Research Article

THE ANALYSIS OF THE NORDIC BODY MAP OF SITTING POSITION AND DURATION AMONG NURSING STUDENTS AT THE FACULTY OF MEDICINE AND HEALTH SCIENCES, UNIVERSITAS LAMBUNG MANGKURAT

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ABSTRACT

Background: *Muscle pain, included in musculoskeletal disorders, is a common condition often caused by prolonged sitting duration and incorrect sitting posture. Students are synonymous with having various activities during lectures involving certain muscles, especially nursing students with a busy lecture schedule. Sitting is one of the good positions in carrying out activities such as learning, especially when attending lectures.* ***Objective:*** *To analyze the Nordic Body Map of Sitting Position and Duration among Nursing Students at the Faculty of Medicine and Health Sciences, Universitas Lambung Mangkurat.* ***Method:*** *A quantitative, observational, analytical method with a cross-sectional approach with 136 respondents was used. The primary data collection technique was obtained by filling out the questionnaire and presenting it as a table with univariate analysis to obtain an overview of the distribution, frequency, and percentage of each variable studied.* ***Results:*** *The results of this study show that the characteristics of the respondents are almost 20 years old, female, normal BMI, and the class of 2022. Most sitting positions are ergonomic with a moderate duration of time, as well as the location and level of muscle pain complaints in the waist, back, and upper neck.*

Keywords: *Sitting Duration, Nursing Students, Nordic Body Map, Sitting Position.*

BACKGROUND

Muscle pain is when one or more parts of the muscle experience pain. This muscle pain includes Musculoskeletal Disorders (MSDs) and is common. Namely, according to data from the World Health Organization (WHO) in 2018, the prevalence of muscle pain is 50-62% of the world's population, and an estimated 1.71 billion people have musculoskeletal problems. MSDs are the leading cause of disability worldwide, with low back pain being the leading cause of disability in 160 countries, including Indonesia (World Health Organization, 2022). Based on the Basic Health Research (RISKESDAS) of the Indonesian Ministry of Health in 2018, musculoskeletal problems in Indonesia were 7.3%. Then, based on the Basic Health Research (RISKESDAS) of South Kalimantan in 2018, the prevalence of musculoskeletal problems in South Kalimantan, namely joint disease, was 4.79%.

Muscle pain can be caused by excessive physical activity, muscle injury, infection, autoimmune diseases, and side effects of medications. However, muscle pain is more common due to muscle strain caused by incorrect sitting positions and prolonged sitting without rest (James N. Parker and Philip M. Parker., 2004). The sitting position is the most stable position for work. Still, the wrong sitting position maintained for a long time will cause pressure on the intervertebral discs twice as much as when doing activities in a standing position. This is because the spine receives static loads that cause fatigue and micro trauma

continuously due to compressive stress loading, thus increasing the risk of pain in the muscles at the back of the body, such as the waist, and radiating to the buttocks or thighs. Thus, the risk of musculoskeletal disease can increase when sitting in the wrong position for a long time (Afif et al., 2021).

Sitting is one of the good positions for carrying out activities such as learning, especially when attending lectures. Students are synonymous with having various activities during lectures that will involve certain muscles (Amin et al., 2023). Activities that students usually carry out include lectures, organizations, leadership, research, internships, and additional academic activities. These activities are closely related to sitting position and duration because most activities students perform consist of attending lectures, studying and reading, and doing assignments. Incorrect sitting position and prolonged sitting duration can increase the risk of muscle strain, eventually leading to muscle pain. Some of the impacts that can be caused by muscle pain are pain, discomfort, sleep disturbances, decreased quality of life, limited physical activity, and psychological disorders such as stress and anxiety (Pramana, I. G. B. T., and Adiatmika, I. P. G., 2020).

Based on a study conducted by Wulandari (2010), there is a significant relationship between the duration and manner of sitting and the complaints of myogenic back pain among university students. A study by Tavares et al. (2019) involving 629 Faculty of Medicine students in Brazil found that 81.7% of respondents experienced low back pain (LBP) due to ergonomically inappropriate sitting positions. This aligns with research by Fadlilah and Setiawan (2019), which focused on nursing students at Respati University Yogyakarta, where 41 individuals reported pain in the cervical and lumbar regions.

The findings indicate that prolonged sitting can lead to overload on the lumbar vertebral tissue and reduce lubrication in the joints, resulting in stiffness in the lower back and discomfort. This increases the risk of LBP among students. A study by Abdu et al. (2022) also established a connection between sitting position and duration with the risk of LBP in university students. This conclusion is supported by research conducted by Amin et al. (2023), which revealed a relationship between the length and position of sitting and the incidence of LBP among students in the Faculty of Medicine at Muslim University of Indonesia from the Class of 2019.

Based on the phenomenon, researchers are interested in exploring the Nordic Body Map of Sitting Position and Duration among Nursing Students at the Faculty of Medicine and Health Sciences, Universitas Lambung Mangkurat.

METHOD

This research method was quantitative with an analytical observational design with a cross-sectional approach, and non-probability sampling techniques were used with a total sampling method of 136 samples. The population in this study were active students of the Nursing Study Program, Faculty of Medicine and Health Sciences, Universitas Lambung Mangkurat in the academic year 2023/2024 batches of 2021, 2022, and 2023 who experienced complaints of muscle pain without any specific medical conditions with a total of 149 people. However, it was reduced by 12 respondents when conducting preliminary studies and researchers, so it amounted to 136 people. The instruments used in this study were the sitting position and duration questionnaire adopted from previous research by Barus, M., Rupang, E. R., and Lahagu, E. in 2023 and the Nordic Body Map by the Occupational Safety and Health Administration (OSHA, 2004) using a Likert scale.

RESULTS AND DISCUSSION

Univariate analysis in this study was carried out by processing data that had been obtained from the results of data obtained from research respondents using a questionnaire sheet to determine the characteristics of respondents (age, gender, BMI, generation), sitting position, sitting duration, and location and level of muscle pain complaints.

Respondents' Characteristics

Table 1 Distribution, frequency and percentage of respondent characteristics (n=136)

Respondents' Characteristics	Frequency (f)	Percentage (%)
AGE		
18 years	13	9,6
19 years	43	31,6
20 years	47	34,6
21 years	27	19,9
22 years	6	4,3
Total	**136**	**100**
GENDER		
Female	110	80,9
Male	26	19,1
Total	**136**	**100**
BODY MASS INDEX (BMI)		
Underweight	34	25
Normal	61	44,9
Overweight	13	9,6
Obesity I	21	15,4
Obesity II	7	5,1
Total	**136**	**100**
CLASS		
2021	41	30,1
2022	53	39
2023	42	30,9
Total	**136**	**100**

Based on Table 1 above, it can be seen that 136 nursing students became the research sample. The majority were 20 years old, as many as 47 people (34.6%), female gender as many as 110 people (80.9%), normal Body Mass Index as many people (44.9%), and nursing students class 2022 as many as 53 people (39%).

Sitting Position

Table 2 Distribution, frequency and percentage of respondents' sitting position (n=136)

Sitting Position	Frequency (f)	Percentage (%)
Non-ergonomic	32	23,5
Ergonomic	104	77,5
Total	**136**	**100**

Based on Table 2 above, it can be seen that 136 nursing students became the research sample. The majority sat in an ergonomic position, as many as 104 people (77.5%) and in a non-ergonomic sitting position, as many as 32 people (23.5%).

This non-ergonomic sitting position can be caused by the long duration of sitting, as many as 38 people (27.9%). This can also be seen from the many lecture methods used such as lectures, seminars, Small Group Discussions (SGD), practicum, skill labs, tutorials, field studies, field practice, and assignments such as making nursing care so that sitting for a long duration causes complaints of muscle pain and pain in certain areas of the student's body. Students who use ergonomic sitting positions may be more aware of the importance of correct posture, but this does not fully guarantee freedom from muscle pain. Therefore, it is important to pause or rest between lectures to reduce complaints of muscle pain despite using an ergonomic sitting position. This is in line with research conducted by Lee et al. (2017), that even if a person adopts an ergonomic position but does not stretch or rest regularly, they will still be at risk of experiencing muscle strain.

The ergonomic theory explains that an ergonomic sitting position can reduce muscle strain by evenly distributing body weight and reducing stress on muscles and joints (Kouyama et al., 2020). However, despite the importance of an ergonomic sitting position, long periods of sitting without breaks can accumulate muscle strain, which can still lead to muscle pain. This is in line with the study by Kouyama et al. (2020), which showed that a long sitting in an ergonomic position can still cause strain on the muscles. Although the majority of students, as many as 104 people (77.5%), have used ergonomic sitting positions, there are still students who use non-ergonomic sitting positions, namely 32 people (23.5%). Muscle pain may occur due to the shape of the chair, where the chair with the design of the chair with a support on the right that is directly connected to the table does not consider the basic principles of ergonomic design, namely

adjustment to the user's varied posture (Smith et al., 2023).

Sitting Duration

Table 3 Distribution, frequency and percentage of respondents' sitting duration (n=136)

Sitting Duration	Frequency (f)	Percentage (%)
Short	40	29,4
Medium	58	42,7
Long	38	27,9
Total	**136**	**100**

Based on Table 3 above, it can be seen that 136 nursing students became the research sample. The majority sat with moderate duration as many as 58 people (42.7%), short duration as many as 40 people (29.4%), and long duration as many as 38 people (27.9%).

This long sitting duration can be caused by the many lecture methods such as lectures, seminars, Small Group Discussions (SGD), practicum, skill labs, tutorials, field studies, field practice, and assignments such as making nursing care and papers. This can also be caused by the absence of breaks between lectures so that students will sit in the same position for a long. This is supported by research by Bostick et al. (2020) that longer sitting durations contribute to increased muscle tension, especially in more vulnerable body parts, such as the back and neck.

Good ergonomics and regular resting habits are essential to reduce muscle pain in students who sit for long periods. Lack of awareness of ergonomic positions can also play a big role. Unergonomic sitting positions with short to medium sitting durations can also increase muscle strain. At moderate sitting durations, without any stretching or movement activities, muscles can still be stressed and cause tension that eventually develops into pain (Kouyama et al., 2020).

In moderate sitting duration (2-4 hours), students tend not to give the body time to rest and move, which can cause strain on the muscles. Although not as long as a long sitting duration, moderate sitting duration is also enough to affect muscles, especially in non-ergonomic sitting positions (Kouyama et al., 2020).

Location and Level of Muscle Pain Complaints

Table 4 Distribution, frequency and percentage of the location and level of muscle pain complaints of respondents (n=136)

Complaints Location	Level of Perceived Complaints							
	No Pain		Little Pain		Pain		Very Pain	
	f	%	f	%	f	%	f	%
Upper neck	67	49,2	58	42,6	9	6,6	2	1,4
Lower neck	74	54,4	54	39,7	8	5,9	0	0
Left shoulder	78	57,3	45	33	11	8,09	2	1,4
Right shoulder	77	56,6	42	30,8	13	9,55	4	2,9
Left upper arm	103	75,7	22	16,1	8	5,88	3	2,2
Back	47	34,5	61	44,8	22	16,1	6	4,4
Right upper arm	93	68,3	31	22,7	10	7,35	2	1,4
Waist	47	34,5	53	38,9	30	22	6	4,4
Buttocks	89	65,4	35	25,7	8	5,88	4	2,9
Butt	98	72	24	17,6	10	7,35	4	2,9
Left Elbow	122	89,7	11	8,09	3	2,20	0	0
Right Elbow	121	88,9	12	8,82	3	2,20	0	0
Left forearm	115	84,5	16	11,7	5	3,68	0	0
Right forearm	113	83	18	13,2	5	3,68	0	0
Left wrist	115	84,5	16	11,7	6	4,41	0	0
Right wrist	111	81,6	21	15,4	4	2,94	0	0
Left hand	116	85,2	14	10,2	6	4,41	0	0
Right hand	103	75,7	16	11,7	17	12,5	0	0
Left thigh	107	78,6	24	17,6	5	3,68	0	0
Right thigh	103	75,7	27	19,8	6	4,41	0	0
Left knee	111	81,6	20	14,7	4	2,94	0	0
Right knee	113	83	17	12,5	6	4,41	0	0
Left calf	111	81,6	19	13,9	6	4,41	0	0
Right calf	103	75,7	26	19,1	7	5,15	0	0
Left ankle	110	80,8	23	16,9	3	2,20	0	0
Right ankle	109	80,1	22	16,1	4	2,94	0	0
Left foot	99	72,7	29	21,3	6	4,41	2	1,4
Right foot	103	75,7	23	16,9	8	5,8	2	1,4

Based on Table 4 above, it can be seen that 136 nursing students became the research sample. Most of the locations of muscle pain complaints were in the waist and back, with 89 people (65.4%) and 69 people (50.7%) feeling muscle pain in the upper neck.

Complaints of muscle pain can be caused by poor posture due to non-ergonomic chair design, such as the lack of a backrest that supports the curvature of the spine, which can cause excessive pressure on the muscles of the lower back (Smith et al., 2023). Furthermore, 69 respondents (50.7%) reported muscle pain in the upper neck. Chairs with fixed desks connected on the right often make users tilt or bend their bodies to write or read, which adds pressure to the neck muscles (Park et al., 2023).

An unergonomic sitting position can also cause complaints of muscle pain because, based on the study results, 32 people (23.5%) were found to have an unergonomic sitting position. According to Rohmert (1973), the theory supports this by saying that an unergonomic sitting position can increase the biomechanical load on muscles and skeletal structures, which can trigger complaints of pain in certain parts of the body. The duration of sitting can also cause complaints of muscle pain because the study found that students who sat for a long duration were 38 respondents (27.9%). According to van der Ploeg et al. (2012), the theory supports that sitting for a long time without stretching can reduce muscle flexibility and cause joint tension, especially in the back and waist areas.

CONCLUSION

This study's results show that the respondents' characteristics are almost 20 years old, female, with a normal BMI, and in the 2022 class. Most sitting positions are ergonomic with a moderate duration of time, as well as the location and level of muscle pain complaints in the waist, back, and upper neck.

The Faculty of Medicine and Health Sciences can support this research by providing learning facilities that support ergonomic sitting positions, such as chairs and tables that suit students' needs. It can also provide adequate rest time during lecture activities so that students can do stretching exercises or light physical activity to reduce the risk of muscle pain.

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