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Factors Associated with Neck Pain among the Local Online Gaming Community in Indonesia

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ABSTRACT

Introduction: There has been a notable rise in smartphone usage among youth, with many exceeding 3 hours of screen time each day. This is a high-risk factor for suffering from neck muscle fatigue due to the static posture of the cervical spine.

Objective: This study is to determine factors associated with neck pain among the local gamer community in Indonesia.

Methods: This study is multivariate predictive study with a cross-sectional approach to members of the AiMSTAR, one of the online gaming communities in Indonesia. The sample was selected using the total sampling technique. Data collection in this study used a questionnaire.

Results: Based on the results of multivariate analysis, it was found that the frequency of smartphone use among gamers in the AiMSTAR community had a significant influence on the occurrence of neck pain, with a p-value of 0.002 (p < 0.05) and a six-fold increased risk compared to a usage frequency of less than 30 minutes (95% CI = 1.96–18.57).

Conclusion: This study shows that the frequency of using smartphone is the most significant contributing factor to the occurrence of neck pain among the local online gaming community in Indonesia.

Keyword : Neck pain, Risk factors, Smartphones, Gamers

1. Introduction

The use of digital devices in Indonesia such as smartphones continues to increase every year due to the development of digital technology and the internet. a survey conducted by APJII (Indonesian Internet Service Providers Association) which stated that the percentage of internet users in Indonesia in 2024 touched 79.5%, which when compared to 2023, there was an increase of 1.4%. In addition to providing convenience in accessing the internet, smartphones can also provide a lot of entertainment so that the number of smartphone users has increased dramatically in recent years [1].

The increasing popularity of entertainment on smartphones such as social media and online

games will be more and more time will be spent by a person with his smartphone. This is supported by the research that there is a surge in smartphone use among young people who can spend more than 3 hours per day using their smartphones with their heads facing forward and their necks down while playing games. A person who spends more than 3 hours per day staring at a screen has a high risk of suffering from neck muscle fatigue due to static cervical spine posture [2].

Some researchers argue that the duration of prolonged smartphone use can cause neck posture positions to be unneutral, such as a bent posture, which can be a common cause of neck pain [1]. Smartphones used for a long time can have a negative impact on posture because they can cause neck pain [3]. Neck pain is caused by repetitive movements of the same muscles leading to reduced muscle use in the upper body which can then impact muscle performance, speed, and ability. This can cause muscle fatigue and affect posture [4].

2. Method

The research design that will be used in this study is a predictive multivariate research. The variables studied were observed associations between the variables. The study aimed to find out information about the factors related to neck pain in smartphone use among the online gaming community. The research will be carried out by distributing questionnaires to members of the AiMSTAR online gamers community.

The questionnaire consists of three sections. The first section contains respondent information. The second section includes questions about smartphone usage intensity. This questionnaire has been validated [5]. The third section contains the Neck Disability Index (NDI) questionnaire. The NDI-Q consists of 10 questions, each scored from 0 to 5, resulting in a total score ranging from a minimum of 0 to a maximum of 50. The Indonesian version of the Neck Disability Index (NDI) questionnaire has high validity and reliability, making it a suitable measurement tool [6].

In this study, the population is members of the AiMSTAR gamers community with a total population of 140 members. Furthermore, community members are screened through inclusion and exclusion criteria to obtain research samples.

Inclusion Criteria:
- Member of the AiMSTAR gamer community
- Willing to be a respondent in the research
- Be 15-35 years old

Exclusion Criteria:
- A member of the AiMSTAR gamer community who has a history of diseases of the cervical spine and has experienced neck trauma
- AiMSTAR gamers community members who have congenital abnormalities born in the neck area.

3. Results and Discussion

This study was conducted from July to September 2024, involving respondents from the AiMSTAR gamers community, a gaming community with members spread across Indonesia. Initially, 140 individuals were approached as the total sample. However, 33 of them did not meet the inclusion criteria due to their unwillingness to participate. As a result, the final number of respondents included in this study was 107.

Table 1. Characteristics of the Study Population

Characteristic	Frequency (n)	Percentage (%)
Age		
Teenagers (12-25 yo)	99	92,5
Adults (26-45 yo)	8	7,5
Gender		
Female	61	57
Male	48	43
The latest education		
High school	87	81,3
College/university	20	18,7
Occupation		
Students	51	47,7
Private employees	13	12,1
Self employed	12	11,2
Government employees	2	1,9
Content creators	4	3,7
Unemployed	19	17,8
Uncategorized	6	5,6
Island of residence		
Sumatera (Sumatra)	28	26,2
Jawa (Java)	57	53,3
Kalimantan (Borneo)	12	11,2
Sulawesi (Celebes)	3	2,8
Bali	5	4,7
East Nusa Tenggara (East Southeast Islands)	2	1,9
Presence of neck pain		
Yes	82	76,6
No	25	23,4

This study found that most gamers in the AiMSTAR community are in the adolescent age group (12–25 years), making up 92.5% of respondents. According to data from the Badan Pusat Statistik (BPS) in 2023, 92.14% of smartphone users are aged between 15–24 years. This result shows that smartphone usage is more common among adolescents because they tend to seek entertainment during school breaks, often using smartphones to play online games, either alone or with friends [7].

An interesting finding was the proportion of gamers by gender, where females (57%) outnumbered males (43%). A study on gender differences in internet and online gaming addiction found that females are more likely to experience online gaming addiction than males [8]. This is because females are more vulnerable to negative impacts, such as Internet Gaming Disorder (IGD), even though males show stronger functional connectivity related to gaming addiction due to a higher drive to play online games [9]. The difference in results in this study may be due to the higher number of female respondents compared to males. While it is generally believed that males are more prone to online gaming addiction, recent evidence suggests that females may face their own vulnerabilities, which require further study. This emphasizes the importance of developing intervention strategies that consider gender differences [10].

Most of the respondents in this study came from Java Island (53.3%). Data from BPS in 2023 showed that over 70% of smartphone users in Indonesia are located on Java Island. This may be due to better internet access and more affordable devices on Java compared to other islands in Indonesia [11]. This is also supported by a 2024 survey by APJII, which reported that Java Island has the highest internet penetration rate in Indonesia, at 83.64%, compared to other regions.

Table 2. Bivariate Analysis between Risk Factors and Neck Pain Among the Local Gamer Community in Indonesia using Chi Square (N=107)

Variables	Yes		No		p Value
	n	%	n	%	
Age					
Teenagers	74	74,7%	25	25,3%	0.104
Adults	8	100%	0	0%	
Gender					
Female	47	77%	14	23%	0.907
Male	35	76,1%	11	23,9%	
Frequency					
<30 minutes	7	43,8%	9	56,3%	0.001*
≥30 minutes	75	82,4%	16	17,6%	
Duration					
<3 hours	6	46,2%	7	53,8%	0.006*
≥3 hours	76	80,9%	18	19,1%	
Position					
Flexed	72	81,8%	16	18,2%	0.006*
Not flexed	10	52,6%	9	47,4%	

The frequency of smartphone use is a significant factor influencing the occurrence of neck pain in this study. Prolonged smartphone use in a flexed neck position without breaks can lead to neck pain, as the angle of neck flexion increases with extended usage, placing greater strain on the neck and exerting pressure on the cervical spine [12]. While playing online games on a smartphone in a static posture, the tonus of the upper trapezius, deltoid, and cervical extensor muscles increases, while repetitive static movements reduce blood circulation and inhibit nutrient delivery to the muscles. This results in muscle fatigue and pain [13]. Consequently, individuals who use their smartphones daily for gaming are 1.5 times more likely to experience neck pain compared to other parts of the body [14].

The results showed a significant relationship between smartphone usage duration and neck pain, with a p-value of 0.006 ($p<0.05$). It was observed that 71% of respondents who used smartphones for more than 3 hours a day reported experiencing neck pain. Previous studies have stated that individuals who spend more than 3 hours per day in front of a screen are at a higher risk of developing neck pain [2]. High-intensity smartphone use and repetitive movements while playing online games can increase the risk of injuries and neck pain [2]. This is because muscle fatigue tends to occur more quickly when using a smartphone, as users often maintain a forward head posture [15]. Therefore, prolonged smartphone use and a flexed neck position can contribute to neck pain [3].

The relationship between smartphone usage posture and the occurrence of neck pain among respondents revealed that using smartphones in a flexed (bent) position was the most common posture associated with complaints of neck pain, reported by 67.5% of respondents. When using a smartphone, the neck and head posture tends to remain in a flexed position, with the head positioned forward relative to the shoulders for extended periods [16]. Misalignment between the head and neck position increases pressure on the posterior cervical region, which affects neck muscle tension. Even small adjustments in head posture can cause strain on the musculoskeletal system [17]. Neck and shoulder muscle tension resulting from non-neutral body positions can trigger pain and interfere with daily functional activities [18].

Table 3. Multivariate Analysis between Risk Factors and Neck Pain Among the Local Gamer Community in Indonesia using Binary Logistics (N=107)

Variables	p Value	AOR	95% CI
Frequency			
<30 minutes	0.002	1	1.96-18.57
≥30 minutes		6.01	
Duration			
<3 hours	0.523	1	0.34-8.67
≥3 hours		1,7	
Posisi			
Flexed	0.102	1	0,83-8.3
Not flexed		2,61	

Based on the results of multivariate analysis, the frequency of smartphone use among gamers in the AiMSTAR community was found to have a significant effect on the occurrence of neck pain, with a p-value of 0.002 (p<0.05) and a six-fold risk compared to a frequency of less than 30 minutes (95% CI = 1.96–18.57). This may occur because prolonged smartphone use without stretching or resting leads to the accumulation of tension in specific areas, increasing the risk of neck pain [19]. Furthermore, longer smartphone usage results in a greater neck flexion angle, which increases the gravitational load on the cervical vertebrae, triggering heightened mechanical pressure and neck pain [20]

Meanwhile, two other factors identified as significant in the bivariate analysis, namely duration and posture, did not show significance in the multivariate test. This can be explained by the importance of rest frequency, which plays a more critical role than total daily smartphone usage duration [21]. Additionally, changing positions, such as moving regularly or periodically adjusting the head position, helps reduce cervical stiffness and prevents neck pain [22].

4. Conclusion

There is a relationship between the variables of frequency, duration, and posture with neck pain. Meanwhile, the most dominant factor causing neck pain in the AiMSTAR gaming community is frequency, specifically smartphone use for more than 30 minutes per session. Excessive smartphone use negatively affects health; therefore, it is recommended that gamers reduce prolonged smartphone use without breaks and improve their usage patterns to minimize health risks.

5. Acknowledgements

6. Conflict of Interest

We declare that there is no conflict of interest in this study.

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