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CORRELATION BETWEEN DURATION AND SITTING POSITION WITH THE INCIDENCE OF LOWER BACK PAIN DURING ONLINE LEARNING

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ABSTRACT

Low back pain is a musculoskeletal disorder that is very common and has an impact on socioeconomic, individual, family, and community losses. Low back pain is choking between the 12th thoracic rib and the bottom of the gluteal fold, with or without pain radiating down the leg. Since the coronavirus disease 2019 (COVID-19) outbreak hit Indonesia, learning that has been carried out in schools and university has become online learning where learning uses laptops or cell phones with internet facilities and in a prolonged sitting position. The condition of sitting for a long time is the most common posture performed during online learning, so it can cause discomfort and pain in the lower back. This study aimed to determine the correlation between duration and sitting position with the incidence of back pain during online learning. This study used a descriptive correlational method with a *cross-sectional design*. The sample in this study was 203 students of the Faculty of Nursing at Syiah Kuala University. The data collection technique used a valid and reliable Sitting Position Duration (DPD) questionnaire with a *Cronbach's Alpha value of* 0.729 and *the Nordic Body Map (NBM) questionnaire* to see low back pain. This study showed no significant relationship between sitting duration and back pain (*p-value = 0.625*), sitting duration, and buttock pain (*p-value = 0.616*). A significant relationship exists between sitting position and back pain (*p-value = 0.002*) and sitting position and buttock pain (*p-value = 0.001*). It was concluded that an unergonomic sitting position for a long time could cause low back pain.

Keywords: Sitting Duration; Sitting Position; Lower Back Pain

INTRODUCTION

Low back pain (LBP) is a significant cause of activity limitation and can cause socioeconomic losses for individuals, communities, and countries. Low back pain is choking between the 12th thoracic rib and the bottom of the gluteal folds, with or without pain radiating down the legs[1]. The condition of sitting for a long time is one of the phenomena that causes low back pain[2].*The coronavirus disease* 2019 (COVID-19), which has hit the whole world, has affected various aspects. Various systems have changed to adapt to the spread of the outbreak as a form of action to stop the spread of COVID-19. Higher education institutions in Indonesia have changed the education system from face-to-face to online.

The Ministry of Education and Culture (Kemendikbud) issued Kemdikbud Dikti circular letter No.1 of 2020 concerning the prohibition for university to carry out face-to-face (conventional) lectures and the obligation to carry out online learning or *online.*[3] This has been well received by all universities in Indonesia, especially Universitas Syiah Kuala in Aceh.The phenomenon in the online learning process is that students do not mobilize during learning and complete assignments given during lectures, individually and in groups. Research conducted by Daneshmandi, Ghaem, Alhamd, & Fakherpour (2017) found that sitting conditions for long periods, both hours, months, and years, can cause stiffness and hurt student health, the most commonly felt impact is distraction musculoskeletal deficient back pain[5].

Students spending more time using laptops, computers, and smartphones during the online learning process during the COVID-19 pandemic can increase the incidence and intensity of LBP[6–8]. Several systematic reviews found a strong relationship between the duration of smartphone use and LBP[9]. The research results by Hawamdeh et al. (2023) showed that LBP scores before online learning were lower than LBP scores during and after online learning[10]. LBP is associated with the student's sitting position[11]. Disruption of pain in students during online learning is associated with a longer duration of pain, painful areas of the body, and greater pain intensity[11]. Students were sitting for more than 3 hours every day in front of a laptop often complain of neck, shoulder, or lower back pain during online learning[12,13]. Caromano et al. (2015) also found that the longer the duration of students sitting in front of the computer (13.5 SD 1.5 hours) can increase LBP[14]. LBP dramatically impacts physical health conditions that

interfere with the comfort of daily activities. LBP experienced by students can increase monthly consumption of analgesics which results in students not being able to complete assignments from lecturers on time, worsening sleep quality to the point of interfering with daily activities [11].

Lower Back Pain (LBP) is a complaint that is felt caused by a sitting position with a posture that is not ergonomic and for a long duration of time[15]. This is what students of the Faculty of Nursing at Syiah Kuala University feel who have undergone *online learning* for 4 semesters. In previous research, many research has been done on the factors and causes of the increase in the incidence of low back pain during online learning. However, there is still little recent research on the extent of the correlation between duration and sitting position and the incidence of low back pain during online learning in college students in Aceh. Researchers focused on this phenomenon, so they were very interested in researching the correlation between duration and sitting position and lower back pain incidence during online learning.

Relationship between sitting duration and low back pain during online learning Complaints of low back pain in this study focused on criticisms of low back pain (point 7) and buttock pain (point 8) on the *Nordic body map questionnaire.*

RESEARCH METHODS

The research used is correlational descriptive with a cross-sectional approach. The population of this study wasall students of the Nursing Science Study Program at the Faculty of Nursing. Large sample, namely 203 respondents who met the inclusion criteria, active students of the Faculty of Nursing, Syiah Kuala University, class of 2018, 2019, and 2020. They had no history of kidney disease/kidney stones, stomach disease, rheumatism, or spinal cord injury and did not smoke. The research instrument consisted of a *Nordic Body Map* questionnaire to find out the scale of a sick body composed of 28 statement items and a sitting position duration (DPD) questionnaire to see ergonomic sitting positions or not ergonomics and sitting duration of more than 4 hours or less than 4 hours in a day. Collection data was held after getting a letter graduated ethics from the Faculty Research Ethics Committee Syiah Kuala University Nursing with research number 111108081221. Analysis data consists from analysis univariate and bivariate.

RESEARCH RESULTS

Table 1. Relationship between sitting duration and back pain (n = 203)

Sitting Duration	Back Pain Category				Total	*p-value*
	TS	AS	S	SS		
< 4 hours	3	6	5	1	15	0.625
≥ 4 hours	28	59	65	36	188	
Total	31	65	70	37	203	

TS: No pain, AS: Slight pain, S: Pain, SS: Severe pain

Based on the results of data analysis, it is known that of the respondents who had a duration of sitting for more than 4 hours a day, as many as 28 respondents did not feel back pain, 59 respondents felt a slight pain in the lower back, 65 respondents felt low back pain and 36 respondents felt very ill on the waist during sitting for online study. The results of the statistical test for sitting duration with low back pain obtained a *p-value* = 0.625 where the value was > α (0.05), so it can be concluded that there is no relationship between sitting duration during online learning and the incidence of lower back pain in the low back pain complaint category.

Table 2. Relationship between sitting duration and buttock pain (n = 203)

Sitting Duration	Buttocks Pain Category				Total	*p-value*
	TS	AS	S	SS		
< 4 jam	3	6	2	4	15	0,616
≥ 4 jam	39	56	53	40	188	
Total	42	62	55	44	203	

TS: No pain, AS: Slight pain, S: Pain, SS: Severe pain

The table above shows that as many as 39 respondents did not feel pain, and 56 respondents felt sore in the buttocks while studying for more than 4 hours a day. The statistical test results for sitting duration with buttock pain complaints obtained *p-value* = 0.616 where the value is > α (0.05), so it can be concluded that there is no significant relationship between sitting duration during online learning and the incidence of lower back pain in the buttocks complaint category.

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The relationship between sitting position and the incidence of low back pain during online learning

Table 3. Relationship between a sitting position and low back pain (n = 203)

Sitting Position	Back Pain Category				Total	*p-value*
	TS _	A S	S	S S		
Ergonomics	3	9	1 6	1 6	44	0.00 2
No Ergonomics	2 8	5 6	5 4	2 1	159	
Total	31	6 5	70	37	203	

TS: No pain, AS: Slight pain, S: Pain, SS: Severe pain

Table 3 shows that 21 respondents who sat in an ergonomic position felt very sick, and 54 respondents felt pain in their waist during online learning. The results of the statistical test of sitting position with low back pain in the category of common back pain complaints in students of the Faculty of Nursing at Syiah Kuala University obtained a *p-value* = 0.002 and this value was <α (0.05), so it can be concluded that there is a significant relationship between sitting position during online learning with complaints of low back pain.

Table 4. Relationship between a sitting position and buttock pain (n = 203)

Sitting Position	Buttocks Pain Category				Total	*p-value*
	TS _	A S	S	S S		
Ergonomics	4	12	11	17	44	0.001
No Ergonomics	38	50	44	27	159	
Total	42	62	55	44	203	

TS: No pain, AS: Slight pain, S: Pain, SS: Severe pain

The results of the data analysis in the table above explain that 27 respondents who sat in an ergonomic sitting position felt very sick, and 44 respondents felt pain in the buttocks during online learning. The statistical test results of the sitting position with lower back pain in the category of buttock pain complaints in students of the Faculty of Nursing at Syiah Kuala University obtained a *p-value* = 0.001. This value was <α (0.05), so it can be concluded that there is a significant relationship between sitting position during online learning with complaints of buttock pain.

DISCUSSION

Relationship between sitting duration and low back pain during online learning

Based on the bivariate analysis, it was found that there was no significant relationship between the duration of the student sitting during online learning and the incidence of low back pain in students of the Faculty of Nursing, Universitas Syiah Kuala.According to Pramana & Adiatmika (2020), lower back pain can occur due to activities carried out in a prolonged sitting position. However, from the results of the study, there was no relationship between a person's sitting state for a long time and low back pain. Research on the relationship between low back pain and prolonged sitting and the results are still controversial [16,17]. This is because students are under the age category of 25 years and have an ideal average body weight, so they are not physically at risk for complaints of low back pain [18].

The study's results by Kusumaningrum et al. (2021) found that age has no relationship with the incidence of LBP[19]. Several studies have found that sitting duration is closely related to or significantly affects the incidence of low back pain[20–23]. Other studies have also revealed that there is no significant relationship between long-sitting and long-standing low back pain in online advertising company workers and the automotive industry [24].Many factors can affect LBP, one of which is age. Musculoskeletal complaints generally begin to be felt at the age of 25 because, at that age, organs and bone conditions experience a decline in function with different percentages. The first complaints will appear at the age of 35 years and will increase with age. Likewise, weight gain that exceeds the ideal will cause pressure on the spine, resulting in easy damage to the spinal structure [19]Umboh et al. (2017), who examined complaints of LBP, show that more respondents are 26 years and over (50.9%)[25]. Arwinno (2018), who also researched complaints about LBP, showed that most respondents entered at the age of > 25 years, as many as 74% [26].

Relationship between Sitting Position and Lower Back Pain During Online Learning

Based on the results of data analysis, it was found that there was a relationship between sitting position and the incidence of low back pain where the *p-value* = 0.002, there was a significant relationship between sitting position and low back pain. The *p-value* = 0.001 showed a substantial connection between a sitting position and complaints of pain buttocks in students of the Faculty of Nursing, University of Syiah Kuala.

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Ergonomic sitting positions are often not understood by many people. Someone will change their sitting position according to their comfort level without regard to ergonomic positions, which can trigger low back pain. Sitting requires less energy than standing, and this causes a reduction in the static muscle load on the legs. Still, an improper sitting position causes back problems. When sitting, the spinal pressure will increase by 100%, and if the sitting position is not ergonomic or stiff causes the pressure to reach 140%. A sitting place that bends forward causes the pressure to be 190% [27].

This is in line with Anggraika, Apriany, & Pujiana's (2019) research, which found a significant relationship between sitting position and the incidence of low back pain (*p-value* = 0.021). A hunched sitting position is often the cause of complaints of back pain, even though sometimes a person uses a chair with a backrest but is not used correctly. If the activity is not carried out ergonomically, it will cause the body to become uncomfortable, and the risk of musculoskeletal disorders or diseases is higher. This is also proven by several theories that a monotonous sitting position for more than 2 hours a day increases the risk of developing back pain [28].

Sitting more static behavior is generally more physiological and impacts a person's biology. The pressure on the lower back caused by a continuous sitting position and compression on the intervertebral discs can result in reduced disc nutrition and ischemic effects resulting from sitting static for a long time. Ergonomic sitting positions that vary through hip rotation and postural movements are highly recommended to prevent LBP [29].

Research by Kett, Sichting & Milani (2021) found that prolonged periods of sitting caused a significant increase in lower back muscle stiffness. Sitting referred to in this study is sitting slumped. This hung sitting condition is often preferred for sitting posture on a chair with a back. However, it could not be found that time spent sitting slumped increase muscle stiffness, and postural activity changes muscle stiffness. Even so, sitting in an ergonomic position can prevent LBP from occurring.[30]

CONCLUSION

Based on statistical testing of the relationship between sitting position and complaints of low back pain, it was found that there was a relationship between sitting position and the incidence of low back pain in students of the Faculty of Nursing, Syiah Kuala University, with
the results of statistical tests in a sitting position with complaints of back pain obtained *p-value* = 0.002 and the effects of statistical tests in a sitting position with complaints of buttock pain received *p-value* 0.001.

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