



## Determinant Factors of Low Back Pain in Paving Block Workers

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### Abstract

Paving block workers are included in the informal sector and have a risk of lower back pain. Documenting the workers' health status in the informal sector has not been done well so that workers do not get protection from the government. Heavy physical work puts pressure on the spine associated with repeated body twisting. This study aims to determine work attitude, length of employment, and exercise habits related to low back pain in Pontianak paving block workers in 2018. This type of research is observational with a cross-sectional approach. Sampling uses total sampling. The research sample of 56 paving block workers in the city of Pontianak, West Kalimantan. Data is processed with a computer program. Data analysis was performed univariate and bivariate and tested using the Chi-square test, with  $\alpha = 5\%$ . The results showed that there was a significant relationship between the length of the work ( $p = 0.013$ ), work attitude ( $p\text{-value} = 0.038$ ), and exercise habits ( $p = 0.003$ ) with low back pain.

### Introduction

Occupational health tends to realize optimal work productivity so that every worker can work healthily without endangering himself and the surrounding community (Ndjoulou, Desmarais, and Pérusse 2015; Bhagawati 2015). For healthy and productive workers to make work health care efforts. These services include promotive, preventive, curative, and rehabilitative work against workers (NS 2014; Jonathan and Mbogo 2016). Occupational health care efforts to protect workers against illness and work accidents (NS 2014). Occupational health services need to carry out continuously, both for formal and informal workers (Nankongnab et al. 2015; Bhagawati 2015). It aims to prevent occupational health problems originating from the work

environment, work capacity, and work.

Work risk is one of the causes of death and pain. It is estimated that 2.78 million deaths occur every year in all countries associated with employment. Employment-related deaths accounted for 5% of total deaths globally. The largest share of work-related deaths originated from work-related diseases, which accounted for 2.4 million (86.3%) of the estimated total deaths. Fatal accidents accounted for the remaining is 13.7%. The inclusion of Chronic Obstructive Pulmonary Disease (COPD) in the estimation of respiratory diseases, which is 17%, has increased and includes the top three diseases after circulatory disease 31% and malignant neoplasms 26%. Together, it contributes more than three-quarters of total work-related deaths, followed by 14% occupational accidents

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and 9% infectious diseases (Nankongnab et al. 2015; Bhagawati 2015).

Occupational diseases and accidents can occur due to various factors, namely work capacity, workload, and work environment factors. Workers factor, with unsafe work behavior, for example not using personal protective equipment and careless. Poor environmental conditions, namely noise, slippery floors, and low lighting. While work factors (workload) do monotonous work (Weinstock and Slatin 2012; Ulutasdemir et al. 2015; Hämäläinen, Takala, and Kiat 2017). Besides, behavioral factors play a large role in the emergence of accidents and occupational diseases (Swaminathan 2011).

Prevention of diseases and work accidents can be done by controlling these factors through directed and organized work health efforts (Swaminathan 2011; Pillay 2015). Besides, by increasing the active participation of all interested parties. However, although various prevention efforts have been developed due to human limitations and neglect, occupational health problems cannot be avoided (Pillay 2015; Wachter and Yorio 2014). The causes of work-related diseases are physical, chemical, biological, physiological, and psychological factors (Wachter and Yorio 2014; Yang et al. 2016). Among physiological (ergonomic) diseases, namely low back pain (Yang et al. 2016; Marras 2000). Lower back pain occurs due to an incorrect posture at work (Marras 2000; Salvagioni et al. 2017). Low back pain can cause physical fatigue and health problems (Furtado et al. 2014; Allegri et al. 2016). In the long term, material body changes or disability can occur (Allegri et al. 2016; Wong, Karppinen, and Samartzis 2017).

Low back pain is often seen as a disease of the elderly, and it is more common among young people. Trauma and mechanical disorders are the leading causes of lower back pain (Wong, Karppinen, and Samartzis 2017; Furtado et al. 2014). People who are not used to doing muscle work or have not done the job for a long time can cause acute lower back pain (Wong, Karppinen, and Samartzis 2017; Coenen et al. 2014). Especially in people whose age has increased and obesity with muscles and veins has been loosened.

These disorders are often experienced in the workplace, especially workers who move with the wrong body position (Ibrahimi-Kaçuri et al. 2015; Lis et al. 2007). Work with lifting heavy items or jobs with a half-sitting place for a long time can cause back pain. This is due to an imbalance in the strength of the abdominal muscles and waist muscles that support the lumbar bones (Hashimoto et al. 2017; Ibrahimi-Kaçuri et al. 2015; Lis et al. 2007). Almost all workers at one time in their life experience lower back pain. The results of research conducted on several workers found that lower back pain at one time during work often arises and requires medical treatment (Hashimoto et al. 2017; Ibrahimi-Kaçuri et al. 2015).

Risk factors that affect lower back pain incidence or prevalence are environmental, occupational, and worker factors. Environmental factors such as physiology (ergonomics), vibration, heat, and psychosocial. Heavy physical work puts pressure on the spine. Work-related to the movement of bending and rotating the body repeatedly and half standing, and the result is monotonous and does not provide satisfaction. Individual worker factors are related to mechanical back pain, namely, age, gender, body fitness, sports skills, and habits (Yang et al. 2016; Watanabe et al. 2018).

Paving block workers are one of the groups of informal workers who can experience low back pain. The activities are mostly done manually, half standing and sitting. Making paving blocks begins with preparing tools and materials, transporting raw materials, processing raw materials, doing drying, hardening, and removing paving blocks and cleaning equipment (Pokharkar et al., 2017).

## Method

This type of research was observational, with a cross-sectional approach, namely analysis to look at the description of the length of work, work attitudes, and exercise habits and at the same time to link with lower back pain in paving block workers. This research was conducted in the city of Pontianak. The sampling technique uses total sampling with a full sample size of 56 paving block workers.

Data collection techniques used in this study are interviews, observation, and examination. Interviews with questionnaires for collecting data on the characteristics of respondents and years of service. Direct observation using the checklist is used for working attitude data retrieval. Physical examination of workers is done for the data collection on symptoms of lower back pain. Data processing using a computer program including editing, coding, scoring, entry, tabulating and analyzing. Data analysis used univariate and bivariate analysis. Bivariate analysis using the chi-square test (X2) with a confidence level of 95% ( $\alpha = 95\%$ ).

**Results and Discussion**

Based on the results of research conducted by researchers, according to the age of the paving block workers obtained information as found in table 1.

Table 1. Frequency Distribution of Characteristics of Respondents

	Total	%
<b>Age (Years)</b>		
< 35	27	48.2
> 35	29	51.8
<b>Length of work (hours/day)</b>		
≤ 6	25	44.6
> 6	31	55.4
<b>Work Attitude</b>		
Right	47	83.9
Wrong	9	16.1
<b>Sports habits</b>		
≥30 minutes/weeks	27	48.2
Never	29	51.8
<b>Lower back pain</b>		
Mild	30	53.6
Several	26	46.4
<b>Total</b>	<b>56</b>	<b>100.0</b>

Source: Primary Data, 2018

Table 1 shows that the proportion of respondents based on the age of paving block workers in Pontianak City is > 35 years, as many as 29 (51.8%). Paving block workers' ratio with a long work of > 6 hours/day is 30 (53.6%). Based on observations made on paving block

workers, it is known that work attitudes consist of several activities. The work philosophy is the appointment of materials, stirring materials, printing paving blocks, removing printed material, and transfer of material, and the work attitude of storage and transfer of work. The results of the study obtained information that works perspectives (Table 1). Based on table 1, the proportion of paving block workers, who have the right working attitude, is 47 (83.9%).

Based on the research results on sports habits in the paving block, workers obtained information found in table 1. According to exercise habits, which is carried out for at least 30 minutes per week, is 27 (48.2%) (Table 1). Based on the research results on low back pain, paving block workers obtained information as found in table 1. Table 1 shows that paving block workers' proportion based on mild low back pain in Pontianak City is 30 (53.6%).

Table 2. Work Periods and Lower Back Pain in Block Paving Workers

Length Work (Hours)	Lower Back Pain						P value <sup>a</sup>
	Several		Mild		Total		
	n	%	n	%	n	%	
> 6	19	61.3	12	38.7	31	100,0	0,013*
≤ 6	7	28.0	18	72.0	25	100,0	
<b>Total</b>	<b>26</b>	<b>46,4</b>	<b>30</b>	<b>53.6</b>	<b>56</b>	<b>100,0</b>	

Source: Primary Data, 2018

<sup>a</sup>Chi Square,  $\alpha=5\%$ ; \*Significance ( $p \leq 0,05$ )

Based on table 2, there is a tendency for work periods > 6 hours/day to occur with severe low back pain (61.3%) more significant than the work period of ≤ 6 hours (37.5%). The statistical test results obtained from the calculation showed that there was a meaningful relationship between work periods with low back pain in paving block workers in Pontianak City (P = 0.013)

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workers in Pontianak City (P = 0.013)

Table 3. Work Attitude and Lower Back Pain in Block Paving Workers

Work Attitude	Lower Back Pain						P-value <sup>a</sup>
	Severel		Mild		Total		
	n	%	n	%	n	%	
Wrong	20	57.1	15	42.9	35	100,0	0,038*
Correct	6	26.6	15	71.4	21	100,0	
<b>Total</b>	<b>26</b>	<b>46,4</b>	<b>30</b>	<b>53.6</b>	<b>56</b>	<b>100,0</b>	

Source: Primary Data, 2018

<sup>a</sup>Chi Square, α=5%; \*Significance (p≤0,05)

Based on the table 3, there is a tendency for wrong working attitudes to occur with fallow lower back pain 57,1% greater than the correct work attitude 26.6%. The statistical test results obtained p-value = 0.038 which means that there is a significant relationship between work attitudes and low back pain in paving block workers in Pontianak City.

Table 4. Sports Habits and Lower Back Pain in Block Paving Workers

Sport habits	Lower Back Pain						P-value <sup>a</sup>
	Severe		Mild		Total		
	n	%	n	%	n	%	
Yes	7	25.9	20	74.1	27	100,0	0,003*
No	19	65.5	10	34.5	29	100,0	
<b>Total</b>	<b>26</b>	<b>46,4</b>	<b>30</b>	<b>53.6</b>	<b>56</b>	<b>100,0</b>	

Source: Primary Data, 2018

<sup>a</sup>Chi Square, α=5%; \*Significance (p≤0,05)

Based on table 4, there is a tendency for those who do not exercise (doing sports min. 30 minutes/week) with severe lower back pain (65.5%) more significant than those who exercise (25.9%). The statistical test results obtained a p-value = 0.003, which means a substantial relationship between sports habits (exercise) with lower back pain in Pontianak paving block workers. Lower Back Pain is felt in the lower back, whose source is the spinal cord, muscles, nerves, and other structures around the area (Ibrahimi-Kaçuri et al. 2015; Hashimoto et al. 2017; Lis et al. 2007). Several factors occur in low back pain, in addition to individual characteristics, also the workplace and work period (Ibrahimi-Kaçuri et al. 2015; Hashimoto et al. 2017). The research results on low back pain in paving block workers in the city of Pontianak showed that of 56 paving block

workers, all of whom provided information had experienced lower back pain at work. Lower back pain in paving blocks workers because most do not pay attention to physiological (ergonomic) work factors (Marras 2000; Yang et al. 2016; Salvagioni et al. 2017). In addition to the working period, lower back pain is aggravated by irregular daily working hours. This is supported by the results of the study, namely workers aged >35 years (51.8%) and the working period >5 hours/day (57.1) with work time per day >7 hours, most experienced back pain, which is 61%.

The statistical analysis results showed a significant relationship between the length of service with low back pain in paving block workers in Pontianak City (p = 0.013). The work period will affect the occurrence of workplace accidents (Pillay 2015). This happens because the longer workers work, the greater the risk of illnesses and occupational accidents at work (Furtado et al. 2014; Wong, Karppinen, and Samartzis 2017). Based on these results, the need for the paving block industry’s management to pay attention to the period of work and work time for workers. It’s arisen because working for a long time with a monotonous working attitude and the wrong working attitude will cause lower back pain. A wrong working attitude and carrying a continuous load will increase body pressure, especially the lower back pain, and cause disability (Lis et al. 2007; Coenen et al. 2014). It would help if you worked ergonomic attitude, and the burden carried not too heavy to avoid the risk of back pain that will occur to workers.

The results showed a relationship between work attitudes and lower back pain (p <0.05). Attitudes o positions in work (standing, sitting, or other working attitudes/positions), ergonomic considerations related to work positions are fundamental. There are several types of work that require individual attitudes that sometimes tend to be uncomfortable. These conditions make workers in a “strange” attitude and work position. It sometimes lasts for a long time (Wong, Karppinen, and Samartzis 2017), resulting in workers tired quickly, making many mistakes in work, or ends with a disability.

Work attitudes are grouped into six healthy working attitudes, namely work attitude

when lifting sand and cement, lifting material from Molen to the printing machine, suitability of printing machine position, elbow height at work, working attitude when printing paving blocks, working attitude when lifting prints for drying, and work attitude when lifting material (Wong, Karppinen, and Samartzis 2017; Lis et al. 2007; Coenen et al. 2014). There was a significant relationship between work attitudes and low back pain in paving block workers in Pontianak City ( $p < 0.05$ ). Workers lift material with the correct technique while keeping the back straight at an angle of about 15 degrees while lifting weights (Lis et al. 2007; Coenen et al. 2014) to minimize disruption abdomen and pressure on the framework of the lower spine. It is expected that the back takes a load, but the legs are working (Yang et al. 2016; Watanabe et al. 2018). Management can provide transport aids such as strollers as a tool to transport material to ease the burden of lifting (Freitas et al. 2011; Coenen et al. 2014).

When used, the press's position is expected to have a height of 5-10 cm below the elbow height. Besides, the foot of the media must be given a foundation or foundation. To reduce work habits that always bend or stand because the printing machine is too low from the standard (Freitas et al. 2011). Workers who will lift the printout so as not to overdo it. Besides, make sure the technique holds the correct one at the finger and palm (Pillai and Haral, n.d.), This is so that the load carried is more controlled and the pack is more evenly distributed throughout the body. Keep your back straight and upright at an angle of about 15 degrees. Working in a changing position or working attitude between sitting and standing periodically will reduce lower back pain disorders (Pillai and Haral, n.d.; Heneweer et al. 2011).

The results of the analysis showed a significant relationship between workers who had exercise habits (physical fitness training) with low back pain in paving block workers ( $p < 0.05$ ). Lack of physical fitness with exercise is one factor associated with lower back pain (Freitas et al. 2011; Wong, Karppinen, and Samartzis 2017). Workers who have exercise habits can reduce the risk of lower back pain than employees who do not exercise regularly

(Heneweer et al. 2011; Niederer, Vogt, and Banzer 2018). Workers who have a habit of physical exercise with a frequency of 3 times/weeks at least 60 minutes can reduce the risk of lower back pain complaints more significantly than those who do not want physical exercise 3 times/week at least 60 minutes or more.

## Conclusion

Based on the description above, it can be concluded that there is a significant relationship between years of service, ergonomic, work attitude, and exercise habits with low back pain in paving block workers ( $p < 0.05$ ). In this regard, it is recommended that there is a need for the socialization of correct work attitudes to prevent lower back pain in plots workers, which results from wrong working attitudes. Counseling about healthy working attitudes, repair of tools used well, regular exercise habits, and proper working time arrangements will result in optimal work productivity and occupational health.

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