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Relationship Between Sitting Position and Sitting Duration with Low Back Pain Complaints in Back Office

Andi Sarbiah[1], Diina Maulina[1], Agung Sunsaru[1], Juhanda Kartika Wijaya[1]

[1]*Universitas Ibnu Sina*

**Corresponding Author: Andi Sarbiah*
E-mail: Dr.andisarbiah@uis.ac.id

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Abstract

Low Back Pain is a musculoskeletal disorder resulting from incorrect implementation of ergonomics. The main symptoms of Low Back Pain is pain in the spinal area of the back. This study aims to determine the relationship between sitting position and sitting time with Low Back complaints Pain in back office at the Mandiri Inhealth Batam Operational Office in 2020. The research method used is a quantitative method with an analytical survey research design with a cross research design sectional on each subject using the Chi- square test , namely comparing the frequency of occurrence (observation) with the frequency of expectations (expectations) with a sample of 30 respondents. From the results of this research, it was concluded that there was a relationship between sitting position (P- Value = 0.003) and sitting time (P- Value = 0.030) with Low Back complaints. Pain . Advice for workers to pay attention to their sitting position and take the time to stretch their muscles when doing work to prevent or reduce complaints of Low Back Pain and for companies providing health education about ergonomics.

Introduction

Occupational safety and health (K3) is one of the maintenance programs in the company. Implementing an occupational safety and health program for employees is very important because it aims to create a safety system and work unity involving management, labor, conditions and an integrated work environment to increase productivity and reduce work accidents. The aim is for the company's human resources to make the best contribution to the realization of the company's goals (Werdhiastutie et al., 2013).

Occupational health is part of health science which aims to ensure that workers obtain a perfect state of health, both physical, mental and social, so that they are able to work optimally. Occupational health is also regulated in Law number 36 of 2009 concerning Health, article 164 concerning occupational health, it is explained that occupational health efforts are aimed at protecting workers so that they live healthily and are free from health problems and bad influences caused by workers (Gunn et al., 2022).

Occupational Diseases (PAK) are diseases caused by work, work tools, materials, processes and the work environment (physical factors, chemical factors, biological factors, physiological or ergonomic factors, psychological factors) (Koirala & Nepal, 2022), therefore occupational diseases are artificial diseases. or often called manmade diseases . In an effort to prevent PAK from occurring due to work, it is necessary to implement occupational safety and health or what is usually called K3 so that workers feel comfortable while working and can avoid PAK (Zulfah et al., 2022)

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Low Back Pain is a musculoskeletal disorder resulting from incorrect implementation of ergonomics. The main symptoms of Low Back Pain is pain in the spinal area of the back. In general, this pain is caused by muscle stretching and increasing age which will cause the intensity of exercise and movement to decrease. This will cause the back and abdominal muscles to become weak (Oliva-Lozano & Muyor, 2020; Afriannisyah et al., 2020).

Low Back Pain can reduce human productivity, 50-80% of workers throughout the world have experienced Low Back Pain where almost a third of those aged have experienced some type of Low Back Pain is the second disease after flu which can cause a person to frequently go to the doctor, thus having a negative impact on socio-economic conditions by reducing working days and reducing work productivity (Cieplinski et al., 2021).

Safety statistical reports and Work (2018) in England there were 500,000 cases of musculoskeletal disorders disorders throughout the 2017 period (Zhang et al., 2024). Meanwhile, research related to musculoskeletal disorders have also been carried out in various manufacturing and service industry sectors in Indonesia (Rahayuningsih, et al., 2018). The prevalence of LBP in Indonesia is 18%. The prevalence of LBP increases with age and occurs most often in the middle and early fourth decades. Most causes of LBP (85%) are non-specific, due to abnormalities in soft tissue, in the form of muscle injury, ligaments, spasm or muscle fatigue. Other serious, specific causes include vertebral fractures, infections and tumors (Linck & Boissonnault, 2024).

Several important risk factors are associated with Low Back events Pain is an individual factor (age, gender, body mass index, years of work, smoking habits, educational history, physical fitness, history of skeletal disease and history of trauma) (dos Santos Bunn et al., 2021). Other factors relate to work (workload, work position, repetition and duration) and the physical environment (vibration and noise).

Another research conducted by Suwartawan & Ariani (2022) regarding the relationship between work attitudes and complaints of lower back pain among Manado sea port workers showed that out of 56 respondents, workers with high risk work attitudes and experienced complaints of low back pain were 14 people (35 %), workers with high risk and experiencing moderate complaints were 26 people (65%), workers with very high risk work attitudes and low complaints were 1 person (6.3%), workers with very high risk work attitudes and experiencing moderate complaints As many as 14 people (87.5%) and 1 person (6.3%) workers with very high risk work attitudes and experienced complaints of high lower back pain. To meet the needs of life, humans are required to work more actively, but often people do not pay attention to the correct position when carrying out work and this can cause Low Back complaints. Pain (LBP).

Mandiri Inhealth is a company operating in the insurance sector that provides commercial health insurance programs in Indonesia. This company has an operational office in Batam which has employees in the division customers service office and verifier. Where Customer Service functions to provide excellent service and build good relationships with clients or customers in finding solutions to resolve complaints either by telephone or via email, while the Verifier functions to verify claims from providers and individual claims because this part of the workforce is required to work in a long sitting position which causes lower back muscles become tense. Problems that occur with customer department employees Mandiri Inhealth services and verifiers who use computers are in the wrong working position and sit for a long time, causing lower back pain or Low Back Pain . Employees at Mandiri Inhealth are most at risk of experiencing low back pain Pain (LBP) is part of the Verifier , because it has a working position that involves more sitting, sometimes because of the large amount of work verifying employee claims, they increase their working hours by 3 hours, even on Saturdays they do the same thing for 5-7 hours, plus they don't know their position. which is in accordance with body

anatomy or ergonomics and is monotonous. Based on employee data for the back section office at the Mandiri Inhealth Operations Office Batam consists of 30 employees, of which 15 PRO (Provider) serve as Verifiers (claim verification). Relations Officer) as many as 10 people and CRO (Customer Relations Officer) as many as 5 people.

Based on the results of surveys and interviews in March 2020 which were conducted by researchers behind office at the Mandiri Inhealth Batam Operational Office, it was found that the workers worked > 8 hours per day in a sitting position that was too long and monotonous. From the results of initial interviews with 15 employees, 10 people were found to complain of frequent low back pain. Based on this, researchers are interested in examining the relationship between sitting position and sitting time with Low Back complaints Pain such as pain in the waist and back after coming home from the office, often feeling achy and tingling in the area of the thighs to the feet, a feeling that spreads like an electric shock or heat in the back area due to sitting for too long and not being active enough. Thus the workers back office at the Mandiri Inhealth Batam Operational Office is at high risk of being hit by Low Back Pain.

Methods

The type of research used in this research is quantitative. The design used is an analytical survey with a cross research design sectional which aims to determine the relationship between sitting position and sitting duration with Low Back complaints Pain in back workers office Mandiri Inhealth Batam Operational Office 2020.

The research location will be carried out at the Mandiri Inhealth Batam Operational Office located at Bumi Riau Makmur Complex, Jl. Admiral Bintan, Sungai Panas, Kec. Batam City, Batam City, Riau Islands. The population and sample in this research are all back employee office Mandiri Inhealth Batam Operational Office with 30 people.

Primary data in this research uses a questionnaire with the latest data taken from filling out the questionnaire by back workers office Mandiri Inhealth Operational Office. Secondary data from this research was obtained from the company itself in the form of records of complaints from workers.

Result and Discussion

Univariate Analysis

Respondent Characteristics

Frequency distribution of respondent characteristics among back workers office is depicted in the following table:

Table 1. Frequency Distribution of Respondent Characteristics

	No Variable	Frequency (f)	Percentage (%)
1	**Type Sex**		
	Woman	21	70
	Man - Man	9	30
	Total	**30**	**100**
2	**Education**		
	College Tall	30	43.3
	Total	**30**	**100**
3	**Age**		
	17 – 25 Years	4	13.3
	26 – 35 Years	22	73.3
	36 – 45 Years	4	13.3
	Total	**30**	**100**

4	**Period Work**		
	< 5 years	11	36.7
	≥ 5 years	19	63.3
	Total	**30**	**100**
5	**Behavior Smoke**		
	Yes	3	10
	No	27	30
	Total	**30**	**100**
6	**Long Rest**		
	< 8 hours	12	40
	≥ 8 hours	18	60
	Total	**30**	**100**
7	**Habit Sport**		
	Yes	20	66.7
	No	10	33.3
	Total	**30**	**100**

Based on table 1 above, it is known that the majority of workers are female, 21 people (70%). All workers have a tertiary education level , 30 people (100%). In general, the average number of workers aged 26 – 35 years is 22 people (73.3%). The majority of workers have worked ≥ 5 years namely 19 people (63.3%), 27 people (90%) did not smoke, took a long break ≥ 8 hours, namely 18 people (60%), and 20 people (66.7%) have exercise habits.

Sitting Position

Table 2. Frequency Distribution of Sitting Positions

No	Position Sit	Frequency (f)	Percentage (%)
1	Risk Which can be ignored	0	0
2	Small Risk	14	46.7
3	Medium Risk	11	36.7
4	High Risk	5	16.7
5	Risk Very high	0	0
	Total	**30**	**100**

Based on table 2 above, it can be seen that the respondents had a sitting position with a small risk of 14 people (46.7%), a medium risk of 11 people (36.7%), a high risk of 5 people (16.7%), a high risk of negligible 0 (0%) and very high risk 0 (0%).

If the worker's sitting position is assessed at an angle of 50 then it is given a value of 1, for a bent back posture of 180 then it is given a value of 2. Meanwhile for the position of the legs in this position is given a value of 1. So the combination of the values of the neck, back and legs is given a value of 2 and there is no additional value for load assessment.

Table 3 . A score

Table A	***Neck***											
		1				2				3		
	Legs											
		1	2	3	4	1	2	3	4	1	2	3	4
Trunk Posture Score	1	1	2	3	4	1	2	3	4	3	3	5	6
	2	2	3	3	5	3	4	5	6	4	5	6	7
	3	2	4	5	6	4	5	6	7	5	6	7	8
	4	3	5	6	7	5	6	7	8	6	7	8	9
	5	4	6	7	8	6	7	8	9	7	8	9	9

The value for the forearm is given a value of 1. For the upper arm it forms an angle of 450 and is given a value of 2. The worker's wrist when writing when typing an angle <150 is given a value of 1.

Table 4. Score B

Table B	***Lower Arm***						
	Wrist	1			2		
		1	2	3	1	2	3
Umper Arm Score	1	1	2	2	1	2	3
	2	1	2	3	2	3	4
	3	3	4	5	4	5	5
	4	4	5	5	5	6	7
	5	6	7	8	7	8	8
	6	7	8	8	8	9	9

The value obtained from the posture above is 2. Next, this value is added to the grip value +0 because the grip can be held well and the grip strength is good. Then the values for the first group and the values for the second group are entered into table C, and a value of 2 is obtained.

Table 5 . Score C (REBA Group C Assessment)

Score A	**Table C**											
	Score B											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	2	3	3	4	5	6	7	7	7
2	1	2	2	3	4	4	5	6	6	7	7	8
3	2	3	3	3	4	5	6	7	7	8	8	8
4	3	4	4	4	5	6	7	7	8	8	9	9
5	4	4	4	5	6	7	8	8	9	9	9	9
6	6	6	6	7	8	8	9	9	10	10	10	10
7	7	7	7	8	9	9	9	10	10	11	11	11
8	8	8	8	9	10	10	10	10	10	11	11	11
9	9	9	9	10	10	10	11	11	11	12	12	12
10	10	10	10	11	11	11	11	12	12	12	12	12
11	11	11	11	11	12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12	12	12	12	12	12

The final step in the calculation using REBA is to add the table C values to the activity values. Mark activity is +1 because more than one part of the worker's body is in a static position. So the total REBA score for workers is 3. A score of 3 means a low level risk, action may be needed.

Assessing that the worker's sitting position forms an angle of 100, the neck is given a value of 1, a bent back posture of 200 is given a value of 2. Meanwhile, the bent leg position is given a value of 2 and +1. So the combination of the neck, back and leg scores is 3 and there is no additional value for the load assessment.

Table 6 . A score

Table A	***Neck***											
		1				2				3			
	Legs												
		1	2	3	4	1	2	3	4	1	2	3	4
Trunk Posture Score	1	1	2	3	4	1	2	3	4	3	3	5	6
	2	2	3	3	5	3	4	5	6	4	5	6	7
	3	2	4	5	6	4	5	6	7	5	6	7	8
	4	3	5	6	7	5	6	7	8	6	7	8	9

	5	4	6	7	8	6	7	8	9	7	8	9	9

The value for the lower arm forming an angle of 60o is given a value of 1. For the upper arm it forms an angle of 200 and is given a value of 2. The worker's wrist when writing at an angle <180 is given a value of 2 and +1.

Table 7 . Score B

Table B	***Lower Arm***						
	Wrist	1			2		
		1	2	3	1	2	3
Umper Arm Score	1	1	2	2	1	2	3
	2	1	2	3	2	3	4
	3	3	4	5	4	5	5
	4	4	5	5	5	6	7
	5	6	7	8	7	8	8
	6	7	8	8	8	9	9

The value obtained from the posture above is 3. Next, this value is added to the grip value +0 because the grip can be held well and the grip strength is good. Then the values for the first group and the values for the second group are entered into table C, and a value of 3 is obtained.

Table 8. C Score (REBA Group C Assessment)

Score A	Table C											
	Score B											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	2	3	3	4	5	6	7	7	7
2	1	2	2	3	4	4	5	6	6	7	7	8
3	2	3	3	3	4	5	6	7	7	8	8	8
4	3	4	4	4	5	6	7	7	8	8	9	9
5	4	4	4	5	6	7	8	8	9	9	9	9
6	6	6	6	7	8	8	9	9	10	10	10	10
7	7	7	7	8	9	9	9	10	10	11	11	11
8	8	8	8	9	10	10	10	10	10	11	11	11
9	9	9	9	10	10	10	11	11	11	12	12	12
10	10	10	10	11	11	11	11	12	12	12	12	12
11	11	11	11	11	12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12	12	12	12	12	12

The final step in the calculation using REBA is to add the table C values to the activity values. Mark activity is +2 because more than one part of the worker's body is in a static position and repetitive activity occurs. So the total REBA score for the worker is 5. A score of 5 means the risk is at a medium level, action is required.

Assessing that the worker's sitting position forms an angle of 300, the neck is given a score of 2, a bent back posture of 350 is given a score of 3. Meanwhile, for a bent leg position, it is given a score of 2 and if it forms an angle > 450, it is given a score of +1. So the combination of the neck, back and leg scores is 6 and there is no additional value for the load assessment.

Table 9 . A score

Table A	***Neck***												
		1				2				3			
	Legs												
		1	2	3	4	1	2	3	4	1	2	3	4
	1	1	2	3	4	1	2	3	4	3	3	5	6
	2	2	3	4	5	3	4	5	6	4	5	6	7

Trunk Posture Score	3	2	4	5	6	4	5	6	7	5	6	7	8
	4	3	5	6	7	5	6	7	8	6	7	8	9
	5	4	6	7	8	6	7	8	9	7	8	9	9

The value of the forearm forming an angle of 900 is given a value of 2. For the upper arm forming an angle of 200 and is given a value of 2. The worker's wrist when writing forms an angle <150 is given a value of 1.

Table 10 . Score B

Table B	***Lower Arm***						
	Wrist	1			2		
		1	2	3	1	2	3
Umper Arm Score	1	1	2	2	1	2	3
	2	1	2	3	2	3	4
	3	3	4	5	4	5	5
	4	4	5	5	5	6	7
	5	6	7	8	7	8	8
	6	7	8	8	8	9	9

The value obtained from the posture above is 2. Next, this value is added to the grip value +0 because the grip can be held well and the grip strength is good. Then the values for the first group and the values for the second group are entered into table C, and a value of 6 is obtained.

Table 11 . Score C

Score A	**Table C**											
	Score B											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	2	3	3	4	5	6	7	7	7
2	1	2	2	3	4	4	5	6	6	7	7	8
3	2	3	3	3	4	5	6	7	7	8	8	8
4	3	4	4	4	5	6	7	7	8	8	9	9
5	4	4	4	5	6	7	8	8	9	9	9	9
6	6	6	6	7	8	8	9	9	10	10	10	10
7	7	7	7	8	9	9	9	10	10	11	11	11
8	8	8	8	9	10	10	10	10	10	11	11	11
9	9	9	9	10	10	10	11	11	11	12	12	12
10	10	10	10	11	11	11	11	12	12	12	12	12
11	11	11	11	11	12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12	12	12	12	12	12

The final step in the calculation using REBA is to add the table C values to the activity values. The activity value is +2 because more than one part of the worker's body is in a static position for more than one minute and the action is performed within a small range (more than 4 times per minute). So the total REBA score for workers is 8. A score of 8 means high risk so changes need to be made immediately.

Sitting for a long time

Table 12. Frequency Distribution of Sitting Time

Long Sit	Frequency (f)	Percentage (%)
< 4 hours	8	26.7
≥ 4 Hours	22	73.3
Total	**30**	**100**

Based on the table above, it can be seen that 22 people (73.3%) had a sitting time of ≥ 4 hours and 8 people (26.7%) had a sitting time of < 4 hours.

Low Back Complaints Pain

Table 13. Frequency Distribution of Low Back Complaints Pain

Complaint *Low Back Pain*	Frequency (f)	Percentage (%)
No Painful	9	30
Painful Light	17	56.7
Painful Currently	3	10
Painful Heavy	1	3.3
Total	**30**	**100**

Based on the table above, it can be seen that 17 respondents complained of LBP with mild pain (56.7%), 9 people had no pain (30%), 3 people had moderate pain (10%) and 1 person had severe pain. people (3.3%).

Bivariate Analysis

Relationship between sitting position and low back complaints Pain in the Back Office at the Mandiri Inhealth Batam Operational Office in 2020

Bivariate analysis is used to see the relationship between two variables, namely the independent variable and the dependent variable. Next, to see the relationship between the two variables, a statistical test is used, namely the Chi- Square test .

Table 14 . Relationship between sitting position and low back complaints Pain in the Back Office at the Mandiri Inhealth Batam Operational Office in 2020

Variable Independent	Variable Dependent								Total		P-Value
	Nope Pain		Mild Pain		Moderate pain		Pain Heavy				
Sitting position	N	%	N	%	N	%	N	%	N	%	
Risk Small	9	64,3	5	35.7	0	0	0	0	14	46,7	
Risk Intermediate	0	0	9	81.8	2	18.2	0	0	11	36.7	0,003
Risk Tall	0	0	3	60	1	20	1	20	5	16.7	
Total	**9**	**30**	**17**	**56.7**	**3**	**10**	**1**	**3.3**	**30**	**100**	

Based on the table above , it can be concluded that of the 30 respondents the majority of sitting positions pose a small risk with complaints of Low Back There was no pain for 9 people (64.3%). Chi- Square results with P -Value 0.003 < 0.05 so Ho is rejected which means there is a relationship between sitting position and Low Back complaints Pain in the Back Office at the Mandiri Inhealth Batam Operational Office in 2020.

Relationship of Long Sitting with Low Back Complaints Pain in the Back Office at the Mandiri Inhealth Batam Operational Office in 2020

Table 15. Relationship between sitting time and low back complaints Pain in the Back Office at the Mandiri Inhealth Batam Operational Office in 2020

Variable Independent	Variable Dependent								Total		P-Value
	Nope Pain		Mild Pain		Moderate pain		Heavy \Pain				
Sitting for a long time	N	%	N	%	N	%	N	%	N	%	
< 4 hours	0	0	7	87.5	0	0	1	12.5	8	26.7	0,030
≥ 4 Hours	9	40.9	10	45.5	3	13.6	0	0	22	73.3	
Total	9	30	17	56.7	3	10	1	3.3	30	100	

Based on table 15 above , it can be concluded that of the 30 respondents the majority sat for ≥ 4 hours with complaints of low back. There were 10 people (45.5%) with mild pain .

Square results with P- Value 0.030 < 0.05 so Ho is rejected which means there is a relationship between long sitting and Low Back complaints Pain in the Back Office at the Mandiri Inhealth Batam Operational Office in 2020.

Based on the research results, workers' sitting positions are divided into negligible risk (0%), small risk (46.7%), medium risk (36.7%), high risk (16.7%), and very high risk (0%). The majority of workers in the Mandiri Inhealth Operational Office have a sitting position with a small risk (46.7%), based on the REBA method with a score of 2-3 which indicates action may be needed. The neck position that forms a 30 degree angle, the back posture that is bent 35 degrees, and the position of the legs bent under the chair are the main factors causing a small risk. Unnatural working positions increase the risk of skeletal muscle complaints , according to the REBA score classification.

As many as 73.3% of workers sat for ≥ 4 hours, while 26.7% sat for less than 4 hours. Sitting for ≥ 4 hours increases the risk of Low Back Pain (LBP) compared with sitting for less than 4 hours. It is recommended that workers stretch their muscles every 60 minutes to reduce muscle fatigue. Sitting for too long can increase the risk of damage to vertebral tissue, especially the lumbar segment , and cause pain or discomfort in the lower back.

Low Back Complaints Pain (LBP) was measured using the VAS questionnaire, with the following results: mild pain (56.7%), no pain (30%), moderate pain (10%), and severe pain (3.3%). Factors causing LBP include individual, work, environmental and psychological factors. Incorrect sitting posture can cause aches and pains in the muscles. Improper working position causes the load to be concentrated on the lower back muscles, which quickly feel tired.

Research shows that the majority of sitting positions with a low risk do not cause LBP (64.3%), while sitting positions with a medium risk cause mild pain (81.8%). Chi- Square results show a P- Value of 0.030 < 0.05, indicating a relationship between sitting position and LBP in back workers office at the Mandiri Inhealth Batam Operational Office. High-risk work positions increase the likelihood of LBP. Repetitive movements and static positions for long periods of time can cause wear and tear in the lumbar region and muscle spasms .

Research shows that there is a relationship between sitting for a long time and complaints of LBP. Sitting for long periods of time causes continuous muscle contractions and vasoconstriction , which disrupts blood flow and causes a buildup of lactic acid, leading to lower back pain. British Association Chiropractic found that 32% of workers sat an average of 10 hours a day without standing. Also shows a relationship between sitting time and LBP complaints, with Fisher exact test results test p- value 0.014 < 0.05. Sitting for a long time without stretching causes LBP complaints in the majority of workers.

Conclusion

Based on the results of research conducted by researchers regarding the relationship between sitting position and sitting time with Low Back complaints Pain in back office at the Mandiri Inhealth Batam Operational Office in 2020, the author can conclude that: (1) Frequency distribution of sitting position on the back office at the Mandiri Inhealth Batam Operational Office. In 2020, the majority had a small risk of 14 respondents (46.7%); (2) Frequency distribution of time sitting on the back office at the Mandiri Inhealth Batam Operational Office in 2020 the majority ≥ 4 hours as many as 22 respondents (73.3%); (3) Back frequency distribution Pain in back office at the Mandiri Inhealth Batam Operational Office in 2020, the majority with mild pain were 17 respondents (56.7%); (4) There is a relationship between sitting position and low back complaints Pain in back office at the Mandiri Inhealth Batam Operational Office in 2020 with statistical test results of 0.003 < 0.05; (5) Back complaints

Pain in back office at the Mandiri Inhealth Batam Operational Office in 2020 with statistical test results of 0.030 < 0.05.

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