Journal of Health and Behavioral Science
Vol. 4, No. 4, December 2022, pp. 619~634

Analysis of Factors Related to Low Back Pain (LBP) in Company Employees

Juviter Praimanjani[1], Apris A. Adu[2], Enjelita M. Ndoen[3]
[1,2,3]Faculty of Public Health, University of Nusa Cendana
e-mail: [1]praimanjanij@gmail.com, [2]aprisadu606@gmail.com,
[3]enjelitandoen@staf.undana.ac.id

Abstract. Low Back Pain is a condition that causes acute or chronic pain and discomfort in the lumbosacral area due to inflammation, degeneration, abnormal cell growth, trauma, or body system disorders. This study aims to analyze the relationship between age, work attitude, workload, and years of service with the incidence of LBP in employees at PT. Muria Sumba Manis. The type of research used is a quantitative analytic survey with a cross-sectional study design. The population in this study were all employees who worked in sugarcane planting, with as many as 71 people. The sample amounted to 61 people who were taken using simple random sampling. The results showed that the variables associated with the incidence of LBP were age (p-value = 0.000), work attitude (p-value = 0.021), workload (p-value = 0.000), and years of service (p-value = 0.000). There is a significant relationship between age, work attitude, workload, and years of service with the incidence of LBP among employees at PT. Muria Sumba Manis. It is expected that employees should pay attention to an ergonomic work attitude to minimize the incidence of LBP.
Keywords: *Work, Low Back Pain, Worker*

Abstrak. NPB merupakan kondisi yang menimbulkan rasa nyeri akut atau kronik serta ketidak nyamanan di daerah *lumbosacral*, karena keadaan inflamasi, degenerasi, kelainan pertumbuhan sel yang abnormal, trauma ataupun gangguan sistem tubuh. Tujuan penelitian ini yaitu menganalisis hubungan antara umur, sikap kerja, beban kerja dan masa kerja dengan kejadian NPB pada karyawan di PT. Muria Sumba Manis. Jenis penelitian ini adalah survei analitik kuantitatif dengan rancangan penelitian potong lintang. Populasi dalam penelitian ini semua karyawan yang bekerja sebagai tanam tebu sebanyak 71 orang, dengan sampel berjumlah 61 orang yang diambil menggunakan teknik pengambilan sampel acak sederhana. Hasil penelitian menunjukkan bahwa variabel yang berhubungan dengan kejadian NPB adalah umur (p-*hitung* = 0.000), sikap kerja (p-*hitung* = 0.021), beban kerja (p-*hitung* = 0.000) dan masa kerja (p-*hitung* = 0.000). Hasil penelitian ini menyimpulkan bahwa ada hubungan yang signifikan antara umur, sikap kerja, beban kerja, masa kerja dengan kejadian NPB pada karyawan di PT. Muria Sumba Manis. Harapan bagi karyawan sebaiknya memperhatikan umur, sikap kerja, beban kerja dan masa kerja dan juga memaksimalkan alat bantu yang ada serta istirahat yang cukup saat bekerja sehingga dapat meminimalisir terjadinya keluhan NPB.
Keywords: *Kerja, Nyeri Punggung Bawah, Pekerja*

Article history:
Received 2 June 2022
Received in revised form 13 December 2022
Accepted 5 January 2023
Available online 7 January 2023

Introduction

Low Back Pain (LBP) is a public health problem that is often encountered by almost everyone at least once in their lifetime, and this complaint can impact daily activities. LBP is a painful condition in the lower back spine that will especially appear when moving or mobilizing. LBP is rarely fatal, but the pain that is felt can cause sufferers to experience a decrease in the ability to carry out daily activities, have work health problems, and lose a lot of working hours in productive age and old age (Nurhafizhoh, 2019).

Based on the 2018 National Basic Health Research (Riskesdas) report, the prevalence of joint disease based on a doctor's diagnosis in the population aged 15 years in Indonesia is 713,783 cases. The majority of these cases in Indonesia decreased from 11.9% in 2013 to 7.3% in 2018. The highest majority occurred in 2018 for farmers and labourers, 9.86 %, and for those who did not work, 6.26%. (Kemenkes RI, 2018). The prevalence of joint disease in East Nusa Tenggara (NTT) Province is 28,430 cases, while in East Sumba Regency, there are 1,379 cases (Dinkes Provinsi NTT, 2018)

Data on LBP cases recorded at Prof. Hospital. Dr. WZ Johannes in 2018 was 1371 cases, where 85% of the causes of LBP were non-specific such as muscle complaints and muscle and ligament injuries (Pandjukang et al., 2020). Data on cases of joint disease in Kupang City in 2019 were 2756 cases (Dinkes Kota Kupang, 2019).

LBP is a phenomenon that is often encountered in every work environment. The work environment can affect the occurrence of LBP complaints to employees. An employee is one of the informal sector workers who work in a company. The risk of LBP complaints to employees can be due to a considerable workload and non-ergonomic positions at work, such as bending, twisting, squatting, tilting the body, and lifting weights. Workers who work intensely in a bent position often experience complaints of pain in the lower back or LBP (Tarwaka in Ramadhiani et al., 2017).

Previous research on PT. Apac Inti Corpora Semarang City in 2018 found that 74% of informal sector workers had a risk of developing LBP because they worked with the wrong body posture (Arwinno, 2018). Another study by Kasumawati (2020) showed that 90.9 % of respondents who experienced LBP complaints were in the category of work postures that needed improvement. The results of the analysis of the study stated that there was a significant relationship between work position and LBP complaints (Kasumawati et al., 2020).

Various factors can increase the risk of LBP complaints in workers. These factors include age, years of service, work attitude, and workload. LBP complaints are also often caused by the wrong sitting posture at work, extended sitting, and excessive activity (Wijayanti, 2017). Rahayu's research (2020) shows a relationship between age, length of service, and work posture variables with musculoskeletal complaints. Research Ones et al. (2021) also indicate an association between age, service size, work length, and LBP work attitude. Regarding age, complaints of LBP can usually be found in the age range of 18-56 years (Atmantika, 2014). LBP is also most common at the age of 35-55 years. Increasing age will increase the risk of LBP complaints due to degeneration of the condition of the intervertebral disc (cartilage joint) (Ramadhiani et al., 2017).

Length of service is another factor associated with LBP complaints. The working period is related to accumulating one's work activities in a relatively long 5-10 years period. Most LBP occurs in workers who work for ten years (Umami in Tupa, 2018). Previous research has shown that the risk of LBP complaints will increase once an individual has worked in a place. This is because LBP is a chronic disease that takes a long time to develop and manifest (Ningsih, 2017).

Another risk factor for LBP complaints is workload. The workload is the burden of physical, mental, and social activity received by a person that must be completed within a specific time, to the physical abilities and the limitations of the workers who receive the burden. Awaluddin et al. (2019) showed a variable relationship between workload and worked attitude with LBP. LBP complaints are

experienced mainly by respondents with heavy workloads compared to light workloads. The greater the workload a person receives to be completed within a certain period, the greater the risk of suffering from LBP.

Work attitude also dramatically affects the occurrence of LBP in a worker. Work attitude is a position when doing work, including sitting, standing, bending, walking, squatting, etc. Ningsih's (2017) research shows a relationship between work attitude and LBP. Workers with non-ergonomic work attitudes have a higher risk of experiencing LBP complaints than those with ergonomic work attitudes.

PT Muria Sumba Manis is located in NTT Province, East Sumba Regency. PT Muria Sumba Manis is engaged in plantation activities and the sugar factory business. PT Muria Sumba Manis has set a production target of 12,000 TCD (Ton Cane per Day). PT Muria Sumba Manis is one of the large-scale companies and the largest company in East Sumba. This PT has 71 employees in the planting and maintenance division whose types of activities are very vulnerable to suffering from LBP complaints. Working for employees, such as planting sugar cane, manual cleaning, lifting sugar cane, watering plants, and others, can drain a lot of energy and energy, so employees must pay attention to an ergonomic work attitude.

Employees at PT Muria Sumba Manis have the potential to suffer from LBP. A reasonably heavy workload and monotonous and repetitive activities can pressure the muscles, resulting in LBP complaints. Employees who work at PT Muria Sumba Manis are also estimated to be 35 years old and at increased risk of experiencing LBP complaints. In addition, the work attitude of the employees at PT Muria Sumba Manis is not ergonomic. The initial survey found that workers ignore a good working position. They are constantly bending, lifting, and squatting, which will significantly affect the occurrence of LBP complaints.

The initial survey by prospective researchers on February 26, 2021, also found that 8 out of 10 respondents who worked as employees of the sugarcane planting and care division at PT Muria Sumba Manis complained of pain in the lower back, waist, neck, arms, and legs. Result of working under a heavy workload.

Employees who experience LBP complaints have worked for more than five years. Although the work carried out is vulnerable to LBP complaints, employees must work as much as possible and produce the products expected from the company. Based on the background description, the authors need to research "Analysis of the relationship between age, work attitude, workload and tenure with LBP (Low Back Pain) on employees at PT. Muria Sumba Manis in 2021"

Method

This research used an analytical survey method with a cross-sectional study design, where data collection and measurement of independent and dependent variables were taken simultaneously. A cross-sectional study design is an epidemiological study that studies the prevalence, distribution, and relationship of disease and exposure by simultaneously observing the status of exposure, condition, or other outcomes in individuals of a population. The instruments in this study were questionnaires and observation sheets to measure the variables to be examined. The variables of age, workload and years of service in this study used a questionnaire. Measurement of work attitude variables through observation using the observation sheet of the Rapid Entire Body Assessment (REBA) form.

The time of study took place from 4-30 January 2022. The population in this study were all employees who worked in the maintenance and planting division at PT. Muria Sumba Manis sugar cane plantation in 2021, totalling 71 people. The sample in this study was employees who worked in the maintenance and planting division at PT. Muria Sumba Manis, totaling 61 people. Questionnaires and observation sheets were used as tools in this study. The data will be analyzed using univariate and bivariate.

Result

Table 1
Distribution of Respondents by Gender on Employees at PT. Muria Sumba Manis 2021

No	Gender	N	%
1	Man	31	50.8
2	Woman	30	49.2
	Total	**61**	**100**

Based on Table 1, it is known that the percentage of respondents who are male and female are almost the same, namely 50.8% and 49.2%, respectively.

Table 2.
Distribution of Respondents Based on Education Level of Employees at PT. Muria Sumba Manis 2021

No	Level of education	N	%
1	Sd	17	27.9
2	Junior high school	18	29.5
3	Senior high school	23	37.7
4	S1	3	4.9
	Total	**61**	**100**

Based on Table 2, most respondents have a high school education, as many as 23 people (37.7%), and at least three have an undergraduate education (4.9%).

Table 3.
Distribution of Respondents by Age on Employees at PT. Muria Sumba Manis 2021

No	Age	N	%
1	at risk	47	77.1
2	No risk	14	22.9
	Total	**61**	**100**

Based on Table 3, it is known that most of the respondents are at risk of LBP (77.1 %).

Table 4.
Distribution of Respondents Based on Work Attitudes to Employees at PT. Muria Sumba Manis 2021

No	Work attitude	N	%
1	Very High Risk	5	8.2
2	High Risk	43	70.5
3	Medium Risk	13	21.3
	Total	**61**	**100**

Table 4 shows that most respondents have a high-risk work attitude toward LBP (70.5 %) and at least have a very high-risk work attitude toward LBP (8.2%).

Table 5.
Distribution of Respondents Based on Workload on Employees at PT. Muria Sumba Manis 2021

No	Workload	N	%
1	Heavy	44	72.1
2	Light	17	27.9
	Total	**61**	**100**

Based on Table 5, it is known that most of the respondents have a heavy workload (72.1 %).

Table 6.
Distribution of Respondents Based on Term of Service to Employees at PT. Muria Sumba Manis 2021

No	Years of Service	N	%
1	At risk	47	77.1
2	No risk	14	22.9
	Total	**61**	**100**

Based on Table 6, it is known that most of the respondents have a working period at risk of LBP (77.1 %).

Table 7.
The Relationship between Age and the Incidence of LBP for Employees at PT Muria Sumba Manis in 2021

Age	*Low Back Pain*						p- *value*
	Yes	%	Not	%	n	%	

at risk	45	95.7	2	4.3	47	100	0.000
No Risk	7	50	7	50	14	100	
Total	**52**	**85.2**	**9**	**14.8**	**61**	**100**	

Based on Table 7, most of the respondents with age at risk have LBP (95.7%). On the other hand, the percentage of respondents in the non-risk age group experiencing and not experiencing LBP is the same (50% each).

The results of statistical tests using *Chi-Square* showed that the p-value (*0.000*) < (0.05). There is a significant relationship between age and the incidence of LBP among employees at PT. Muria Sumba Manis in 2021.

Table 8.
The Relationship between Work Attitudes and LBP Incidences for Employees at PT Muria Sumba Manis in 2021

Work Attitude	***Low Back Pain***						**p- *value***
	Yes	**%**	**Not**	**%**	**n**	**%**	
Very high risk	5	100	0	0	5	100	0.021
High risk	39	90.7	4	9.3	43	100	
Medium risk	8	61.5	5	38.5	13		
Total	**52**	**85.2**	**9**	**14.8**	**61**	**100**	

Table 8 shows that the results of this study did not find respondents who experienced everyday work attitudes and low-risk work attitudes of LBP. Table 8 shows that most high-risk and moderate work attitudes experienced LBP (90.7 % and 61.5%), and all respondents with very high-risk work attitudes experienced LBP (100%).

The results of statistical tests using *Chi-Square* showed that the p-value (*0.02*) < (0.05). There is a significant relationship between work attitudes and the incidence of LBP among employees at PT. Muria Sumba Manis in 2021.

Table **9**.
The Relationship between Workload and LBP Incidence for Employees at PT Muria Sumba Manis in 2021

Workload	***Low Back Pain***						**p- *value***
	Yes	**%**	**Not**	**%**	**n**	**%**	
Heavy	44	100	0	0	44	100	0.000
Light	8	47.1	9	52.9	17	100	
Total	**52**	**85.2**	**9**	**14.8**	**61**	**100**	

Based on Table 9, it is known that all respondents with heavy workloads experienced LBP (100%). On the other hand, the respondents in the light workload group who participated and did not experience LBP were almost the same (47.1 % and 52.9%).

The results of statistical tests using *Chi-Square* showed that the p-value (*0.000*) < (0.05). There is a significant relationship between workload and the incidence of LBP among employees at PT. Muria Sumba Manis in 2021.

Table 10.
The Relationship between Work Period and LBP Incidence for Employees at PT Muria Sumba Manis in 2021

Years of service	***Low Back Pain***						**p- *value***
	Yes	**%**	**Not**	**%**	**n**	**%**	
At risk	47	100	0	0	47	100	0.000
No risk	5	35.7	9	64.3	14	100	
Total	**52**	**85.2**	**9**	**14.8**	**61**	**100**	

Table 10 shows that all respondents with years of service are at risk of experiencing LBP (100%). On the other hand, most respondents with no tenure at risk did not experience LBP (64.3%).

The results of statistical tests using *Chi-Square* showed that the p-value (*0.000*) < (0.05). There is a significant relationship between tenure and the incidence of LBP among employees at PT. Muria Sumba Manis in 2021.

Discussion

Age is the span of life measured in years. Age is an individual's age from birth to birthday (Awaluddin et al., 2019). The statistical tests showed a very significant relationship between age and the incidence of LBP among employees at PT Muria Sumba Manis. The study results found that most of the respondents were at the age at risk of LBP (35 years). The distribution of bivariate data between age and the incidence of LBP shows that most of the respondents in the age category are at risk of experiencing LBP, while the number of respondents in the non-risk age category experiencing and not experiencing LBP is the same. Non-ergonomic work attitudes can cause LBP incidence in respondents in the non-risk age category.

This study's results align with research conducted by Ones (2021), which showed a significant relationship between age and the incidence of LBP in weaving workers in the TTS Regency. Another study also found a meaningful relationship between age and complaints of LBP in batik artisans at Batik Semarang (Saputra, 2020).

Age affects a person's physical ability and muscle strength. Increasing age will affect a person's ability to carry out work and cause muscle complaints (Simanihuruk, 2018). Muscle complaints generally begin to be felt at the working age of 30 years. At the age of 30 years, degeneration occurs in tissue damage and fluid loss. This condition causes the stability of the bones and muscles to be reduced. The older a person is, the higher the risk of that person experiencing a decrease in the elasticity of the bones, which triggers the onset of LBP symptoms.

The results of this study confirm the need for education about LBP to the public, especially employees, to minimize the risk of LBP. The education provided is in the form of information to maintain correct posture during activities. For example, sitting properly or standing up straight so that the back does not hurt, combined with exercise and a healthy diet or balanced nutrition.

Work attitude is a person's position when carrying out his activities(Nurrahman, 2017). Work attitudes that humans often carry out in doing work include standing, sitting, bending, squatting, walking, and others. The working attitude is carried out depending on the conditions of the existing work system (Tupa, 2018). Statistical tests show a significant relationship between work attitudes and the incidence of LBP in employees at PT Muria Sumba Manis. The study found that most respondents had a high-risk work attitude toward LBP. The distribution of bivariate data between work attitudes and the incidence of LBP shows that most of the respondents with work attitudes in the high and moderate-risk categories experience LBP, and all respondents in the same high-risk work attitude category experience LBP.

This study's results align with research conducted by Awaluddin et al. (2019), which showed a significant relationship between work attitude and the incidence of LBP in workers in the sewing section of RJA Makassar. Other studies have also shown a significant relationship between work attitudes and the incidence of LBP in Kupang-Bolok route drivers (Tupa, 2018)

This study found that the work attitude of respondents at risk of LBP was related to non-ergonomic body positions when cutting sugar cane, doing maintenance, and planting sugar cane. Respondents work with a body position that is always bent when doing manual cleaning, lifting sugar cane stalks, and tilting the body when growing sugar cane. This working attitude takes place continuously for a relatively long time, impacting LBP complaints.

Work attitudes that cause LBP risk are reaching, bending, turning, tilting, kneeling, squatting, holding in a static position, and clamping with hands. Based on previous research, this risky work attitude often causes workers to experience muscle fatigue, back pain, back pain, varicose veins, and neck stiffness (Rohmawan & Hariyono, 2017).

This study confirms the need for education for the public, especially employees, to know the factors influencing the incidence of LBP to minimize risky

work attitudes. For employees with a high-risk and very high-risk work attitude, it is better to have regular check-ups at the health service to handle and rehabilitate LBP complaints. Employees (workers) must also pay attention and apply for good body positions at work to minimize LBP occurrence. PT. MSM must also be more proactive in providing direction to employees to pay attention to and apply an ergonomic work attitude without compromising the quality of their work.

The workload is any work that requires muscle or thought, which is a burden for the performer. The responsibility includes physical, mental, or social obligations according to the type of work. The study found that all respondents were in the heavy workload category (125-176 beats/minute). The statistical tests showed a very significant relationship between workload and the incidence of LBP among employees at PT Muria Sumba Manis. The distribution of bivariate data between workload and the incidence of LBP shows that all respondents included in the heavy workload experience LBP, while the number of respondents in the light workload category who experience and do not experience LBP is almost the same.

The results of this study align with research conducted by Awaluddin et al. (2019) that there is a significant relationship between workload and the incidence of LBP among workers in the sewing section of RJA Makassar. Other studies have shown a meaningful relationship between workload and LBP for brick masonry workers in Rote Tengah District, Rote Ndao Regency (Likumahua, 2020).

This study found the workload of employees at PT. MSM is generally a physical workload that requires much energy to carry out manual lifting, pushing, pulling, and cutting sugarcane stalks. MSM always does work: cutting sugar cane stalks ready to be planted, lifting sugar cane stalks to be distributed to prepared locations, cleaning manually, so sugarcane plants are fertile and spraying on pests. If appropriately considered, the workload carried out by employees will stay within the capacity of the body's tissues. Employees with a heavy workload are at risk for LBP because the more significant the physical workload, the higher the heart rate the employee feels.

The conclusion is that when the body does physical work, there will be changes in heart rate and oxygen consumption. When a person starts working, the heart rate and the level of oxygen consumption will increase until it meets their needs. Workers who carry out physical workloads will experience LBP risk because they do work that requires high concentration for a relatively long time. This condition increases heart rate because it is influenced by high temperatures, high static muscle loading, and fewer muscles in a working state (Tupa, 2018).

The results of previous studies on TKBM workers at the port of Maumere showed that workers at risk of LBP were workers with heavy workloads, namely carrying out continuous activities for long periods, such as lifting, pulling, and pushing goods manually. The workload causes the back, waist, neck, and wrist muscles to feel sore and stiff. The work also drains much energy and further increases the pressure on the heart rate (Renggas, 2017).

This study confirms the need to minimize the risk of LBP in workers or employees with heavy workloads. Employees who experience heavy workloads and are at risk of LBP should make curative efforts in health services to reduce the risk of LBP. PT. MSM must evaluate existing work methods in biomechanics and anthropometry and provide tools for lifting and cutting sugarcane stalks to facilitate and reduce the physical workload of employees at work.

The working period is related to the length of time a person works in a place. The longer the operating time or a person is exposed to work in a home, the greater the risk of experiencing LBP (Andini, 2015). The study results found that all respondents were in a risky working period (> 5 years). Statistical tests show a significant relationship between years of service and the incidence of LBP in employees at PT Muria Sumba Manis. The distribution of bivariate data between years of service and the incidence of LBP shows that all respondents included in the working period are at risk of experiencing LBP. In contrast, most respondents in the category of the active period are not at risk of not experiencing LBP.

This study's results align with research conducted by Ones (2021) that there is a significant relationship between tenure and the incidence of LBP in weaving workers in the TTS Regency. Other studies also state a substantial connection between the term and the incidence of LBP (AZ et al., 2019).

The at-risk working period comprises workers who work (> five years). The active period is at risk for LBP due to accumulating a person's work activities that are carried out for a long time. Regarding the results of this study, if the actions of cutting, spraying, pulling, and lifting sugarcane stalks are carried out continuously for years, it can cause disturbances in the body, including the appearance of LBP complaints. Physical pressure for specific periods results in reduced muscle performance, and the symptoms showed are also lower movement (Nurrahman, 2017). The longer a person works, the higher the risk of LBP is tripled because it causes the disc cavity to narrow permanently (Ramadhiani et al., 2017).

The results of this study confirm the need for education to the public, especially employees, to find out the increased risk of LBP events along with increasing years of service. Employees with a work period at risk (> five years) should pay attention to sufficient rest time to stretch so that the muscles that experience fatigue are not stiff and reduce pain.

Conclusion

The study results concluded a relationship between age, work attitude, workload, and years of service with the incidence of LBP in employees at PT. Muria Sumba Manis in 2021.

Suggestion

Employees should pay attention to an ergonomic work attitude, take preventive measures by stretching the body, and make curative efforts to get effective treatment from medical personnel, as well as adequate rest and

maximizing assistive devices to ease the workload to minimize the occurrence of LBP complaints.

For other researchers to continue this research to analyze the factors that cause the incidence of LBP in employees who are at a non-risk age and have a light workload, and also those who have not been studied regarding work factors regarding the use of work tools in helping employees with the incidence of LBP.

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