

## The Correlation Between Working Posture and Work Duration and Non-Specific Neck Pain Symptoms in Computer User Employees

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### ABSTRACT

**Introduction:** Longer work processes with non-ergonomic working postures by employees who use computers can certainly cause musculoskeletal tension. One of the musculoskeletal disorders (MSDs) associated with computer use is complaints of non-specific neck pain caused by a non-ergonomic posture of the neck muscles over a long period, which causes muscle tension. This study aims to determine the relationship between working posture and duration of work using a computer on non-specific neck pain complaints among Hasanuddin University Rectorate employees.

**Method:** A cross-sectional research design was carried out on 121 administrative employees aged >22 years who met the inclusion and exclusion criteria. Assessment of working posture uses the Baseline Risk Identification of Ergonomic Factor (BRIEF) questionnaire, and for non-specific neck pain complaints using the Nordic Body Map (NBM) questionnaire. The Spearman's rho correlation test analyzes the relationship between variables.

**Results:** 49 out of 121 respondents had a high-risk working posture for non-specific neck pain, and 59 out of 121 had a long working duration. Working posture is positively correlated with symptoms of non-specific neck pain ( $p = 0.001$ ;  $r = 0.598$ ). In contrast, work duration did not correlate with symptoms of non-specific neck pain ( $p = 0.063$ ;  $r = 0.169$ ).

**Conclusion:** High-risk working postures can predict the incidence of non-specific neck pain in office administration employees. This can be a consideration for office leaders to pay attention to the working posture of their employees.

**Key words:** Duration, non-specific neck pain, working posture



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## **Introduction**

In the workplace, interactions that cannot be avoided between humans, work tools, and the work environment always involve the human senses, either directly or indirectly. Some jobs that use repetitive movements and static conditions for extended periods can cause musculoskeletal disorders (MSDs) due to stretching and muscle tension in the neck area. This condition usually affects administrative workers who work in front of a computer for a long time.<sup>1</sup> Neck pain is one of the most common musculoskeletal disorders (MSDs) worldwide and has the risk of causing disability.<sup>2</sup>

One of the MSDs associated with computer use is neck muscle fatigue caused by non-ergonomic postures of the neck muscles for a long time, resulting in muscle tension.<sup>3</sup> A non-ergonomic posture can cause a part of the body to move away from its natural position, i.e. the movement of the worker's arms that are too raised, the back position is too bent, the neck position looks up or down, and other non-ergonomic positions. The farther the body's position from the centre of gravity of the body, the higher the risk of complaints of muscle fatigue.<sup>4</sup>

According to the International Association for the Study of Pain (IASP), neck pain is localized from the superior to the nuchal line to the first thoracic spinous process.<sup>5</sup> The pain is often described as burning, stabbing and continuous and can be worsened by movement, constant stimulation and stress.<sup>6</sup> Blanpied et al. stated that around 70% of the population has experienced neck pain during their lifetime, and the incidence of neck pain will continue to increase. The results of an epidemiological study show that neck pain is highest in groups working in offices and in front of computers.<sup>7</sup> The prevalence of neck pain in office workers in Turkey reaches 84% .<sup>8</sup>

Hasanuddin University is one of the higher education institutions in Makassar City. Administrative employees in the rectorate building work to support administrative process activities centred in the rectorate building. Almost all administrative employees in the rectorate building use computers in their work processes. A study by Situmorang revealed that computer use exceeding 4 hours was significantly associated with complaints of non-specific neck pain.<sup>3</sup> This study analyses the relationship between working posture and work duration during computer use on non-specific neck pain complaints among Hasanuddin University Rectorate employees.

## **Methods**

This quantitative study with a cross-sectional approach aims to determine the

relationship between working posture and work duration during computer use on complaints of non-specific neck pain among Hasanuddin University Rectorate Employees. The population in this study were employees of the Hasanuddin University Makassar Rectorate, totalling 165 employees who were more than 21 years old. The research was conducted in March-April 2022. A minimum sample was 121 according to the normogram Harry King calculation for alpha 5%. A simple random sampling was conducted to obtain the sample. This research has received ethical approval from the Health Research Ethics Committee, Faculty of Public Health, Hasanuddin University 3806/UN4.14.1/TP.01.02/2022.

The data obtained was primary data by measuring working posture using the Baseline Risk Identification of Ergonomic Factor (BRIEF) questionnaire and for complaints of non-specific neck pain using the Nordic Body Map (NBM) questionnaire. The work duration was classified into long (2-4 hours) and very long (more than 4 hours) according to the average daily work hours.

The data was analyzed using the SPSS 25 computerized program (IBM, USA). To determine whether the data is normally distributed or not, the Kolmogorov-Smirnov normality test is carried out. Data is said to be normally distributed if  $p > 0.05$ . Bivariate analysis was carried out with a non-parametric correlation test, namely Spearman's rho test, to determine the relationship between working posture, work duration, and complaints of non-specific neck pain.

## Results

Table 1 shows the characteristics of the respondents. In this study, the dominant age group was 33-42 years (43 people, 34.7%). Most of the respondents in this study were female (72 people, 59.5%). Most respondents were employees who had worked >4 years in the administration department of the rectorate (92 people, 72%).

**Table 1.** Characteristics of Study Participants

Characteristics	Total (n)	Percentage (%)
<b>Age (years)</b>		
23-32	33	27.3
33-42	42	34.7
43-52	33	27.3
53-62	13	10.7
<b>Gender</b>		
Male	49	40.5
Female	72	59.5
<b>Work Experience</b>		
Short-term ( 0 – 1 years)	3	2.5
Medium (2 – 4 years)	26	21.5
Long-term (>4 years)	92	72.0

Table 2 shows the distribution of working postures based on respondent characteristics. The age range of 33-42 years was the most dominant among respondents, whereas in the high-risk working posture category, the predominant age was 43-52 years (22 people, 18.2%). For the low-risk category, the highest value was 6 (5%) respondents aged 22-32. In the medium-risk category, the highest value was the age range 33-42, with 20 (16.5%) respondents. The female gender was mainly found in all working posture categories, including high-risk, medium-risk, and low-risk. Meanwhile, the work experience more than 4 years dominate the total number of respondents, and working postures in the high-risk category occupy the highest number (58 people, 47.9%).

**Table 2.** Distribution of working posture based on age, gender and work experience

Characteristics	Classification of Working posture (N=165)			Total (n)
	Low-Risk (%)	Medium-Risk (%)	High-Risk (%)	
<b>Age (years)</b>				
23-32	6 (5)	14 (11.6)	13 (10.7)	33 (27.3)
33-42	1 (0.8)	20 (16.5)	21 (17.4)	42 (34.7)
43-52	2 (1.7)	9 (7.4)	22 (18.2)	33 (27.3)
53-62	0	0	13 (10.7)	13 (10.7)
<b>Gender</b>				
Male	4 (3.3)	15 (12.4)	30 (24.8)	49 (40.5)
Female	5 (4.1)	28 (23.1)	39 (32.2)	72 (59.5)
<b>Work Experience</b>				
Short-term (0 – 1 years)	0	3 (2.5)	0	3 (2.5)
Medium (2 – 4 years)	6 (5)	9 (7.4)	11 (9.1)	26 (21.5)
Long-term (>4 years)	3 (2.5)	31 (25.6)	58 (47.9)	92 (76)

Table 3 shows the distribution of work duration based on respondent characteristics. Employees aged 33-42 years dominated the total number of respondents in the category of long working duration, which occupied the highest number with 34 (19.8%) respondents. Females were primarily found in both work duration categories, including long and very long work duration. The respondents with long-term work periods dominate the total number of respondents, and the long work duration occupies the highest number with 92 (76%) respondents.

Table 4 shows the incidence of non-specific neck pain complaints from respondents based on working posture and work duration. Most employees in the low-risk, medium-risk, and high-risk categories had non-specific neck pain complaints in the no-pain (6 people, 66.7%), moderate pain (19 people, 44.2%), and painful category (49

people, 71%), respectively. Most employees with long and very long work durations complained of non-specific neck pain in the painful category.

**Table 3.** Distribution of work duration based on age, gender and work experience

Characteristics	Classification of Work Duration		
	Long (%)	Very Long (%)	Total N (%)
<b>Age (years)</b>			
23-32	14 (11.6)	19 (15.7)	33 (27.3)
33-42	24 (19.8)	18 (14.9)	42 (34.7)
43-52	24 (19.8)	9 (7.4)	33 (27.3)
53-62	8 (6.6)	5 (4.1)	13 (10.7)
<b>Gender</b>			
Male	28 (23.1)	21 (17.4)	49 (40.5)
Female	42 (34.7)	30 (24.8)	72 (59.5)
<b>Work Experience</b>			
Short-term (0 – 1 years)	1 (0.8)	2 (1.7)	3 (2.5)
Medium (2 – 4 years)	13 (10.7)	13 (10.7)	26 (21.5)
Long-term (>4 years)	56 (46.3)	36 (29.8)	92 (76)

**Table 4.** The distribution of non-specific neck pain complaints from respondents based on working posture and work duration

Characteristics	Classification of non-specific neck pain		
	No Pain n (%)	Moderate Pain n (%)	Painful n (%)
<b>Working posture Category</b>			
Low-risk	6 (66.7)	3 (33.3)	0
Moderate-risk	14 (32.6)	19 (44.2)	10 (23.3)
High-risk	3 (4.3)	17 (24.6)	49 (71)
<b>Work Duration Category</b>			
Long	12 (9.9)	24 (19.8)	34 (28.1)
Very Long	11 (9.1)	15 (12.4)	25 (20.7)

Table 5 shows the correlation test results between working posture and work duration with complaints of non-specific neck pain. A positive correlation exists between working posture and complaints of non-specific neck pain ( $p = 0.001$ ;  $r = 0.598$ ). The higher the risk of working posture, the more severe the degree of non-specific neck pain complaints. Even though there is a positive correlation between work duration and complaints of non-specific neck pain, this correlation is insignificant ( $p > 0.05$ ,  $r = 0.169$ ).

**Table 5.** Correlation Test Results Between Working Posture and Working Duration with Non-specific Neck Pain Complaints

Variables	Non Specific Neck Pain Category		
	n	Correlation Coefficient (r)	p value
Working Posture	121	0.598	0.000
Work Duration	121	0.169	0.063

## **Discussion**

The sample in this study were employees aged 21-60 years. Those aged >60 years predominantly experience a decline in physiology, thus triggering an imbalance in muscle protein synthesis (MPS) and muscle protein breakdown (MPB).<sup>9</sup> In this study, the age group of 33-42 years dominated the total number of respondents, namely 34 (19.8%). Previous study also revealed that workers are between 30 and 45 years old. This age is considered very productive for workers because if the age is under 20, the average individual still needs more skill maturity and educational process.<sup>10</sup>

In this study, the number of respondents was dominated by female respondents. Based on research, there is also a gender factor in assessing a person's level of participation and productivity at work. Jobs basically cannot be differentiated based on gender. But in general, men are more productive in jobs that require physical strength. However, in certain circumstances, women's productivity can sometimes be higher than men's because women are more thorough, patient and diligent.<sup>11</sup>

Based on the results of this research, it was found that working posture using a computer was related to complaints of non-specific neck pain among Hasanuddin University rectorate employees. Most employees with low-risk work postures had non-specific neck pain complaints in the no-pain category. In contrast, most employees with high-risk work postures had non-specific neck pain complaints in the painful category. Respondents felt that complaints of neck pain were handled both while working and after working for relatively long periods, and the lack of movement resulted in subjective complaints of neck pain. The results of this study are similar to that of Affanatu's study, which states that respondents have poor posture and need to apply several good ergonomic principles.<sup>12</sup> The principle of body ergonomics aims to maintain normal body posture so that it is not harmful to body health. It can be concluded that in this study, incorrect posture is the main and most prominent risk factor that causes neck pain in college students.

Poor work posture from most respondents can be due to several things, such as flexed head posture, which often causes changes in the cervical spine, curvature, ligaments, tendons and muscles in the neck area, which in turn causes changes in posture and pain in the neck. In addition, workplace designs that are less ergonomic or have an imbalance in the body when using chairs and work desks with high duration and frequency of computer use also cause complaints of neck pain. As in previous studies, there was a significant relationship with static bending posture for a long time, particularly in bending forward posture (flexi neck), leaning too much to the right or left, which caused many students to complain of pain in their

necks with a static posture. This mechanism causes the muscles to contract longer so that blood flow to muscle tissue will be limited.<sup>13,14</sup>

Work duration was not correlated with complaints of non-specific neck pain in the present study. These results are in line with one of the previous studies conducted by Situmorang, which stated that there was no significant relationship between the duration of computer use and neck pain complaints in respondents. From the results of the respondent's analysis, the duration of computer use did not significantly affect neck pain complaints. However, a history of previous neck pain complaints and the influence of activities outside working hours were the highest factors causing musculoskeletal complaints, namely neck pain. The task load with the time limit that the respondent has is also the reason the respondent spends a prolonged duration while using the computer.<sup>3</sup> This long duration of work can lead to an accumulation of musculoskeletal complaints, especially for respondents with the wrong work posture, which can increase the occurrence of non-specific neck pain complaints. Even though computer use is prolonged, coupled with correct posture and routine stretching or resting for 10-15 minutes after 2 hours of work, it can function in relaxing muscles, thereby reducing the risk of neck pain complaints.<sup>15</sup>

In contrast to the research conducted by Kenwa et al., which states that there was a weak significant correlation between the long duration of smartphone use and an increase in the neck pain scale, using a smartphone for 7 hours or more increases the risk by 2.8 times to be affected. Moderate to severe neck pain. Generally, the longer the duration of exposure to a risk factor, the greater the risk level. It should be noted that the combined causative factors, including the risk of occurrence of complaints, will increase workers' exposure to several risk factors simultaneously in carrying out their work. The complaints may include pain and spasms in the muscles of the user's neck, arms and eyes. This complaint, if left continuously, will become chronic neck pain. If this is the case, the best way is to stop work and rest.<sup>16</sup>

This study has limitations in analyzing the effect of sample characteristics on non-specific neck pain complaints, such as age, gender, and years of service. These factors may have contributed to the dependent variable in this study. Filling out the BRIEF questionnaire might cause bias during data collection related to the possibility that respondents did not display their usual work posture.

## **Conclusion**

Based on the research results that have been done, it is concluded that there showed high acceptance and satisfaction of the digital illustrator in practical skills. The learners expressed high perceived usefulness, ease of use, and intention to use the digital illustrator in

learning practical histology skills. The learners also found the materials relevant, effective, enjoyable, and exciting and would recommend them to their fellow students for use. The expressed high acceptance of and satisfaction with the video-based instructional materials was, to a large extent, also uniform among the respondents of the three study centers. Thus, irrespective of location, the learners generally appeared optimistic about their experiences using the digital illustrator to learn histology practicals in medical faculty.

### **Conflicts of Interest**

Nothing to declare

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