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## Factors Related to the Low Back Pain Complaint of Heavy Equipment Operator

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**Abstract****Original Research Article**

Low Back Pain (LBP) is clinical syndrome with main symptom is in vertebrae area at the lower. Age, the long-term time of work, working period, body mass index, smoking status, sport habits and work position that become the factors to determine low back pain complaint of heavy equipment operator. This research aims are to know the factors that related to the low back pain complaint of heavy equipment operator at Tol Layang A.P Pettarani Project in Makassar City. This type of research is observational analytic with cross sectional study approach. Data collected on March - April 2019 with 45 operators as samples taken by total sampling technique. The data were obtained using questionnaire, nutritional status using weight scales and microtoice, work posture using REBA, and LBP complaint using Oswestry Disability Index (ODI). The data analysis that carried out was univariate and bivariate with chi-square test. The result of the research shows that 46.7% have LBP complaint and that is 53.3% don't have LBP complaint. As for the relation that occurs between age ( $p=0.001$ ), work period ( $p=0.001$ ), work posture ( $p=0.003$ ) with the LBP complaints. The conclusion of this research is that there is a relation between the age, work period and work posture with the Low Back Pain complaint. As for suggestions to these company is put up ergonomic work posters as a form of socialization to operators and modify the worker's place to be more comfortable and prevent the LBP complaint becomes worse.

**Keywords:** Low Back Pain, Heavy Equipment Operator, Construction.

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### INTRODUCTION

Along with the development of technological advances that continue to increase, the role of human labor is still the main and most important thing in producing production, not least the production process of companies that still use manual tools that involve humans in their work. In carrying out a job at work, a person is at risk of getting an accident or illness due to work. One of the work-related disorders that result from work-related diseases is low back pain.

Low back pain is a clinical syndrome characterized by the main symptoms of pain or other feelings that are uncomfortable in the lower back region [1]. LBP is a symptom that is often described as blunt, deep pain, stiffness, persistence and spread to the bottom of the buttocks, legs, and feet [2]. United States statistics show an incidence of 15%-20% per year. As many as 90% of back pain cases are not caused by organic abnormalities, but by body position errors at work [3]. Research conducted by PERDOSSI Pain Study Group (Indonesian Neurologist Association) on 14 teaching hospitals in Indonesia shows the number of pain

sufferers is 4,456 people (25% of total visits) of which 1,598 people (35.86%) of whom are lower back pain sufferers (NPB) or LBP [4].

Humans in carrying out their work influenced by various factors, there are beneficial or detrimental that can cause occupational diseases such as low back pain. These factors include physiological factors. Physiological factors caused by poor posture and an ergonomic work tools can cause physical fatigue and can eventually cause physical changes in the worker's body [5]. In addition there are also individual factors, lifestyle factors, environmental factors and psychological factors that are factors that influence the complaint of low back pain [6].

Based on Regulation Of The Minister Of Manpower And Transmigration Of The Republic Of Indonesia Number PER.09 / MEN / VII / 2010 Concerning Operators And Officers Of Aircraft And Transport, operators are workers who have the ability and have special skills in the operation of lift and transport aircraft [7]. Heavy equipment operators who work in a sitting position have a maximum weight 6-7

times more than standing because there is an emphasis on the spinal cord, causing the muscles of the waist to become tense and the muscles lacking oxygen which results in 6 in the lower back area so the level complaints of low back pain is very high [8].

Based on research conducted by Kristiawan, the results show that the relationship of the type of vehicle used by the operator with LBP events shows that there is a significant relationship between the risk factors for static vehicle types and LBP events. The odds ratio for this factor is 4.19, which means the possibility of being exposed to the risk of a static vehicle is 4.19 times that of a moving vehicle driver. There is a significant relationship between the incidence of low back pain with exercise habits of heavy equipment operators (p value = 0.029,  $\alpha = 0.05$ ). Odds Ratio also shows a significant value of 2.94, which means that employees who do not have regular exercise habits will have a risk of developing low back pain by 2.94 times greater than employees who often exercise regularly. It was found that employees who were diagnosed with low back pain experienced more work stress (43%) compared to those who were not diagnosed with low back pain (14%) [1].

Low back pain in heavy equipment operators is caused by several factors, risk factors in the form of behavior and the environment that affects the occurrence of low back pain. Behavioral factors / individual characteristics that are influenced by age, smoking behavior, lack of exercise, not maintaining weight, work attitude that is not ergonomic. Environmental influences in the form of vibration, pressure and stress at work. Problems such as within a company or in a construction project are still under-addressed and underestimated. In fact, if left unchecked, this will be detrimental to the company due to the loss of several hours of work and the company has to pay medical expenses for the worker. Therefore, this study aims to determine the factors associated with complaints of low back pain in heavy equipment operators.

## METHODS

This type of research is analytic observational with cross sectional study approach. This research was conducted at the A.P Pettarani overpass toll road in Makassar City in March - April 2019. The population is 45 people. The total sample of 45 people were taken by total sampling technique. Data obtained from respondents using questionnaires, scales and microtoice to get nutritional status data, REBA to get work attitude data, Oswestry Disability Index questionnaire to get LBP complaint data. Data analysis performed was univariate and bivariate using the chi square test and the results were presented in tables and narratives.

## RESULTS

**Table-1: Distribution of Respondents to Heavy Equipment Operators of A.P Pettarani Flyover Project Makassar City**

Variable	Frequency	
	n	(%)
<b>Age</b>		
Old (>35 Years Old)	28	62.2
Young (<= 35 Years Old)	17	37.8
<b>Length of Working</b>		
Qualify	45	100
<b>Years of service</b>		
Old (> 10 years)	24	53.3
New (<= 10 years)	21	46.7
<b>Body Mass Index (BMI)</b>		
Abnormal	28	62.2
Normal	17	37.8
<b>Smoking Status</b>		
Smoke	39	86.7
Not smoking or quitting	6	13.3
<b>Sports Habits</b>		
Bad	42	93.3
Well	3	6.7
<b>Work attitude</b>		
Not Ergonomic	32	71.1
Ergonomic	13	28.9
<b>Low Back Pain Complaints</b>		
Experiencing LBP	21	46.7
Not Experienced LBP	24	53.3

Source: Primary Data, 2019

The results of the study based on the age of the respondents obtained that respondents who are old are 28 people (62.2%) and young people are 17 people (37.8%). The length of work of respondents who worked as operators met the requirements of 45 people (100%). Based on the working period, it was found that the operators who had the old work status were 24 (53.3%) while the operators who had the new work status were 21 people (46.7%). Based on the Body Mass Index (BMI) the results show that operators who have a non-native BMI of 28 people (62.2%) and a normal BMI of 17 people (37.8%) (Table-1).

While based on the operator's smoking status, it was found that respondents who smoked were 39 people (86.7%) and respondents who did not smoke or had stopped smoking namely as many as six people (13.3%). Based on exercise habits, it is found that operators who have bad sports habits are 42 people (93.3%) and good sports habits are three people (6.7%). Based on work attitudes, it is found that operators who have ergonomic work attitudes are 32 people (71.1%) and operators who have ergonomic work attitudes are 13 people (28.9%). Based on the measurement results of low back pain complaints using the Oswestry Disability Index (ODI) questionnaire obtained that operators who experienced low back pain by 21 people (46.7%) while operators who did not experience low back pain by 24 people (53.3%) (Table-1).

**Table-2: Relationship of Independent Variables with Dependent Variables on Heavy Equipment Operators A.P Pettarani Layang Toll Road Project**

Variable	Low Back Pain				Total		Statistical Test Result
	Experiencing		Not Experiencing		n	%	
	n	%	n	%			
<b>Age</b>							<i>p</i> = 0.001
Old	19	67.8	9	32.2	28	100	
Young	2	11.7	15	88.3	17	100	
<b>Years of Service</b>							<i>p</i> = 0.001
Long (>10 years)	5	20.8	19	79.2	24	100	
New (≤ 10 years)	16	76.2	5	23.8	21	100	
<b>IMT</b>							<i>p</i> = 0.134
Abnormal	16	57.1	12	42.9	28	100	
Normal	5	29.4	12	70.6	17	100	
<b>Smoking Status</b>							<i>p</i> = 0.126
Smoke	20	51.3	19	48.7	39	100	
Do not smoke or have stopped	1	16.7	5	83.3	6	100	
<b>Sports Habits</b>							<i>p</i> = 0.143
Bad	21	50	21	50	42	100	
Good	0	0	3	100	3	100	
<b>Work Attitude</b>							<i>p</i> = 0.003
Not Ergonomic	20	62.5	12	37.5	32	100	
Ergonomic	1	7.6	12	92.4	13	100	

Source: Primary Data, 2019

The results of bivariate analysis showed that low back pain complaints were more experienced by older respondents, 19 people (67.8%), compared to younger respondents only two respondents (11.7%). The results of data analysis using the Chi Square test *p* value = 0.001 (*p* < 0.05), this means that H0 is rejected and Ha is accepted, it can be concluded that age has a relationship with complaints of low back pain on heavy equipment operators of the AP Pettarani City elevated toll road project Makassar (Table-2).

The results of bivariate analysis showed that low back pain complaints were more experienced by respondents who had a new service life of 16 people (76.2%), compared to respondents who had a long service life of only five respondents (20.8%). The results of data analysis using the Chi Square test obtained the value of *p* = 0.001 (*p* < 0.05), this means that H0 is rejected and Ha is accepted, so it can be concluded that the working period has a relationship with complaints of low back pain on the heavy equipment operator of the AP Pettarani elevated toll road project Makassar City (Table-2).

The results of bivariate analysis showed that low back pain complaints were more experienced by respondents who had an abnormal BMI of 16 people (57.1%), compared to respondents who had a normal BMI of five respondents (29.4%). The results of data analysis using the Chi Square test *p* value = 0.134 (*p* > 0.05), this means Ha is rejected and H0 is accepted it can be concluded that the Body Mass Index (BMI) has no relationship with complaints of low back pain in project

heavy equipment operators AP Pettarani elevated highway Makassar City (Table-2).

The results of bivariate analysis showed that low back pain complaints were more experienced by respondents who had bad exercise habits, namely 21 people (50%), compared to respondents who had good sports habits, namely 0 respondents (0%). The results of data analysis using the Chi Square test *p* value = 0.143 (*p* > 0.05), this means that Ha is rejected and H0 is accepted, so it can be concluded that sports habits do not have a relationship with low back pain complaints on heavy equipment operators of the AP elevated toll road project Makassar City Pettarani (Table-2).

The results of bivariate analysis showed that low back pain complaints were more experienced by respondents who had non-ergonomic work attitudes namely 20 people (62.5%), compared to respondents who had ergonomic work attitudes namely 12 respondents (37.5%). The results of data analysis using the Chi Square test obtained *p* value = 0.003 (*p* < 0.05), this means that H0 is rejected and Ha is accepted, it can be concluded that work attitude has a relationship with low back pain complaints on heavy equipment operators of the AP Pettarani elevated toll road project Makassar City (Table-2).

## DISCUSSION

Low back pain is pain that is found in the lower part of the spine. Usually located between the base of the ribs with the upper part of the lower leg. These complaints are things that can arise due to various

causes. LBP is a symptom that is often described as blunt, deep pain, feeling stiff, permanent and radiating to the bottom of the buttocks, legs, and feet.

In this study, it was found that workers who experience low back pain complaints tend to be experienced in older age operators (> 35 years) compared to younger operators ( $\leq$  35 years). In general, complaints from the muscles begin to be felt at the age of 25-65 years of work. The first complaint is usually felt at the age of 35 years and the level of complaints will continue to increase with age. This happens because in middle age, muscle strength and endurance begin to decrease, so the risk of muscle complaints increases. A person's age is directly proportional to physical capacity to a certain extent and reaches a peak at the age of 25 years. At the age of 50-60 years muscle strength decreases by 25%, motor sensory ability decreases by 60%. Furthermore, the physical work of a person aged > 60 years to reach 50% of people aged 25 years [9].

In this study, operators who have a long working period ( $\geq$ 10 years) tend to experience low back pain complaints compared to operators who have a new work period (<10 years). Long working periods for work that is carried out monotonously and continuously, can cause physical stress resulting in pain in the muscles. Physical pressure over a period of time will result in decreased muscle performance and symptoms of lower movement, accumulated pressure every day will worsen health and cause clinical fatigue so that muscle and bone saturation occurs physically and psychologically and can lead to musculoskeletal disorders [10].

In this study, operators who had abnormal IMT tended to experience low back pain complaints compared to operators who had normal BMI. Someone who has an abnormal body mass index is at twice the risk of having complaints in the lower back region than people with a normal body mass index [11]. In people who have excess weight the risk of hip pain is greater, because the burden on the supporting joints will increase in body weight, so as to allow the occurrence of low back pain. Excessive weight can cause traction in the soft tissues of the back [2].

This study explains that operators who experience complaints of low back pain tend to be operators who smoke compared to operators who do not smoke or have stopped smoking. The effect of smoking habits on the risk of muscle complaints has a close relationship with the duration and level of smoking habits. The longer and the higher the frequency of smoking, the higher the level of muscle complaints felt. Boshuizen *et al.*, found a significant relationship between smoking and muscle complaints. Smoking can reduce lung capacity due to carbon monoxide content so that the ability to consume oxygen decreases and as a result the level of freshness decreases. If the person

concerned performs a task that requires exertion, he will get tired easily because of the low oxygen content in the blood, the combustion of carbohydrates is inhibited, there is a buildup of lactic acid, and finally muscle pain arises [12].

In this study explained that operators who experience complaints of low back pain tend to be operators who have bad exercise habits compared to operators who have good exercise habits. Less physical activity can reduce the supply of oxygen to the muscles so that it can cause muscle complaints. In general, muscle complaints are more rarely found in someone who in their daily activities have enough time to rest and do enough physical activity. The level of muscle complaints is also strongly influenced by the level of freshness of the body. Adequate physical activity and carried out regularly can help prevent complaints of low back pain [13].

In this study explains that operators who experience complaints of low back pain tend to be operators who have an ergonomic work attitude compared to ergonomic work attitude. Static work positions are also a cause of low back pain. Static work attitudes over long periods of time lead to complaints in the musculoskeletal system. If this is allowed to continue and do not pay attention to ergonomic factors, it will be easier to cause complaints of low back pain [14]. In addition to the suitability of the use of a seat, a desk that is not the right size tends to make the wrong attitude or sitting position. If this is done continuously it can cause interference with the body and cause fatigue in the muscles in this case low back pain [15]. Research conducted by Tona *et al.*, explains that the magnitude of the incidence of muscle pain and many risk factors occupational diseases is almost entirely in the form of low back pain. This causes a direct effect on the Body Mass Index on LBP and LBP on productivity [16].

## CONCLUSION

The study concluded that there were 46.7% who had LBP complaints and as many as 53.3% did not have LBP complaints. It is found that there is a relationship between age ( $p = 0.001$ ), years of service ( $p = 0.001$ ), work attitude ( $p = 0.003$ ) and there is no relationship between Body Mass Index (BMI) ( $p = 0.134$ ), smoking status ( $p = 0.126$ ) and exercise habits ( $p = 0.143$ ) with complaints of Low Back Pain in heavy equipment operators. Suggestions to the company are to put up an ergonomic work attitude poster for the operator and socialize the ergonomic work attitude, modify the work station of the operator to make it more comfortable and prevent the severity of low back pain (seat replacement, additional seat belts, etc.).

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