KNOWLEDGE AND AWARENESS AMONG DENTAL STUDENTS REGARDING SMARTPHONE USAGE AS A RISK FACTOR FOR TEMPOROMANDIBULAR DISORDERS: A CROSS-SECTIONAL STUDY

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Abstract

Objectives: The signs of smartphone addiction can be roughly divided into two groups: psychosocial disorders, such as sleep problems, agitation or depression, dropping out of school, and antisocial personality disorder; and physiological disorders, such as dry eyes, carpal tunnel syndrome, musculoskeletal issues, and migraine headaches. The aim of this study was to describe the impact of smartphone addiction on cervical posture and function as well as TMDs in adolescents.

Materials and Methods: A longitudinal cross-sectional survey had 200 dental students. A self-administered, closed-ended questionnaire was created and distributed to evaluate the knowledge and awareness of dental students regarding the smartphone usage as a risk factor for temporomandibular joint disorders. The statistical analysis was made through IBM SPSS software version 23 and results were obtained. Statistical significance was analyzed.

Results: 87% of the total population was not aware that usage of smartphones is indirectly related to TMJ disorders. Majority of the participants replied that males are more commonly affected with TMJ disorders than females i.e 58%. 0.5% of final years and 9% of interns have said maybe over usage of smartphones can cause craniocervical disorders. Only 12% of the females were aware that all of the mentioned disorders come under craniocervical disorders such as TMJ dysfunction, misaligned teeth and MPDS. 3.5% of 2nd years and 3rd years, 2% of final years and 7.5% of interns have said MPDS. However, measurement using an inclinometer showed that the youths who were smartphone addicts had a cervical posture that was significantly flexed and a reduced cervical range of motion. Muscular difficulties were more frequently seen in smartphone addicts, according to the clinical profile of temporomandibular disorders.

Conclusion: The awareness and knowledge about smartphone usage as a risk factor for Temporomandibular disorders were moderate. Our study helped in creating awareness about the interlink between smartphone usage and temporomandibular joint disorders. Males had more awareness about the influence of over usage of smartphones on TMD's which was 10% but females were unaware. The negative consequences of smartphone use on MD, bruxism, and daily drowsiness are significant. Concerns have been raised about their impact on the expense of healthcare and public health.

Keywords: Temporomandibular joint disorder, smartphone usage, craniocervical disorders.

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1. Introduction

Smartphones have made it possible for everyone, wherever, to have access to the internet, and they may be used for anything from basic communication and enjoyment to business [1]. Smartphone addiction, which is described as the unrestrained overuse of cellphones and their ensuing interference with daily life, is causing significant alarm, but, at the same time [2]. Though mobile phones are still only a recent arrival, a National Information Agency poll has indicated that the frequency of smartphone addiction (8.4%) has surpassed that of internet addiction (7.7%) [3]. However, neither manufacturers nor medical professionals have offered sufficient information, including appropriate guidelines, about the usage of smartphones. According to earlier research on the prevalence of smartphone addiction, adolescents are more prone than adults to be immersed in digital media and have a greater risk of addiction [4].

The signs of smartphone addiction can be roughly divided into two groups: psychosocial disorders, such as sleep problems, agitation or depression, dropping out of school, and antisocial personality disorder; and physiological disorders, such as dry eyes, carpal tunnel syndrome, musculoskeletal issues, and migraine headaches [5]. When using a smartphone for extended periods of time, the fingers, neck, back, and shoulder are the most commonly affected areas by musculoskeletal issues [6]. Furthermore, prior studies have shown that prolonged use of digital devices, particularly cell phones, frequently results in negative changes to head and neck posture, rounding the shoulders and pulling the head forward. Additionally, it has been suggested that the increased use of cellphones affects upper cervical posture significantly [7]. Additionally, it is well known that an incorrect upper cervical posture can cause pain, changes in muscular tone, and even structural damage to the head and shoulders. Other research has discovered a link between smartphone use and musculoskeletal complaints, such as muscle soreness and fatigue, as well as a reduced cervical range of motion. Misalignment is also well known to occur [8].

The onset or exacerbation of temporomandibular disorders (TMDs), which are musculoskeletal conditions affecting the masticatory muscles and temporomandibular joint, has also been linked to a misaligned craniocervical posture, according to numerous researches. Poor cervical position may influence the pathologic development of TMDs by altering the stomatognathic system's muscle tone, according to earlier research [9]. The precise biomechanical impact of smartphone addiction in the craniocervical region is yet unknown, despite several research suggesting that it causes diverse changes in head and shoulder posture and mobility. Additionally, there hasn't been much research on how smartphone addiction affects the clinical characteristics of teenagers with TMDs.Our team has extensive knowledge and research experience that has translate into high quality publications[10–19]. Therefore, the aim of this study was to describe the impact of smartphone addiction on cervical posture and function as well as TMDs in adolescents.

2. Materials and Methods

The survey had 200 participants. A cross sectional study was conducted with 14 questions regarding association between temporomandibular joint disorders and smartphone usage was created and circulated among the survey participants (Table 1). The results were first added in excel spreadsheets and then the values were added in IBM SPSS version 23 and were derived into bar graphs and pie charts. Chi square test was used to find the p value, when p value = (<0.05), the survey results were said to be statistically significant.

Inclusion criteria:
1. Both females and males with smartphone usage.

Exclusion criteria:
1. Not interested in taking part in the survey.
2. Any prior neck and upper extremity related ailments.

Table 1 represents the questionnaire regarding over usage of smartphones and Temporomandibular joint disorders.

S. No.	QUESTIONS	ANSWERS
1.	Gender	1- Male 2- Female
2.	Year of study	1- First year 2- Second year 3- Third year

		4- Final year 5- Intern
3.	Are you aware that TMJ disorders are related to over usage of mobile phones?	1- Yes 2- No
4.	Which gender is most commonly affected with TMJ disorders?	1- Male 2- Female 3- Both are equally affected
5.	What are the TMJ disorders that are caused due to over usage of mobile phones?	1- Inconvenience when yawning 2- Joint noise 3- Opening disorders of joints 4- Jaw discomfort 5- Jaw joint stiffness 6- Can't take hard food items 7- Chin shift during opening and closing 8- Discomfort while closing 9- All of the above
6.	Are you aware about the presence of craniofacial disorders?	1- Yes 2- No
7.	Does over usage of mobile phones cause craniocervical disorders?	1- Yes 2- No 3- Maybe
8.	What are the craniocervical disorders that you are aware of?	1- Temporomandibular joint dysfunction 2- Lordosis 3- Malaligned teeth 4- Myofascial pain dysfunction 5- All of the above
9.	What are the causes of craniocervical disorder?	1- Physical trauma 2- Inflammatory diseases 3- Congenital disorder 4- All of the above
10.	Are you aware that prolonged usage has been scientifically proven to cause alterations in muscle behaviour and neuromuscular proprioception in the head-and-neck region?	1- Yes 2-No
11.	What are the adverse effects of over usage of mobile phones?	1- Day time sleepiness 2- Bruxism 3- Both
12.	What are the best ways to overcome smartphone addiction?	1- Medications 2- Interacting with people 3- Keep yourself on a schedule 4- Turn off as many push notifications as possible 5- Take distracting apps off your home screen 6- Kick your device out of bed 7- All of the above
13.	How many hours do you spend on your smartphone in a day?	1- Less than 1 hour 2- 1-2 hours

		3- 3-4 hours 4- More than 4 hours
14.	Do you think there is any association between time duration of usage of smartphone and temporomandibular disorders?	1- Yes 2- No

3. Results

Association graph in between gender with temporomandibular Jong disorders and year of study with TMJ disorders. After obtaining the results from 200 participants. 53% were males and 47% were females (fig:1). The total number of participants from the undergraduate intern BDS was more i.e 33.5% when compared to 1st year, second year, third year, final year (fig: 2). 87% of the total population was not aware that usage of smartphones is indirectly related to TMJ disorders (fig: 3). 27.5% of interns were not aware about the interlink between smartphone usage and TMJ disorders (fig: 4). Majority of the population thinks males are more commonly affected with TMJ disorders than females i.e 58% (fig: 5). 2% of final years and 10% of interns have said both the genders are equally affected with TMJ disorders (fig: 6).

Only 38% of the participants were aware that all the above mentioned i.e inconvenience while yawning, joint noise, opening disorders of joints, jaw discomfort, jaw joint stiffness, can't take hard food items, chin shift during opening and closing and discomfort while closing (fig: 7). 10% of third years, 10% of final year and 11% of interns have said all the above causes are TMJ disorders seen in over usage of smartphones (fig: 8). 54% of the participants were aware about craniocervical disorders (fig: 9). 11.5% of 3rd years, 15% of final years and 14% of interns were not aware of craniocervical disorders (fig: 10). 43% of males and females have said there is impact on craniocervical disorders due to over usage of smartphones (fig: 11). 0.5% of final years and 9% of interns have said maybe over usage of smartphones can cause craniocervical disorders (fig: 12).

Only 12% of the females were aware that all of the mentioned disorders come under craniocervical disorders such as TMJ dysfunction, misaligned teeth and MPDS (Fig: 13). 3.5% of 2nd years and 3rd years, 2% of final years and 7.5% of interns have said MPDS (fig: 14). 55% of the participants have told that the main cause of craniocervical disorder is physical trauma, only 15% of the female participants were aware that physical trauma, inflammatory diseases and congenital disorders are causes of craniocervical disorders (fig: 15). 8.50% of final years and 3.5% of interns have said all the listed reasons that cause craniocervical disorders (fig: 16).

It is said prolonged usage of smartphones have an impact on muscles of the head and neck region (fig: 17). 5.5% of final years and 5% of interns have said no it's not scientifically proven that prolonged usage of mobile phones cause alterations in muscle behavior and neuromuscular proprioception in the head-and-neck region (fig: 18).

80% of the participants have said that day time sleepiness is the most commonly faced adverse effect of smartphone usage (fig: 19). 3.5% of third years, 1.5% of final years and 5% of interns have said both the above options are adverse effects caused by over usage of smartphones (fig: 20). 35% of the participants have said 'interacting with people' is the best way to overcome the overuse of smartphones (fig: 21). 4.5% of interns have said all of the above options can be done to overcome smartphone addiction (fig: 22). 57% of the participants have said that usage of smartphones even for an hour has a higher chance of getting temporomandibular joint disorder (fig: 23). 2% of final years and 6.5% of use for 3-4 hours. 0.5% of second years, 1% of third years, 5% of final years and 5.5% of interns have used smartphones more than 4 hours in a day (fig: 24). Participants were aware that is an association between time duration of smartphone usage (fig: 25). 2.5% of 1st years, 4% of second years, 11.5% of third years, 15% of final years and 14% of interns have said no there is not association between time spent on smartphones and TMJ disorders (fig: 26).

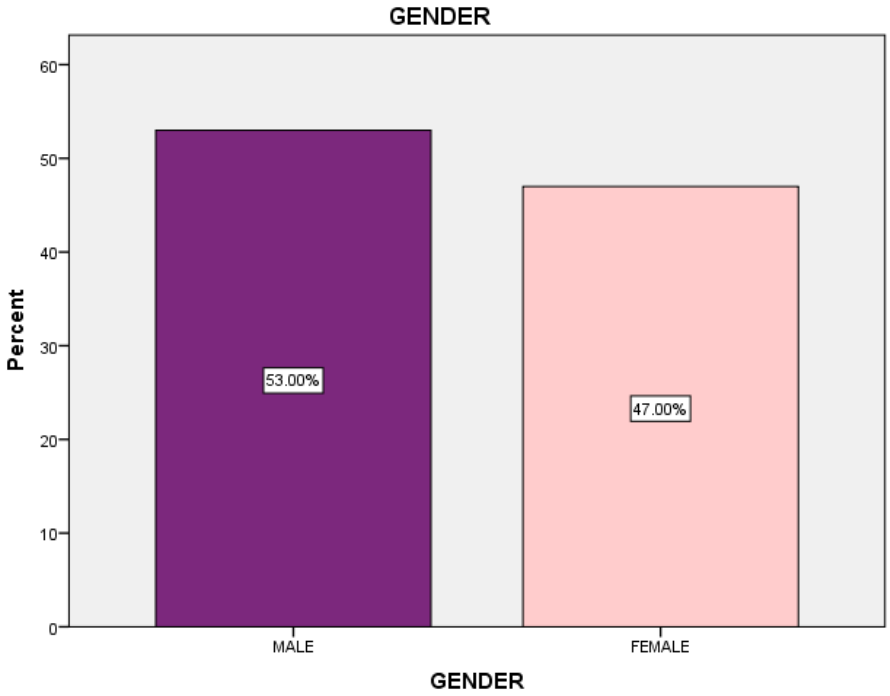

Figure:1: Bar graph represents the gender population of the study.

Violet represents males and it was around 53%, whereas pink represents females and the participants were 47%.

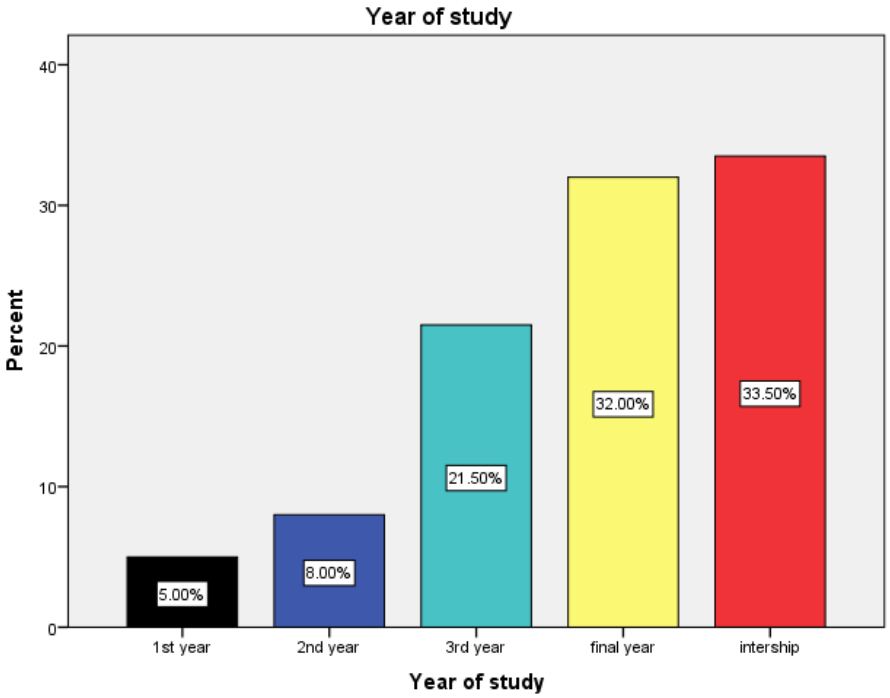

Figure:2: Bar graph represents the age population of the study.

Black represents 1st year and it was around 5%, whereas blue represents 2nd year with 8%, 3rd year is light green with 21.5%, yellow was final year and the participants were 32%. Red represents internship with 33.5%.

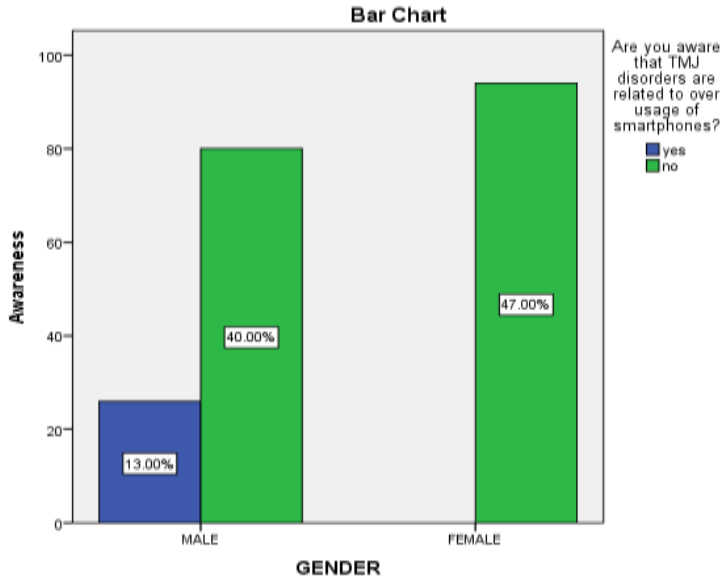

Figure:3: Bar graph represents the awareness of association between smartphone usage and TMJ disorders based on gender.

X-axis indicates the 'gender' and Y-axis is the percentage of participants. Blue represents 'yes' and green is 'no'. 13% of males were aware. 40% of males and 47% of females were not aware about the interlink between smartphone usage and TMJ disorders. Chi-square value- 9.970; p =0.003 (<0.05), however, the results were statistically significant.

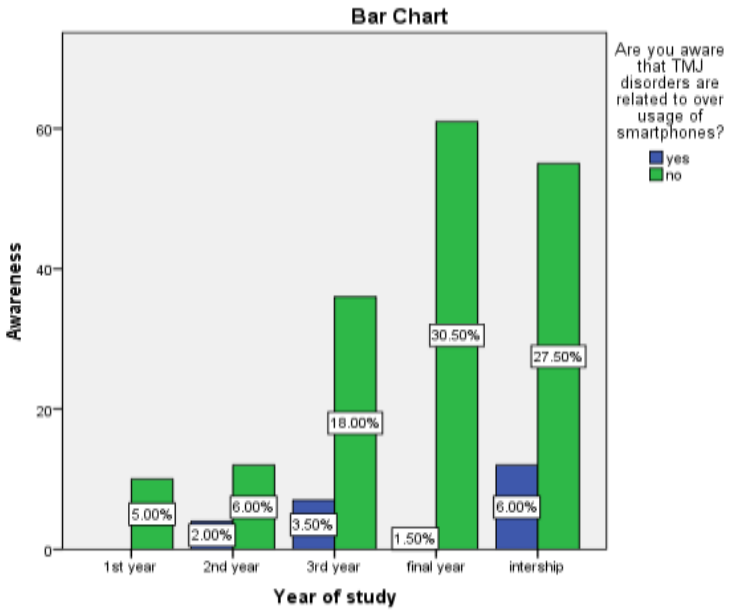

Figure:4: Bar graph represents the awareness of association between smartphone usage and TMJ disorders based on year of study.

X-axis indicates the 'year of study' and Y-axis is the percentage of participants. Blue represents 'yes' and green is 'no'. 13% of males were aware. 2% of 2nd years, 3.5% of 3rd years, 1.5% of final years and 6% of interns were aware about over usage of smartphones and TMJ are interlinked. 5% of 1st years, 6% of 2nd years, 18% of 3rd years, 30.5% of final years and 27.5% of interns were not aware about the interlink between smartphone usage and TMJ disorders. Chi-square value- 9.970; p =0.003 (<0.05), however, the results were statistically significant.

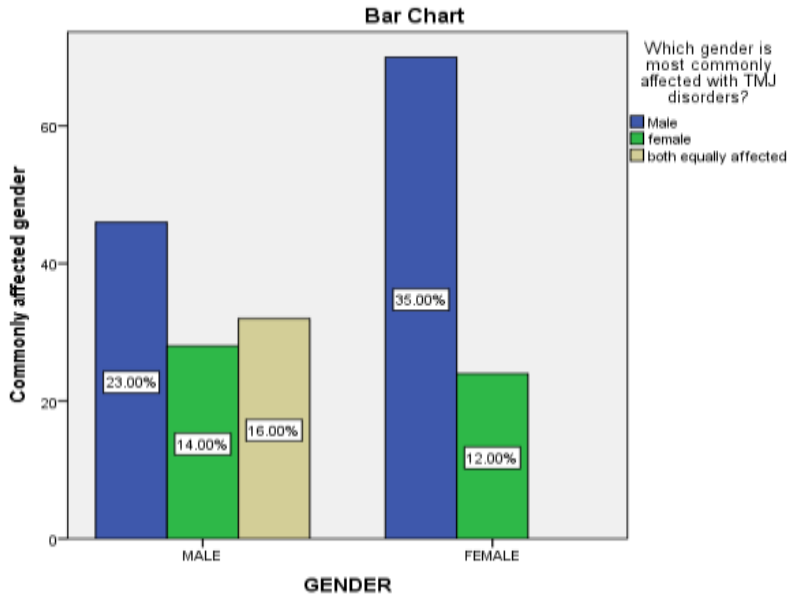

Figure:5: Bar graph represents the awareness of gender prevalence of TMD based on gender.

X-axis indicates the gender and Y-axis is the gender prevalence. Blue represents 'Male' , green is 'female' and brown is both equally affected. 13% of males were aware. 40% of males and 47% of females were not aware about the interlink between smartphone usage and TMJ disorders and 16% of males think that both the genders are equally affected. Chi-square value- 9.970; p =0.003 (<0.05), however, the results were statistically significant.

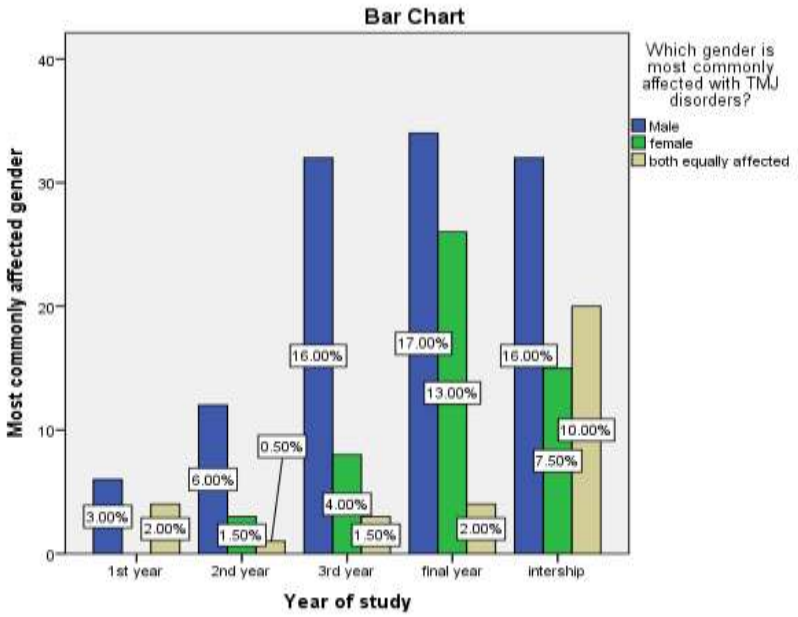

Figure:6: Bar graph represents the awareness of gender prevalence of TMD based on year of study.

X-axis indicates the year of study and Y-axis is the gender prevalence. Blue represents 'Male', green is 'female' and brown is both equally affected. 3% of 1st years, 6% of 2nd years, 16% of 3rd years, 17% of final years and 16% of interns have said males are more affected. 1.5% of 2nd years, 4% of 3rd years, 13% of final years and 7.5% of interns have said females are more affected and 2% of 1st years, 0.5% of 2nd years, 1.5% of 3rd years, 2% of final years and 10% of interns have said both the genders are equally affected with TMJ disorders. Chi-square value- 9.970; p =0.003 (<0.05), however, the results were statistically significant.

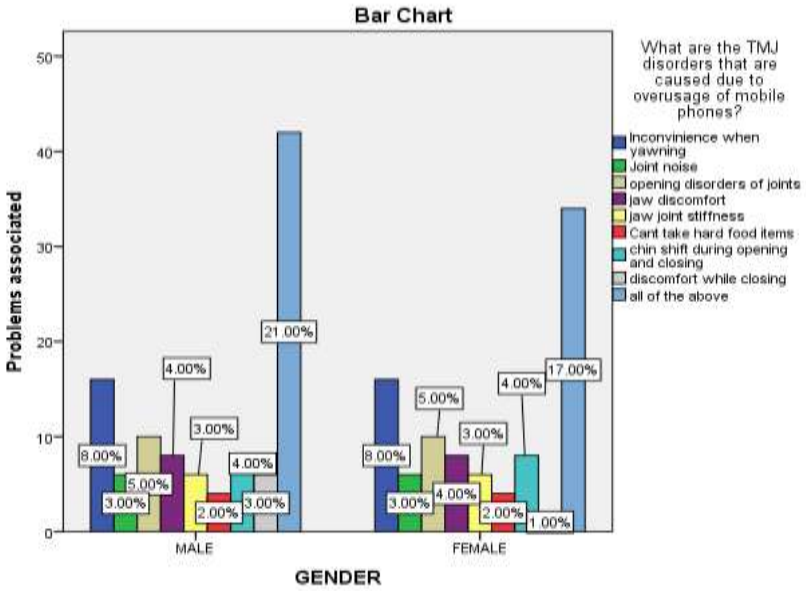

Figure:7: Bar graph represents the association between gender and problems associated with over usage of smartphones.

X-axis indicates the gender and Y-axis is the problems associated with over usage of smartphones. Dark blue is inconvenience when yawning, green is joint noise, brown is opening disorders of joint, purple is joint discomfort, yellow is jaw joint stiffness, red is unable to take hard food items, sky blue indicates chin shift during opening and closing, gray is discomfort while closing and light blue represents all of the above. 8% of females and males had inconvenience while yawning, 3% of females and males had joint noise, 5% of females and males had opening disorders of joints, 4% of females and males had jaw discomfort, 3% of females and males had jaw joint stiffness, 2% of females and males was not able take hard food items, 4% of females and males had chin shift during opening and closing, 3% of females and 1% of males had discomfort while closing mouth and 21% of females and 17% of males had all the above problems. Chi-square value- 22.118; p =0.002 (<0.05), however, the results were statistically significant.

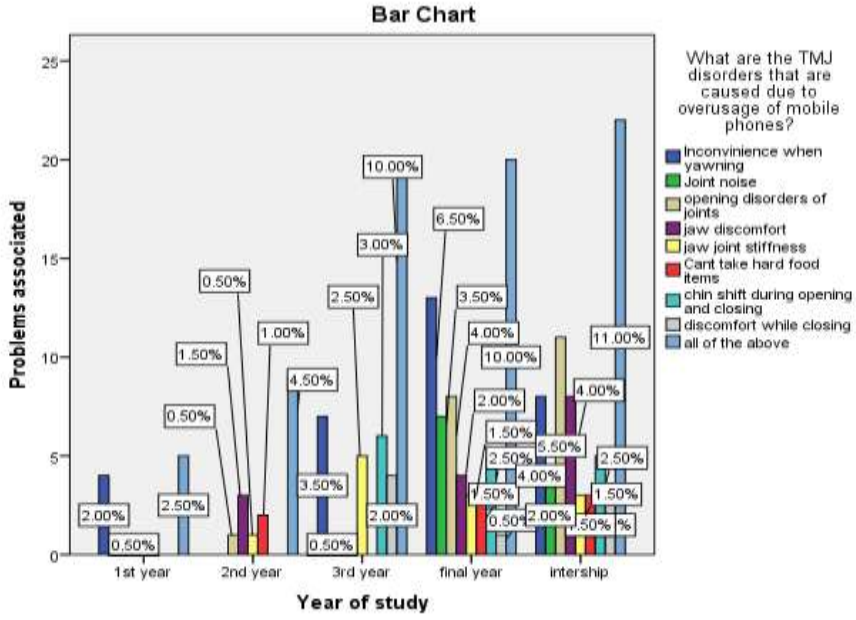

Figure:8: Bar graph represents the association between year of study and problems associated with over usage of smartphones.

X-axis indicates the year of study and Y-axis is the problems associated with over usage of smartphones. Dark blue is inconvenience when yawning, green is joint noise, brown is opening disorders of joint, purple is joint discomfort, yellow is jaw joint stiffness, red is unable to take hard food items, sky blue indicates chin shift during opening and closing, gray is discomfort while closing and light blue represents all of the above. 2% of 1st years, 3.5% of 3rd years, 6.5% of final years and 4% of interns have said 'inconvenience when yawning'. 6.5% of final years and 4% of interns have said 'joint noise'. 0.50% of 1st years and 2nd years, 3.5% final years and 5.5% of interns have have said 'opening disorders of joint'. 1.50% of 2nd years, 2% of final years, 4% of interns said 'jaw discomfort'. 0.5% of 2nd years, 2.5% of third years, 1.5% of final years interns have said 'jaw joint stiffness'. 1% of 2nd years, 1.5% of final years and interns have said 'can't take hard food items'. 3% of 3rd years, 2.5% of final years and interns have said 'chin shift during opening and closing'. 2% of 3rd years, 0.5% of final years and 1.5% of interns have said 'discomfort while closing'. 2.5% of 1st years, 4.5% of 2nd years, 10% of third years, 10% of final year and 11% of interns have said all the above causes are TMJ disorders seen in over usage of smartphones. Chi-square value- 3.746; p =0.036 (<0.05), however, the results were statistically significant.

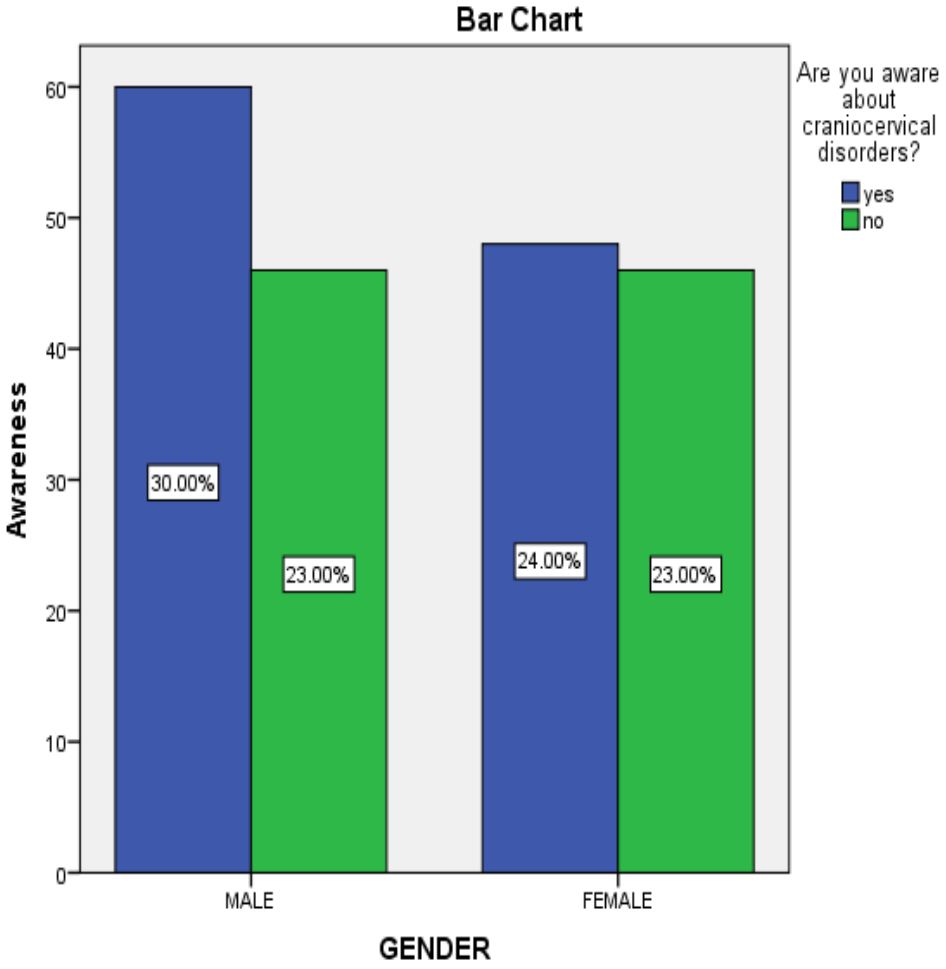

Figure:9: Bar graph represents the association between gender and awareness of craniocervical disorders.

X-axis indicates gender and Y-axis is awareness about craniocervical disorder. Blue represents 'yes' and green is 'no'. 28% of males and 25% of females were aware and 25% of males and 22% of females were unaware about craniocervical disorders. Chi-square value- 16.327; p =0.001 (<0.05), however, the results were statistically significant.

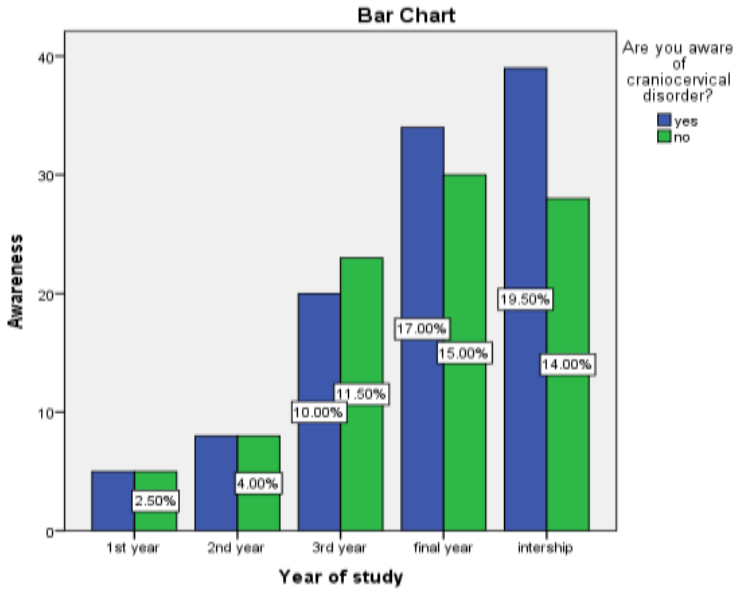

Figure:10: Bar graph represents the association between year of study and awareness of craniocervical disorders.

X-axis indicates year of study and Y-axis is awareness about craniocervical disorder. Blue represents 'yes' and green is 'no'. 2.5% of 1st years, 4% of 2nd years, 10% of 3rd years, 17% of final years and 19.5% of interns were aware. 2.5% of 1st years, 4% of 2nd years, 11.5% of 3rd years, 15% of final years and 14% of interns were not aware of craniocervical disorders. Chi-square value- 19.109; p =0.004 (<0.05), however, the results were statistically significant.

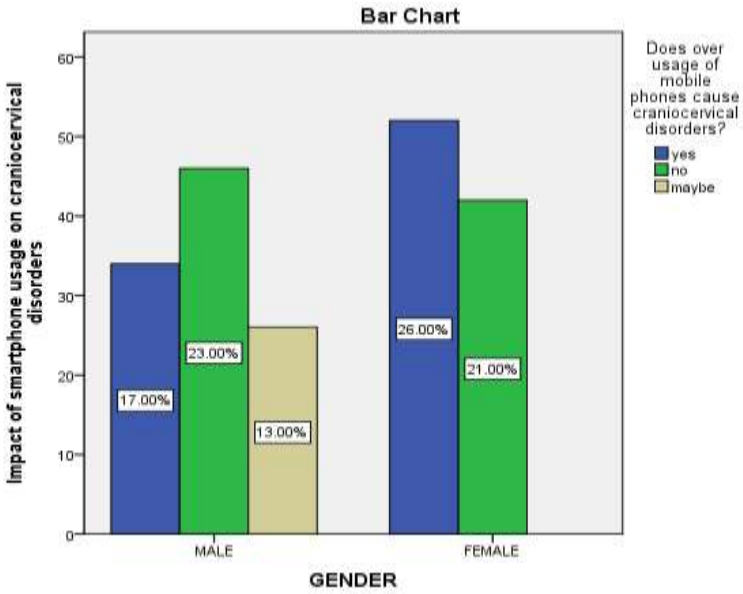

Figure:11: Bar graph represents the association between gender and impact of smartphones on craniocervical disorders.

X-axis indicates gender and Y-axis is impact of smartphones on craniocervical disorder. Blue represents 'yes', green is 'no' and brown is 'Maybe'. 17% of males and 26% of females were aware and 23% of males and 21% of females were unaware and 13% of males thought they might know about the impact of craniocervical disorders. Chi-square value- 16.808; p =0.015 (<0.05), however, the results were statistically significant.

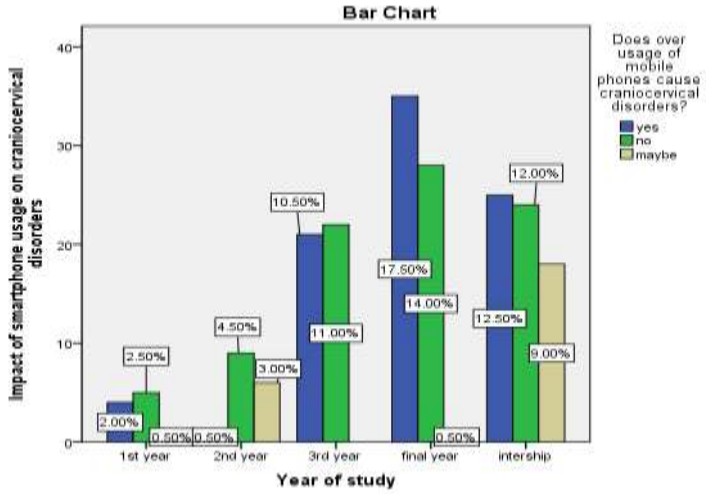

Figure:12: Bar graph represents the association between year of study and impact of smartphones on craniocervical disorders.

X-axis indicates year of study and Y-axis is impact of smartphones on craniocervical disorder. Blue represents 'yes', green is 'no' and brown is 'Maybe'. 2% of 1st years, 0.5% of 2nd years, 10.5% of 3rd years, 17.5% of final years and 12.5% of interns have said yes. 2.5% of 1st years, 0.5% of 2nd years, 11% of final years and 12% of interns have said no. 0.5% of 1st years, 3% of 2nd years, 0.5% of final years and 9% of interns have said maybe over usage of smartphones can cause craniocervical disorders. Chi-square value- 9.024; p =0.002 (<0.05), however, the results were statistically significant.

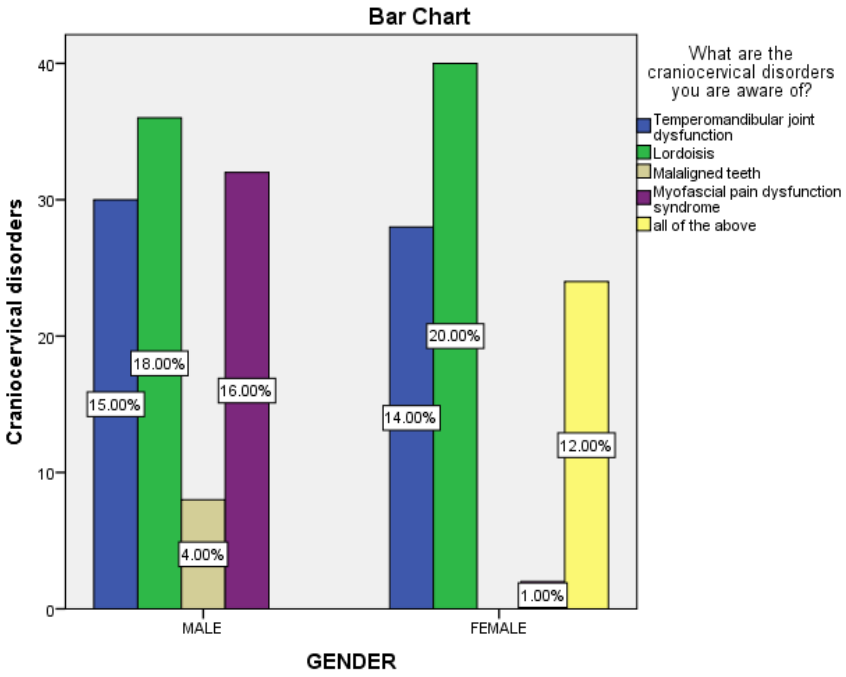

Figure:13: Bar graph represents the association between gender and craniocervical disorders.

X-axis indicates the gender and Y-axis is the craniocervical disorder. Dark blue is temporomandibular joint dysfunction, green is lordosis, brown is misaligned teeth, purple is Myofascial pain dysfunction syndrome, yellow is all of the above. 15% of males and 14% of females says temporomandibular joint dysfunction, 18% of males and 20% of females says loidosis, 4% of males have told misaligned teeth, 16% of males and 1% of females have told Myofascial pain

dysfunction syndrome and 12% of the females says all of the above complications are associated with craniocervical disorders. Chi-square value- 1.826; p =0.115 (>0.05), however, the results were statistically not significant.

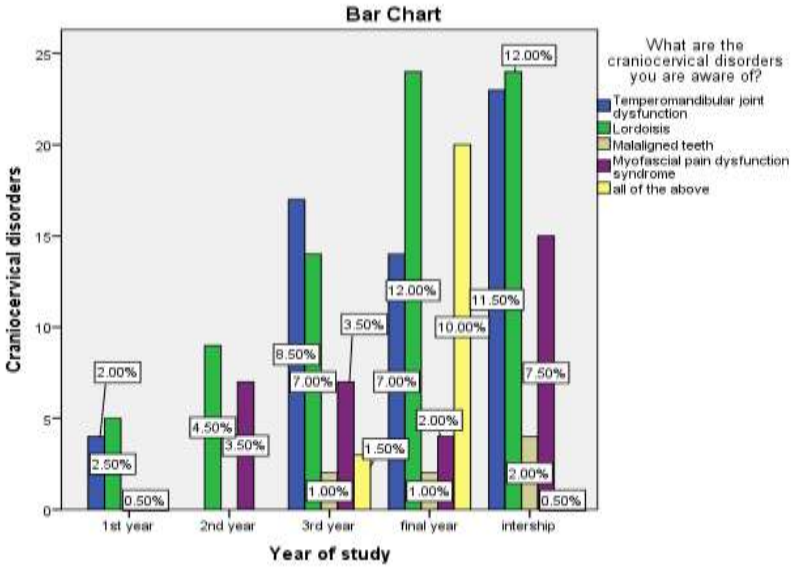

Figure:14: Bar graph represents the association between year of study and craniocervical disorders.

X-axis indicates the year of study and Y-axis is the craniocervical disorder. Dark blue is temporomandibular joint dysfunction, green is lordosis, brown is misaligned teeth, purple is Myofascial pain dysfunction syndrome, yellow is all of the above. 2% of 1st years, 8.5% of 3rd years, 7% of final years, 11.5% of interns have said TMJ dysfunction. 2.5% of 1st years, 4.5% of 2nd years, 7% of 3rd years, 12% of final years, 12% of interns have said lordosis. 1% of 3rd years and final years, 2% of interns have said malaligned teeth. 3.5% of 2nd years and 3rd years, 2% of final years and 7.5% of interns have said MPDS. 1.5% of 3rd years, 10% of final years, 0.5% of interns have said all of the above options are craniocervical disorders. Chi-square value- 9.667; p =0.002 (<0.05), however, the results were statistically significant.

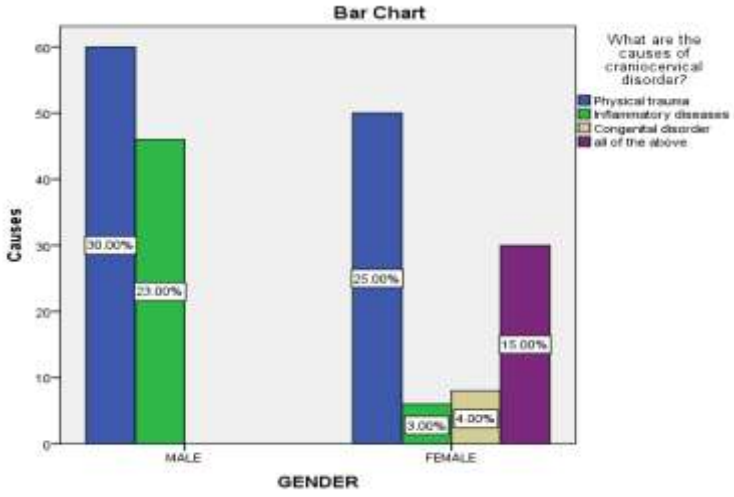

Figure:15: Bar graph represents the association between gender and causes of craniocervical disorders.

X-axis indicates gender and Y-axis is the cause of craniocervical disorder. Dark blue is physical trauma, green is inflammatory diseases, brown is congenital disorder, purple is all of the above. 30% of males and 25% of females have reported physical trauma, 23% of males and 3% of females as inflammatory diseases, 4% of females as congenital disorder and the rest 15% of the females

have said all of the above reasons are the cause of craniocervical disorder. Chi-square value- 0.014; p =0.511 (>0.05), however, the results were statistically not significant.

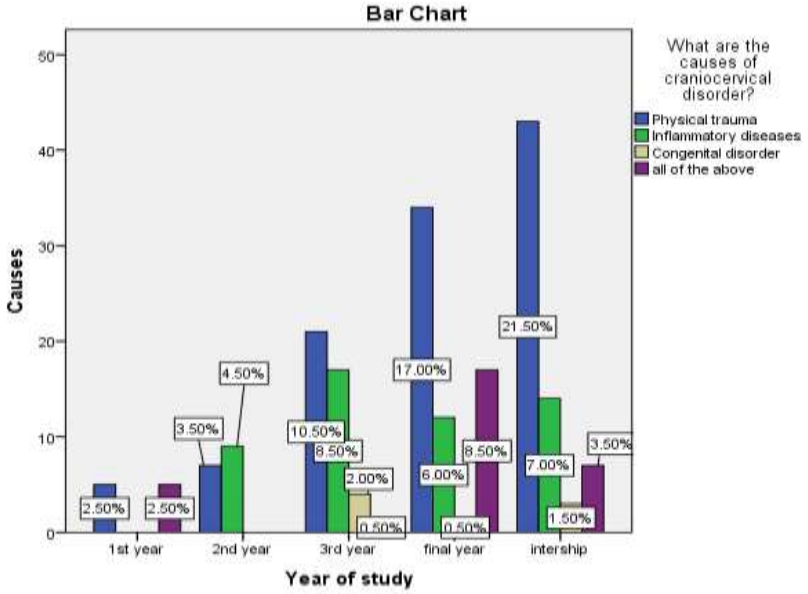

Figure:16: Bar graph represents the association between year of study and causes of craniocervical disorders.

X-axis indicates year of study and Y-axis is the cause of craniocervical disorder. Dark blue is physical trauma, green is inflammatory diseases, brown is congenital disorder, purple is all of the above. 2.5% of 1st years, 3.5% of 2nd years, 10.5% of 3rd years, 17% of final years and 21.5% of interns have said physical trauma. 4.5% of 2nd years, 8.5% of 3rd years, 6% of final years and 7% of interns have said inflammatory diseases. 2% of 3rd year, 0.5% of final years and 1.5% of interns chose congenital disorders. 2.5% of 1st years, 0.5% of 3rd years, 8.50% of final years and 3.5% of interns have said all the listed reasons cause craniocervical disorders. Chi-square value- 26.843; p =0.01 (<0.05), however, the results were statistically significant.

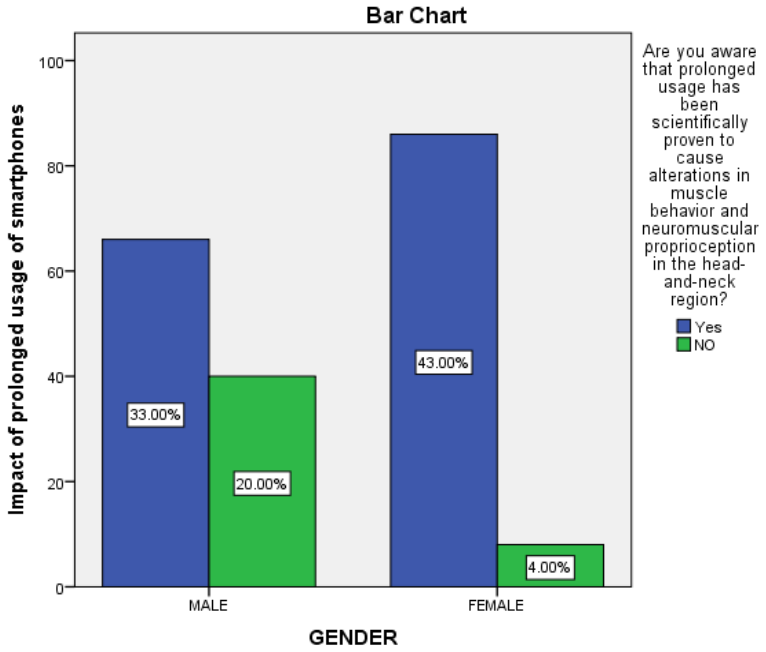

Figure:17: Bar graph represents the association between gender and awareness of prolonged smartphone usage causing problems in muscles of the head and neck region.

X-axis indicates gender and Y-axis is awareness on prolonged usage has been scientifically proven to cause alterations in muscle behavior and neuromuscular proprioception in the head-and-neck region. Blue represents 'yes' and green is 'no'. 33% of males and 43% of females were aware and 25% of males and 22% of females were unaware about the scientifically proven correlation between over usage of smartphones and craniocervical disorders. Chi-square value- 5.421; p =0.114 (>0.05), however, the results were statistically not significant.

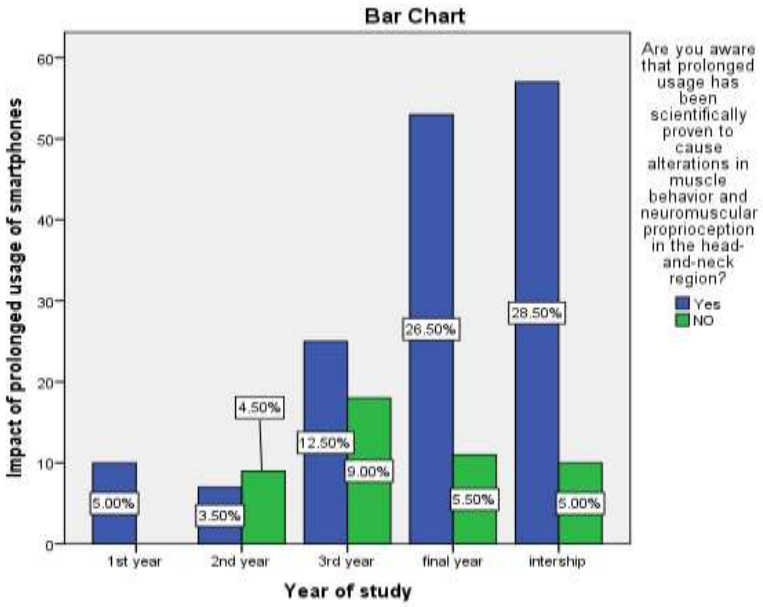

Figure:18: Bar graph represents the association between year of study and awareness of prolonged smartphone usage causing problems in muscles of the head and neck region.

X-axis indicates year of study and Y-axis is awareness on prolonged usage has been scientifically proven to cause alterations in muscle behavior and neuromuscular proprioception in the head-and-neck region. Blue represents 'yes' and green is 'no'. 5% of 1st years, 3.5% of second years, 12.5% of third years, 26.5% of final years and 28.5% of interns have said yes. 4.5% of second years, 9% of third years, 5.5% of final years and 5% of interns have said no it's not scientifically proven that prolonged usage of mobile phones cause alterations in muscle behavior and neuromuscular proprioception in the head-and-neck region. Chi-square value- 0.030; p =0.489 (>0.05), however, the results were statistically not significant.

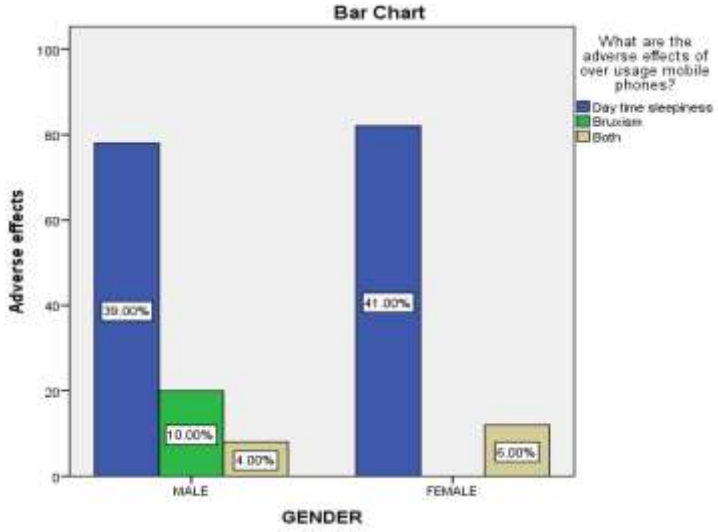

Figure:19: Bar graph represents the adverse effects of over usage of smartphones based on gender.

X-axis indicates the gender and Y-axis is the adverse effects of mobile phone usage. Blue represents 'daytime sleepiness', green is 'bruxism' and brown is both'. 39% of males, 41% of females have told 'daytime sleepiness', 10% of male have told it as 'bruxism' and 4% of males and 6% of females have replied as 'all of the above'. Chi-square value- 7.530; p =0.005 (<0.05), however, the results were statistically significant.

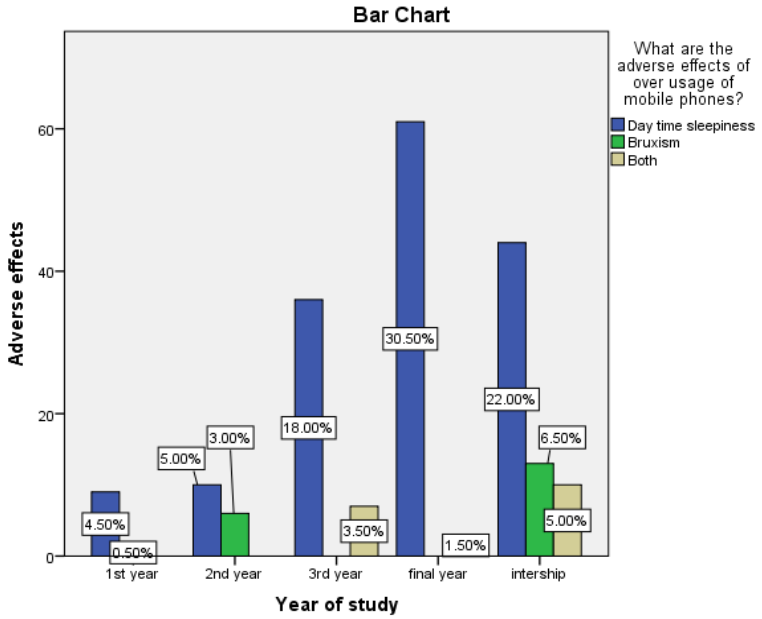

Figure:20: Bar graph represents the adverse effects of over usage of smartphones based on year of study.

X-axis indicates the year of study and Y-axis is the adverse effects of mobile phone usage. Blue represents 'daytime sleepiness', green is 'bruxism' and brown is both'. 4.5% of 1st years, 5% of second years, 18% of third years, 30.5% of final years and 22% of interns have said daytime sleepiness. 0.5% of 1st years, 3% of second years and 6.5% of interns have said bruxism. 3.5% of third years, 1.5% of final years and 5% of interns have said both the above options are adverse effects caused by over usage of smartphones. Chi-square value- 12.227; p =0.01 (<0.05), however, the results were statistically significant.

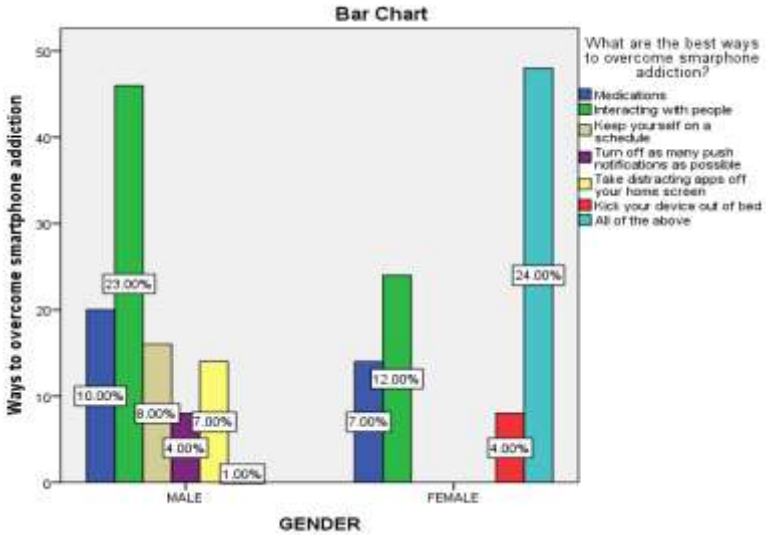

Figure:21: Bar graph represents the association between gender and the best way to overcome the smartphone addiction.

X-axis indicates gender and Y-axis is the 'ways to overcome smartphone usage'. Dark blue is medication, green is interacting with people, brown is keeping yourself on a schedule, purple is turning off the notifications, yellow is taking distracting applications off the screen, red is kicking the device out of bed and sky blue indicates all of the above. 10% of males and 7% of females says medications, 23% of males and 12% of females says interacting with people, 8% of males say keep yourself on a schedule, 4%of males say turn off the notifications, 7% of males says take off the distracting applications off the screen, 1% of males and 4% of females thinks keeping mobile off from the bed during sleep time is one of a best way and 24% of females have said all the above options are good way to overcome the over usage of smartphone. Chi-square value- 9.306; p =0.002 (<0.05), however, the results were statistically significant.

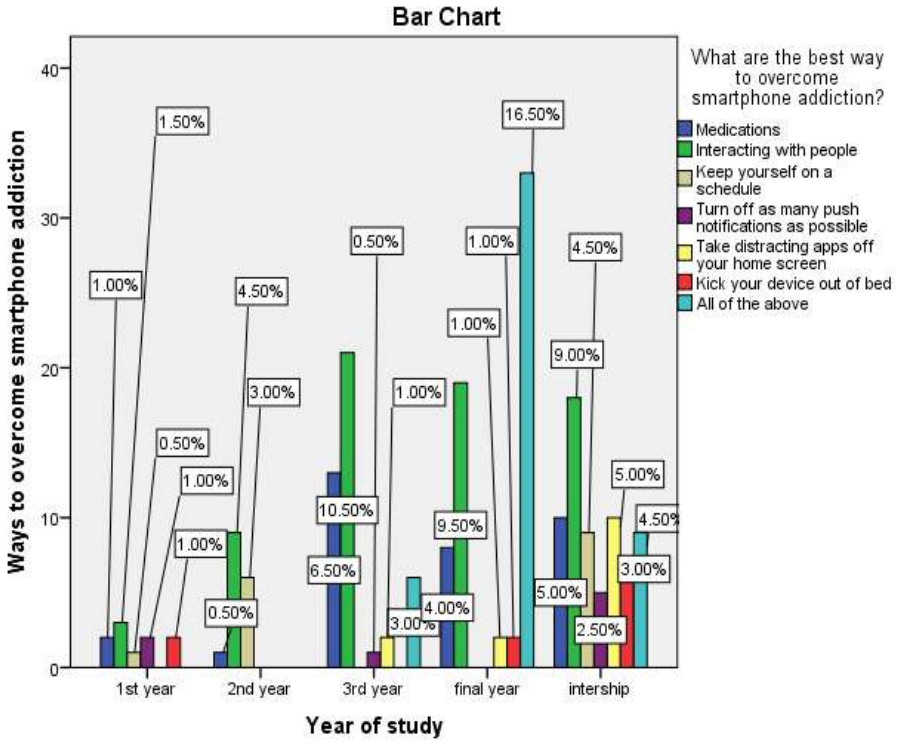

Figure:22: Bar graph represents the association between year of study and the best way to overcome the smartphone addiction.

X-axis indicates year of study and Y-axis is the 'ways to overcome smartphone usage'. Dark blue is medication, green is interacting with people, brown is keeping yourself on a schedule, purple is turning off the notifications, yellow is taking distracting applications off the screen, red is kicking the device out of bed and sky blue indicates all of the above. 1% of 1st years, 0.5% of second years, 6.5% of third years, 4% of final years and 5% of interns have said medications. 5% of 1st years, 3.5% of second years, 12.5% of third years, 26.5% of final years and 28.5% of interns have said yes. 1.5% of 1st years, 4.5% of second years, 10.5% of third years and 9% of interns have said interacting with people. 0.5% of 1st years, 3% of second years and 4.5% of interns have said keep yourself on schedule. 1% of 1st years, 0.5% of third years, and 2.5% of interns have said to turn off as many push notifications as possible. 1% of third and final years and 5% of interns have said to take off the distracting applications out of the screen. 5% of 1st years, 3.5% of second years, 12.5% of third years, 26.5% of final years and 28.5% of interns have said yes. 1% of 1st years and final years and 3% of interns have said Kick your smartphones off bed. 3% of third years, 16.5% of final years and 4.5% of interns have said all of the above options can be done to overcome smartphone addiction. Chi-square value- 9.306; p =0.002 (<0.05), however, the results were statistically significant.

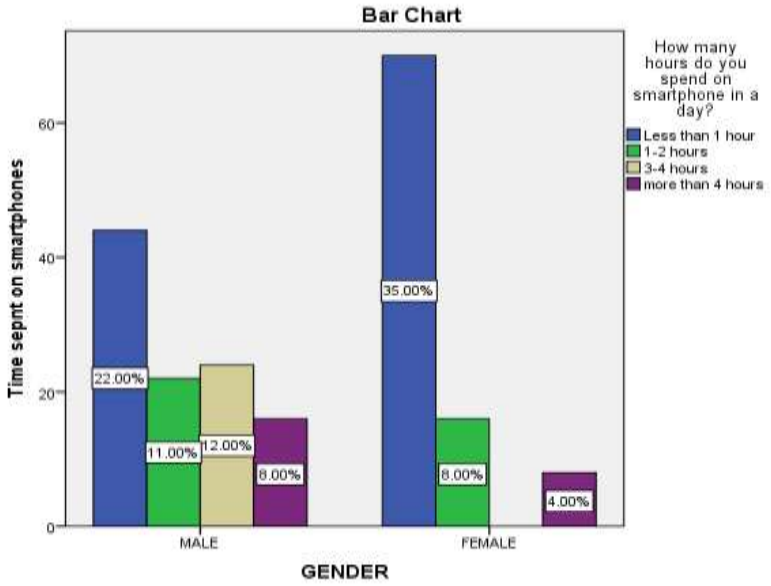

Figure:23: Bar graph represents the association between gender and amount of time spent on smartphones.

X-axis indicates the gender and Y-axis is the amount of time spent on smartphones. Dark blue is less than 1 hour, green is 1-2 hours, brown is 3-4 hours, purple is more than 4 hours. 22% of males and 35% of females spend less than 1 hour, 11% of males and 8% of females spend 1-2 hours, 12% of males spend 3-4 hours and 8% of males and 4% of females spend more than 4 hours on smartphones. Chi-square value- 33.830; p =0.003 (<0.05), however, the results were statistically significant.

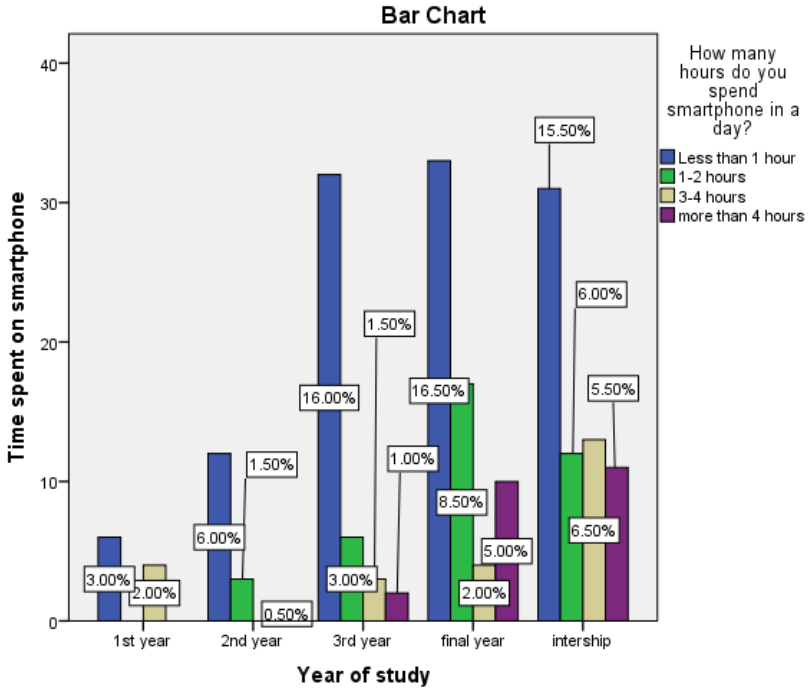

Figure:24: Bar graph represents the association between year of study and amount of time spent on smartphones.

X-axis indicates the year of study and Y-axis is the amount of time spent on smartphones. Dark blue is less than 1 hour, green is 1-2 hours, brown is 3-4 hours, purple is more than 4 hours. 3% of 1st years, 6% of second years, 16% of third years, 16.5% of final years and 15.5% of interns use less than 1 hour. 1.5% of second years, 3% of third years, 8.5% of final years and 6% of interns use for 1-2 hours. 2% of 1st years, 1.5% of third years, 2% of final years and 6.5% of use for 3-4 hours. 0.5% of

second years, 1% of third years, 5% of final years and 5.5% of interns have use smartphones more than 4 hours in a day. Chi-square value- 22.118; p =0.002 (<0.05), however, the results were statistically significant.

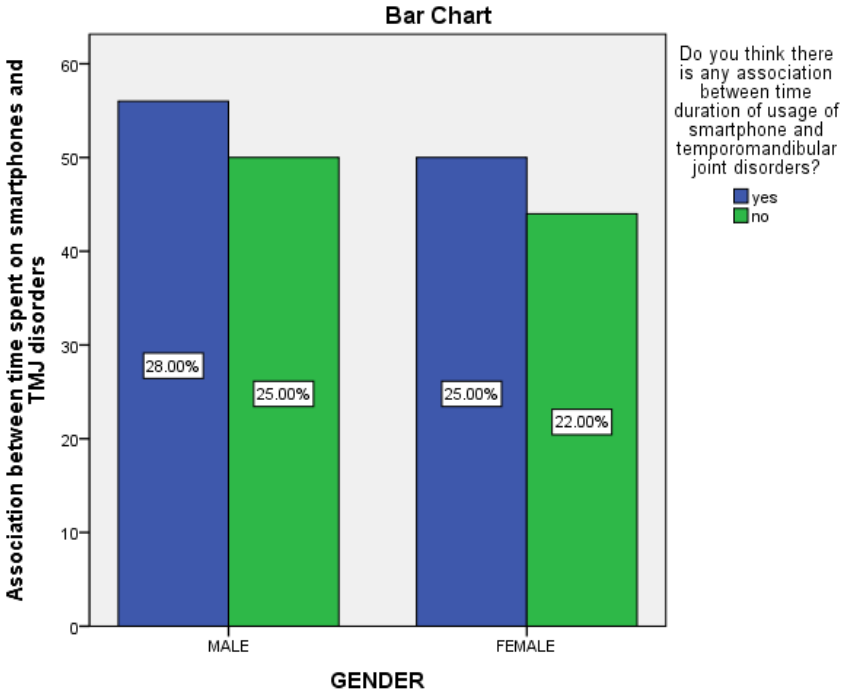

Figure:25: Bar graph represents the association between the time spent on smartphone and TMJ disorders based on gender.

X-axis indicates gender and Y-axis is association between the time spent on smartphone and TMJ disorders. Blue represents 'yes' and green is 'no'. 28% of males and 25% of females have said 'yes' and 25% of males and 22% of females replied 'No'. Chi-square value- 3.746; p =0.036 (<0.05), however, the results were statistically significant.

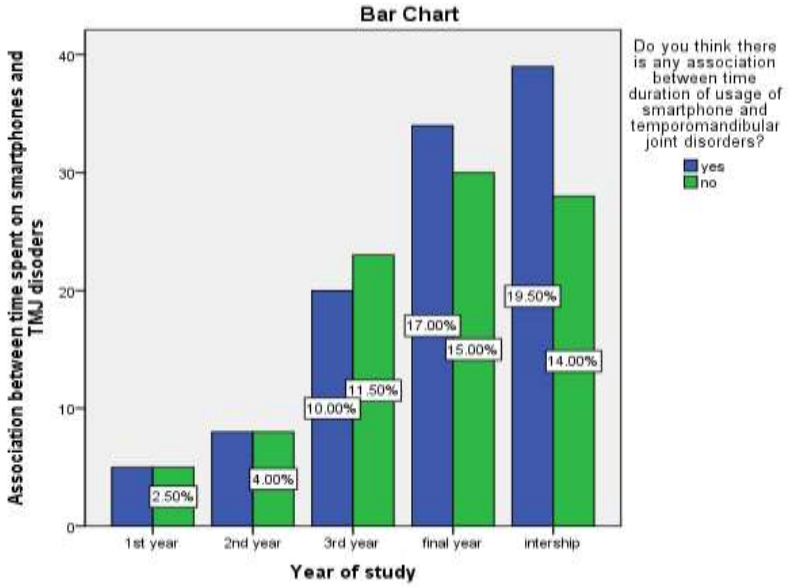

Figure:26: Bar graph represents the association between the time spent on smartphone and TMJ disorders based on year of study.

X-axis indicates gender and Y-axis is association between the time spent on smartphone and TMJ disorders. Blue represents 'yes' and green is 'no'. 2.5% of 1st years, 4% of second years, 10% of third years, 17% of final years and 19.5% of interns have said yes. 2.5% of 1st years, 4% of second years, 11.5% of third years, 15% of final years and 14% of interns have said no there is not association between time spent on smartphones and TMJ disorders. Chi-square value- 16.327; p =0.001 (<0.05), however, the results were statistically significant.

4. Discussion

According to one definition, smartphone addiction is the excessive, unchecked, and harmful usage of a smartphone coupled with neurotic dependence on the device and its associated services, ultimately resulting in a state of being enslaved to it [20, 21]. According to a recent NIA survey, the smartphone has a greater rate of addiction than other digital media devices, making it more addictive than those other mediums. In addition, more than half the population were smartphone addicts, which is a rate twice as high as that of adults. Teenagers with smartphone addiction use for an average of 3 hours [22]. The majority of the research on this relatively new subject has focused on children and adolescents. It concerns how cellphones affect sleep, daytime drowsiness, and other potentially related clinical disorders. Mobile phone use after lights out is a common occurrence, and studies among secondary school students in Belgium have shown that it is linked to higher levels of exhaustion [23]. Teenagers in Japan reported having trouble sleeping when using their mobile phones to make calls and send texts after bedtime. In our study 83% of the participants think daytime sleepiness is only an adverse effect on TMJ disorders. Previous research has shown that daytime clenching commonly happens while paying attention to anything. Furthermore, one of the main causes of TMDs is thought to be habitual clenching. Therefore, overly prolonged contraction of masticatory muscles like the masseter and temporalis may result from smartphone addiction. Also known to cause central sensitization during cervical muscular exhaustion are prolonged and repeated noxious stimuli. Recent research suggests that central [24, 25]sensitization and myogenous TMDs may be intimately connected, maybe through secondary hyperalgesia or transferred pain to the masticatory muscles. Overall, extended smartphone use may cause cervical muscular exhaustion, which may contribute to the onset and progression of myogenous TMDs. According to our study alteration in muscle behavior and neuromuscular proprioception has an effect on smartphone usage. More than 50% of participants were aware [26].

Adult populations' use of smartphones and its harmful repercussions are not well understood. According to research by Appleton et al., 20% of Australian adults wake up from sleep at least twice a week to use an electronic device, and this behavior is linked to bad daily outcomes like impaired driving and poor employment prospects [27–29]. To the best of the authors' knowledge, this study is one of the first to assess the effects of mobile phone use on two common disorders, MD and bruxism, in addition to daytime sleepiness. the capacity to contrast young adults who connect to the internet with young adults who do not (the KP group). In our present study, 9.5% of participants say that bruxism is the main adverse effect of over usage of smartphones. The increasing incidence of car accidents is one example of how daytime sleepiness has negative effects on both the individual and society [30]. The findings that using a cell phone at night increases the risk of daytime sleepiness and that stress brought on by using a phone points to potentially frightening effects of modern technology. Concern over the negative impact of the new technology on public health is warranted in light of the results that use of mobile phones in diverse contexts increases the risk of TMD and bruxism. The harmful effects of MD and bruxism include irreparable damage to hard oral tissue structures and chronic orofacial pain.

The price of orofacial dysfunction treatment, Unfortunately, changing the FOMO sometimes or frequently, and the majority said that it is nearly impossible to change the way that mobile phones are used [31]. According to Wolfers et al., treatments that concentrate on the fact that students experience FOMO particularly later in the treatment of problematic media usage should be modified to a day and later in the week [31, 32]. This finding on the two religious groups who refrain from using their mobile phone or any other appliances on the Sabbath, in addition to the specific target group and differentiated viewpoint that is made clear by our findings, may partially exaggerate the way that digital media is used. According to Bora et al., one of the most typical symptoms is clicking or crepitation in the temporomandibular joint (TMJ), which is followed by headache. In our study 7.5% of the participants had joint discomfort and 5.5% of the participants had joint noise. Setting alarms that limit how frequently you can check your phone is the simplest approach Rosen et al. recommend for weaning yourself off of it. Start with every 15

minutes and work your way up to every 45 minutes, half hour, or hour [33]. After one minute of going through all alerts when your alarm goes off, reset the timer. In our study participants suggested interacting with people will make us come out from over usage of smartphones which was about 35%.

5. Conclusion

The awareness and knowledge about smartphone usage as a risk factor for Temporomandibular disorders were moderate. This cross-sectional study helped in creating knowledge and attitude about TMJ disorders and its interlink with over usage of smartphones in the developing dental practice. Majority of the population thinks males are more commonly affected with TMJ disorders than females i.e 58%. Internship students had more awareness when compared to first, second, third and final years which was 6%.

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