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The Relationship of Individual and Occupational Factors with Complaints of Tendinitis in Transport Workers at Bulog Talumolo Rice Warehouse Bulog Bulog Gorontalo Branch Office

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ABSTRACT

Transportation workers in rice warehouses have a high risk of experiencing unergonomic work postures, excessive physical workload, and high lifting frequencies that can trigger tendinitis complaints. These complaints can be influenced by various factors, both individual factors and work factors. This study aims to determine the relationship between individual factors and occupational factors with tendinitis complaints in transport workers at Bulog Talumolo Rice Warehouse, Gorontalo. This study uses a quantitative research methodology with observational analytical research types and cross-sectional design. The population and sample in this study amounted to 50 transport workers, the sampling technique was a total sampling. The statistical test used in this study is the Spearman Rank test. The results of the analysis using the Spearman Rank test showed that there was a significant relationship between individual factors, namely age ($p = 0.000$; $r = -0.594$), body mass index ($p = 0.002$; $r = 0.424$), and occupational factors, namely work posture ($p = 0.032$; $r = 0.304$), physical workload ($p = 0.019$; $r = 0.331$), and tendinitis complaints. The conclusion that individual and occupational factors are significantly related to tendinitis complaints. It is recommended that there be ergonomic interventions, training on correct working postures, and reduction of repetitive workload as an effort to prevent tendinitis complaints in transport workers.

INTRODUCTION

The informal sector according to International Labour Organization (ILO), Work in the informal sector often puts the perpetrators in a vulnerable position to the risk of work accidents and health problems due to the lack of formal regulatory protections. One of the real manifestations of this phenomenon is the profession of lift-to-transport workers or porters, where individuals offer manual material mobilization services. In carrying out their duties, these workers rely heavily on physical capacity as the main instrument to carry, carry, pull, and push loads. The high dependence on bodily strength without the support of a standardized safety system makes this profession have a significant occupational health urgency to be studied (Betancourt-Sánchez, 2021).

Many health risks are associated with manual work of workers transporting goods. The concept of work done using their bodies to transport loads poses such risks. Freight forwarders have a higher risk of work-related illnesses. MSD causes diseases that usually persist. Discomfort, pain, itching, and fatigue can be caused by damage to tendons, muscles, ligaments, joints, nerves, cartilage, or spinal discs (Yenni et al., 2023).

Transport workers are a representation of labor that offers services to move materials or goods between locations as the main source of livelihood. Technically, operational activities in this profession are dominated by manual handling mechanisms, where the physical strength of individuals becomes the central instrument in work.

This shows that worker productivity is highly dependent on biological conditions and body resistance, given the lack of use of mechanical aids in the process (Wahyuni, 2019). Transport worker jobs involve a very high level of work that poses a risk to occupational health and safety. Each task must be balanced with the physical and cognitive abilities of the worker according to their limitations. (Tarwaka, 2019).

Research conducted by the Toronto Institute for Health and Work found that incorporating ergonomic elements into work can improve health and productivity. Disruption Musculoskeletal Work-related WMSDs have been on the rise in industries United States identified as a major factor in causing work-related illnesses. As a result of WMSD, an estimated 846,000 workdays are lost each year, resulting in $20 billion in medical costs. However, with the implementation of better ergonomic elements, medical costs can be reduced to $43 billion (National Academy of Sciences, 2005). World Health Organization (WHO) in 2020 stated that around 1.71 billion people in the world experienced problems Musculoskeletal, which affects productivity and quality of life. According to the World Health Organization (WHO), 619 million cases of low back pain occurred in 2020, and it is projected to be 843 million by 2050. MSDs are now a major factor in the cause of disability worldwide and pose a huge socio-economic burden. International Labour Organization (ILO) records 374 million non-fatal occupational accidents and 2.78 million work-related deaths each year. In the scope of occupational health and safety, Musculoskeletal Disorders (MSDs) recorded as one of the most dominant health disorders experienced by workers, especially in the informal sector (K. A. Rahmawati et al., 2025). Number of diseases Musculoskeletal in Indonesia at 7.9%, according to Riskesdas data in 2018, the highest prevalence was found in Aceh (13.3%), followed by Bengkulu (10.5%). Bali (8.5%), and Bengkulu (Riskesdas, 2018).

Disorders of MSDs in tendons occur due to inflammation caused by repetitive work activities and putting a load on the tendons without providing enough rest time. Inflammation that occurs in tendon tissue is often referred to as tendinitis. Disruption Musculoskeletal related to work, one of which is tendinitis, is one of the main issues in occupational health at the global level, especially in workers who perform manual handling tasks (Scott, et al., 2024).

Tendinitis It is one of the musculoskeletal disorders characterized by inflammation of the tendons, which are strong connective tissues that connect muscles to bones. This condition is usually caused by overuse, injury, or other rheumatic conditions. Tendinitis Initially, it shows symptoms of pain due to inflammation, which feels painful when touched or moved. Prevalence tendinitis Manual workers show alarming numbers in various industrial sectors. Studies conducted on manufacturing companies Heavy equipment found the prevalence of inflammation in the tendons by 9% of 1244 workers (Bozukova, 2023).

Tendinitis due to individual factors and employment factors. Individual factors play an important role in susceptibility to tendinitis. The first individual factor, age, is a factor related to increased risk, especially for chronic tendinopathy of the shoulder. Decreased tissue regeneration capacity, older people are at greater risk of tendon disorders. Both factors of body mass index (BMI) are also associated with the likelihood of being exposed to tendinitis. Weight increases mechanical stress on joints and tendons, increasing the risk of inflammation due to excess stress, when compared to individuals of ideal weight, workers with an above-normal BMI are more likely to experience muscle and tendon pain (Rahmilah et al., 2025).

Tendinitis It is also caused by occupational factors, especially unergonomic working postures, people working with repetitive physical loads, and lifting frequency. The first occupational factor is the risk factor for disorders Musculoskeletal, including tendinitis, is a work posture that does not conform to ergonomic principles, such as bending, bending, or raising the hands above the shoulders. The second factor is the physical workload, work that requires excessive use of muscles and tendons, especially due to heavy workloads, is the main cause tendonitis. Although tendons can withstand mechanical stress, repeated microtrauma to their tissues can cause inflammation. In the case of tendinitis, a chronic inflammatory response occurs when the load received exceeds its physiological capacity or if there is not enough recovery time. (Samoylov et al., 2022)

Transport workers are one of the working groups that show a high vulnerability to development tendinitis, which is caused by the intrinsic demands of their roles, which include heavy manual handling activities. This profession requires workers to engage in the repetitive lifting, moving, and transport of large loads in postures that often lack ergonomic considerations. The interaction between the physical needs of the work environment and the individual attributes of workers raises a complex set of problems that require a comprehensive understanding to formulate effective preventive measures (S. Rahmawati et al., 2023).

Preliminary observations showed that two out of five transport employees between the ages of 21 and 35 were not at risk of developing tendinitis, while three employees over 35 years of age were considered at risk of developing tendinitis. One worker had a body mass index (BMI) of 30.84 in the obesity category, and the other four workers were in the normal category (BMI 18.5–24.9). Three workers have been working for more than ten years, which is considered a long period of service; Two workers have worked for six to ten years, which is considered a medium working period. In addition, three out of five transport workers complained of shoulder pain after performing lifting duties, while the other two did not. They also smoke between 12 and 20 cigarettes per day, which is a moderate-level smoking habit.

Based on the work factor, the initial observation results of five workers showed that all workers did physical work by lifting heavy weights manually. The main work activities observed included lifting, carrying, and

moving sacks of rice weighing 5 to 50 kg. In addition to rice, transport workers also transport cooking oil weighing about 11 kg per box (12 liters) and sugar packaged in sacks weighing 5 to 50 kg.

METHOD

This research was carried out at the Bulog Talumolo Rice Warehouse, Perum Bulog, Gorontalo Branch Office from January to February 2026 This study applies a quantitative method with an observational analytical design through a cross-sectional approach. The population in this study is all transport workers at the Bulog Talumolo Rice Warehouse, Perum Bulog, Gorontalo Branch Office, which consists of 50 people. All people in the population were sampled as a whole through the total sampling technique. The variables in this study consist of independent variables and dependent variables. Independent variables are individual factors which include age, body mass index, smoking habits, working period and occupational factors including work posture, physical workload, lifting frequency. Meanwhile, the dependent variable is tendinitis complaints. Data was collected using a questionnaire that has been tested for validity and reliability. Data analysis was carried out univariate and bivariate using sperman's rank test to determine the relationship between individual and employment factors and tendinitis complaints in transport workers at the Talumolo rice warehouse in the Gorontalo branch office.

RESULTS AND DISCUSSION

Respondent Characteristics

Univariate Analysis

Table 1 Distribution of respondents by age

Age	Quantity	
	n	%
≥35 years (at risk)	37	74
<35 years old (not at risk)	13	26
Total	**50**	**100**

Primary Data Sources 2026

Based on Table 1, the distribution of the number of workers by age is the most in the risk category with 37 workers (74%) and the least is in the non-risk category with 13 workers (26%).

Table 2 Distribution of Respondents Based on Body Mass Index (BMI)

Body Mass Index (BMI)	Quantity	
	n	%
Skinny	5	10
Normal	25	50
Overweight	11	22
Obesity	9	18
Total	**50**	**100**

Primary Data Sources 2026

Based on Table 2, the distribution of the number of workers based on body mass index (BMI) is mostly in the normal category with 25 workers (50%) and the least is in the Skinny category with 5 workers (10%).

Table 3 Distribution of Respondents by Work Posture

Work Posture	Quantity	
	n	%
Low Risk	10	20
Medium Risk	17	34
High Risk	23	46
Total	**50**	**100**

Primary Data Sources 2026

Based on Table 3, the distribution of the number of workers based on work posture is most in the high-risk category with 23 workers (46%) and the least is in the low-risk category with 10 workers (20%).

Table 4 Distribution of Respondents by Physical Workload

Physical Workload	Quantity	
	n	%
Very Light	3	6
Lightweight	9	18
Medium	19	38
Weight	17	34
Very Heavy	2	4
Total	**50**	**100**

Primary Data Sources 2026

Based on Table 4, the distribution of the number of workers based on physical workload, the most are in the medium category with 19 workers (38%) and the least are in the very heavy category with 2 workers (4%).

Table 5 Distribution of Respondents by Tendinitis Complaints

Complaints *of Tendinitis*	Quantity	
	n	%
0 No Pain	2	4
1-3 Mild Pain	14	28
4-6 Moderate Pain	24	48
7-10 Severe Pain	10	20
Total	**50**	**100**

Primary Data Sources 2026

Based on Table 5, the distribution of the number of workers based on tendinitis complaints is mostly in the Moderate pain category with 24 workers (48%) and the least is in the non-pain category with 2 workers (4%).

Bivariate Analysis

Table 6 Cross-tabulation between age and complaints of tendinitis in transport workers at Bulog Talumolo Rice Warehouse Perum Bulog Gorontalo Branch Office

Age	Complaints *of Tendinitis*								Quantity		*P* value	r
	No pain		Mild pain		Moderate pain		Severe pain		n	%		
	n	%	n	%	n	%	n	%				
≥35 Years at Risk	1	2,7	4	10,8	24	69,9	8	21,6	37	100	0,000	-0,594
<35 Years not at risk	1	7,7	11	84,6	0	0	1	7,7	13	100		
Total	2	4	15	30	24	48	9	18	50	100		

Primary Data Sources 2026

Based on table 6, it shows that in the age group ≥35 years old, the most are in the category of moderate pain tendinitis complaints with a total of 24 workers (69.9%), while workers with the age group of <35 years are the most in the category of mild pain tendinitis complaints as many as 11 workers (84.6%).

And there was 1 respondent with the age of ≥35 years who did not experience complaints of tendinitis. This can be caused by differences in each person's physical condition and physical abilities, such as good muscle strength, ideal tendon tissue endurance, and the body's ability to adjust workloads. Other factors, such as correct weightlifting techniques, shorter working times, adequate rest time, and a good level of fitness, can also lower the risk of complaints. Meanwhile, there was 1 respondent with the age of <35 years who had complaints of severe pain tendinitis, this was caused by a high physical workload, especially manual lifting of weights that were done repeatedly and in an unergonomic way. Additional factors that can increase the risk of tendon inflammation are

excessive biomechanical stress on the tendon, improper working posture, and muscle fatigue due to lack of rest. This condition suggests that complaints of tendinitis are not only influenced by age, but also by the mechanism of work, the intensity of the workload, and the way workers do their work. This means that even though workers are at a younger age, they are still more likely to develop complaints of tendinitis if they are exposed to excessive and repetitive workloads.

Based on the results of the Spearman's Rho statistical test, a p-value of 0.000 was obtained, which is significantly smaller than the significance level of α = 0.05. These findings indicate a clear relationship between the age factor and the prevalence of tendinitis complaints in transport workers at the Bulog Talumolo Rice Warehouse, Perum Bulog, Gorontalo Branch Office. Interestingly, the correlation coefficient showed a negative value with the strength of the relationship in the medium category. This illustrates the direction of the relationship that is antagonistic or in the opposite direction, where in the subjects of this study, the more at-risk age group (≥35 years) actually shows a lower rate of tendinitis complaints, and vice versa.

In line with research conducted by Fajariani et al., (2015) The study found that the age-variable beta coefficient had a negative direction with a value of -0.320, which means that in certain situations, MSD complaints tend to decrease, statistically with age, although ergonomics theory generally suggests that old age increases the risk. Although the direction of the negative connection is influenced by the variable coding system, in terms of frequency distribution, it can be seen that workers aged ≥35 years have more complaints tendinitis with moderate and severe pain. Physiologically, increasing age can lead to decreased tendon elasticity, reduced muscle strength, and decreased tissue recovery ability, thus increasing the risk of tendonitis.

Table 7 Cross-tabulation between Body Mass Index (BMI) and Complaints of Tendinitis in Transport Workers at Bulog Talumolo Rice Warehouse Perum Bulog Gorontalo Branch Office

Body Mass Index (BMI)	Complaints *of Tendinitis*								Quantity		*p* value	r
	No pain		Mild pain		Moderate pain		Severe pain		n	%		
	n	%	n	%	n	%	n	%				
Skinny	0	0	5	100	0	0	0	0	5	100		
Normal	1	4	8	32	16	64	0	0	25	100		
Overweight	1	9,1	0	0	8	72,7	2	18,2	11	100	0,002	0,424
Obesity	0	0	1	11,1	0	0	8	88,9	9	100		
Total	2	4	14	28	24	48	10	20	50	100		

Source : Primary Data 2026

Based on table 7, it shows that the body mass index with the most thin category is in the category of mild pain tendinitis complaints with 5 workers (100.0%), the body mass index with the most normal category is in the category of moderate pain tendinitis complaints with 16 workers (64.0%), the body mass index with the most overweight category is in the category of tendinitis complaints moderate pain with 8 workers (72.7%), and body mass index with the most obesity category was in the category of severe pain tendinitis complaints with 8 workers (88.9%). And there were 8 respondents with body mass index (BMI) in the normal category who experienced complaints of mild pain tendinitis. This is because with normal BMI weight and height remain balanced, so that the mechanical load received by the musculoskeletal system, including tendon tissue, remains at the physiological limit of the body. This allows the tendon to work properly without being subjected to excessive pressure that can lead to inflammation. and 16 respondents who experienced complaints of moderate pain tendinitis, this is due to physical workload that is carried out repeatedly and for a long period of time, even though the respondents have a body mass index (BMI) that is considered normal, the repetitive manual lifting process can cause the accumulation of pressure and microtrauma on the tendon tissue. As a result, the tendon tissue becomes inflamed, which causes moderate pain complaints. There was 1 respondent with a body mass index (BMI) in the overweight category who did not experience complaints of tendinitis. This is due to the body's physiological adaptability to the workload, so that the tendon network is still able to tolerate mechanical stress that occurs during work activities. Other factors, such as correct weight-lifting techniques, ergonomic working postures, and not excessive work frequency, can also help reduce the risk of developing tendinitis complaints. Those who report excessive BMI also have the potential to develop tendinitis.

Based on the results of statistical analysis using the Spearman's Rho correlation test, a significance value of 0.002 ($p < 0.05$) was found, which proves that there is a statistically significant relationship between Body Mass Index (BMI) and the prevalence of tendinitis complaints in transport workers at the Bulog Talumolo Rice Warehouse, Gorontalo Branch Office. The results of this study showed a correlation coefficient value of r = 0.424, which indicates that the level of strength of the relationship is in the moderate category with a positive correlation direction. This means that the increase in BMI value is directly proportional to the increased risk or intensity of

tendinitis complaints, so that the anthropometric factor is a crucial aspect for the physical health of workers in the environment.

Referring to the theory put forward by Tarwaka (2015), musculoskeletal complaints that correlate with the anthropometric dimensions of the body are generally triggered by structural imbalances in the skeletal system when supporting body weight and external loads. This phenomenon causes an escalation of mechanical stress in muscle components, joints, and other supporting tissues, especially when the workload received exceeds the threshold of an individual's physiological capacity. Furthermore, uneven distribution of load will create biomechanical instability that ultimately accelerates the occurrence of tissue fatigue and the risk of injury to the motor system.

Table 8 Cross-tabulation between work posture and complaints of tendinitis in transport workers in Bulog Talumolo Rice Warehouse Perum Bulog Gorontalo Branch Office

Work Posture	Complaints *of Tendinitis*								Quantity		value	*r*
	No Pain		Mild Pain		Moderate pain		Severe pain		n	%		
	n	%	n	%	n	%	n	%				
Low Risk	0	0	7	70	3	30	0	0	10	100	0,032	0,304
Medium Risk	0	0	3	17,6	13	76,5	1	5,9	17	100		
High Risk	2	8,7	5	21,7	8	34,8	8	34,8	23	100		
Total	2	4	17	34,0	22	44	9	18	50	100		

Source : Primary Data 2026

Based on table 8, it is shown that the work posture with the highest risk category is in the category of mild pain tendinitis complaints as many as 7 workers (70.0%), the work posture with the most moderate risk category is in the category of moderate pain tendinitis complaints as many as 13 workers (76.5%), and the work posture with the highest risk category is in the category of tendinitis complaintsmoderate and severe pain in 8 workers (34.8%). And there were 7 respondents with a low-risk posture who experienced complaints of mild pain tendinitis. This is because the position of the worker's body is still in a fairly ergonomic position and does not burden the musculoskeletal system, especially the tendon network. There were 3 respondents who had a low risk posture but experienced complaints of moderate pain tendinitis. This is because the workload that does not exceed the maximum limit of manual lifting or is still within reasonable limits is not less or no more but moderate. Meanwhile, there were 2 respondents who did not even experience pain. This is because the working position is still in the ergonomic category and the lifting load is still within the maximum limit (≤20 kg).

Based on the results of the Spearman's Rho correlation test, a p-value of 0.032 was obtained, which is below the significance threshold of $\alpha = 0.05$. These findings indicate a statistically significant relationship between work posture and the prevalence of tendinitis complaints in transport workers at the Bulog Talumolo Rice Warehouse, Perum Bulog Gorontalo Branch Office. The value of the correlation coefficient ($r = 0.304$) indicates a positive one-way relationship, where the increased risk of working posture is directly proportional to the increase in tendinitis complaints. Clinically, this condition is triggered by unergonomic load lifting activities and physical loads that exceed the maximum carryability limit, which reaches or exceeds 20 kg

Table 9 Cross-tabulation between physical workload and tendinitis complaints in transport workers at Bulog Talumolo Rice Warehouse Bulog Bulog Gorontalo Branch Office

Physical Workload	Complaints *of Tendinitis*								Quantity		*p* value	*r*
	No pain		Mild Pain		Moderate pain		Severe pain		n	%		
	n	%	n	%	n	%	n	%				
Very light	0	0	3	100	0	0	0	0	3	100	0,019	0,331
Lightweight	1	5,3	3	33,3	5	55,6	0	0	9	100		
Medium	1	5,3	3	15,8	13	68,4	2	10,5	19	100		
Weight	0	0	2	15,4	4	30,8	7	53,8	17	100		
Very heavy	0	0	1	50	0	0	1	50	2	100		
Total	2	4	15	30	24	48	9	18	50	100		

Source : Primary Data 2026

Based on table 9, it is shown that the physical workload with the most severe pain category is in the category of mild pain tendinitis complaints as many as 3 workers (100.0%), the physical work category with the most light category is in the category of moderate pain tendinitis complaints as many as 5 workers (55.6%), the physical workload with the most moderate category is in the category of tendinitis complaintsmoderate pain as many as 13 workers (68.4%), physical workload with the most severe categories was in the category of moderate and severe pain tendinitis complaints as many as 6 workers (35.3%), and physical work with the most very heavy category was in the category of mild pain and severe pain tendinitis complaints as much as 1 worker (50.0%). And there were 5 respondents with a physical workload in the light category and even experienced complaints of moderate pain tendinitis This is due to old age (more than forty years), excess weight, and smoking habits that reduce blood flow and tendon regeneration capacity. As a result, tendons are susceptible to inflammation despite minimal loads. In addition, unergonomic working postures such as tendon microtrauma gradually occur, especially in the shoulders and wrists, despite light loads, bending postures, or repetition of hand movements (OWAS category 2-3). And there is 1 respondent with a physical workload in the very heavy category and even has complaints of mild pain tendinitis This is because the age of the worker is still in the non-risk category (<35 years), the working period is not more than 5 years and the posture of the worker is still in an ergonomic or low position and no improvement is needed.

Based on the results of the Spearman's Rho statistical test, it was found that the p-value was 0.019, which is significantly smaller than the alpha value ($\alpha = 0.05$). These findings indicate a clear relationship between physical workload and the prevalence of tendinitis complaints in transport workers at the Bulog Talumolo Rice Warehouse, Perum Bulog Gorontalo Branch Office. A correlation coefficient of 0.331 indicates a positive unidirectional relationship, which means that an increase in the intensity of physical workload is directly proportional to an increase in tendinitis complaints. The condition is triggered by load carrying activities that exceed the maximum capacity (more than 20 kg) without the support of mechanical aids. Performed repeatedly and over a long duration, this activity exerts excessive mechanical stress on the musculoskeletal system, particularly in the muscle tissue, joints, and tendons, thus increasing the risk of occupational health problems.

CONCLUSION

There is a relationship between age and complaints of tendinitis in workers transporting rice warehouses in Bulog Talumolo Perum Bulog Gorontalo Branch Office with a p-value of 0.000. Where the p-value is < of α (α = 0.05)

There was a relationship between body mass index and complaints of tendinitis in transportation workers in the rice warehouse of Bulog Talumolo Perum Bulog Gorontalo Branch Office with a p-value of 0.002. Where the p-value is < of α (α = 0.05)

There is a relationship between work posture and complaints of tendinitis in workers transporting rice in the Bulog Talumolo rice warehouse with a p-value of 0.032. Where the p-value is < of α (α = 0.05)

There was a relationship between physical workload and tendinitis complaints in transportation workers in the Bulog Talumolo rice warehouse with a p-value of 0.019. Where the p-value is < of α (α = 0.05)

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