Interdental Jurnal Kedokteran Gigi
Website: https://e-journal.unmas.ac.id/index.php/interdental
ISSN 1979-9144 (print), ISSN 2685-5208 (online)

Research Article

The Relationship Between Body Posture and Temporomandibular Disorder (TMD) in Online Game Players in Cimahi

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Received date: October 28, 2025 **Accepted date: November 14, 2025** **Published date: December 28, 2025**

KEYWORDS

Forward head posture, game online, temporomandibular disorder

DOI : 10.46862/interdental.v21i3.12815

ABSTRACT

Introduction: Temporomandibular Disorder (TMD) is a musculoskeletal disorder that involves the temporomandibular joint (TMJ) and masticatory muscles, with symptoms such as pain, clicking sounds, and limited jaw movement. The etiology of TMD was multifactorial, one of which was Forward Head Posture (FHP), often triggered by poor body posture due to prolonged sitting, as in online gamers. This study aimed to determine the relationship between body posture (FHP) and Temporomandibular Disorder (TMD) in online gamers in Cimahi.
Methods: A cross-sectional study was conducted on online gamers in the Cimahi area using consecutive sampling techniques, resulting in 35 online gamers who met the inclusion criteria. The Subjects were asked to complete the FAI questionnaire to assess TMD, and CVA measurements were taken to evaluate the FHP.
Results and Discussions: A total of 51.4% of subjects were identified as experiencing mild TMD, and 54.3% had mild FHP. Spearman's correlation test yielded $p = 0.449$ ($p > 0.05$), indicating no significant difference.
Conclusions: Online gamers with a CVA ≤ 50, indicating mild FHP, were also identified as experiencing mild TMD.

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How to cite this article: Nawawi AP, Suntana MS, Amanda BFH. (2025). The Relationship Between Body Posture and Temporomandibular Disorder (TMD) in Online Game Players in Cimahi. Interdental Jurnal Kedokteran Gigi 21(3), 457-62. DOI: 10.46862/interdental.v21i3.12815

INTRODUCTION

Temporomandibular Joint Disorder (TMD) is one of the most common causes of pain in the mouth and face, aside from odontogenic pain. TMD ranks as the second most common musculoskeletal disorder worldwide after lower back pain. TMD refers to a condition characterized by abnormalities or dysfunctions in the musculoskeletal system involving the Temporomandibular Joint (TMJ), the masticatory muscles, and the surrounding bony and soft tissues. The Temporomandibular Joint TMJ plays a crucial role in daily activities such as speaking, eating, yawning, and more.[1-4]

Zieliński et al.[5] reported that the global incidence of TMD reaches 34%, with individuals aged 18–60 years being the most affected.[5] According to Himawan, the incidence of TMD in Indonesia has increased by approximately 2% over time.[2] Marpaung et al.[6] found that the highest prevalence of TMD in Indonesia occurs in adolescents aged 13–18 years, at 36.9%.[6] The National Health Interview Survey indicates that TMD is more prevalent in women than in men.[3]

The symptoms of TMD include TMJ pain, facial muscle pain, neck and shoulder pain, fatigue in the masticatory muscles, limited jaw movement, TMJ sounds such as clicking or crepitus, and headaches.[3] The etiology of TMD is multifactorial, involving structural abnormalities, lifestyle, posture, parafunctional habits, occlusion, stress, trauma, and more.[7-8]

Poor body posture—such as forward head posture (FHP), sitting while resting the chin on the hand, prolonged head flexion, and long durations of sitting—can lead to musculoskeletal disorders. These poor postural habits are commonly observed in online game players. Online gaming is widely popular and is considered addictive across various demographics, including both males and females, and people of different ages. Faldano et al. noted that online gaming addiction is more prevalent among males and in the age group of 20–24 years.[9]

Extended periods of computer use can contribute to the development of FHP and excessive muscle activity. Kenneth et al. reported that approximately 25.8% of online game players who use computers develop FHP.[10] Their study also mentioned that longer gaming durations, particularly playing for more than three hours, increase the risk of developing FHP. According to Lee,[8] the greater the distance between the body and the computer desk, the higher the risk of developing FHP.[8]

Washfanabila et al.[12] found a significant relationship between FHP and clicking sounds in the TMJ, which is one of the symptoms of TMD.[10-14] Although studies have linked FHP with TMD, there has been no research focusing on online game players. Therefore, this study aims to investigate whether there is a relationship between poor body posture, such as FHP, and TMD in online game players.

MATERIAL AND METHODS

This study is an analytic research with a cross-sectional approach conducted at Esport Arena, a dedicated venue for playing and competing in games in the Cimahi area, during the period from September to December 2024. The research subjects consist of a population that meets the inclusion and exclusion criteria. The inclusion criteria include online game players who are willing to participate, play games for more than one hour per day per session, are aged 18–25 years, use a computer for playing, and have at least one year of gaming experience. Meanwhile, the exclusion criteria include players who have lost one or more teeth, use orthodontic appliances, have a history of musculoskeletal disorders, or have bad habits such as bruxism and clenching.

The study sample was obtained using a non-probability technique with consecutive sampling, meaning that subjects who met the inclusion criteria were selected over a specified period. The study procedure consisted of several stages. First, preparations were made by obtaining ethical approval and research permission, as well as preparing a questionnaire to screen subjects according to the criteria, including the Fonseca Anamnestic Index (FAI) questionnaire in the form of a Google Form. Second, online game players were asked to fill out the questionnaire to screen for subjects who met the research criteria. Third, the selected subjects underwent measurement of the craniovertebral angle (CVA) using a

goniometer. The measurement was performed by asking the subjects to stand in a neutral position, then determining reference points at the ear tragus and the spinous process (C7). The goniometer was positioned along the horizontal line of the spinous process (C7) and the line extending to the ear tragus, and the resulting angle was recorded. Fourth, the measurement of temporomandibular disorder (TMD) was carried out on subjects with forward head posture (FHP) by asking them to fill out the FAI questionnaire. The data obtained were then processed and analyzed using the Spearman correlation test to determine the relationship between the dependent variable (the occurrence of TMD) and the independent variable (poor body posture, i.e., FHP), since both variables are measured on an ordinal scale.

The ethical approval for this study was issued by Universitas Padjadjaran with number 1095/UN6.KEP/EC/2024 and registered with registration number 2409021247.

RESULTS AND DISCUSSIONS

The study on the relationship between body posture (FHP) and temporomandibular disorder (TMD) involved 35 online game players in Cimahi. The research was conducted at Esports Arena Cimahi with primary data collected through a Google Form questionnaire filled out by the respondents, and body posture measurements taken by the researcher using a goniometer.

The characteristics of the subjects based on gender and age are presented below:

Table 1. Characteristics of research subjects

Variable	Total	
	Count (n)	%
Gender		
Male	30	85.7%
Female	5	14.3%
Age		
18	9	25.7%
19	6	17.1%
20	5	14.3%
21	6	17.1%
22	3	8.6%
23	4	11.4%
24	1	2.9%
25	1	2.9%

Based on Table 1, it can be seen that the majority of subjects in this study were male, totaling 30 individuals (85.7%). In terms of age, the most common age among subjects was 18 years, with 9 individuals (25.7%).

Table 2 shows the distribution of online game players in Cimahi who experienced TMD:

Table 2. Distribution of subjects with TMD

Temporomandibular Disorder	Total	
	n	%
No TMD	13	37.1%
Mild TMD	18	51.4%
Moderate TMD	3	8.6%
Severe TMD	1	2.9%

Based on Table 2, it can be observed that the majority of subjects experienced mild TMD, totaling 18 individuals (51.4%). This distribution was obtained through the FAI questionnaire filled out directly by the research subjects, as shown in Table 3.

Table 3. Distribution of FAI questionnaire responses

		Answer n (%)		
No.	Question	0	5	10
1.	Do you have difficulty opening your mouth wide?	26 (74.3%)	7 (20%)	2 (5.7%)
2.	Do you have difficulty moving your jaw sideways?	30 (85.7%)	4 (11.4%)	1 (2.9%)
3.	Do you experience muscle stiffness or pain when chewing?	23 (65.7%)	14 (31.4%)	1 (2.9%)
4.	Do you frequently experience headaches?	16 (45.7%)	14 (40%)	5 (14.3%)
5.	Do you feel pain or stiffness in your neck?	13 (37.1%)	21 (60%)	1 (2.9%)
6.	Do you experience ear pain or pain around that area (temporomandibular joint)?	26 (74.3%)	9 (25.7%)	0 (0%)
7.	Have you ever heard a sound in the temporomandibular joint when chewing or opening your mouth?	23 (65.7%)	9 (22.9%)	4 (11.4%)
8.	Do you have habits such as grinding or clenching your teeth?	30 (85.7%)	3 (8.6%)	2 (5.7%)
9.	Do you feel that your teeth are misaligned?	13 (37.1%)	5 (14.3%)	17 (48.6%)
10.	Do you consider yourself a tense (nervous) person?	12 (34.3%)	14 (40%)	9 (25.7%)

Note: 0 = No, 5 = Sometimes, 10 = Yes

Based on Table 3, it can be seen that for the 10 questions, the majority of subjects did not exhibit TMD symptoms. However, some subjects experienced occasional TMD symptoms, such as neck stiffness or pain (60%), and a smaller proportion experienced symptoms such as misaligned teeth (48.6%).

The distribution of online game players in Cimahi who experienced FHP is shown in the following table:

Table 4. Distribution of subjects with FHP

Forward Head Posture	Total	
	n	%
Normal	16	45.7%
Mild	19	54.3%

Based on Table 4, it can be seen that more subjects exhibited mild FHP (54.3%) compared to those with normal posture (45.7%).

To determine the relationship between body posture (FHP) and TMD in online game players in Cimahi, the researcher performed an analysis using the Spearman correlation test. The results are shown in Table 5.

Table 5. The Relationship between body posture and Temporomandibular Disorder (TMD) in online game players in Cimahi

Variable	p value
FHP and TMD	0.449

Based on Table 5, the statistical test showed a very weak and positive relationship between the variables with a p-value > 0.05, which means that there is no significant relationship between body posture (FHP) and Temporomandibular Disorder (TMD) in online game players in Cimahi.

This study showed that the majority of online game players experienced mild temporomandibular disorder (TMD), with a prevalence of 51.4% (Table 2). This finding is in line with research conducted by Shivamurthy P et al.[15] who used the FAI questionnaire on subjects aged 17–25 years, finding that 33.3% experienced TMD, with most cases classified as mild.[15] Similarly, Khan W et al.[16] reported that 43.11% of respondents aged over 22 years experienced mild TMD.[16] In accordance with the present study, the 18–25 age group was more likely to experience mild TMD. Several studies have also reported that increasing age can elevate the risk of TMD symptoms.[6] Individuals aged 20–40 years are more susceptible to TMD due to heightened stress levels, which can trigger deleterious habits such as bruxism and clenching. These habits lead to excessive muscle use, ultimately resulting in pain in the temporomandibular joint (TMJ). Moreover, a decrease in the remodeling capacity of the TMJ's fibrocartilage with age may contribute to TMJ degeneration.[2,17]

In this study, the craniovertebral angle (CVA) used to identify forward head posture (FHP) ranged between 48°–50° and 53°.[18] The results indicated that most subjects exhibited mild FHP with a CVA ≤ 50°, accounting for 54.3% (Table 4). This finding is consistent with the study, which reported that 100% of esports athletes in their study experienced mild FHP.[19] In addition, Rachman Putra et al.[20] found that the majority of computer-using employees exhibited mild FHP (CVA < 49) at a rate of 92.9%.[20] One factor that may contribute to these findings is the inclusion of break times in esports athletes' training sessions, allowing them to move or relax their muscles, thereby reducing the accumulation of muscle tension—a key trigger for severe FHP.[19]

Long-term computer use for more than six hours per day can increase the risk of FHP. Continuous activity of the neck extensor muscles leads to fatigue and diminishes the muscles' ability to maintain proper posture. Moreover, an ergonomically poor body position while working in front of a monitor contributes to the lengthening of the posterior neck muscles and shortening of the anterolateral muscles, prompting repetitive contractions to stabilize the head. As a result, there is increased stiffness in the neck extensor muscles and weakness in the neck flexor muscles, which exacerbates FHP.[2,19]

The analysis of the relationship between FHP and TMD in online game players yielded a p-value of 0.449 (p > 0.05), indicating that there is no significant relationship between these two variables (Table 5). This outcome is consistent with the findings, which also reported no

significant relationship between FHP and TMD symptoms.[19] However, this finding contradicts the research by Washfanabila K et al.,[12] which demonstrated that poor postural habits, including FHP, were significantly associated with clicking sounds in the temporomandibular joint ($p < 0.05$).[12]

A greater degree of FHP is associated with decreased muscle contraction in the neck and shoulder regions. FHP caused by slouched shoulder posture can affect the craniosacral region and the TMJ. Even a 1 mm posterior shift of the mandibular condyle in the presence of FHP can induce microtrauma in the surrounding tissues. The increased pressure on the retrodiscal tissues diminishes their elasticity, which may cause the disc to shift anteriorly and produce a clicking sound—one of the symptoms of TMD.[12,19]

The study by Xiao Qiao Chu et al.,[20] which utilized cephalometric methods to assess FHP, revealed that patients with moderate to severe TMD had higher values of CVT/RL (Craniovertebral Angle to Ramus Line), OPT/RL (Odontoid Plane to Ramus Line), and NSL/C2' (Nasion-Sella Line to C2 Angle) compared to patients with mild TMD. This suggests that patients with moderate to severe TMD exhibit increased FHP. In individuals with TMD, there is heightened activity in the temporal and masseter muscles, accompanied by increased pain sensitivity in the neck and masticatory muscles. These effects are often attributed to postural misalignment resulting from FHP. Alterations in cervical curvature can affect neck muscle tension, disrupt mandibular movement, and influence the function of TMJ muscles, potentially leading to TMD. FHP also contributes to the development of TMJ pain, demonstrating a connection between head position, muscle function, and TMJ discomfort. FHP stretches the soft tissues and muscles in the cervical area, altering the length of muscle fibers and leading to decreased activity in the suprahyoid and infrahyoid muscles, as observed in electromyography (EMG) studies.[18,20]

Furthermore, individuals with FHP experience a posterior shift of the mandibular condyle compared to the normal position. This shift increases pressure on the posterior TMJ tissues, which are less robust and not designed for sustained loading. Excessive pressure can result in inflammation, muscle spasms, and discomfort in the TMJ. Additionally, the anterior-superior TMJ structure, naturally designed to bear loads, becomes less effective when the condyle shifts posteriorly. This displacement may also lead to TMJ disc dislocation, a primary cause of TMD. Several studies have shown that individuals with TMD tend to have a more forward head posture than healthy individuals, underscoring the importance of maintaining an ideal head posture to prevent TMD.[21]

CONCLUSION

Based on the results of the study, it can be concluded that the majority of online game players in Cimahi experienced temporomandibular disorder (TMD) in the mild category. Statistical analysis indicated that there was no significant difference between body posture and the incidence of TMD among online game players in Cimahi..

ACKNOWLEDGEMENT

The authors would like to express their gratitude to the Faculty of Dentistry at Universitas Jenderal Achmad Yani for the support and facilities provided during this research. Appreciation is also extended to the supervising lecturers for their guidance and direction throughout the research process and in the preparation of this article.

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