

Original Research

Sitting Position and Low Back Pain (LBP) Incidents in Online Learning During the Pandemic of Covid-19: A Correlational Study

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ABSTRACT

COVID-19 has an impact on the education sector. Transitioning from face-to-face to online learning puts students at risk for back pain as they must perform most tasks in a sitting position with a non-ergonomic posture. The aim was to analyze the relationship between the sitting position and low back pain during online learning. In this study, we used a cross-section design. A total of 224 nursing students participated in the study. Sampling was done randomly, and data collection using online questionnaires. Data analysis was done descriptively and inferentially. The Chi-Square test was used to determine the correlation between sitting position and low back pain. The results showed that almost half (49.1%) of students sat down when learning online, and the incidence of low back pain in students was as much as 45.1%. In addition, the results also showed no significant association ($p\text{-value} = 7,035 \geq 0.05$; $r = 0.030$) between sitting position and low back pain incidence in nursing students during online learning during the COVID-19 pandemic. The sitting position factor is not the primary determinant of low back pain. Therefore, further research is needed concerning other low back pain events.

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Introduction

Coronavirus Disease 2019 (COVID-19), which has spread to almost all countries, has made this disease a global pandemic. This pandemic has also hit Indonesia (Yuliana, 2020). Indonesia ranks second in Asia with COVID-19 cases from 11 countries. The number of confirmed cases of COVID-19 in Indonesia since July 23, 2021, is 3,033,339 people, with a death toll of 79,032 (World Health Organization, 2021). The increasing incidence of COVID-19 in Indonesia requires the government to implement a lockdown policy or social restrictions in the community to prevent COVID-19 infection (Thorik, 2020).

The government's policy on social restrictions impacts the education sector. This policy has an impact on learning patterns. Face-to-face student learning turns into online or virtual learning. Syarifudin (2020) said online learning is a solution for implementing teaching and learning activities during a natural disaster. Online learning requires students to learn independently, prepare materials, and master and understand learning technology (Sudarsana *et al.*, 2020). Therefore, online learning requires students to actively seek and understand the material presented by the lecturer, especially outside of learning hours.

However, online learning at home or elsewhere does not cause students to use laptops or devices for a long time and does not move at all. This activity causes physical fatigue. During the COVID-19 pandemic, students experienced burnout or physical, mental, and emotional exhaustion. This fatigue causes various symptoms, one of which is low back pain (Christiana, 2020).

Online learning using gadgets or laptops causes students to sit for a long time because they focus on receiving material. This prolonged sitting activity can also cause the risk of low back pain. Anggraika (2019) said that the absence of a change in sitting position and the lack of stretching could risk low back pain. During online learning, there are times when students are too focused on the material, so they are less able to stretch their bodies.

Low back pain is a problem in the lower back due to musculoskeletal disorders or incorrect mobilization that causes pain, decreases lumbar flexibility, and disrupts

activities (Aras, 2019). Low back pain can be caused by poor body movement or the wrong position, such as a less ergonomic sitting position during online learning. In addition, low back pain also most often occurs due to improper posture, poor sitting posture, sitting too long, excessive activity, and trauma to the musculoskeletal system (Anggraika, 2019).

Likewise, Shaukat *et al.* (2020), learning activities or working in front of a laptop that is carried out for a long time can cause complaints of low back pain. Many young and middle-aged adults have experienced low back pain during the COVID-19 quarantine. Respondents experienced low back pain during the COVID-19 quarantine. They are active sitting in front of a laptop or computer for 6-8 hours daily. A total of 39.2% of respondents experienced back pain during the COVID-19 quarantine. As many as 30.8% of respondents use gadgets for 6-8 hours. At the same time, 3.5% spend their time on laptops or computers for more than 8 hours. As many as 50.9% of respondents said they sit in the same position when using a smartphone.

Long sitting and static positions that are not ergonomic can cause the waist muscles to tense up and cause damage to the soft tissues and surrounding tissues. The tension of these muscles can result in pressure on the spinal cord, which can cause a hernia (Pramana & Adiatmika, 2020). Credeur *et al.* (2019) also said that sitting for long periods harmed the health of peripheral blood vessels, significantly interfering with the vasodilation function of the leg arteries.

Sitting for a long time causes discomfort in the musculoskeletal system, so it can cause cognitive decline (Baker *et al.*, 2018). In addition, the indirect impact of sitting for a long time can also cause pain in the lower back; the neck becomes stiff, sore, and tired quickly (Kautsar & Dewi, 2020). Credeur *et al.* (2019) state that low back pain can reduce a person's quality of life and not perform daily activities optimally.

During this COVID-19 pandemic, extended online learning for hours contributes to low back pain due to a long sitting position and lack of movement during education. Based on the description above, this study intends to analyze the correlation between sitting position and the incidence of

low back pain in nursing students when undergoing online learning during the COVID-19 pandemic. This study aims to identify the relationship between sitting position and the incidence of low back pain. The study results are expected to be input in determining one of the factors causing the incidence of low back pain during online learning and become a reference for further treatment.

Method

This analytical descriptive study applied a cross-sectional design. Two hundred twenty-four nursing students at a university in Bandung participated in this study. The response rate reached 100%. Sampling used a proportionate stratified random sampling based on the distribution of study programs and students' level (class).

Respondents were selected according to inclusion criteria: 1) active status of students, 2) education levels including undergraduate and vocational, and 3) participating in online learning for approximately four hours a day within five days for one week. Meanwhile, the exclusion criteria applied in this study were students with a history of low back pain based on a medical diagnosis before the outbreak of the COVID-19 pandemic.

Data were collected through online instruments, including a sitting position questionnaire and a questionnaire on the incidence of low back pain during online learning. The questionnaire on the incidence of low back pain and sitting position was designed according to related concepts and tested for reliability and feasibility.

The sitting position questionnaire was tested for content validity by an expert to see the suitability and feasibility of the questionnaire (Brown *et al.*, 2005; Surya & Legiran, 2018). The results of the questionnaire assessment were declared feasible and could measure the description of the sitting position of the individual being assessed.

Meanwhile, the questionnaire on the incidence of low back pain developed by the researcher was conducted to test the validity of the content to the expert, construct validity test, and test reliability. This questionnaire has been declared reliable and can reliably

measure the incidence of low back pain in students during online learning. This questionnaire has a validity value in the range of 0.711 – 0.857 and a reliability value of 0.835, so it is declared valid and reliable.

Data analysis used descriptive and inferential analysis. Chi-Square test was applied to identify the correlation between sitting position and the incidence of low back pain. This research has obtained ethical approval Number 27/KEP.01/Unisa-Bandung/VI/2021 from the Research Ethics Committee at the Universitas' Aisyiyah Bandung.

Results and Discussion

A total of 224 nursing students participated in this study. Most of the participating students (29.9%) were 20 years old, and almost entirely (89.3%) were women. Regarding education level, most of the students involved in research (71.4%) came from the undergraduate level (Table 1).

In addition, based on Table 2, almost all students (94.2%) participate in online learning 4 hours a day for five days. The condition of students with a fixed or unchanged sitting position for 20-30 minutes was 46.4%. As many as 65.6% of students complained of lower back pain on the pain scale range 1-3 (0-10) or mild discomfort. Pain felt by students, such as a burning sensation (30.4%), with a duration of pain, was deemed less than six weeks (59.8%). In addition, students also reported that during online learning, almost all students did not do heavy work (86.6%).

The measurement of sitting position and the incidence of low back pain, as shown in table 3, shows that the incidence of low back pain during online learning is 45.1%. The slouched sitting position was the most practiced by students, namely 22.8%, and caused low back pain.

The results of an inferential analysis to identify the relationship between sitting position and the incidence of low back pain showed a p-value of 7.035 and a correlation coefficient (r) of 0.030. Thus, the p-value is 7.035 0.05, so there is no correlation between sitting position and the incidence of low back pain during online learning during the COVID-19 pandemic.

Table 1. Student Characteristics

Characteristics	n	%
Age		
18 years	18	8.0
19 years	59	26.3
20 years	67	29.9
21 years	48	21.4
22 years	27	12.1
23 years	4	1.8
24 years	1	0.4
Gender		
Male	24	10.7
Female	200	89.3
Education Level		
Bachelor	160	71.4
Vocational	64	28.6

Table 2. Student Conditions During Online Learning

Conditions	n	%
Online Learning 4 hours a day for approximately five days a week		
Yes	211	94.2
No	13	5.8
The sitting position remains or does not change for 20-30 minutes.		
Yes	104	46.4
No	120	53.6
Low back pain perceived pain scale.		
Scale 0 (No Pain)	21	9.4
Scale 1-3 (Mild Pain)	147	65.6
Scale 4-6 (moderate pain)	55	24.6
Low Back Pain like Burning		
Yes	68	30.4
No	156	69.6
History of Low Back Pain 6 weeks		
Yes	134	59.8
No	90	40.2
History of Doing Heavy Work During Online Learning		
Yes	30	13.4
No	194	86.6

Table 3. Chi-Square Analysis Results

Sitting Position	Low Back Pain Incident				p-value	r
	Yes		No			
	f	%	f	%		
Upright	6	2.7	15	6.7	7.035	0.030
Bent Over	51	22.8	42	18.7		
Leaning	44	19.6	66	29.5		
Total	101	45.1	123	54.9		

The COVID-19 pandemic has had an impact on the world of education. The COVID-19 pandemic has caused the transition from face-to-face learning to virtual face-to-face learning. In Indonesia, the online learning policy is new, especially for students. This online learning pattern is a new habit and a challenge for lecturers and students (Napitupulu, 2020).

Online learning that is carried out requires students to have the ability to operate communication media and technology. This ability is an absolute requirement when learning online at home (Simarmata *et al.*, 2019). Students who carry out online learning also need to prepare a comfortable learning environment, especially when dealing with computers or devices that communicate with lecturers and other students. A relaxed atmosphere is how students sit comfortably and watch learning occur (Nurafriliano *et al.*, 2020).

Students undergoing learning during the COVID-19 pandemic are more difficult because they have to carry out online learning and assignments every day for more than 4 hours a day for approximately five days a week. This online learning pattern causes students to sit in a fixed position during learning. Same as what was found by Asiah (2020), students who did online education for more than 4 hours complained of a stiff neck, dizziness, aches all over the body, and complaints of sore eyes. Students also experience back and waist pain due to sitting too long, complaints of ear pain due to wearing the headset for too long, vertigo, nausea, and vomiting.

Casas *et al.* (2016), in their research involving 516 health faculty students, found that online learning caused various complaints. The participating students experienced more pain in the lower back area. Time spent in academic activities was 21 hours per week, and time spent sitting opposite a computer screen was 17.9 hours per week. It is associated with neck and back pain.

Sitting is a natural activity and must be done during online learning. Nevertheless, good sitting must be maintained by every student. The sitting position determines a person's health status. Moreover, sitting is a

work attitude carried out daily (Aeni & Faudiah, 2019). A person may need to use several body positions, such as sitting up straight, half sitting, and sitting hunched over, while doing educational activities (Widjayanti *et al.*, 2018). Therefore, in learning, every student must understand that movement when sitting is necessary to maintain a healthy condition.

The ergonomic sitting position is not too bent when sitting. When viewed from the function and arrangement of bones, ergonomic sitting posture or posture is sitting upright by leaning against a chair. This sitting position will make the muscles in the abdomen not weak, and the back will not slouch (Angkouw Chyntia, 2019). Nurafriiliano *et al.* (2020) state that the ergonomic sitting position is positioning the back on the back of an upright chair and the feet on the floor. Then the part of the hands supported on the back and the eyes pointing parallel to the computer screen or device.

The correct posture for a person when sitting is as follows: (1) try to look parallel to the computer screen; (2) the correct back position is a straight body, not leaning left and right; (3) the correct arm position is to keep the elbows close to the body by allowing the wrists and elbows to be in a straight line at an angle of 90 degrees to the shoulders; (4) the correct wrist position is to place the plane with the keyboard; (5) the correct position of the legs and feet is where the feet are flat on both sides of the floor, the feet are perpendicular to the ground, leaving the weight of both feet (Prueksanusak *et al.*, 2019).

Meanwhile, Wijaya *et al.* (2019) said that the correct sitting position is that the knees are parallel to the pelvis. The legs do not lift, but there is something to support the legs. In addition, the two legs should not cross each other. A good sitting position avoids sitting in the same position for long periods. Sitting in one position for more than 20 minutes to 30 minutes is not recommended. The elbows of the arms should be at rest at all times on the chair support. The shoulder position should also remain relaxed.

This study shows no correlation between sitting position and low back pain among nursing students during online learning during the COVID-19 pandemic. The

majority of students sitting in this study are in a reclining position. Half of the students in a reclined sitting position did not experience low back pain incidents.

This study is in line with Surya & Legiran (2018), finding that sitting position has no relationship with the incidence of low back pain. However, Pramana & Adiatmika (2020) show a link between the incidence of low back pain in medical students at Udayana University with a sitting position. His research found that 64 students who did not sit in an ergonomic position complained of low back pain. Meanwhile, 58 students assessed as posing ergonomic sitting did not experience low back pain.

Low back pain is also defined as pain and discomfort localized below the lower costal margin and above the inferior gluteal fold, with or without leg pain (Pillai & Haral, 2018). The impact of low back pain does not directly cause death. Still, it causes individuals to become unproductive, so it can cause disability (disability) even for socio-economic conditions causing reduced working days resulting in decreased productivity (Aini & Silvia, 2019).

The impact of low back pain on students is the disruption of daily functions such as activities, sleep, and walking quality, which can hinder their work. Other effects are pain that triggers the mood to become angry and anxious (Vujcic *et al.*, 2018). As AlShayhan & Saadeddin (2018) say that low back pain has an impact on the psychological aspect of the young population because it can cause depression, anxiety, and irritability, so health science students are vulnerable to stress and the length of time studying, and training will make them likely to experience low back pain.

The leading cause of low back pain is individuals with the wrong posture when sitting, standing, and lifting heavyweights. The cause of low back pain is due to poor individual body activities or activities in the wrong position (Gupta & Alok, 2020). One of the causes is an error in sitting position while doing activities (using a laptop).

One of the risk factors for experiencing complaints of extremity disorders is students. Because it is caused by the type of activity or type of work, inappropriate ergonomic conditions such as learning attitudes, table

shapes, and lecture tools that are not suitable can trigger musculoskeletal complaints (Prawira *et al.*, 2017).

Similarly, Surya & Legiran (2018) said that the knees and hips were inflected when sitting, while the lumbar lordosis was flatter. A person experiences a more significant reduction in lumbar lordosis caused by sitting without a backrest than someone with a backrest. This sitting position causes an increase in intradiscal pressure, causing lower back pain. A less ergonomic student sitting less ergonomic position can be a risk factor for experiencing low back pain.

Sitting for a long time with minor ergonomic static, such as sitting upright, can cause tension in the vertebrae, especially in the lumbar (Widjayanti *et al.*, 2018). Repeated and excessive activities are then carried out continuously and in a monotonous and less ergonomic sitting position can cause changes in the curved line or curve of the spine in a person so that complaints of pain occur in certain parts (Pramana & Adiatmika, 2020). Bad posture, such as sitting or lying down that is improper, can significantly impact health and affect the incidence of back/spine pain (Setiawan & Fadilah, 2019).

The sitting position that is not good or not ergonomic causes muscle contraction isometrically (against resistance) in the primary muscles involved in the work. As a result, the workload rests on the waist area, which is the main support load, and it is easy to get tired and experience muscle pain around the waist or back. lower back (Aeni & Faudiah, 2019).

Students are individuals who have good fitness and health conditions to carry out activities still. Students who experience health problems such as tenderness due to low back pain can recover faster if treated. Rasyidah *et al.* (2019) revealed that the first complaints of low back pain incidents usually appear around 35 years. Complaints of low back pain will continue to increase with increasing age. This complaint will get worse if it is not treated immediately. Moreover, increasing age causes muscle endurance to decrease and is at risk for muscle disorders.

The incidence of low back pain in nursing students during online learning is associated with various risk factors. Risk

factors that cause low back pain include age, fitness, health, psychological, and psychosocial problems. As Vujcic *et al.* (2018) revealed, the main risk factors for low back pain are age, gender, obesity, and psychosocial factors such as stress, anxiety, and depression. In addition, back pain can also be influenced by education, work, decreased flexibility and muscle mobility, competitive sports, postural habits, physical activity, and smoking.

The work that a person does can also result in this incident. Body position and posture when standing, sitting, and even sleeping do not affect low back pain (Setiawan & Fadilah, 2019). Thus, several factors may cause no correlation between sitting position and low back pain. However, these factors were not investigated in this study. These factors may be confounding aspects of the results of this study.

Although the study results did not show a significant relationship between sitting position and the incidence of low back pain during online learning, the results showed that an ergonomic sitting position, namely a leaning sitting position, could reduce the incidence of low back pain. This sitting position is highly recommended for students learning online, but a passive sitting position for more than 20-30 minutes is not recommended.

Conclusion

The study results show that most nursing students use a reclining sitting position during online learning and do not experience low back pain incidents. Meanwhile, the statistical analysis results showed no relationship between the incidence of low back pain and the sitting position of nursing students who underwent online learning.

Sitting position is not one of the main factors that can cause the incidence of low back pain. Therefore, a broader and more in-depth study is needed to analyze other factors related to the incidence of low back pain in students, especially during online learning. The analysis of various factors that influence the incidence of low back pain will be a finding in preventing low back pain incidents, especially in learning from the future.

Limitations of the study

The study's limitation is that the respondents determined the assessment of low back pain incidents through the questionnaire. There was no direct assessment or observation by health experts to assess the low back pain incidence. When social restrictions apply, the data collection process is carried out when social limits apply, and students continue learning at home.

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Conflict of Interest

There is no conflict of interest in conducting this study.

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