditions.¹²

Musculoskeletal disorders in employees are usually underestimated as a problem, as they are usually chronic. Therefore, musculoskeletal disorders, especially in physically engaged workers, deserve special attention as they cause absenteeism due to injury or illness in almost all work tasks.¹ Musculoskeletal complaints are complaints on parts of the skeletal muscles' bones that someone feels, from very mild to very painful.¹³ The consequences of poor workload activities can cause pain in the skeletal muscles felt by workers, which starts from common complaints to high complaints. If the

muscles continuously receive static and repetitive loads over a long period, it can cause damage to joints, ligaments, and tendons.¹⁴

We learned from some of the construction sites in Batubulan that they work seven to eight hours a day with an hour's break. When we first visited the site, we saw transporters transporting building materials such as cement, stones, bricks, and wood. It can be seen that transport workers do not use any tools when lifting construction materials with quite heavy loads.

Based on the above problems, the researcher is interested in conducting a study titled "Relationship between Lifting Load and Shoulder Pain Complaints in Material Transport Workers in Gianyar."

This study aimed to determine whether there is a relationship between lifting heavy loads and complaints of shoulder pain in workers at material stores in Gianyar.

METHODS

The design in this study uses a quantitative approach with a comparative research type with a cross-sectional design. This study was conducted in February 2023 in a material workshop in Gianyar. The variables in this study were lifting load as the independent variable, shoulder pain as the dependent variable, and physical activity as the control variable. The normally and non-normally distributed data were analyzed by the *Pearson* correlation and *Spearman* correlation tests. There were 64 subjects that were obtained for this study (61 male and 3 female).

RESULTS

The sample in this study were material transport workers in Gianyar who met the inclusion criteria and exclusion with data collection techniques, namely a total sampling of 64 research samples. The characteristics of the study in Table 1 show that the number of male respondents was 61 people and three women. Table 2 obtained the standard deviation of the heavy load of 2563.517, the pain of 1.317, and the age of 8.6 with an frequency (N) of 64. Table 3 carried out data analysis using the *Pearson* test, and the results obtained $p = 0.000$, which means that the data is not normally distributed, so the *Spearman* test analysis is carried out. The relationship between lifting weights and complaints of shoulder pain in material transport workers in Gianyar was tested using the *Spearman* test. Table 4 shows a relationship between heavy loads and pain; the higher the load lifted, the higher the pain.

Table 1. Gender Distribution of Research Subjects

Gender	Frequency	Percent (%)
Male	61	95.3
Women	3	4.7
Total	64	100.0

Table 2. Descriptive Data Overview

	N	Average	Standar Deviation
Load Weight (kg)	64	2538.3	2563.5
Pain	64	3.6	1.3
Age	64	36.2	8.6

Table 3. Normality Test

Category	Z	P-value	Total
Load weight (kg)	0.2	0.000	64
Pain	0.2	0.000	64

Table 4. Correlation Test

Variables	Coefficient	P-Value
Heavy Load	0.6	0.000
Pain	1.0	0.000

DISCUSSION

The results of the study regarding the distribution of sample characteristics of men were 61 people with a percentage of 95.3%, and women were 3 people with a percentage of 4.7%, so the data is dominated by men with a percentage of 95.3%. In line with research conducted (Ila Izzatus S), male respondents dominate it with a total percentage of 87% and women 13%. Statistically, it was found that there was a relationship between the gender of the subject and complaints of shoulder pain when viewed from the physical abilities of women, on average about 2/3 of the physical abilities of men.¹⁵ This is because women undergo biological cycles such as menstruation, pregnancy, childbirth, breastfeeding, etc. According to the research of Wiwik Dian C (2016), age affects physical performance, where the increasing age of physical abilities will also gradually decrease with certainty.¹⁶

According to Revaldo's research (2021), material handling that exceeds the manual limit can cause pain in the left shoulder by 58.33% and the right shoulder by 56.25%. Often workers working manually without using tools to do their work will be able to cause complaints of pain, especially in the shoulder area.¹⁷

The results of the Spearman test analysis show that the correlation coefficient value of the pair of heavy load variables with complaints of shoulder pain is 0.551 so it can be accepted that the correlation between heavy load and shoulder pain is significant. The correlation coefficient value in the age variable is 1.000, indicating a relationship between pain and age. The higher the age, the higher the pain. While in gender, the correlation coefficient value is 0.006 meaning there is no relationship between pain and gender.

Lifting heavy weights on the shoulders indirectly causes the accumulation of small and large impacts that accumulate continuously over a while and can interfere with the normal function of the soft tissues of the musculoskeletal system consisting of the nervous system, deltoid muscle, supraspinatus tendon, supporting structures, and trapezius muscle to occur tissue damage that causes pain and pain in the shoulder. Shoulder pain can also be caused by overuse of the shoulder, so that the supraspinatus tendon in the shoulder region is inflamed or torn, or the joint surfaces of the acromioclavicular joint, sternoclavicular joint, and glenohumeral joint are damaged due to degenerative processes, excessive movement due to capsule, etc. The ligaments are weak and allow excessive movement. The ligaments are weak and allow excessive movement. Excessive

force causes shoulder instability leading to subluxation and dislocation.

Musculoskeletal complaints are one of the impacts of non-ergonomic work patterns.¹⁸ Many workers experience this in the workshop. The load they carry exceeds the provisions of the rules applied by the International Labour Organization (ILO), namely adult men 40 kg and adult women 15-20 kg, which causes musculoskeletal complaints to occur.^{19,20} The areas most often experience MSDs are the back, neck, shoulders, and extremities. These complaints usually arise over a relatively long period caused by various risk factor exposures.^{16,17}

Pressure is also related to static load on the shoulder muscles. The $p=0.000$ value and $r=0.551$ value were obtained. As a result, H_0 is rejected, and H_a is accepted, so it can be assumed that heavy loads significantly affect shoulder pain.

Limitations of this study. First, the sample size was small. A multicenter study with a larger sample size is needed to further verify this study's results. Secondly, as this study was a cross-sectional survey, we could not observe the level of shoulder pain complaints of patients dynamically, and it was challenging to explore the causal relationship between variables. Future researchers are expected to pay more attention to the duration of the lifting load and shoulder pain complaints in material transport workers.

CONCLUSIONS

Based on the results of data analysis and discussion of research that has been done, it can be concluded that there was a relationship between heavy loads and shoulder pain in material workers in Gianyar.

ETHICAL CLEARANCE

This study included informed consent. As such, the study did not require ethical approval or consideration.

CONFLICT OF INTEREST

This study has no conflicts of interest.

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AUTHOR CONTRIBUTIONS

IPMS and NLPKGS conceived the study design and data collection and drafted the manuscript; IPAG and AANTND collected the data and revised the manuscript.

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