The Relationship Between Body Mass Index, Work Period and Smoking With Low Back Pain Complaints Among Ironworkers in Babakan Village, Mataram City in 2025

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Abstract.

Background: Low Back Pain (LBP) is a common musculoskeletal disorder among informal sector workers, including blacksmith workers, due to heavy physical workloads and non-ergonomic working postures. Individual factors such as Body Mass Index (BMI), length of employment, and smoking habits are suspected to increase the risk of LBP. Methods: This was an observational analytic study with a cross-sectional design. A total of 51 blacksmith workers were selected using purposive sampling based on inclusion and exclusion criteria. Data were collected through anthropometric measurements, the Nordic Body Map questionnaire, and a smoking habits questionnaire. Data analysis was performed using univariate and bivariate analyses with the Chi-Square test at a significance level of α = 0.05. Results: A significant association was found between BMI and low back pain complaints (p = 0.001; PR = 7,073; 95% CI: 1,090–45,883). Length of employment was also significantly associated with low back pain complaints (p = 0.004; PR = 3,850; 95% CI: 1.081–13.708). However, smoking habits were not significantly associated with low back pain complaints (p-value = 0.154; 95% CI: 1.039–2.338; PR: 1.558). Conclusion: Body Mass Index and length of employment are significantly associated with low back pain complaints among blacksmith workers, while smoking habits show no significant association. Preventive efforts should focus on weight control and regulation of work duration and workload.

Keywords: *Low back pain; body mass index; length of employment; smoking and blacksmith workers.*

I. INTRODUCTION

Non-communicable diseases (NCDs) are a group of health disorders that are not caused by germs or infectious agents so they cannot be transmitted from one individual to another. This disease generally develops slowly, is chronic and is influenced by a combination of factors such as lifestyle, environment, genetics, and aging processes such as heart disease, hypertension and diabetes. In addition, one of the groups of health disorders that are also included in NCDs is musculoskeletal disorders (Schneider et al., 2023).One example of musculoskeletal disorders that include non-communicable diseases is Low Back Pain (NPB). This condition refers to complaints of pain, tension or discomfort felt in the lower back, spreading to the buttocks, pelvis or legs. The causes are diverse, ranging from muscle injuries, shifts in spinal pads, wrong posture to excessive or monotonous physical activity. Although not directly life-threatening, low back pain can reduce the quality of life and productivity of sufferers (Briggs et al., 2019).Based on a 2019 World Health Organization (WHO) report, seven out of ten major causes of death in the world are non-communicable diseases. In addition, the World Health Organization (WHO) also reports that low back pain is one of the causes of disability with a global prevalence of 7.2%. Low Back Pain (NPB) falls under the category of musculoskeletal disorders that can cause Disability Adjusted Life Years, the incidence of NPB is higher than that of HIV, TB, lung cancer, and COPD. Disability can affect the economic level both individually and in society (Wahab, 2019).

According to the World Health Organization (WHO) NPB is pain felt in the lower back area in the lumbar and sacral area (L5-S1) the pain experienced can be acute, subacute, and chronic. Low Back Pain (NPB) can be specific or nonspecific. Specific Low Back Pain (NPB) is pain that arises due to certain diseases that affect the spine so that it causes complaints of pain or structural disorders. Meanwhile, nonspecific Low Back Pain (NPB) is pain that cannot be explained by the presence of an underlying disease, about 90% of NPB cases are classified as nonspecific (Silitonga et al., 2021).In 2020 according to the World Health Organization (WHO), the incidence of Low Back Pain (NPB) was 619 million cases which is

expected to increase by 2050 by 843 million cases. The last Riskesdas data that contained the prevalence of musculoskeletal disorders was in 2013 in Indonesia, the prevalence of musculoskeletal disorders (MSDs) was recorded at 11.9%. Based on data from the Ministry of Health (Kemenkes), around 57.5% of fishermen in West Nusa Tenggara (NTB) reported experiencing complaints of Low Back Pain (NPB) (Wahab, 2019). Based on the results of interviews with workers in Babakan Village, Mataram City, it is known that most workers experience complaints of low back pain while working.

This condition shows the potential for occupational health problems that need attention in the region. Some of the factors that are suspected to play a role in the onset of low back pain include Body Mass Index (BMI), working period and smoking habits.Body Mass Index (BMI) is a method of measuring body weight adjusted to height, calculated using body weight in kilograms divided by the square of height in meters (kg/m2) (Rasyid, 2017). Risk factors that can affect Low Back Pain (NPB) can be obesity which can be measured using BMI and can simply assess the nutritional status of adults. Body Mass Index (BMI) can determine whether a person falls into the criteria of underweight, normal, overweight, and obesity. As technology develops, human lifestyles become disrupted such as unhealthy diets, lack of activities that can affect BMI. Excessive Body Mass Index (BMI) can be the trigger for Low Back Pain (NPB) caused by the accumulation of excess fat causing changes in the lumbar arch due to too heavy loading, coupled with weakened muscles, this condition increases the mechanical load on the spine and triggers NPB complaints Chou et al., (2016). Various studies support this Cantika et al., (2024) found that in NPB patients the prevalence of obesity reached 53.7% and there was a significant relationship between BMI and pain levels ($p = 0.03$; $r = 0.837$). The underlying mechanism is described by Fernandez et al., (2025) which means that fat accumulation can increase lumbar load and weaken the abdominal muscles so that the compression load on the spine is heavier.

The results of this study are consistent with the results of the research Nugroho et al., (2022) The relationship between BMI and NPB was obtained in solo batik feeder drivers which found that 87.5% of respondents with overweight BMI experienced NPB while in normal BMI it was only 18.75%. Inversely proportional to the results of the study Alfiansyah et al., (2021) with the results of the Chi-Square test with a p-value = 0.757 (p-value>0.05) which indicates that there is no relationship between BMI and NPB complaints on heavy equipment operators at PT Kutai Bara Abadi.According to the Great Dictionary of the Indonesian Language (KBBI), the length of service is the length of time a person has worked, both in the formal and informal sectors. The working period can be interpreted as the duration of the workforce in a workplace until a certain time limit is reached. Ergonomic factors, such as the position of the body while working and the weight lifted, play a role in increasing the risk of low back pain (NPB) (Saputra, 2021). In line with this, research Arwinno, (2018) which shows the relationship between the working period and NPB complaints in the garment tailor of PT Apac Inti Corpora, with the result p-value = 0.001.

Inversely proportional to research Ardi et al., (2021) which did not find a relationship between the working period and NPB complaints on workers carrying the Beringharjo market in Yogyakarta City.Smoking is one of the behaviors that remains a global health problem, including in Indonesia. This habit not only impacts the cardiovascular and respiratory systems but is also identified as a risk factor for the occurrence of Low Back Pain (NPB). The content of harmful compounds in cigarettes, such as nicotine and carbon monoxide, can induce vasoconstriction of blood vessels resulting in decreased blood flow to the tissues and structures of the spine. This blood supply disruption if it lasts for a long time has the potential to cause tissue damage and trigger NPB complaints (Elmasry et al., 2015). In line with research Astuti et al., (2019) there is a relationship between smoking and NPB complaints to waste collectors in Bandung Wetan District. Inversely proportional to research Anggraeni et al., (2022) who did not find a relationship between smoking and NPB complaints in production employees at CV. Racak Furniture and Handicraft Yogyakarta.From previous research, there are seven factors known to be related to Low Back Pain (NPB), namely age, gender, Body Mass Index (BMI), ergonomic factors, smoking habits, physical activity and working period. This study focuses on three main factors, namely BMI, working period and smoking.

Excessive Body Mass Index (BMI) increases the mechanical load on the spine, long working periods reflect accumulated exposure to physical loads whereas smoking can accelerate spinal degeneration through

disruption of blood flow. These three factors were chosen because of their high prevalence in the productive age group and are easy to measure and are modifiable factors so that the results of the study are expected to be more relevant to support prevention efforts. Therefore, these three factors are considered most suitable to be analyzed in the blacksmith worker group in Babakan Village, Mataram City. Workers in the informal sector are a group that lacks health services, especially in terms of occupational safety and health (K3) (Pratama, 2017). One of the jobs in this sector is blacksmithing, which is a job engaged in making iron-based equipment. Some of the factors that contribute to the emergence of lower back pain (NPB) complaints include working period Body Mass Index (BMI) and smoking habits. A high Body Mass Index (BMI) can increase the pressure on the spinal structure, triggering pain or tension in the back. Long periods of work are related to the length of repeated exposure to physical activity that can cause fatigue and disorders of muscle tissue. Smoking habits affect the decrease in oxygen supply to muscles and bones so that the tissue repair process is disrupted and the risk of low back pain increases. Without occupational safety and health (K3) concerns, this population is vulnerable to NPB, therefore this population is very worthy of research.Because of this, the researcher is interested in conducting research on the relationship between Body Mass Index (BMI), working period and smoking habits and complaints of Low Back Pain (NPB) in blacksmith workers in Babakan Village, Mataram City.

This work is generally carried out in unergonomic work positions with heavy workloads, smoking habits and long work durations so that these risk factors are suspected to trigger the occurrence of NPB complaints. Based on this description, this study aims to analyze the relationship between BMI, working period and smoking with NPB complaints in blacksmith workers in Babakan Village, Mataram City.The novelty of this study compared to previous research lies in the focus that specifically examines the relationship between Body Mass Index (BMI), working time and smoking in blacksmith workers in Babakan Village, Mataram City. Most of the previous research was more done on groups of fishermen, farmers, tailors or office workers while research on blacksmith workers is still limited in the West Nusa Tenggara (NTB) area, and there is no research that specifically discusses this group so it is hoped that this research will be able to fill the gap in previous research with a focus on research related to the relationship between BMI, working period and smoking habits with complaints of Low Back Pain (NPB) in blacksmith workers in Babakan Village, Mataram City.The Babakan Village area, Mataram City was chosen as the research location because it is known as a production center for kitchen utensils and iron-based engineering machines. In addition, Babakan Village is one of the largest metal industry centers in Mataram City, so it is very relevant to be used as a research location regarding complaints of Low Back Pain (NPB) in workers in this sector.

II. METHODS

This research is included in the type of observational research with an analytical approach, using a cross sectional research design. The population in this study is all blacksmiths in Babakan Village, Mataram City in 2025, both permanent and non-permanent because there is no exact data available on the total population, so the population is considered uncertain. Based on calculations with the Lemeshow formula and considering the potential for 10% dropouts or non-respondents, the minimum number of samples needed is 51 people. The sampling technique used is purposive sampling, which is the selection of subjects based on predetermined inclusion and exclusion criteria. This study uses primary data, namely data taken directly by researchers from the research sample.

The following are the instruments used in the form of tools and materials, namely an approval sheet containing consent to be a respondent in the research, a digital scale and a stadiometer to measure the Body Mass Index (BMI), the measurement of lower back pain complaints is carried out using the Indonesian version of the Nordic Body Map (NBM) questionnaire which has been proven to be valid and reliable, the Brinkman Index Questionnaire has been tested for validity by previous researchers, namely Atiyanigrum et al., (2016). Data analysis was carried out to obtain research conclusions. The collected data will be processed and analyzed with the Statistical Package for The Social Sciences (SPSS) for windows version 22 with Chi-Square statistical analysis. In this study, two data analysis methods were carried out, namely univariate and bivariate.

III. RESULT AND DISCUSSION

Respondent Characteristics Analysis

Table 1. Analysis of Respondent Characteristics by Age

Age	Frequency	
	N	%
20-29	16	31,4
30-29	19	37,3
40-52	16	31.4
Total	51	100

Source: Primary data for 2025

Table 1 shows the characteristics of respondents by age in the blacksmith workers who were the subjects of this study. The age of the respondents ranged from 20 to 52 years, which illustrates that blacksmith work is done by individuals in different age groups. The age distribution of respondents showed that most of the respondents were in the age group of 30–39 years, which was 19 people (37.3%). This age group is a productive age that still physically has good work ability to do heavy work activities such as blacksmith work.The age group of 20–29 years and 40–52 years each amounted to 16 people (31.4%). Respondents aged 20–29 years generally still have relatively good physical condition, but their work experience tends to be less. Meanwhile, respondents in the 40–52 age group generally had longer work experience, but began to experience a decline in physical capacity as they aged.Overall, the age distribution of respondents shows that the majority of blacksmiths are at productive age, which allows them to remain actively engaged in work with high physical demands. The presence of respondents at an older age remains to be considered because increasing age can contribute to the risk of musculoskeletal disorders, including complaints of low back pain

Table 2. Analysis of Respondent Characteristics Based on Recent Education

Final Education	Frequency	
	N	%
SD	7	13,7
Junior High School	17	33,3
High School	27	52,9
Total	51	100

Source: Primary data for 2025

Based on Table 2, the characteristics of respondents based on their last education showed that out of a total of 51 respondents, most of them had a high school education level, namely 27 people (52.9%). Furthermore, respondents with junior high school education were 17 people (33.3%), while respondents with elementary education were 7 people (13.7%).The distribution of education level shows that the majority of blacksmiths in this study have a secondary education background. This condition is in line with the characteristics of the informal sector workforce in Indonesia, which is generally dominated by workers with low to medium formal education levels but have skills acquired through work experience and learning from generation to generation (Rafi'ah et al., 2024).

Univariate Analysis

Table 3. Univariate Analysis of Body Mass Index (BMI)

IMT	Frequency	
	N	%
≥23	41	80,4
<23	10	19,6
Total	51	100

Source: Primary data for 2025

Based on the results of the univariate analysis in Table 3, it is known that most blacksmiths in Babakan Village have a Body Mass Index (BMI) ≥ 23, namely 41 respondents (80.4%) who are included in the overweight category according to the Asian BMI classification. Meanwhile, respondents with a BMI of < 23 who were classified as underweight to normal amounted to 10 respondents (19.6%). These findings show that the majority of respondents are in a condition of excess nutritional status.

Table 4. Univariate Analysis of Tenure

Working period	Frequency	
	N	%
> 5 Years	40	78,4
≤5 Years	11	21,6
Total	51	100

Source: Primary data for 2025

Based on the results of the univariate analysis in Table 4, the distribution of the respondents' working period shows that most blacksmiths in Babakan Village have a working period of > 5 years, namely 40 respondents (78.4%). Meanwhile, respondents with a working period of ≤ 5 years amounted to 11 respondents (21.6%). These results illustrate that the majority of respondents have been working as blacksmiths for a relatively long period of time.

Table 4. Analysis of Smoking Univariate

Smoking	Frequency	
	N	%
Weight	1	2
Medium	10	19,6
Lightweight	40	78,4
Total	51	100

Source: Primary data for 2025

Based on the results of the univariate analysis in Table 5, the distribution of respondents' smoking habits shows that most blacksmiths are included in the category of light smokers, namely as many as 40 respondents (78.4%). Furthermore, respondents with the category of medium smokers amounted to 10 respondents (19.6%) while respondents who included heavy smokers were only 1 respondent (2%). These results show that the majority of respondents have a relatively low level of cigarette consumption.

Table 5. Analysis of Univariate Low Back Pain (NPB)

NPB	Frequency	
	N	%
Pain	30	58,8
No	21	41,2
Total	51	100

Source: Primary data for 2025

Table 6 shows that out of a total of 51 respondents who were the subject of the study, most of the respondents experienced complaints of low back pain (NPB), namely 30 respondents (58.8%). Meanwhile, respondents who did not experience complaints of low back pain amounted to 21 respondents (41.2%). These results show that more than half of the blacksmiths in the study experienced complaints of low back pain. The high proportion of respondents who experience low back pain indicates that musculoskeletal complaints, especially in the lower back area, are a fairly dominant health problem in blacksmiths

Bivariate Analysis

Table 6. Bivariate Analysis of Body Mass Index (BMI) with Lower Back Pain (NPB) Complaints

IMT	NPB						P-Value	95% CI	PR
	Pain		No		Total				
	n	%	n	%	n	%			
≥23	29	56,9	12	23,5	41	80,4	0,001	1.090-45.883	7.073
<23	1	5,9	9	17,6	10	19,6			
Total	30	58,8	21	41,2	51	100			

Source: Primary data for 2025

Based on the results of the bivariate analysis in Table 7, it shows that there is a significant relationship between Body Mass Index (BMI) and lower back pain complaints (NPB) in blacksmith workers in Babakan Village, Mataram City (p = 0.001; p < 0.05). A Prevalence Ratio (PR) value of 7.073 with a Confidence Interval (CI) of 95%: 1.090-45.883 indicates that workers with BMI ≥23 have about 7 times greater risk of experiencing lower back pain complaints compared to workers with BMI <23. A CI range that

does not cross the number 1 indicates that the relationship is statistically significant. This means that a high Body Mass Index (BMI) plays an important role as a risk factor for low back pain in blacksmiths.

Table 7. Bivariate Analysis of Working Time with Lower Back Pain (NPB) Complaints

Tenure	NPB						P-Value	95% CI	PR
	Pain		No		Total				
	n	%	n	%	n	%			
>5 Years	28	54,9	12	23,5	40	78,4	0,004	1.081-13.708	3.850
≤5 Years	2	3,9	9	17,6	11	21,6			
Total	30	58,8	21	41,2	51	100			

Source: Primary data for 2025

Based on the results of bivariate analysis in Table 8, it shows that there is a significant relationship between working time and low back pain complaints (NPB) in blacksmith workers in Babakan Village, Mataram City (p = 0.004; p < 0.05). A Prevalence Ratio (PR) value of 3,850 with a Confidence Interval (CI) of 95%: 1,081-13,708 indicates that workers with a service period of >5 years have almost 4 times greater risk of experiencing low back pain complaints compared to workers who have a service period of ≤5 years. A CI range that does not cross the number 1 indicates that the relationship is statistically significant. This means that longer working hours play an important role as a risk factor for low back pain in blacksmiths.

Table 8. Bivariate Analysis of Smoking Frequency with Lower Back Pain (NPB) Complaints

Smoking	NPB						P-Value	95% CI	PR
	Pain		No		Total				
	n	%	n	%	n	%			
Weight	1	2	0		1	2	0,154	1.039-2.338	1.558
Medium	8	15,7	2	3,9	10	19,6			
Lightweight	21	41,2	19	37,3	40	78,4			
Total	30	58,8	21	41,2	51	100			

Source: Primary data for 2025

Based on Table 9, the Chi-Square test cannot be used because there is a frequency value of 0 so that the conditions for using the Chi-Square test are not met. Therefore, the analysis of the relationship between smoking habits and lower back pain complaints (NPB) was continued using the Likelihood Ratio as an alternative test. The results of the Likelihood Ratio test showed a p-value of 0.154 (p > 0.05) so it can be concluded that there is no significant relationship between smoking habits and complaints of low back pain in blacksmiths.Statistically the relationship is meaningless, the Prevalence Ratio (PR) value of 1.558 with a Confidence Interval (CI) of 95%: 1.039–2.338 indicates a tendency to increase the risk of low back pain complaints in workers with moderate and heavy smoking frequency compared to light smokers. However, because the results of the main statistical test showed a p-value of > 0.05 and data limitations such as a relatively small number of samples and the presence of cells with a frequency of 0, smoking habit could not be declared as a risk factor that significantly affected the occurrence of low back pain in blacksmiths.

Discussion

The Relationship between Body Mass Index (BMI) and Lower Back Pain (NPB) Complaints

The results of this study show that there is a significant relationship between Body Mass Index (BMI) and lower back pain complaints in blacksmith workers in Babakan Village, Mataram City. This is proven by the results of the Chi-Square test in Table 4.7 with a p-value = 0.001 (p < 0.05) so that statistically BMI is stated to be significantly related to lower back pain complaints. In addition, the Prevalence Ratio (PR) value was 7.073 with a range of 95% CI: 1.090-45.883 which means that workers with BMI ≥23 have a 7,703 times greater risk of experiencing low back pain than workers with normal BMI.The high proportion of respondents with BMI ≥ 23 indicates that being overweight is a fairly dominant condition in blacksmiths in Babakan Village. Excess nutritional status is known to have a negative impact on the musculoskeletal system, especially the lumbar spine. Increased body weight causes an increase in the mechanical load that must be supported by the spine, increasing the pressure on the lumbar vertebrae and intervertebral discs. This condition in the long term can accelerate the degenerative process and increase the risk of low back pain complaints (Zhang et al., 2025).Theoretically, the relationship between Body Mass Index (BMI) and low back pain can be explained through biomechanical and physiological mechanisms.

An increase in BMI, especially in the overweight and obesity categories, causes the distribution of body weight to be unbalanced so that there is a shift in the body's fulcrum towards the anterior. This condition can cause lumbar hyperlordosis resulting in increased pressure on the spinal structures, including the intervertebral discs, paravertebral muscles and supporting ligaments. The cumulative load on the lumbar area triggers sustained mechanical stress, increasing the risk of spinal structure degeneration and low back pain. In addition to mechanical factors, the increase in body fat mass also affects the decrease in the strength of the core muscles, especially the abdominal muscles which play an important role in maintaining the stability of the spine. This condition makes the spine more susceptible to musculoskeletal disorders. This is in accordance with the theory Zhang et al., (2025) which states that obesity triggers musculoskeletal imbalances thereby increasing the risk of spinal injuries.The difference in the results of this study with several other studies may be influenced by differences in the characteristics of the respondents and the working conditions studied. In this study, the respondents were blacksmiths who performed strenuous physical activities regularly so that being overweight could put additional weight on the spine. In addition, differences in working length, intensity of physical activity and rest habits can affect the onset of low back pain complaints. Other factors such as the physical condition of the worker can also have an effect, therefore differences in the work context and characteristics of the respondents may explain the inconsistency of the results between this study and the previous study.

The Relationship of Working Time with Lower Back Pain (NPB) Complaints

The results of the study showed that there was a significant relationship between working time and complaints of low back pain in blacksmiths in Babakan Village, Mataram City. Based on the Chi-Square test, a p-value of 0.004 ($p < 0.05$) was obtained, which means that there is a significant relationship between the length of work and the incidence of low back pain. In addition, a Prevalence Ratio (PR) value of 3.850 with a range of 95% CI: 1.081–13.708 indicates that workers with a working period of >5 years have almost 4 times greater risk of experiencing low back pain complaints than workers with a working period of ≤5 years.The dominance of respondents with a working period of more than five years shows that blacksmith work is a livelihood that is lived on a permanent and sustainable basis by most workers. Long working hours reflect the length of an individual's exposure to repetitive work activities over time. Continuous occupational exposure over a long period of time can cause an accumulation of load on the musculoskeletal system, especially on the muscles, joints and lower spinal structures, increasing the risk of low back pain complaints. Physiologically, work activities that are carried out repeatedly over a long period of time can cause persistent muscle contractions without adequate recovery time. This condition has the potential to cause chronic muscle fatigue, lactic acid buildup and impaired blood flow to muscle tissue and soft tissues around the spine. If it lasts for a long time, the condition can cause pain, muscle tension and discomfort in the lower back area (Sumigar et al., 2022).

In addition, a long working period is also related to the body's adaptation process to a cumulative workload. As the duration of work increases, the ability of musculoskeletal tissues to maintain elasticity and strength can decrease, especially if it is not balanced with an ergonomic working posture and adequate rest time. This condition causes the spine and its supporting tissues to become more susceptible to degenerative disorders that can trigger complaints of low back pain (Rahmawati, 2021).Thus, the high proportion of blacksmiths with a working period of more than five years in this study shows that the working period is an important factor that needs to be considered in efforts to prevent low back pain complaints. Risk control efforts can be carried out through balanced work and rest time and occupational health education to minimize the negative impact of long-term work exposure.Theoretically, longer working hours can increase the risk of musculoskeletal disorders due to cumulative exposure to physical workload, unergonomic postures, movement repetitions and vibrations of the work tools. According to the theory of cumulative ergonomics, the longer a person is exposed to unergonomic working conditions, the higher the chance of muscle fatigue and structural changes in joint cartilage, soft tissues and intervertebral discs.

Degenerative processes in the spine such as disc protrusion, decreased ligament elasticity and muscle weakness will become more and more pronounced after years of repeated biomechanical exposure (Greggi et al., 2024). Overall, the results of this study are in line with previous theories and research that

states that working period is one of the factors that affect low back pain complaints. The longer a person works, the longer the body is exposed to physical workload, unergonomic working positions and repetitive movements. Such long-term exposure can lead to a decrease in muscle strength as well as changes in the structure of the spine that eventually cause low back pain. The difference in results in several other studies may be due to differences in respondent characteristics, type of work, workload and the application of ergonomics in the workplace. Thus, the findings of this study support that long working hours play an important role in increasing the risk of low back pain complaints in blacksmiths.

The Relationship between Smoking and Low Back Pain (NPB) Complaints

Based on the results of the analysis in Table 4.9, it is known that there is no significant relationship between the frequency of smoking and complaints of low back pain in blacksmiths in Babakan Village, Mataram City with a p-value of 0.154 ($p > 0.05$). This shows that the status of smoking, whether mild, moderate or severe, has not been statistically proven to have an effect on the appearance of low back pain complaints in respondents. However, a Prevalence Ratio (PR) value of 1.558 with a range of 95% CI: 1.039-2.338 indicates a tendency to increase the risk for moderate and heavy smokers although the association is not statistically significant.The dominance of respondents who were classified as light smokers in this study showed that although most blacksmiths had a smoking habit, the intensity of cigarette consumption carried out was relatively low. This condition is suspected to be one of the factors that causes smoking habits not to show a significant association with lower back pain complaints. In light smokers, exposure to nicotine and harmful substances in cigarettes is not large enough to cause vascular disorders and degenerative changes in musculoskeletal tissue.In addition, in blacksmiths, work factors such as heavy physical workload, unergonomic work postures, and repetitive work activities have a more dominant influence on the occurrence of low back pain than smoking habits.

This caused the contribution of smoking to low back pain complaints to be statistically significant in this study, although theoretically smoking still has the potential to have a negative impact on musculoskeletal health if exposure lasts for a long timeThe difference in the results of this study with some previous studies may be due to differences in the condition of respondents and the type of work. In blacksmith workers, the work activities carried out tend to be heavy and require a lot of energy, so that the work factor has more influence on the occurrence of low back pain than the habit of smoking. This can cause the effect of smoking on low back pain to be not statistically obvious.The difference in the results of the study can also be influenced by the varying smoking habits of the respondents, both from the number of cigarettes consumed and the length of smoking. Not all respondents have a habit of smoking for a long time, so the impact of smoking on the body is not strong enough to cause complaints of low back pain. Other factors such as physical condition, weight, and length of work can also affect the results of the study. Therefore, although smoking may theoretically increase the risk of low back pain in this study, the effect did not show a statistically significant association due to the presence of other factors that are more dominant.

IV. CONCLUSION

There is a significant relationship between Body Mass Index (BMI) and lower back pain complaints which shows that BMI plays a risk factor in the occurrence of low back pain complaints in blacksmiths. There is a significant relationship between working time and low back pain complaints which indicates that the longer a person works, especially in jobs with strenuous physical activity and unergonomic work postures, the higher the risk of developing low back pain complaints. There was no significant association between smoking and lower back pain complaints. Although there is a tendency to increase the risk in smokers, the association is not statistically significant in this study.

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