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Risk Factors Correlated with Subjective Complaints of Low Back Pain in Blending Process at PT. X, 2022

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Abstract
Introduction: *Blending section workers are at risk for Low Back Pain complaints seen from every work process.* ***Objective:*** *The purpose of this study was to determine the risk factors currelated with subjective complaints of Low Back Pain in blending process at PT X.* ***Method:*** *The research used was observational research with a cross sectional design. The study population was blending process at PT X totaling 48 people.* ***Result and Discussion:*** *The results of this study indicate the prevalence of subjective complaints of Low Back Pain with moderate pain complaints felt by 76.7% of blending process. The statistical test results show that the work attitude variable (p=0.008 <0.05), the working period variable (p=0.000 <0.05), the age variable (p=0.000 <0.05), the Body Mass Index variable (p=0.815>0.05), the load weight variable (p=0.008 <0.05), the disease history variable (p=0.454>0.05) and the smoking habit variable (p=0.028 <0.05).* **Conclusion:** *Work attitude, work period, age, weight, and smoking habits have a relationship with subjective complaints of Low Back Pain in blending process PT X.*
Keywords: Blending Process Worker; Low Back Pain; Oswestry Disability Index; Rapid Entire Body Assessment;

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Introduction

Work is a life support tool to fulfill one's life standards, in every job that is occupied there are low-risk jobs and there are also high-risk jobs (Tarwaka, 2014). Work aims to achieve life goals, namely the achievement of a more productive life and is very important for the progress of improving one's achievements (Tarwaka, 2014). Every worker will spend part of his time at work with this the body will get external loads from his body in the form of physical and mental burdens, both of which can cause illness and accidents due to work (Tarwaka, 2014).

The World Health Organization (WHO) reports that one of the global occupational risk factors for the number of morbidity and death is *Low Back Pain* at 37% which is one of the most common *musculoskeletal* disorders by workers in Indonesia (Ministry of Health RI, 2020). Every year there are 15-45% of adults who experience LBP generally in the age range of 35 to 55 years and one in 20 people who suffer must undergo treatment at the hospital (Tito Nurfajri, Subakir, 2022). Within 2 weeks chronic LBP will experience impulsive healing and only about 1-2% of cases need to be evaluated as surgery (Tito Nurfajri, Subakir, 2022).

Results of initial data observations conducted on 10 workers at PT. X, especially the blanket *(blending process)* found 7 workers who complained of pain in the lower back or *Low Back Pain.* They began to feel it after the process of taking, pulling, cutting, lifting, and placing blankets in non-ergonomic work positions with bent backs could be seen by workers doing their work for ±8 hours. Repetitive work attitude positions require considerable energy and have an impact on fatigue faster and risk causing complaints of *Low Back Pain.*

The impact of *Low Back Pain* itself can cause a decrease in work productivity and can affect the safety and health of workers. The average production that should be able to produce 14,865 kg every day, due to LBP complaints, has decreased not in accordance with the proper production target. LBP is very risky for workers, with this study, it is expected that companies pay more attention to the application of work ergonomics.

Method

This research is a quantitative study with an observational design and is included in a *cross-sectional* case study. The dependent variables studied were work attitude, length of work, age, Body Mass Index, weight load, history of disease and smoking habits. This research was conducted at PT. X is located on Jalan KH Utomo Number 42, Malay Arabic Village Opposite Jambi City, Servantgan District, Jambi City, Jambi Province. The time used and carried out in this study was from April to November 2022. The population in this study amounted to 48 blanket workers *(blending process)* at PT. X. The sample in this study was blanket workers *(blending process)* at PT. X. This study used primary data obtained from blanket workers *(blending process)* using questionnaires with interviews, *Rapid Entire Body Assessment* sheets to measure work

attitudes and *Oswestry Disability Index* to measure LBP. Data analysis in this study is univariate analysis and bivariate t analysis with statistical tests using chi *square* test with meaning limit α = 0.05 (Adi, 2018).

Results and Discussion

Result

1. Univariate Analysis

Table 1

Distribution of Respondents Based on Research Variables on Blanket Section Workers *(Blending Process)* at PT. X

Research Variables	Frequency	Percentage (%)
Work Attitude		
Very Low	0	0
Low	0	0
Keep	5	11.6
Tall	38	88.4
Very High	0	0
Period of Service		
Old	35	81.4
New	8	18.6
Age		
Your	27	62.8
Young	16	37.2
IMT		
Thin	5	11.6
Fat	7	16.3
Normal	31	72.1
Weight		
Risk	38	88.4
No Risk	5	11.6
History of the disease		
Exist	15	34.9
None	18	65.1
Smoking Habits		
Smoke	37	86.0
No Smoking	6	14.0
LBP		
Mild pain	10	23.3
Moderate pain	33	76.6
Severe Pain	0	0
Paralyzed	0	0
Acute pain	0	0
Total	**43**	**100**

Based on table 1, it is known that as many as 88.4% of respondents have a high-risk work attitude, 81.4% of respondents have a long working period, 62.8% of respondents have old age, 72.1% of respondents have a normal BMI, 88.4% of respondents are severely at risk, 65.1% of respondents have no history of disease, 86.0% of respondents have smoking habits, and 76.7% of respondents experience *Low Back Pain* moderate pain.

1. Bivariate Analysis

The Relationship of Work *Attitude with Low Back Pain*

Table 2

The Relationship between Work Attitude, Working Period, Age, BMI, Weight Load, History of Disease, and Smoking Habits in Blanket Section Workers *(Blending Process)* at PT. X

Variable	*Low Back Pain*				Total		*P-Value*	PR (95% Cl)
	Moderate pain		Mild pain					
	n	%	n	%	n	%		
Work Attitude								
Tall	**32**	**84.2**	**6**	**15.8**	**38**	**100**	**0.008**	**4.211 (0.726-24.435)**
Keep	**1**	**20.0**	**4**	**80.0**	**5**	**100**		
Period of Service								
Old	**32**	**91.4**	**3**	**8.6**	**35**	**100**	**0.000**	**7.314 (1.166-45.879)**
New	**1**	**12.5**	**7**	**87.5**	**8**	**100**		
Age								
Your	**26**	**96.3**	**1**	**3.7**	**27**	**100**	**0.000**	**2.201(1.257-3.855)**
Young	**7**	**43.8**	**9**	**56.3**	**16**	**100**		
IMT								
Tidak Normal	**10**	**83.3**	**2**	**16.7**	**12**	**100**	**0.815**	**1.123(0.810-1.558)**
Normal	**23**	**74.2**	**8**	**25.8**	**31**	**100**		
Load Weight								
Risky	**32**	**84.2**	**6**	**15.8**	**38**	**100**	**0.008**	**4.211(0.726-24.435)**
No Risk	**1**	**20.0**	**4**	**80.0**	**5**	**100**		
History of the disease								
Exist	**13**	**86.7**	**2**	**13.3**	**15**	**100**	**0.454**	**1.213(0.893-1.649)**
None	**20**	**71.4**	**8**	**28.6**	**28**	**100**		
Smoking Habits								
Smoke	**31**	**83.8**	**6**	**16.2**	**37**	**100**	**0.028**	**2.514(0.804-7.863)**
No Smoking	**2**	**33.3**	**4**	**66.7**	**6**	**100**		

Based on the results of the analysis, *a p-value* (0.008) ($p < 0.05$) was obtained, showing that there is a relationship between work attitude and *Low Back Pain* in blanket workers *(blending process)* at PT. X and shows a *prevalence ratio* (PR) value of 4,211 (95%Cl= (0.726-24.435), meaning that respondents with high-risk work attitudes will have a 4,211 times greater risk for moderate pain than respondents with lower-risk work attitudes.

The result of *the* analysis obtained *p-value (0.000) (*p < 0.05), showing that there is a relationship between working life and *Low Back Pain* in blanket workers *(blending process)* at PT. X and shows a prevalence ratio (PR) value of 7,314 *(*95%Cl= (1,166-45,879), meaning that respondents with long working years will have a 7,314 times greater risk for moderate pain than respondents with new working periods.

The results of the analysis obtained *p-value* (0.000) (p < 0.05), showing that there is an age relationship with *Low Back Pain* in blanket workers *(blending process)* at PT. X and shows a *prevalence ratio* (PR) value of 2,201 (95%Cl=(1,257-3,855), meaning that respondents with old age will have a 2,201 times greater risk for moderate pain than respondents with young age.

The results of the analysis obtained *p-value (0.815) (*p > 0.05), showing that there was no relationship between BMI attitude and Low Back Pain in blanket workers (blending process) at PT. X. The results of the analysis obtained p-value (0.008) (p < 0.05), showing that there is a relationship between load weight and Low Back Pain in blanket workers (blending process) at PT. Angkasa Raya Djambi and showed a prevalence ratio (PR) value of 4,211 (95%Cl= (0.726-24.435), *meaning that respondents with a weight load at risk will have a risk 4,211 times greater for moderate pain than respondents with a weight load that is not at risk.*

The result of the analysis obtained *p-value* (0.454) (p > 0.05), showing that there was no relationship between disease history and *Low Back Pain* in blanket workers *(blending process)* at PT. X. The results of the analysis obtained *p-value* (0.028) (p < 0.05), showing that there is a relationship between smoking habits and *Low Back Pain* in blanket *workers (blending process)* at PT. X and shows a *prevalence ratio* (PR) value of 2,514 (95%Cl= (0.804-7.863), meaning that respondents who have a smoking habit will risk 2,514 times greater for moderate pain than respondents who do not smoke.

Discussion

1. The Relationship of Work Attitude with Low Back Pain

Research shows that there is a significant relationship between work attitude and *Low Back Pain* in blanket workers *(blending process)* at PT. X with a p-value of 0.008 (p<0.05) and a *prevalence ratio* (PR) of 4.211 (95%Cl=(0.726-24.435), means that respondents with a high-risk work attitude will have a 4,211 times greater risk of experiencing *Low Back Pain*.

This study agrees with previous research where forced work attitudes can result in work accidents that cause temporary disability to permanent disability as a result of unnatural work intentions causing body positions to move away from natural positions, for example: raised hand movements, back too bent, head raised, and so on (Tarwaka, 2014) . The farther the position of the body from the center of gravity, the higher the risk of LBP complaints (Tarwaka, 2014).

Research conducted by Sujono et al (2018) regarding work attitudes and Low Back Pain states that there is a relationship between work attitudes towards *Low Back*

Pain in rubber production workers at PT. X Pontianak with a significance value of 0.000 (Sujono et al., 2018).

The results of this study are also supported by research conducted by Sumiaty, et al (2021) which states that 122 employees of the *plywood line* at PT. Sumber Graha Sejahtera who works experiences *Low Back Pain* with an uncomfortable attitude of 96.7% and a comfortable attitude of 3.2%. Based on the Chi-Square statistical test value, a value of p = 0.000 (p > 0.05) was obtained which showed that there was a significant relationship between work attitudes and complaints of *Low Back Pain* (Putri et al., 2022). Based on the observations made by work activities in the blanket *(blending process)* are still mostly done manually, causing most workers to have high-risk work positions, such as the neck flexion more than 20 ° and the position of the upper arm away from the body 45 °, the flexion forearm < 60 ° or >100 ° when taking the blanket to the *conveyor breaker* , blanket collection from the *mangle* machine as well as during the drying process. Back, waist and hips are bent > 60° and both legs are flexed > 60°. The bending work attitude is also accompanied by lifting heavy loads of > 10 kg found in the rubber lifting work to the *conveyor breaker*, rubber roll cart and hanging blanket drying parts.

Workers who work lifting and carrying heavy loads every day, then the spine will continue to experience pressure so that over time the position of the body will change. Changes occur as a result of workers' habits of carrying burdens, how to work for a long time with the wrong attitude. In addition, workers in the blanket *(blending process)* tend to do *repetitive* movements or be in a static position for a long time this will cause inflammation of tendons, inertia, and joints so as to clamp the nerves and eventually cause *Low Back Pain*

2. The Relationship of Working Time with *Low Back Pain*

The results showed that there was a significant relationship between working time and *Low Back Pain* in blanket workers *(blending process)* at PT. Angkasa Raya Djambi with a p-value (0.000) (p < 0.05) and a *prevalence ratio* (PR) of 7,314 (95%Cl=(1,166-45,879), meaning that respondents with long service will have a 7,314 times greater risk of experiencing *Low Back Pain*.

Research conducted by Arma et al (2017) said that working period is closely related to complaints of *Low Back Pain.* This means that the longer a person's working period eats, the greater the level of *Low Back Pain* complaints he experiences (Rohmawan &; Hariyono, 2017).

Previous research conducted by Yunus et al (2019) stated that there is a significant relationship between working period and *Low Back Pain*. The result of the correlation between working time and complaints of *Low Back Pain* in sand porter workers is Aseem. Sig (2-sided) = 0.007< 0.05 with a new working period of 23.3% (7 respondents), while sand porter workers whose working life is medium 63.3% (19 respondents) and sand porter workers whose working life is long 13.3% (4 respondents)

(Raya et al., 2019).

Based on the results found in the field, it was found that many workers were already working at PT. Angkasa Raya Djambi for a dozen years. The average working life of the workers is more than 5 years. The longest working time of the respondents was 14 years and the most recent working time was 1 year. Then during the interview process with workers, many of them who have worked for a long time feel more complaints of *Low Back Pain* compared to workers who have only worked as workers at the PT for a few years. This is because workers whose working period has been long, longer are also exposed to difficult work situations at work compared to workers with new working periods.

3. Age Relationship with *Low Back Pain*

The results showed that there was a significant relationship between age and *Low Back Pain* in blanket workers *(blending process)* at PT. Angkasa Raya Djambi with a p-value (0.000) ($p < 0.05$) and a *prevalence ratio* (PR) of 2,201 (95%Cl=(1,257-3,855), means that respondents with old age will have a 2,201 times greater risk of experiencing *Low Back Pain*.

The Lancet study (2018) states that generally the significant age to experience *Low Back Pain* is the age of 35 to 55 years and the intensity of LBP increases when someone reaches the age of 65 to 79 years (James et al., 2018). Based on the results found in the field, it was found that there were more elderly workers (≥ 35 years) than the number of young workers (<35 years). This is because of the age limit for workers at PT. Angkasa Raya is 60 years old.

The results of this study are also supported by Suryono's research (2021) which states that there is a relationship between age and *Low Back Pain* of PT. Indowire Prima Industrindo with p *value* 0.000 ($p<0.05$)(Maharani et al., 2021). Similarly, research conducted by Sitorus (2019) found p-value on heavy equipment operators at PT. X of 0.000 ($p<0.05$), it can be concluded that there is a significant relationship between age and complaints of *Low Back Pain* (Kurniati et al., 2019). From the results of the analysis, a PR = 2.318 value was also obtained, meaning that operators aged >35 years have a 2.318 times greater chance of experiencing *Low Back Pain* (Kurniati et al., 2019).

4. The Relationship of Body Mass Index (BMI) with *Low Back Pain*

The results showed that from the results of statistical tests with *the Chi-square* test obtained *p-value* (0.815) ($p > 0.05$), showing that there was no relationship between BMI and *Low Back Pain* in blanket workers (*blending process*) at PT. X

This research is in line with the research of Waren et al (2020) from 43 respondents, there are 27 (62.8%) not overweight and 16 (37.2%) *overweight*. The results of the *chi-square* statistical test found that the BMI variable was not related to *Low Back Pain* with a *p-value* = 0.348 (Pratiwi et al., 2020).

This research is supported by Triastuti (2020) the number of BMI owned by everyone in non-LBP convection tailors with BMI < 23 as many as 12 people (42.9%) and BMI ≥ 23 as many as 12 people (31.6%). The LBP group with BMI < 23 as many as 16 (57.1%) and BMI>23 as many as 26 people (68.4%) with a value of p= 0.347>0.05 which means there is no significant relationship between the non-LPB group and the LPB group in convection tailor BMI (Hasyim &; Triastuti, 2019).

After measuring body weight and height in the field, it was found that there were 31 workers who had a normal BMI while there were 12 workers who had an abnormal BMI where there were 7 workers who had an abnormal BMI with the overweight or obesity category and *the underweight* category or skinny there are 5 people. Someone who is underweight or excess can both cause various mechanisms for the occurrence of LBP including chronic inflammation which can increase the production of proinflammatory stikon and acute phase reactants that trigger pain, accidental injury, and the last due to BMI always increases this will be associated with bone degeneration and spinal mobility will decrease (Emaculata, 2019). Whereas in someone who has a normal BMI the center of gravity of the body will remain in the pelvis and lumbar lordosis will not occur, the pressure received by the spine when receiving a load will be stable (Emaculata, 2019).

5. The Relationship of Weight Load with Low Back Pain

The results showed that there was a significant relationship between load weight and *Low Back Pain* in blanket workers *(blending process)* at PT. Angkasa Raya Djambi with a p-value (0.008) ($p < 0.05$) and a *prevalence ratio* (PR) of 4,211 (95%Cl=(0.726-24,435), meaning that respondents with heavy loads at risk will have a 4,211 times greater risk of experiencing *Low Back Pain*.

Based on observations made by researchers, the weight of the load lifted by the blanket *(blending process)* workers mostly lifts loads beyond capacity, which exceeds 40 Kg. The weight of the load usually lifted by workers varies in the *conveyor breaker* to *mangle* ranging from 35 Kg to 50 Kg while in the trolley to drying ranges from 45 Kg to reach 200 Kg. The weight of the load exceeds the body capacity of the workers and is also not in accordance with the weight recommended by the ILO, which is 40 Kg. Due to the load that is too heavy can cause workers to experience *Low Back Pain.* This is evidenced by the greater the amount of material removed and moved in a day, the faster it will reduce the thickness of the *intervertebral disc* or elements between the segments of the spine.

The results of a previous study conducted by Yuliani et al (2018), which said that workers who lift ≥40 kg at work have a 2.3 times higher risk of experiencing *Low Back Pain* compared to workers who lift < 40 kg loads. From the results of statistical tests, it was obtained that the value of *p-value*=0.031 means that the weight of the load is related to *Low Back Pain* (p<0.05) (Setyaningsih, 2018). In addition, research conducted by Devi (2018) found *p value*=0.000 <0.05 which means there is a relationship between

weight load and complaints of *Low Back Pain* in coolies in the Surakarta legion market (Devi Risdianti, 2018).

6. Relationship of Disease History with *Low Back Pain*

The results showed that the results of statistical tests with *the Chi-square* test obtained *p-value* (0.454) ($p > 0.05$), showing that there was no relationship between history of disease and *Low Back Pain* in blanket workers *(blending process)* at PT. Angkasa Raya Djambi.

This research is also supported by Insyira's research (2021) related to the relationship between individual characteristics and *complaints of Low Back Pain* in online motorcycle taxi drivers in Lamongan, known to be *p-value* 0.355 (p>0.05), this means that there is no relationship related to a history of trauma in online motorcycle taxi drivers in Lamongan (Insyira, 2021). However, this study is contrary to Sitepu's (2015) research on orange farmers in Dokan Village, Brand District, Karo Regency, contrary to this study, history of disease is associated with the incidence of Low Back Pain (Eli Sulvici Sitepu, Muhammad Makmur Sinaga2, 2015)

Based on the results of research found by asking respondents about the history of diseases related to locomotion function that many workers do not have a history of disease. This is likely because they have never checked or never fallen, resulting in injuries to the back, so that when researchers distributed questionnaires about the history of this disease, many respondents answered that they had no history of disease. While respondents who answered having a history of this disease may have experienced pain due to prolonged work or could also be because they have fallen on the back resulting in injury and cannot sit too long or duck too long which can later result in *complaints of Low Back Pain.*

7. The Relationship of Smoking Habits with *Low Back Pain*

The results showed that there was a significant relationship between smoking habits and *Low Back Pain* in blanket workers *(blending process)* at PT. Angkasa Raya Djambi with a p-value (0.028) ($p<0.05$), and a *prevalence ratio* (PR) of 2,514 (95%Cl=(0.804-7.863), meaning that respondents with smoking habits will have a 2,514 times greater risk of experiencing *Low Back Pain*.

Another study conducted by Rustam et al (2021) obtained data analyzed using the Spearman correlation test (p value <0.05). The results showed that most respondents had a mild smoking habit of 70.8% and mild disability of 42.3%. Based on statistical tests, a positive correlation was obtained between the degree of smoking and *Low Back Pain* disability in stevedoring workers at the Kendari City port with a p value = 0.000 and a correlation coefficient = 0.524 (Rahmawati, 2021).

Contrary to this study, research conducted by Kusmiati (2019) related to Low Back Pain and Smoking Habits, Body Mass Index, Working Period, and Workload in Waste Collectors stated that the results of this study showed that there was no

relationship between smoking habits and *Low Back Pain known p value* 0.811 (p>0.05) (Astuti et al., 2019).

Based on the results of observations in the field, most respondents have smoking habits. The results data that have been presented show that respondents who have smoking habits experience *more Low Back Pain* than respondents with non-smoking habits. Respondents who have smoking habits have complaints of *Low Back Pain* because work in the blanket *(blending process)* requires more muscle exertion which requires fitness in the body for each process.

Conclusion

According to the results of research conducted on blanket *workers (blending process)* at PT. Angkasa Raya Djambi, there is a significant relationship with *complaints of Low Back Pain* between work attitude (P-value 0.008) and PR value = 4.211, working time (P-value 0.000) and PR = 7.314, load weight (P-value 0.008) and PR = 4.211, smoking habits (P-value 0.028) and PR = 2.514. Problems that are not related to complaints of *Low Back Pain* are BMI (P-value 0.815) and history of disease (P-value 0.454). Advice for blanket workers *(blending process)* the need to pay attention to the work attitude on the body while working so as not to bend continuously interspersed with upright positions or not away from the direction of gravity, workers who have new or old work periods should pay more attention to sleep and rest patterns, do regular physical activity such as exercising and multiply eating vegetables and fruits that are helping rejuvenation at age and reduce smoking habits.

Parti PT. X makes substitutions, such as replacing the seat in the contamination section with a reclining chair, replacing the manual conveyor *breaker* with an *elevator* car as a means of transferring wet rubber to the machine, elevating the rubber washer and drying tub with the height of the worker, doing work rotations per week, and providing tools during the blanket lifting process. For further researchers, it is better to measure *complaints of Low Back Pain* of a medical nature and include other variables, especially variables that are environmental factors, namely vibration and lighting.

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