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## FACTORS INFLUENCING COMPLAINTS OF MUSCULOSKELETAL DISORDERS (MSDS) ON FEMALE TRANSPORT WORKERS “TUKANG SUUN” AT BADUNG-KUMBASARI MARKET

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### Abstract

Work as a transport worker or "manufacturer" is one of the jobs at risk of musculoskeletal disorders (MSDs). Complaints are caused by various factors such as age, years of service, workload, and hauling distance. This study aims to determine the effect of age, years of service, weight of load, and distance of transport with musculoskeletal complaints. The research location was carried out in Badung-Kumbasari Market, Denpasar City with a cross sectional method. The design used in this study is a cross sectional study. Data collection was carried out from September-December 2016. The sample of this study was taken consecutively with 32 women as respondents. Musculoskeletal complaints were measured using a Nordic Body Maps questionnaire with a Likert scale and the factors to be studied were using questionnaires and tools that had been prepared. Data analysis used the Pearson correlation test. From the results of the study, it was found that there was a relationship between age and musculoskeletal complaints ( $r^*=0.625$ ;  $p<0.001$ ), the relationship between years of service and musculoskeletal complaints ( $r^*=0.683$ ;  $p<0.001$ ), the relationship between the weight of the load and musculoskeletal complaints ( $r^*=0.731$ ;  $p<0.001$ ) and the relationship between haulage distance and musculoskeletal complaints ( $r^*=-0.528$ ;  $p<0.001$ ). It can be concluded that age, working period, weight of load and hauling distance affect MSDs in haulage workers and weight of load is the dominant factor. It is hoped that ergonomic weight control can reduce musculoskeletal complaints in female transport workers.

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### Introduction

Everyone in doing work is at risk of experiencing interference or injury that can interfere with his health. The most common complaint experienced by someone who does work is a complaint on his musculoskeletal system or what is commonly termed as a complaint of musculoskeletal disorders (MSDs). Complaints of MSDs are complaints of skeletal muscle parts that are felt by a person ranging from very mild complaints to very sick. If the muscles receive static loads repeatedly for a long time, it can cause complaints in the form of damage to joints, ligaments, and tendons (Tarwaka & Sudiajeng, 2004).

The results of a study on MSDs show that the muscles of the neck, shoulders, arms, hands, fingers, back, waist, and lower muscles are the most commonly affected parts of

workers. The causes or factors that influence the occurrence of MSDs in each job include gender, age, body posture, weight of transportation, distance of transportation, frequency of transportation, as well as external factors that influence it. In studies on the European continent, if these musculoskeletal complaints continue, it will manifest into several diseases such as rheumatoid arthritis (27.9%), spondyloarthopathy (23.2%), osteoarthritis (10.8%), sprains or strains (7.2%), pain in the spine and neck (3.6%), osteoporosis (1.1%), and upper limb disorders (0.5%) (Zheltoukhova, 2013) (Kulin & Reaston, 2011) (Sirge, Erelina, Kums, Gapeyeva, & Pääsuke, 2014). Complaints of MSDs can also affect the productivity of workers to perform her job.

In Denpasar City, there is one of the economic centers of the community, namely Pasar Badung-Kumbasari. The Badung-Kumbasari market is one of the traditional markets that is a place for the development of informal sector work and absorbs a lot of labor (Zheltoukhova, 2013) (Purawati, 2011). As the largest traditional market in Denpasar City which provides basic needs, traders and buyers are in dire need of the services of goods transport workers at Badung Market. Kumbasari or often referred to as a sundresser.

Tukang Suun is a term for female transportation workers who work to offer their services to transport groceries or merchandise to be moved to one place, by placing the goods on top of their heads. The number of stackers recorded at the Regional Company of Pasar Badung-Kumbasari Denpasar City is 90 people (Yanti, 2014). From previous studies, the load lifted by each person ranged from 25-50 kg plus a basket of 1-2 kg, and the average distance traveled per transport frequency 100 meters long (Hutagalung, 2013). According to the International Labor Organization (ILO), the lifting limit for women is between 9.6-14.3 kg, so that the transportation workers in the Badung-Kumbasari Market exceed the normal lifting limit. In observations made in December 2015 at the Badung-Kumbasari Market, interviews were conducted with female transport workers "tukang suun" and goods owners that the weight of the goods lifted varies and the luggage can exceed 50 kg depending on the luggage such as unprocessed food ingredients.

Based on these data, ergonomics discrepancy is also one of the risks of MSDs in the stacker. This study aims to determine the relationship between the incidence of MSDs in transportation workers at Badung-Kumbasari Market with several risk factors, namely age, load, working mass, and haul distance. And in the future it is useful in preventing the incidence of MSDs in workers who have similar activities.

## Research Method

The design used in this study is a cross sectional study. Data collection was carried out from September-December 2016. All female transport workers who were in the Badung-Kumbasari market were the target population. All of the women need to transport goods for women who are in the Badung-Kumbasari market to become an affordable population.

From the affordable population, there are 90 people, the sample is selected by consecutive sampling that has been determined by the formula (S., 2014). The number of samples is determined based on the number of target population (N) of 90 people, the expected standard deviation ( $Z\alpha$ ) is 1.96, which is the expected confidence level the sample is 95%, the proportion of events at the population level (P) is 50%, and the level of precision or desired effect size is 15%. By using the formula for determining the sample size (n'k) it takes 29 people and plus 10% of the sample to 32 people to anticipate the drop out of the sample.

Samples were selected based on inclusion and exclusion criteria. The inclusion criteria for selecting the sample were female transport workers “tukang Suun” who were in the Badung-Kumbasari Market and in Ex. Tiara Wholesale and work by upholding the goods carried over the head. The sample will enter the exclusion criteria if the sample has a history of pain before doing work, the sample is speech-impaired and blind and the sample is not willing to be studied.

The measured variable is the total value of the Nordic Body Map questionnaire with a Likert scale which is one measure of complaints of musculoskeletal disorders (MSDs) as the dependent variable. Age, working period, weight of load and hauling distance as independent variables while as threshold variables are ambient temperature and relative humidity.

Data collection was carried out in the Badung-Kumbasari and Ex Tiara Wholesale Markets by conducting structured interviews by researchers and measuring instruments that had been prepared previously. Structured interviews used interview guidelines in the form of questionnaires to obtain information on age, years of service, frequency of transportation and history of previous illnesses. The weight of the lifting load is measured by weighing the load to be lifted using the Camry Luggage Scale. The measurement of hauling distance uses the O2 Pedometer tool to measure the distance traveled in real time from the start of work to the end of work. Musculoskeletal complaints were measured using a Nordic Body Maps questionnaire with a Likert scale. Prior to interviews and measurements, respondents had filled out informed consent as evidence of consent to participate in the study.

Characteristics of respondents were analyzed univariately, while the relationship between age, length of service, weight of load, hauling distance and musculoskeletal complaints were analyzed bivariately to calculate the correlation coefficient ( $r^*$ ) as a determinant of the effect of a relationship between variables. Bivariate analysis using the Pearson correlation test was assisted by the help of a computerized program (Lapau, 2013).

## Result and Discussion

### Characteristics of Respondents and Workload

All respondents studied agreed to participate in this study and there was no refusal. Characteristics of respondents and workload in this study include age, education level, weight, height, years of service, weight of transportation load, hauling distance, frequency of transportation, and length of work of previous respondents which are presented in Table 1.

**Table 1. Distribution of Respondents' Characteristics and Work Weight.**

Characteristics	n	%
<b>Age</b>		
20-29 years old	2	6,3
30-39 years old	8	25
40-49 years old	13	40,6
50-59 years old	8	25
More than 60 years	1	3,1
Total	32	100
(Min=25 years, Max=65, Mean=44.09, SD=9,014, Median=44,5, Mode=45)		
<b>Level of education</b>		
No School	23	71,9
Primary School (SD)	8	25
Junior high school (SMP)	1	3,1

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Total	32	100
	(Min=0, Max=2, Mean=0,31, SD=0,535, Median=0, Modus=0)	
<b>Weight</b>		
40-49 kilograms	3	9,4
50-59 kilograms	12	37,5
60-69 kilograms	8	25
70-79 kilograms	5	15,6
80-89 kilograms	3	9,4
90-99 kilograms	1	3,1
Total	32	100
	(Min=45 kg, Max=92 kg, Mean=63.41, SD=12,567, Median=63, Mode=56)	
<b>Height</b>		
140-149 cm	3	9,4
150-159 cm	19	59,4
160-169 cm	10	31,3
Total	32	100
	(Min=148 cm, Max=168 cm, Mean=156.34, SD=5.32, Median=155, Mode=153)	
<b>Years of Service</b>		
Less than 10 years	2	6,3
10-19 years old	7	21,9
20-29 years old	14	43,8
30-39 years old	7	21,9
40-49 years old	2	6,3
Total	32	100
	(Min=8 years, Max=42 years, Mean=24.56, SD=8.955, Median=25, Mode=25)	
<b>Load weight</b>		
30-39 kilograms	8	25
40-49 kilograms	9	28,1
50-59 kilograms	12	37,5
60-69 kilograms	3	9,4
Total	32	100
	(Min=31,8 kg, Max=65 kg, Mean=48,191, SD=9,3875, Median=49,65, Modus=38)	
<b>Transport distance</b>		
Less than 2,500 meters	16	50
2,500-5,000 meters	4	12,5
5,001-7,500 meters	2	6,3
7.501-10,000 meters	6	18,8
More than 10,000 meters	4	12,5
Total	32	100
	(Min=1.050 m, Max=11.531 m, Mean=4.818,13, SD=3.609,088, Median=2.470,5, Modus=1050)	
<b>Transport frequency</b>		
10-19 times	22	68,8
20-29 times	9	28,1
More or equal to 30 times	1	3,1
Total	32	100
	(Min=10 kali, Max=37 kali, Mean=18,06, SD=5,984, Median=17, Modus=10)	
<b>Length of working</b>		
4 hours	3	9,4
5 hours	4	12,5
6 hours	14	43,8
7 hours	8	25
8 hours	3	9,4
Total	32	100
	(Min=4, Max=8, Mean=6,13, SD=5,984, Median=6, Modus=6)	

Table 1. It can be seen that the age variable in the respondent group is mostly in the 40 to 49 year age group as many as 13 people (40.6%). For the education level of the respondents, at most 23 people (71.9%). Based on weight and height, the most respondents' body weight was in the weight range of 50-59 kilograms as many as 12 people (37.5%), and the highest respondent's height was in the range of 150-159 cm as many as 19 people (59.4%). The history of the disease suffered by the respondent in the interview results all respondents had suffered from upper respiratory tract infections, fever, and diarrhea.

Based on the workload, the most working years ranged from 20-29 years (43.8%). Heavy haulers carry the most loads, on average, 50-59 kilograms per working day. The highest frequency of transportation ranges from 10-19 times by way of 22 people (68.8%) and workers who work a day for a maximum of 6 hours as many as 14 people (43.8%).

#### Musculoskeletal complaints

Musculoskeletal complaints include pain or stiffness in the upper or lower neck, pain in the shoulders, pain in the left and right upper arms, pain in the back, waist, buttocks, buttocks, right and left elbows, left and right forearms, right wrists and ankles, left, right and left fingers, right and left thighs, right and left knees, left and right calves, left and right ankles, and left and right toes are presented in Table 2.

**Table 2. Respondents Musculoskeletal Complaints.**

Complaint Type	Scale							
	1		2		3		4	
Upper neck	0	(0%)	8	(25%)	14	(43,8%)	10	(31,3%)
Lower neck	0	(0%)	8	(25%)	15	(46,9%)	9	(28,1%)
Left shoulder	0	(0%)	11	(34,4%)	17	(53,1%)	4	(12,5%)
Right shoulder	0	(0%)	9	(28,1%)	19	(59,4%)	4	(12,5%)
Left upper arm	3	(9,4%)	15	(46,9%)	12	(37,5%)	2	(6,3%)
Back	2	(6,3%)	10	(31,3%)	15	(46,9%)	5	(15,6%)
Right upper arm	3	(9,4%)	11	(34,4%)	16	(50%)	2	(6,3%)
Waist	2	(6,3%)	6	(18,8%)	18	(56,3%)	6	(18,8%)
Butt	5	(15,6%)	7	(21,9%)	15	(46,9%)	5	(15,6%)
Butt	5	(15,6%)	10	(31,3%)	14	(43,8%)	3	(9,4%)
Right elbow	6	(18,8%)	14	(43,8%)	5	(15,6%)	7	(21,9%)
left elbow	6	(18,8%)	14	(43,8%)	5	(15,6%)	7	(21,9%)
Left forearm	13	(40,6%)	11	(34,4%)	7	(21,9%)	1	(3,1%)
Right forearm	13	(40,6%)	10	(31,3%)	8	(25%)	1	(3,1%)
Left wrist	13	(40,6%)	15	(46,9%)	3	(9,4%)	1	(3,1%)
Right wrist	14	(43,8%)	15	(46,9%)	2	(6,3%)	1	(3,1%)
Left hand fingers	21	(65,6%)	7	(21,9%)	3	(9,4%)	1	(3,1%)
Right hand fingers	21	(65,6%)	7	(21,9%)	3	(9,4%)	1	(3,1%)
Left thigh	1	(3,1%)	4	(12,5%)	13	(40,6%)	14	(43,8%)
Right thigh	1	(3,1%)	4	(12,5%)	13	(40,6%)	14	(43,8%)
Left knee	0	(0%)	2	(6,3%)	2	(6,3%)	28	(87,5%)
Right knee	0	(0%)	2	(6,3%)	2	(6,3%)	28	(87,5%)
Left calf	1	(3,1%)	5	(15,6%)	9	(28,1%)	17	(53,1%)
Right calf	1	(3,1%)	6	(18,8%)	8	(25%)	17	(53,1%)
Left ankle	3	(9,4%)	15	(46,9%)	13	(40,6%)	1	(3,1%)
Right ankle	3	(9,4%)	16	(50%)	12	(37,5%)	1	(3,1%)
Left toes	14	(43,8%)	17	(53,1%)	1	(3,1%)	0	(0%)
Right toes	14	(43,8%)	17	(53,1%)	1	(3,1%)	0	(0%)

**Description**

1 = no complaints

2 = few complaints

3 = complaints interfere with work, disappear immediately (<24 hours)

4 = complaints that interfere with work, disappear for a long time (> 24 hours)

Table 2. shows that the most musculoskeletal complaints were on the right and left knees with 28 respondents (87.5%) stating that they felt pain or discomfort that interfered with their work for a long time.

All these complaints, they are added up to get the total value of musculoskeletal complaints so that musculoskeletal complaints are obtained for female transport workers at the Badung-Kumbasari Market with minimum complaints with a total score of 58 and a maximum of 95. The mean value obtained is 70.64 with a standard deviation of 7.738.

**Bivariate Analysis**

Bivariate analysis between the 4 independent variables and the dependent variable showed that they had a relationship in influencing musculoskeletal complaints in respondents, namely age, years of service, weight of the load and hauling distance which are presented in Table 3.

**Table 3. Relationship between Independent Variables and Dependent Variables.**

Predictive variable	Musculoskeletal complaints		
	r*	p	n
Age	0,625	<0,001	32
Years of service	0,683	<0,001	32
load weight	0,731	<0,001	32
Transport distance	-0,528	0,002	32

r\* = correlation coefficient

p=probability

The bivariate analysis of each independent and dependent variable using the Pearson correlation test, it was found that the correlation coefficient (r\*) was positive for the variables of age, work period and weight of transport with the number of musculoskeletal complaints in respondents. The results of the correlation coefficient (r\*) that the relationship between age and the number of musculoskeletal complaints is 0.625 with a p value of <0.001, while the relationship between years of service and musculoskeletal complaints is 0.683 with a p value of 0.001 and the relationship between transport weight and the number of musculoskeletal complaints is 0.731 with a value of p<0.001. This shows that there is a strong relationship between age, years of service, weight of transport and the number of musculoskeletal complaints in respondents.

In another bivariate analysis, the variable distance of transportation with the number of musculoskeletal complaints obtained a negative correlation coefficient (r\*) of 0.528 with a value of p=0.002. This shows that there is a strong relationship between the distance of transportation and the number of musculoskeletal complaints in the respondents.

The results of this study indicate that there is a relationship between 4 variables that have been shown to affect musculoskeletal complaints in respondents, namely age, length of service, weight of transport load and haul distance.

Age in the results of this study was shown to increase musculoskeletal complaints. This is in line with the opinion of Chaffin and Guo who stated that in general musculoskeletal complaints begin to be felt at the age of 35 years and the level of complaints will continue to increase in line with increasing age (As' Adi, Sujoso, & Prasetyowati, 2014). There is a relationship between age and musculoskeletal complaints because the transport workers entering In middle age, the strength and endurance of the



muscles have begun to decrease so that the risk of musculoskeletal complaints will increase if they continue to carry loads that exceed the ability of the muscles to contract optimally (Hall & Hall, 2020).

The working period in the results of this study was proven to affect musculoskeletal complaints in female transport workers. This is supported by activities with long-term periods that will result in pain and the pain will become permanent in the limbs that are related to work such as the body, arms, joints and muscles that contract for a long time (Suma'mur, 2019).

The results of this study indicate that the weight of the load affects the magnitude of musculoskeletal complaints in female transport workers at Badung-Kumbasari Market. This is in accordance with Sugeng Budiono's theory which states that every human being has the ability to lift different loads depending on their respective conditions. Musculoskeletal complaints can also be caused by excessive muscle stretching and are often complained of by transport workers whose activities are lifting, pushing, pulling and holding a load. In carrying out manual material handling or manual lifting of goods if carrying heavy loads will result in increased musculoskeletal complaints in these workers (Gómez-Galán, Callejón-Ferre, Díaz-Pérez, Carreño-Ortega, & López-Martínez, 2021). In the manual material handling guidelines the load that can be lifted by a woman is a maximum of 15 kilograms, if excessive it will cause musculoskeletal complaints (Susihono & Adiatmika, 2021).

Multiple linear regression analysis shows that the weight of the load is the dominating factor of the other three factors. This is indicated by the results of the T test of Tcount of the weight of the load greater than Ttable ( $2.519 < 2.04523$ ) which proves that workload is the main cause of musculoskeletal complaints in female transport workers in Badung-Kumbasari Market. The factors of age, working period and hauling distance are supporting factors or intermediate variables that cause an increase in musculoskeletal complaints in transport workers.

The transport distance in the results of this study has a negative relationship with musculoskeletal complaints. This is different from Eko Nurmiyanto's theory which states that the longer the distance traveled, the greater the musculoskeletal complaints (De Groote & Falisse, 2021). However, after re-analysis, the researcher found that the hauling distance also had a negative relationship with the weight of the load with a correlation coefficient ( $r^*$ ) of 0.614 with a probability of  $< 0.001$ . This means that the greater the distance traveled by the transport workers, the lighter the load carried, causing fewer musculoskeletal complaints.

## Conclusion

Based on the results of the research that has been described in the discussion, it can be concluded that the factors of age, length of service, weight of load, and distance of transportation affect musculoskeletal complaints in female transport workers in Badung-Kumbasari Market. The increase in factors of age, length of service, and weight of the load tends to increase musculoskeletal complaints in female transport workers at Badung-Kumbasari Market. Meanwhile, the longer the hauling distance, the lighter musculoskeletal complaints caused by the negative relationship between the hauling distance and the weight of the load. In terms of influencing musculoskeletal complaints in these transport workers, the weight of the load becomes the dominant factor in the emergence of complaints.

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