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Correlation Between Smartphone Induced Head-Neck Posture with Self-Reported Temporomandibular Joint Symptoms: A Cross- Sectional Survey Among Students

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Abstract

Introduction: Prolonged smartphone use, especially at bedtime, may lead to forward head posture and increased cervical load, potentially effecting temporomandibular joint (TMJ) function. This study explored the relationship between smartphone-induced head–neck posture and TMJ symptoms among students.

Materials and Methods: A cross-sectional study was conducted at Western Balkans University using a self-administered online questionnaire among students aged 18–35 years. Data included demographics, smartphone usage duration, bedtime posture, head–neck craning, and self-reported TMJ symptoms over the past 30 days. Descriptive statistics were applied.

Results: A total of 152 participants completed the survey, most were frequent smartphone users, with over 70% using their phones nightly before sleep. The most common bedtime posture was side-lying with neck bending. Headache and neck pain were the most reported symptoms, followed by jaw clicking, stiffness, and occasional jaw pain.

Discussion: Findings suggest that prolonged smartphone use with poor posture may contribute to cervical strain and TMJ discomfort, due to muscular fatigue and altered biomechanics.

Conclusions: Frequent bedtime smartphone use and inappropriate posture were associated with increased prevalence of TMJ-related symptoms. Awareness and ergonomic education are recommended.

Keywords

Smartphone use; Posture; Temporomandibular joint.

Introduction

The fast increase in smartphone usage has altered postural behaviors, particularly among students who spend very long periods engaged in academic and enjoyment screen-based activities. Smartphone use commonly elevates the risk of a sustained forward head posture and excessive neck flexion, increasing mechanical load on the cervical spine and musculature. Such poor postural behaviors have been associated to musculoskeletal problems, uncomfortable cervical mobility, and lack of neuromuscular control, raising concerns about their long-term health implications [1].

Temporomandibular joint disorders (TMDs) include a group of conditions affecting the temporomandibular joint, masticatory muscles, and related structures, with symptoms such as jaw pain, clicking sounds, popping, limited mouth opening, and headaches. The etiology of TMDs is multifactorial, involving biomechanical, psychological, and postural factors. Forward head posture, in particular, may increase tension on the stomatognathic system, contributing to the development or aggravation of TMJ symptoms. However, evidence regarding the relationship between smartphone-induced postural changes and TMD symptoms remains limited and indeterminate [2].

Therefore, the present cross-sectional study aims to show the correlation between smartphone-induced head and neck posture and self-reported temporomandibular joint symptoms among students. The specific objectives are to evaluate smartphone usage patterns, correlate head and neck posture associated with smartphone use, and evaluate the prevalence of self-reported TMJ symptoms in the young population. The null hypothesis of the study is that there is no significant correlation between smartphone-induced head–neck posture and self-reported temporomandibular joint symptoms among students. Understanding this relationship may help in early identification of risk factors and guide preventive and ergonomic interventions [3].

Materials and Methods

A cross-sectional study was conducted in Western Balkans University to observe the link between head and neck posture with TMJ symptoms using a self-administrated online questionnaire. Questionnaire was distributed between ages of 18-35 years old. It was divided by email among the students of the university. The included faculties were the faculty of dentistry, faculty of medicine, faculty of technical-medical sciences. The participants were evaluated based on VAS (Visual Analog scale) where 10 was the highest severity of discomfort and 1 considered the least.

Questionnaire design

Main demographic consideration including gender, age was primarily studied. Then the time consideration of phone usage per day, usage of smartphone before bedtime, amount of time spent before sleeping, posture of the body during smartphone usage in bedtime, visualization of the positions was generated by artificial intelligence. Students choose the position which was observed to be used by them more often during bedtime. Head and neck raising (craning) was determined in the questionnaire to evaluate muscle tension, phone resting closer to stomach level or face level was evaluated as well to determine the number of head and neck movement. Students showed signs of TMJ symptoms which has been manifested during the last 30 days and described based in severity. The timing of symptom manifestation was evaluated to localize the most common period of time prior to smartphone usage during bedtime. Tooth grinding(bruxism) was estimated in correlation of timing during sleep or post-sleeping. Awareness of head and neck posture was estimated to determine how capable is the prevention of any TMJ symptoms. The level of knowledge to understand the effect of head-neck posture influenced by smartphone usage during bedtime.

Inclusion and disocclusion criteria

The estimated age group from 18 to 35 years old, usage of smartphone during bedtime in correlation with TMJ symptoms. The students with chronic/systemic medical conditions were disclosed from the questionnaire.

Statistical analysis

The results were analyzed and evaluated using descriptive statistical methods. The study includes 152 students and every characteristic in questionnaire was summarized and valued based in frequencies (n) and percentages (%). Each survey item, the number of participants selecting each response option was calculated and expressed based in percentage of the total sample. There were questions allowing multiple response options such as related to TMJ symptoms in the last 30 days, were analyzed based on reporting the frequency of each selected option independently. The results were presented in corresponding graphics to evaluate the most and the least commonly reported symptoms within the study.

Results

The sample is consisted mainly of young adults, with values found in females(n=104) and lower with males(n=48) with a gender distribution of 68,4% and 31,6% respectively. Most participants were between 18-20 years old (n=83) and 21-23 years old (n=51), the age groups with the fewest participants were 27-30 years old (n=7) and 30-35 years old (n=5) age groups (Figure 1).

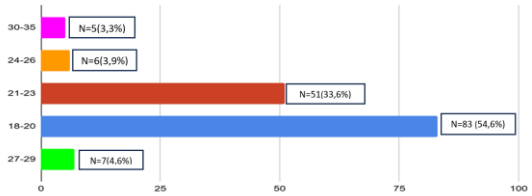

Figure 1: Age groups distribution of study participants.

Daily smartphone use was common among all participants, with the majority reported spending 5-6 hours per day, n=60(39,5%), followed by 3-4 hours, n=50 (32,9%). The participants who spent more than 6 hours were around n=37 (24,3%) in total. Very few reported spending less than an hour within 5 participants (3,3%).

Almost all the participants reported that they used their smartphone in bed before sleeping. The largest group was distributed in every night usage n=109(71,7%), a few times per week n=33(21,7%), rarely usage during bedtime was reported by n=10(6,6%), no participant selected the option Never (n=0).

Correlated to the duration of smartphone use at bedtime, the majority of participants reported using their smartphone for 10-30 minutes, n = 74(48.7%). This is followed by 40-60 minutes of use, n=44(28,9%) (Figure 2).

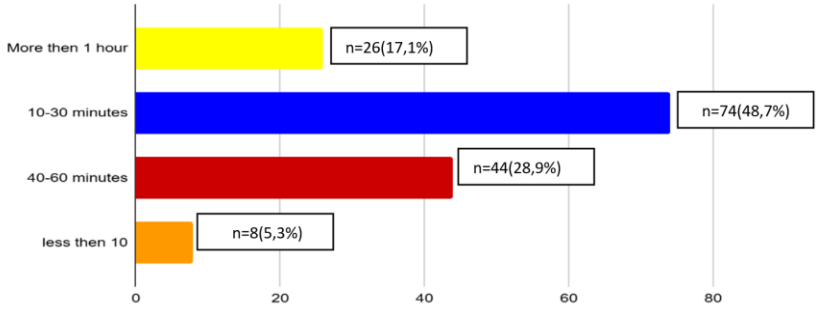

Figure 2: Duration of smartphone use during bedtime among study participants.

Related to body posture during smartphone use in bed, the most practiced position was lying on the side with head bent sideways while looking at the phone n=81(53,3%),followed by lying on the back with the head supported and phone held above the chest n=31(20,4%).lying on the back with the chin pushed towards the chest while phone rested on stomach or lap was selected by n=18(11,8%),while lying on the side while supporting the head with hand(elbow bent) was selected by n=15(9,9%). The last posture selected by the options was lying in stomach with the neck extended upward to view the phone, n=7(4,6%) (Figure 3).

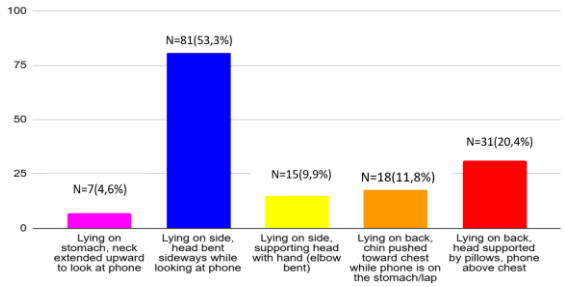

Figure 3: Body posture during bed time smartphone usage reported by the study participants.

Practice of head-neck raise (craning) was reported that the participants sometimes raise their head and

neck to look at their smartphone n=64(42,1%), which was followed by those who reported doing so rarely n=54(35,5%).

Related to TMJ symptoms experienced in the last 30 days (multiple selection allowed therefore total may exceed 100%), the most frequent symptom shown in data was headache n=71(46,7%) followed by neck pain n=65(42,8%). A considerable proportion of participants reported jaw clicking or popping during mouth opening or closing n=25(16,4%). other reported ear pain, n=17(11,2%),morning jaw stiffness or tightness n=16(10,5%), the temple pain or pressure on one side of the head n=16(10,5%). Less common symptoms were ear pain n=17(11,2%), jaw pain n=10(6,6%) and pain while chewing n=9(5,9%). While n=37(24,3%) reported they had none of these symptoms (Figure 4).

Participants in our study showed different results related to TMJ symptoms progression. The largest group value was observed to have no symptoms n=49 (32,2%). The most frequent timing of symptoms manifestation was later in the day n=37(24,3%), then followed by not related to smartphone or posture n=29(19,1%). Small number of participants reported symptoms happening in the morning n=21(13,8%), less participants reported their TMJ symptoms during or after using their smartphone on bed n=16(10,5%) (Figure 4).

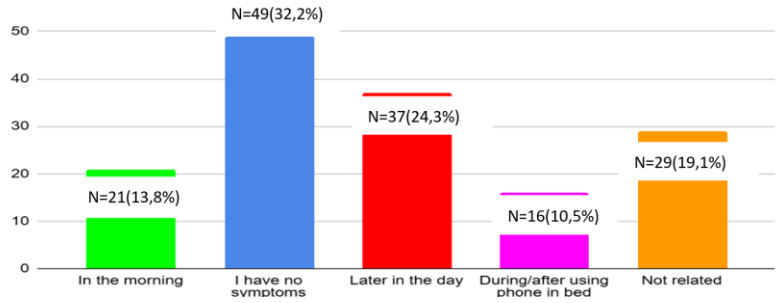

Figure 4: Timing of TMJ symptoms occurrence.

Half of the participants reported no tooth clench or grind(bruxism) n=77 (50,7%), a considerable number of participants were unsure if they grind their teeth n=31(20,4%). Night bruxism was reported more often n=19 (12,5%) then grinding during the day n=10 (6,6%), still n=15 (9,9%) reported grinding both day and sleep.

Discussion

This cross- sectional study reported the relationship between smartphone usage during bedtime in correlation with head and neck posture and TMJ symptoms among young participants between 18-35 years old [4].

Our findings showed very high generality of smartphone use during bed time and bad postural habits and significant occurrence of TMJ symptoms supporting our hypothesis that prolonged smartphone use in bedtime with poor posture can increase manifestations of TMJ and bruxism. The study population of our research was consisted mainly by young adults with a higher proportion for females of males. Since the female sample is larger in our study it consists with a studies suggesting that females report TMJ

symptoms more frequently than males [5,6].

The largest age group was 18 to 20 years followed by 21 and 23 years indicating that smartphone usage during bed time is commonly in younger generation. This demographic distribution of young adults that tend to have a higher daily smartphone usage is also mentioned in the study conducted by Senturk at.al. Daily smartphone use was large scaled among all the students. The highest time spend in smartphone was reported 5 to 6 hours per day followed by 3 to 4 hours additionally all the participants reported their smartphone before bedtime with more than 70 percent every night. These findings determine that smartphone used in bedtime is a habitual behavior rather than occasional [7,8].

The most common reported posture during bed time smartphone use was lying on the side with the head bend side away while looking at the phone. This posture places asymmetric pressure on head and neck muscles and may increase loading of TMJ and lateral loading. Less frequently reported and more harmful posture included lying on the back, chin pushed towards the chest and lying prone with the neck extended upward, which can increase cervical spine stress. Head and neck craning was reported to be very common in the majority of the participants. Sustained craning can increase muscle tension in the cervical and masticatory muscles raising the potential of TMJ symptoms [9-11].

The most frequent reported symptoms were headache and neck pain, followed by jaw clicking and popping, jaw stiffness. These results showed a strong connection between cervical discomfort and TMJ symptoms supported by the studies showing a correlation between cervical spine and temporomandibular joint [12,13]. The arrangement of TMJ symptoms were reported mainly later in the day which may indicate cumulative muscle tension and fatigue as a result of prolonged smartphone usage in bedtime and poor posture throughout the day.

More than half of the participants have reported no tooth clenching or grinding while a considerable number where unsure about their bruxism status. Night time bruxism was more common than daytime bruxism. These results related to bruxism enhances the hypothesis of our study that undiagnosed bruxism can increase TMJ symptoms [14].

Akodu A. at al showed that there was a lack of awareness in young adults in relation with their posture. The findings of our study proved the importance of ergonomic education and practices such as posture check, limitation of screentime may help to reduce TMJ symptoms [15].

The limitations of our study are the subjectivity of the interpretation of symptoms and perception of the participants. Future studies should include longitudinal designs to better understand the impact of smartphone usage on TMJ health.

Conclusions

Overall, the results suggested that frequent smartphone usage during bed time with a correlation of head and neck posture shows high prevalence in TMJ symptom manifestation.

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