

Research Article

Prevalence of Temporomandibular Joint Disorders among University Students with Smartphone Addiction

Neeta Kumari¹, Muhammad Mohsin Kamal², Durr-e-Sadaf^{3*}, Naseer Ahmed⁴, Muhammad Khawaja Hammad Uddin⁵, Muhammad Waqas Rashid⁶

¹FCPS Oral and Maxillofacial Surgery, Senior Registrar and Head of Oral Medicine and Diagnosis Department, Fatima Jinnah Dental College Hospital, Karachi, Pakistan.

²Medical Superintendent/ Assistant Professor, Department of Community Dentistry, Fatima Memorial College of Dentistry, Lahore, Pakistan.

^{3*}Assistant Professor Oral Medicine, Army Medical College, Rawalpindi, Pakistan.

⁴Associate Professor, Department of Community & Preventive Dentistry, Altamash Institute of Dental Medicine, Karachi, Pakistan.

⁵Assistant Professor, Department of Science of Dental Materials, Dr. Ishrat Ul Ebad Khan Institute of Oral Health Sciences, Dow University of Health Sciences, Karachi, Pakistan.

⁶BDS, M.Phil, Associate Professor Oral Biology, Niazi Medical & Dental College, Sargodha, Pakistan.

Corresponding Author: Durr-e-Sadaf

Assistant Professor, Oral Medicine, Army Medical College, Rawalpindi, Pakistan.

Email: durr_e_sadaf@hotmail.com

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ABSTRACT

Background: Temporomandibular joint disorders (TMDs) are common orofacial disorders involving pain, joint noises, and restrictions in function. With the current generation's extensive dependence on their mobile devices, an extended smartphone habit can cause a change in your posture, strain in your muscles and temporomandibular dysfunction. The purpose of this study was to find the prevalence of TMD symptoms among university students with smartphone addiction.

Methods: It was a descriptive cross-sectional study with 150 students at the university over 150 days. The participants were selected by a consecutive sampling method. A structured questionnaire was used in which the demographic characteristics, Smartphone Addiction Scale -Short Version (SAS-SV), and assessment of the symptoms of TMD were collected. Data was analyzed with SPSS version 26. Frequencies and percentages were computed, and the chi-square test and logistic regression analysis were used to assess associations. A p-value of less than 0.05 was defined as being statistically significant.

Results: The mean age of the participants was 22.4 years $\pm$ 2.1 years. The prevalence of TMD among students was 45.3%, with the most common complaints being joint clicking, jaw pain, and masticatory muscle discomfort. Over 50% of the respondents had smartphone use of over 4 hours daily. Higher levels of smartphone addiction were associated with TMD symptoms ($p=0.002$). Students who were more likely to be highly addicted to their smartphones were almost 3 times more likely to experience symptoms of TMD than those with lower smartphone addiction scores.

Conclusion: The prevalence of symptoms of TMD and its significant relationship with smartphone addiction and long smartphone use were observed among the students of the university. Educating users of smartphones, their ergonomic awareness and early detection may be helpful in reducing the development of TMD in young adults.

Keywords: Temporomandibular Joint Disorder, Smartphone Addiction, Orofacial Pain, Musculoskeletal Disorders, Smartphone Addiction Scale.

INTRODUCTION

Temporomandibular joint disorders (TMDs) are a group of musculoskeletal disorders that involve the temporomandibular joint, masticatory muscles, and surrounding anatomical structures.[1] The symptoms of these disorders are pain in the jaw region, joint noises (clicking or crepitus), limited movement

of the mandible, headaches, and problems while eating.[2] TMDs are among the most prevalent chronic orofacial pain disorders after dental caries or periodontal diseases, with clinically significant negative effects on quality of life, sleep, academic performance, and psychological well-being.[3] TMD etiology is complex and includes biological, behavioral,

psychological, and mechanical factors such as parafunctional habits, stress, postural abnormalities, and excessive muscular activity.[4]

TMDs are common in some populations but uncommon in others, depending on the diagnostic criteria, age groups, and the environment.[5] Epidemiological research has shown that 20–40% of people have at least one sign or symptom of TMD, with fewer reporting that they are receiving clinical care.[6]] Young adults are a vulnerable population due to the additional stress of academic activities, sleep disruptions, extended periods of sitting, and habits that may lead to temporomandibular dysfunction.[7] In recent years, it has been reported that the number of university students experiencing jaw pain, muscle fatigue, and joint problems is increasing, emphasizing the need for greater awareness of the problem of TMD in this group.[8]

The increased use of smartphones in recent years has created a new behavior and ergonomic problem for young adults.[9] Smartphones are a vital part of life for many students in universities, spending several hours per day on their smartphones for communication, education, entertainment, and social interaction.[10] According to the global reports, over 70% of the world population owns a smartphone, and this is the age group that uses them the most.[11] Smartphone addiction or problematic smartphone use has been linked to physical health issues, such as neck and shoulder pain, forward head posture, decreased physical activity, sleep disruption, and heightened psychological stress.[12]

Based on this, the present study aimed to determine the prevalence of TMDD among university students who reported having a smartphone addiction and evaluate the possible relationship between excessive smartphone use and TMD-related symptoms. The results of this study can help inform emerging trends in oral and musculoskeletal health impacts of digital behaviors and inform evidence-based recommendations for enhancing student health outcomes. The purpose of the study was to investigate the prevalence of TMJD among university students who are smartphone addicted.

METHODOLOGY

A descriptive cross-sectional study was conducted using a sample of university students to measure the prevalence of temporomandibular joint disorders (TMDs) and

their relationship with smartphone addiction. The study was carried out at Oral and Maxillofacial Surgery. The study lasted for 6 months from July to December, 2025. Informed consent was obtained, and confidentiality of the information collected was maintained from the participants.

The sample size was determined using the OpenEpi sample size calculator for prevalence studies, with a 95% confidence interval, an 8% margin of error, and an estimated prevalence of TMJs in university students that was reported in a previous study. To be 35% of young adults/university-aged students had TMD.[13] The calculated sample size was 150 university students.

A non-probability consecutive sampling technique was used for the selection of study participants. The students who met the eligibility criteria were approached during the period of the study, and those who agreed were enrolled in the study one by one till the required sample size was obtained. The participants were recruited from various academic departments to have adequate representation of students with different levels of smartphone exposure. All participants gave informed written consent, and the purpose and procedures of the research were explained before entering them into the study.

The study included students from the University between 18 and 30 years of age, both male and female. All participants who were active in using their smartphones and were willing to participate were enrolled. Students who had reported regular use for academic, social, or entertainment purposes of their cell phone were included and gave informed consent. The participants who filled out the necessary questionnaires for the evaluation of the smartphone addiction and TMJD symptom scale were taken as the final analysis group.

The study excluded students who had previously undergone TMDL surgery, those with facial trauma, and those with congenital craniofacial abnormalities. Systemic diseases that are known to affect musculoskeletal function, current orthodontic treatment, or current dental treatment that affects jaw function were also excluded. Incomplete questionnaires, questionnaires that were not electronically submitted with informed consent, and questionnaires that were not returned to the research team were not included in the final analysis.

Data were collected using the structured questionnaire, obtaining informed consent from

all the respondents. The questionnaire was split into three sections: Demographic, assessment of smartphone addiction, and evaluation of temporomandibular joint disorder symptoms. Demographic data including Age, Gender, Academic year, and Smartphone usage time were gathered. The Smartphone Addiction Scale - Short Version (SAS-SV) was used to assess smartphone addiction, assessing the problematic use patterns of the participants.[14] Temporomandibular joint disorders were evaluated by the presence of the following symptoms: jaw pain, clicking sounds from the temporomandibular area, problems with opening the mouth, and pain while chewing. The participants were briefed on the procedure of filling the questionnaire and the questionnaire was filled on the same day so as to eliminate the recall bias. All data collected were checked for completeness and entered securely into a computer for statistical analysis. The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26. The demographic characteristics and study variables were summarized using descriptive statistics. The continuous variables were expressed as mean $\pm$ standard deviation, and categorical variables were frequencies and percentages. Temporomandibular joint disorders among University students were determined as percentages. The association between smartphone addiction levels and the presence of TMD symptoms was assessed using the Chi-square test. Logistic regression analysis was used to explore the association between smartphone addiction and the possibility of TMD development, when containing other factors that can be confounding. A p-value of <0.05 was considered statistically significant.

RESULTS

The mean age of the 150 university students who were part of the study was 22.4 ± 2.1 years, and there was a slight majority of females. The majority of students were from the age group 21-25 years and were from medical/dental-related fields. The distribution for the academic level and field of study was satisfactory. (Table 1)
Smartphone usage pattern findings showed that over half of the participants used their

smartphone more than 4 hours a day on average, with social media being the most frequent reason for using a smartphone. Students also mentioned using their phones before they go to sleep, suggesting that they spend a lot of time on their phones and may become dependent on them. (Table 2)

The results of the smartphone addiction assessment by the SAS-SV showed that most of the students had moderate to high levels of smartphone addiction. The overall mean addiction score revealed that students in the university were highly addicted to the use of the smartphone. (Table 3)

The prevalence of TMJD symptoms was found to be 45.3% of the participants. The study population was particularly susceptible with regard to symptoms related to TMD, with the most prevalent symptoms reported being joint clicking, jaw pain and masticatory muscle discomfort. (Table 4)

There was a significant correlation between TMD symptom and smartphone addiction level. Higher addiction scores had higher percentages of TMD manifestations than lower addiction scores ($p=0.002$), indicating that excessive use of the smartphone may increase the risk of temporomandibular dysfunction. (Table 5)

TMD occurrence was also significantly associated with the duration of smartphone use. Use of smartphones for >4 hours/day was associated with increased frequency of TMD symptoms when compared with <2 hours/day ($p=0.041$). (Table 6)

High smartphone addiction score and extended usage time of the phone were the significant factors found in multivariate analysis as predictors of TMD development. After controlling for other factors, students who were highly addicted to their phones were nearly three times more likely to have the TMD symptoms. (Table 7)

Assessment of symptom severity showed that moderate and severe TMD symptoms were more frequently observed among students with higher smartphone addiction levels, whereas students with low addiction scores mostly remained symptom-free. This finding further supported a dose-dependent relationship between smartphone dependency and temporomandibular dysfunction. (Table 8)

Table 1: Demographic Characteristics of Study Participants (n=150)

Variables	Frequency (n)	Percentage (%)
Age (years)		
18-20	38	25.3
21-25	96	64.0

>25	16	10.7
Mean age (years)	22.4 ± 2.1	—
Gender		
Male	73	48.7
Female	77	51.3
Academic discipline		
Medical/Dental sciences	62	41.3
Engineering/Sciences	44	29.3
Arts/Social sciences	44	29.3
Academic year		
1st–2nd year	58	38.7
3rd–4th year	67	44.7
Final year	25	16.6

Table 2: Smartphone Usage Pattern Among University Students (n=150)

Variables	Frequency (n)	Percentage (%)
Daily smartphone usage duration		
<2 hours	18	12.0
2–4 hours	54	36.0
>4 hours	78	52.0
Years of smartphone use		
<3 years	21	14.0
3–6 years	76	50.7
>6 years	53	35.3
The main purpose of smartphone use		
Social media	61	40.7
Academic activities	42	28.0
Entertainment/gaming	31	20.7
Communication	16	10.6
Smartphone use before sleep		
Yes	112	74.7
No	38	25.3

Table 3: Smartphone Addiction Level Based on SAS-SV Score (n=150)

Smartphone Addiction Category	Frequency (n)	Percentage (%)
Low addiction	39	26.0
Moderate addiction	71	47.3
High addiction	40	26.7
Mean SAS-SV score	32.8 ± 7.6	—

Table 4: Prevalence of Temporomandibular Joint Disorder Symptoms Among Participants (n=150)

TMD-related Symptoms	Frequency (n)	Percentage (%)
Presence of at least one TMD symptom	68	45.3
No TMD symptoms	82	54.7
Jaw pain	39	26.0
Joint clicking sounds	46	30.7
Difficulty in mouth opening	22	14.7
Pain during chewing	31	20.7
Facial/masticatory muscle discomfort	35	23.3
Headache associated with jaw symptoms	29	19.3

Table 5: Association Between Smartphone Addiction and Temporomandibular Disorder Symptoms (n=150)

Smartphone Addiction Level	TMD Present n (%)	TMD Absent n (%)	Total	p-value
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Low addiction	10 (25.6)	29 (74.4)	39	0.002
Moderate addiction	33 (46.5)	38 (53.5)	71	
High addiction	25 (62.5)	15 (37.5)	40	

Table 6: Relationship Between Smartphone Use Duration and TMD Symptoms (n=150)

Daily Smartphone Use	TMD Present n (%)	TMD Absent n (%)	p-value
<2 hours/day	5 (27.8)	13 (72.2)	0.041
2–4 hours/day	22 (40.7)	32 (59.3)	
>4 hours/day	41 (52.6)	37 (47.4)	

Table 7: Logistic Regression Analysis of Factors Associated with TMD Development

Variables	Odds Ratio (OR)	95% CI	p-value
Female gender	1.42	0.78–2.58	0.24
Smartphone use >4 hours/day	2.18	1.12–4.21	0.02
High smartphone addiction score	2.94	1.45–5.96	0.003
Smartphone use before sleep	1.76	0.91–3.40	0.08
Academic stress	1.89	1.01–3.52	0.04

Table 8: Severity of TMD Symptoms According to Smartphone Addiction Category

TMD Severity	Low Addiction n (%)	Moderate Addiction n (%)	High Addiction n (%)	p-value
No symptoms	29 (74.4)	38 (53.5)	15 (37.5)	0.001
Mild symptoms	8 (20.5)	22 (31.0)	15 (37.5)	
Moderate symptoms	2 (5.1)	10 (14.1)	8 (20.0)	
Severe symptoms	0 (0)	1 (1.4)	2 (5.0)	

DISCUSSION

The current study examined the prevalence of temporomandibular joint disorders (TMDs) in students suffering from smartphone addiction and revealed that 45.3% of the students showed at least one symptom of TMD. The results showed that excessive use of cell phones was significantly correlated with the occurrence and severity of TMD symptoms, with individuals with higher mean scores for smartphone addiction having higher odds of TMD dysfunction. This implies that extended smartphone exposure could be a new behavioral risk factor for oral and musculoskeletal diseases in young adults.

The current study has found that the prevalence of TMD symptoms is similar to that found in previous studies of university students. Recent research has shown that TMD symptoms are prevalent in young adults and are attributed to greater academic demands, parafunctional habits, and changes in posture.[15, 16] The association found in the present study may be due to studies that have highlighted the association between long-term digital device use and forward head posture, cervical muscle imbalance, and an increase in masticatory muscle activity.[17-19]

Our finding that students using smartphones for more than 4 hours daily had significantly higher TMD prevalence is supported by

previous research showing that prolonged smartphone exposure increases the risk of neck pain, poor posture, and muscular fatigue. A new study that explored mobile phone addiction in youth concluded that there was a relationship between excessive mobile phone usage and physical discomfort related to prolonged flexed neck position and altered biomechanics.[20] This repetitive position can affect the TMJ due to possible alteration of cervical alignment and jaw muscle coordination.

The present study also revealed a significant relationship between the severity of smartphone addiction and TMD symptoms, as students with high addiction scores were almost three times as likely to suffer from TMD. These results are in line with other studies, which reported that problematic smartphone use is associated with psychological stress, anxiety, sleep problems, and parafunctional behavior like teeth grinding and bruxism.[21-23] These activities can impose repetitive loading forces on the temporomandibular joint and contribute to pain, clicking, and limited mandibular movement.

Our findings showed a high prevalence of specific symptoms such as joint clicking, jaw pain, and discomfort in the masticatory muscles, which was similar to prior studies

reporting that the most common symptoms of TMD in the younger population were sounds of clicking and muscle pain.[2, 24] The recent reviews have emphasized that TMD has a multifactorial etiology, with the mechanical load, emotional stress, and behavioral habits working together to play a role in symptom development.[25]

These findings are similar to recent findings indicating that lifestyle changes linked to digital technology are now increasingly impacting oral health outcomes.[26] New research has confirmed that oral disease can also be attributed to behavioral and environmental risk factors and that diseases like TMD are not dental diseases but rather diseases that are also associated with posture, stress, and daily habits.[27]

The previous studies also highlighted the need to screen for oral complications related to lifestyle changes early on.[27, 28] While systemic diseases like diabetes and periodontal disease have garnered lots of attention in recent oral health literature, these investigations all help to reinforce the idea that chronic exposures to the system can have a profound impact on the state of the mouth.

The results of the present study have clinical implications since university students are a population known to be highly dependent on their smartphones and spending long durations on screens. The identification of smartphone addiction as a potential risk factor for TMD can aid in the development of preventive strategies such as ergonomic education, the reduction of excessive smartphone usage, posture correction exercises, and early dental assessment for students who demonstrate symptoms of TMD.

Finally, the present study has revealed that there exists a high correlation between TMJD and the addictions of the smartphones among university students. The findings may contribute to the ongoing evidence that excessive use of electronic devices may have psychological and musculoskeletal consequences, and also affect the stomatognathic system. Additional longitudinal research is suggested to determine causality and to assess if smartphone dependence reduction can lower the prevalence and/or severity of TMD symptoms.

Limitations

There were some limitations in this study that should be taken into account when interpreting the results of the study. First, the cross-

sectional design did not allow for establishing a causal relationship between smartphone addiction and TMDs, so further research is needed to determine if excessive smartphone use is a direct cause of the development of TMDs. Secondly, the smartphone addiction and TMD symptoms were self-reported, which may have led to recall bias and/or subjective reporting errors. Third, this study did not assess potential risk or protective factors not included in the study such as psychological stressors, anxiety, sleep quality, parafunctional habits (bruxism/clenching) and altered postures, among others, which could be associated with the occurrence of TMD. Furthermore, the study was based on the students of the University, which may not reflect other age groups and population.

CONCLUSION

The findings of the present study showed that the symptoms of TMJD were common among university students, and that there was a significant correlation between TMJD symptoms and smartphone addiction. Students who showed higher scores in smartphone addiction evidenced a greater association with the occurrence of complaints related to TMD, indicating that the excessive use of smartphones is a behavioral risk factor for the development of TMD. Education on healthy smartphone use, posture, and the early signs and symptoms of TMD could be one of the ways to alleviate the burden of these disorders in the young adult population. Longitudinal and multicenter studies are recommended to further understand the long-term effects of smartphone dependency on TMD.

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