

# RELATIONSHIP LONG SITTING, SITTING POSITION, AND STUDENT STATUS WITH LOW BACK PAIN COMPLAINTS IN STUDENTS OF IBNU SINA UNIVERSITY, BATAM CITY IN 2023

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**Abstract:** Low Back Pain or lower back pain is an injury that is found as a result of poor physical activity. One of the factors that can influence the occurrence of complaints of low back pain is position, duration of sitting, and during activities. This study aimed to determine the relationship between sitting duration, sitting position, and student status with complaints of low back pain in college students. A cross-sectional analytic survey study was carried out on 107 people using a questionnaire, sampling was taken by random sampling. Questionnaire results were tested by Chi-Square statistical test. It was found that there was a relationship between long sitting and complaints of low back pain in Ibnu Sina University students with a p-value of 0.05;  $r^2 = 0.04$ . There is a relationship between sitting position and complaints of low back pain in Ibnu Sina University students, p-value 0.05;  $r^2 = 0.02$ . There is a relationship between student status and complaints of low back pain in students at Ibnu Cyan University, p-value 0.05;  $r^2 = 0.03$ . This study concludes that there is a relationship between sitting time, sitting position, and student status with complaints of low back pain among students at Ibnu Sina University, Batam City in 2023.

**Keywords:** Long sitting, sitting position, student status, low back pain

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## 1. Introduction

Ergonomics can be defined simply as the study of work. More specifically, ergonomics is the science of designing jobs to fit the worker, rather than physically forcing the worker's body to fit the job. Tailoring tasks, workplaces, tools, and equipment to suit workers can help reduce physical stress on workers' bodies and eliminate many potentially serious and disabling work-related musculoskeletal disorders (MSDs). (OSHA, 2000)

Occupational safety and health (K3) are one of the maintenance programs in the company. The implementation of an occupational safety and health program for employees is very important because it aims to create a safety system and work unit by involving integrated management, workforce, conditions, and work environment to increase productivity and reduce work accidents. The goal is that the company's human resources can make the best contribution to the realization of company goals (International Labour Office, 2013).

Occupational Diseases are diseases caused by work, work tools, materials, processes, and work environment (f physical factors, chemical factors, biological factors, physiological or ergonomic factors, psychological factors), therefore occupational diseases are diseases artificial or often called manmade diseases. Efforts to prevent PAK caused by work require the application of

occupational safety and health or commonly called K3 so that workers feel comfortable while working and can avoid PAK. (Husaini et al., 2017).

The prevalence of low back pain each year varies greatly with figures reaching 15-45%. According to WHO (2013), shows that 33% of the population in developing countries is in persistent pain. Meanwhile, in Indonesia, data for the number of sufferers of *Low Back Pain* is also not known with certainty but is estimated to vary between 7.6% to 37% of the total population. *Low Back Pain* is not caused by organic disorders, but by an incorrect position of the body at work (Rahmawati, 2021).

*Low Back Pain* is a musculoskeletal disorder resulting from the application of wrong ergonomics. The main symptom of *Low Back Pain* is pain in the spine area of the back. In general, this pain is caused by stretching muscles 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 (Riza Umami et al. 2014.)

*Low Back Pain* can reduce productivity in humans, 50-80% of workers around the world have experienced *Low Back Pain* and almost a third of their age have experienced some type of *Low Back Pain* which is the second disease after the flu that can make a person often go to the doctor to provide adverse impact on socio-economic conditions with reduced working days as well as decreased work productivity (Tanderi et al., 2017)

*Human Safety and Work* statistical report (2018) in the UK there were 500,000 cases of *musculoskeletal disorders* occurring throughout 2017. Meanwhile, research related to *musculoskeletal disorders* has also been carried out in various manufacturing and service industry sectors in Indonesia (Rahayuningsih et al., 2018). The prevalence of *Low Back Pain* in Indonesia is 18%. The prevalence of *low back pain* increases with age and is most common in the middle and early fourth decades. Most of the causes of *Low Back Pain* (85%) are non-specific, due to abnormalities in the soft tissues, in the form of muscle, ligament injuries, muscle spasms, or fatigue. Other serious causes are specific, including vertebral fractures, infections, and tumors.

Based on academic data from Ibnu Sina University, the majority of students at Ibnu Sina University study while working, where they work from Monday to Saturday morning until the afternoon from 08.00 – 17.00 (8 hours) and continue studying at 18.30 – 22.00 ( $\pm$ 4 hours) from Monday to Friday. (Siakadku.uis.ac.id, 2023)

Seeing the conditions in the field, the researcher is interested in researching complaints of *low back pain* in students at Ibnu Sina University in 2023, due to being in college and working. From these problems, it can be said that *low back pain* does not only occur in old age but along with current developments it is starting to appear that *low back pain* can be experienced at a young age. If *low back pain* has occurred at a young age it will interfere with *productivity*.

## 2. Materials and Methods

The type of research used in this research is quantitative. The design used by the researchers was *an analytic survey* with a *cross-sectional research design*. The location of this research was conducted at the University of Ibnu Sina Kota Batam and conducted in May-July 2023. The population in this study totaled 107 people and the *sampling technique* used was *random sampling*. Sitting position measurements were carried out using *the Rapid Entire Body Assessment* (Hignett & Ergonomist, 2000). Bivariate analysis in this study used a statistical test, namely *the chi-square test*.

## 3. Results and Discussion

### 3.1 Univariate analysis

#### 3.1.1 Characteristics of respondents

**Table 1.** Frequency Distribution of Respondent Characteristics

No	Variable	Frequency (f)	Percentage (%)
<b>Gender</b>			
1	Man	70	65,4
	Woman	37	34,6
	Total	107	100
<b>Student status</b>			
2	Work	92	86
	Doesn't work	15	14
	Total	107	100
<b>Length of working</b>			
3	>5 Years	57	53,3
	< 5 years	50	46,7
	<b>Total</b>	<b>107</b>	<b>100</b>
<b>Long Sitting</b>			
4	> 4 hours	25	23,4
	< 4 hours	82	76,6
	Total	107	100

<b>Rest Length</b>			
<b>5</b>	>8 hours	45	42,1
	< 8 hours	62	57,9
	Total	107	100
<b>Sitting Position</b>			
<b>6</b>	Small Risk	58	54.2
	Medium Risk	18	16.8
	High risk	31	29
	Total	107	100
<b>Complaints of Low Back pain</b>			
<b>7</b>	No pain	15	14
	Mild pain	50	51.4
	Moderate Pain	31	25.2
	Severe pain	11	9.3
	Total	107	100

From Table 1 it can be seen that there were 70 male respondents (65.4%) and 37 female respondents (34.6%).

From the table above, the status of students who work is 92 respondents (86%) and those who do not work are 14 respondents (15%).

Respondents working period > 5 years was 57 respondents (53.3%), and working period <5 years was 50 respondents (46.7%).

There were 25 respondents (23.4%) who sat while working > 4 hours and < 4 hours totaled 82 respondents (76.6%).

From the table above it can be seen that the length of rest for students > 8 hours totaled 45 respondents (42.1%) and those who < 8 hours totaled 62 respondents (57.9%).

From the table above it can also be seen that the sitting position with low risk was 58 respondents (54.2%), those with moderate risk were 18 respondents (16.8%) and those with high risk were 31 respondents (29%).

For *bivariate results* of the relationship between the length of sitting, sitting position, and student status at Ibnu Sina University Students in 2023 can be seen in the table below.

**Table 2.** The Relationship between Long Sitting and Complaints of *Low Back Pain* in Ibnu Sina University Students in 2023

No	Independent variable	Dependent Variable										P Value
		No Pain		Mild pain		Moderate Pain		Severe Pain		Total		
		n	%	n	%	n	%	n	%	N	%	
<b>1</b>	< 4 hours	6	35.5	6	35.3	24	26.7	2	11.8	17	100.0	0.04
<b>2</b>	> 4 hours	9	10.0	49	54.4	3	17.6	8	8.9	90	100.0	
	<b>Total</b>	15	14.0	55	51.4	27	25.2	10	9.3	107	100.0	

From Table 2 it can be seen that there is a relationship between long sitting and complaints of *low back pain* in Ibn Sina University students who did not experience pain totaling 15 respondents (63.3%), mild pain totaling 55 respondents (89.7%), moderate pain totaling 27 respondents (44.3%) and severe pain amounted to 10 respondents (20.7%).

Hasi *Chi-Square* with *P-Value* 0.04 <0.05 so that  $H_0$  is rejected, which means there is a relationship between long sitting and *low back pain complaints* among students at Ibnu Sina University in 2023.

Judging from the statistical tests above, 55 respondents (51.4%) had mild pain complaints, 27 respondents had moderate pain complaints, 27 respondents (25.2%) and 10 respondents with severe pain complaints (9.3%), in other words, studying while working for long periods of sitting statically. in a period of  $\geq 4$  hours has a greater chance of causing *Low Back Pain* than just sitting < 4 hours. This is in line with research (Hutasuhut et al., 2021), namely, there is a relationship between *low back pain* and long sitting among Sam Ratulangi University medical students. Sitting on a computer while studying or working for 2-4 hours is enough to cause discomfort in the lower back area.

This study is also in line with the relationship (Syahputra Wardoyo et al., 2021) in this study between long sitting and complaints of low back pain in Pontianak Integrated Office employees who sit for 4-6 hours at risk and found a prevalence of *Low Back Pain* at 12.6% in people who frequently work sitting for > 4 hours.

Sitting too long causes additional burdens. The addition of a continuous load causes interference and if it is not handled properly for too long it can cause tissue damage to the vertebral segments, especially the lumbar vertebral segments. Sitting for a long time increases the tendency to assume a static sitting position, which results in oxygenation to the discs, ligaments, muscles, and other tissues, resulting in pain or discomfort in the lower back area. Increased blood circulation, decreased muscle work, and reduced pressure on the vertebral column and intervertebral discs are

a series of positive effects of sitting position in a chair that involves ergonomics (Vujcic et al., 2018).

**Table 3.** Relationship Sitting Position and Complaints of *Low Back Pain* in Ibnu Sina University Students in 2023

No	Independent variable	Dependent Variable										
		No Pain		Mild pain		Moderate Pain		Severe Pain		Total	P Value	
		n	%	n	%	n	%	n	%	N		%
<b>1</b>	Little Risk	8	13.1	29	47.5	20	32.8	4	6.6	61	100.0	0.02
<b>2</b>	Risk medium	6	30.0	9	45.0	4	20.0	1	5.0	20	100.0	
<b>3</b>	High risk	1	3.8	17	65.4	3	11.5	5	19.2	26	100.0	
<b>Total</b>		15	14.0	55	51.4	27	25.2	10	9.3	107	100.0	

From Table 3 the relationship between sitting position and complaints of *low back pain* in Ibnu Sina University students is known to have no pain totaling 15 respondents (14.0 %), mild pain 55 respondents (51.4 %), moderate pain numbering 27 respondents (25.2 %) and severe pain in 10 (9.3 %). Hasi *Chi-Square* with *P-Value*  $0.02 < 0.05$   $H_0$  is rejected, which means there is a relationship between sitting position and *low back pain complaints* among students at Ibnu Sina University in 2023.

The results of the study showed that 55 respondents (51.4%) experienced mild pain, 27 respondents (25.2%) experienced moderate pain and 10 respondents (9.3%) experienced severe pain. The cause of this sitting position has a high level of risk because the position of the neck forms an angle of 30° the posture of the back is bent 35° the position of the bent legs resting on the bottom of the chair, the upper arms and forearms resting on the table and holding objects and activities of more than one part the worker's body is in a static position for more than one minute and the action is performed in a small range (more than 4 times per minute). A hunched-back posture is an unnatural working posture.

This research is in line with (Teguh Pram, 2020) finding of a significant relationship between sitting position and the occurrence of back pain complaints ( $p\text{-value} = 0.019$ ;  $r^2 = 0.274$ ). There is a significant relationship between sitting position and the occurrence of buttock pain complaints ( $p\text{-value} = 0.030$ ;  $r^2 = 0.262$ ).

This is also in line with the research (Lating et al., 2022) results of data analysis on the relationship between sitting position and the incidence of symptoms of *Low Back Pain* in 2020 obtained  $p\text{-value} = 0.011$  and the results of data analysis on the relationship between sitting position and the incidence of symptoms of *Low Back Pain* in 2020 obtained  $p\text{-value} = 0.011$  There

is a strong relationship significant difference between sitting position and length of sitting for tailors in Ambon City.

This is to the statement (Adityah et al., 2022) that an unnatural working attitude is a working attitude that causes the position of the body parts to move away from its natural position, for example, the movement of the arms raised, the back too bent, the head raised and so on. The farther the position of the body part is from the body's center of gravity, the higher the risk of developing skeletal muscle complaints.

**Table 4. Relationship Student Status and Complaints of Low Back Pain Among Students at Ibnu Sina University in 2023**

No	Independent variable	Dependent Variable										P Value
		No Pain		Mild pain		Moderate Pain		Severe Pain		Total		
		n	%	n	%	n	%	n	%	N	%	
1	Doesn't work	6	37.5	6	37.5	3	18.8	1	6.3	16	100.0	0.03
2	Work	9	9.9	49	53.8	24	26.4	9	9.9	91	100.0	
<b>Total</b>		15	14.0	55	51.4	27	25.2	10	9.3	107	100.0	

From Table 4 it can be seen that college students while working are not working experiencing complaints of low back pain totaling 15 respondents (14.0%), experiencing mild pain complaints 55 respondents (51.4%), moderate pain totaling 27 respondents (25.2%), severe pain totaling 10 respondents (9.3%). *Chi-Square* results with a *P-Value* of  $0.03 < 0.05$  Ho are rejected, which means there is a relationship between student status and complaints of low back pain among students at Ibnu Sina University in 2023.

The results of the study found that on average students found mild to severe complaints, 55 respondents (51.4%) had mild complaints, 27 respondents (25.2%) had moderate complaints, and 10 respondents (9.3%) had severe pain. This is in line with research (Fitriani et al., 2021). The results showed that 278 (70.6%) students experienced *Low complaints of Back Pain*. The results of the multivariate analysis showed that students with lectures > 5 hours/day (OR=1.81; 95% CI=1.07-3.06) and students with non-ergonomic body positions during lectures (OR=2.35; 95% CI=1.45-3.81) associated with LBP complaints during distance learning. Meanwhile, the duration of using the gadget (OR=1.29; 95% CI=0.81-2.07) was not related to the incidence of LBP complaints.

*Low Back Pain* complaint factor is caused by individual factors, work factors, environmental factors, and psychological factors. Low back pain can also be caused by muscles that experience tension which is expressed as aching pain. This situation can occur due to wrong sitting, sleeping, and standing attitudes.

According to (Terfe et al., 2023) which states that low back pain is also caused by fatigue in the muscles when workers bend their torso while working in a standing position. Doing this posture causes the load to be concentrated on the lower back muscles which can quickly feel tired. So that immediate improvement is needed in the position of the back, it can be done with REBA and RULA assessments.

#### **4. Conclusion**

##### **4.1 Relationship of Long Sitting with Complaints of *Low Back Pain* in Ibnu Sina University Students in 2023**

Based on the results of research that have been done that there is a relationship between long sitting with complaints of *Low Back Pain* in Ibnu Sina University students in 2023. Sitting for a long time in a static position will cause continuous muscle contraction and *vasoconstriction*. In *vasoconstriction*, blood flow is blocked, ischemia occurs, tissue is deprived of oxygen and nutrients, and long muscle contractions can cause a buildup of lactic acid. This can cause lower back pain or discomfort (L. N. I. Sari, 2015)

*The British Chiropractic Association* found that 32% of the research population with worker/employee status spent an average of 10 hours a day sitting doing their job. Half never stand while working even though time is provided to rest.

The results of this study are in line with research conducted by (Sari et al., 2015) This study shows that there is a relationship between long sitting and complaints of *Low Back Pain* in travel company computer operators. this result is based on the results of *the Fisher exact* test with a mark p-value of  $0.014 < 0.05$ .

##### **4.2 Relationship Sitting Position and Complaints of *Low Back Pain* in Ibnu Sina University Students in 2023**

High-risk work positions have a high risk of experiencing *Low Back Pain*. If the worker's working position is in a static condition for a long time, especially the lumbar region, then the positions and movements that occur during the weaving process can cause wear and tear on the lumbar region due to repetitive movements. In addition, the excessive muscle work to maintain the weaver's working position, so that the muscles can experience spasms. Muscle complaints generally occur due to excessive muscle contraction due to giving work that is too heavy with a long duration of loading. If the muscle contraction is excessive then the blood circulation to the muscles will be reduced. As a result, the supply of oxygen to the muscles will decrease, the metabolic process will be hampered and eventually, there will be an accumulation of lactic acid which will cause pain in the muscles. (Spellman, 2017)



The results of this study are in line with research conducted by (Wijaya et al., 2019) about the relationship between position and sitting duration with low back pain in online game players obtained from the results of the *chi-square test* of 0.000. This value indicates that there is a significant relationship between sitting position and low back pain.

### **4.3 Relationship Student Status and Complaints of *Low Back Pain* in Ibnu Sina University Students in 2023**

The status of students who work and do not work their activities are very busy, where students work from morning to evening, and continue to conduct lectures from 18.20 to 22.00. Studying while working has a lot of impact on students, both positive and negative. The positive impact is that by working students can help parents pay for college, gain work experience and economic independence (Schwartz, 2009). On the other hand, the problem that working students need to watch out for is that work can make students neglect their main task, namely studying (Wiyono et al., 2018)

This is in line with research (Moroder Schulthess Klinik et al., 2014) for health workers when they were students who had found the problem of *Low Back Pain*. This is because health students have a time-consuming curriculum and have a sedentary lifestyle, they can generate > 3 hours per day studying in a sitting position 2 times more often than students of other majors. *Low Back Pain* can become one of the more serious health problems if not treated quickly and appropriately

Based on the results of research that have been conducted by researchers regarding the relationship between sitting position, long sitting, and complaints of *Low Back Pain* in students at Ibnu Sina University in 2023, the authors can conclude that:

There is a significant relationship between sitting position, sitting duration, and complaints of *Low Back Pain* in Ibnu Sina University students in 2023.

It is expected that students will pay more attention to their sitting position and take the time to stretch their muscles when doing lectures and work to prevent or reduce *Low Back Pain complaints* and it is hoped that the campus will provide health education to students about good work attitudes or ergonomics to reduce the risk of *Low Back Pain Back Pain*.

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### **Conflict of Interest**

All Authors declare no conflict of interest and agree with the content of the manuscript.

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