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Prevalence of Temporomandibular Joint Disorders in Orthodontic Patients of Bundelkhand Region, India

Tarulatha R Shyagali[1*], Ruchi Jha[1], Anil Tiwari[1], Abhishek Gupta[2], Deepak Bhayya[2]

[1]Department of Orthodontics and Dentofacial, Hitkarini Dental College and Hospital, Jabalpur, India

[2]Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur, India

**Corresponding e-mail: drtarulatha@gmail.com*

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ABSTRACT

Background: *Temporo Mandibular Joint (TMJ) disorders are most commonly encountered problem in dental clinics. The study aimed to evaluate the prevalence of TMJ disorders in Bundelkand population, India.*

Materials and Methods: *A questionnaire based cross sectional study was done on the sample of 400 Bundelkand populations using the systemic random sampling. Out 400 samples, 320 were females and 80 were males with the mean age of 20.9 ± 2.72 years. TMJ related health status questionnaire consisted of three domains viz; pain, trauma, jaw components, eye-ear and breathing components. Frequency of the response was recorded and was analyzed. Further, the data was subjected to statistical chi square test to evaluate the difference between the male and female participants.*

Result: *Headaches were the most commonly cited reason for the pain (60.3%) followed by the Stiff neck (32.8%). Eighteen percent of the respondents had jaw joint problems. Pain with either jaw was prevalent in 7.8% of the participants. Dizziness was prevalent by 39%. Significant difference was noted between males and females for most of the symptoms of TMJ disorder. 66.2% females had headaches in comparison to males (36.2%). Increased number of (6.2%) males had met with whiplash injury than females (1.9%). A higher prevalence of crackling sound from either jaw was seen in males (7.5%) as compared to females (2.5%).*

Conclusion: *Current group of the population showed the higher prevalence of various symptoms of TMJ disorder. It is recommended that, further follow up of the individuals who had reported positive symptoms should be done through the proper diagnosis and the treatment planning.*

Keywords: Prevalence, Headaches, Temporo Mandibular Joint (TMJ), Temporo Mandibular Joint Disorder (TMD)

INTRODUCTION

Temporo Madibular Joint (TMJ) is one of the most important joint and Temporo Mandibular Disorder (TMD) are most commonly encountered problems in day to day clinical practice. TMD are a collection of pathologic and functional conditions affecting the temporo Mandibular Joint TMJ and the muscles of mastication as well as adjacent tissue components [1].

TMDs involve musculoskeletal pain, disturbances in the mandibular movement patterns, and/or impairment in functional movement. Pain is the main feature of most TMDs and also the main reason for patients to seek treatment. Many TMDs are chronic conditions, as they continue to bother the individuals for many years. Psychological factors are considered to be pivotal in the causation of several TMDs. Stress, somatic distress, and depression is the main psychological factors responsible for the TMD's. There is a correlation between the increase in the pain symptom of TMJ with that of the more obvious and eminent psychological factors. Even after a decrease of the somatosensory input, suffering and pain behavior may continue and even increase [2-5].

Epidemiological studies of TMD so often have not been conducted systematically and have used widely different illness criteria and research designs, making them difficult to compare. There exits an uncertainty regarding the prevalence of Temporo Mandibular disorders in the general population. And the study pertaining to the prevalence of TMDs especially in India are limited. Therefore, the current study was undertaken with the aim to evaluate the prevalence of TMDs in Central Indian population.

MATERIALS AND METHODS

A cross sectional questionnaire based study was conducted on a sample 400 people who visited the OPD of department of orthodontics and dentofacial orthopedics. The Mean age of the study participants was 20.9 ± 2.72 years with the age range of 13 years-40 years. There were 320 (80%) females and 80 (20%) males in the study. A systemic random sampling was executed to select the sample. The ethical clearance for the study was obtained by institutional ethical committee. All the participants were briefed about the purpose of the survey and a signed informed consent was obtained for their willingness contributes towards the survey. The participants who had undergone or undergoing orthodontic treatment, pain related to dental origin, systemic disorders, behavioral or cognitive disorders, syndrome, severe facial/dental anomalies, intraoral prosthetic wearers were excluded from the study [6-10].

A preformed questionnaire prepared both in English and the local language containing the information regarding the personal details of the participant and the TMJ related health status questions was administrated to the participants. They were asked to fill the survey form within the span of 15 minutes with the 0.5 seconds leeway for each question. The questionnaire included the domains like pain, trauma, ear and breathing problems. A pilot study was conducted on 15 participants, for the reliability of the self-administrated questions and Cronbach's alpha value was checked for the same, which was greater than 0.8 indicating the good reliability of the questionnaires. The collected data was tabulated and was subjected to statistical Analysis using SPSS version 22 IBM Chicago. Frequency distribution tables were made for categorical variables and responses of participants for different questions of the TMJ questionnaire. Chi-square test of statistic was used for finding any significant differences between males and females for the responses of the questions. Level of confidence was set as 95% with 5% error. $P<0.05$ was considered as significant [11,12].

RESULTS

Demographic details of the study population are depicted in Table 1. The mean age of the study participants was 20.9 ± 2.72 years. There were 320 (80%) Females and 80 (20%) males in the study (Table 1).

Table 1 Demographic data

Age		
N	Valid	400
	Missing	0
Mean		20.9
Std. deviation		2.728
Minimum		13

Maximum				40
Gender				
Gender	**Frequency**	**Percent**	**Valid percent**	**Cumulative percent**
Female	320	80	80	80
Male	80	20	20	100
Total	400	100	100	

The Frequency distribution of responses of the participants on pain and its symptoms are about 77.5% had no positive pain symptoms associated with TMJ whereas only 22.5% had positive symptoms. Headaches were the most commonly cited reason for the pain (60.3%) followed by the Stiff neck (32.8%) (Table 2).

Table 2 Frequency distribution of responses of the participants on pain and its components

Questions on pain component	**Responses**	
	Yes	**No**
	N (%)	**N (%)**
Do you get headaches	241 (60.3%)	159 (39.7%)
Do you get migraine headaches	66 (16.5%)	334 (83.5%)
Do you frequently have neck aches or stiff neck muscles	131 (32.8%)	269 (67.3%)
Have you ever had chronic shoulder or back pain	114 (28.5%)	286 (71.5%)
Do you have trouble sleeping soundly	49 (12.3%)	351 (87.7%)
Are your jaw tired when you awaken	9 (2.3%)	391 (97.8%)
Are your teeth sore when you awaken	18 (4.5%)	382 (95.5%)
Have your wisdom teeth been extracted	19 (4.8%)	381 (95.2%)
Do you get headaches in the right or left temple area	144 (36%)	256 (64%)

Do you get headaches in the front or back temple of your head	195 (48.8%)	205 (51.2%)
Do you Clench your teeth during the day	59 (14.8%)	341 (85.3%)
Do you grinding Your teeth when asleep	25 (6.3%)	375 (93.8%)

Frequency of prevalence of any trauma component is depicted in Table 3. Data showed that only 3.25% study participants reported of past trauma or accidents which affected TMJ. Prevalence of jaw component problems in the study population is represented in second part. On an average 18% of the respondents reported of any jaw joint problems whereas 82% of participants didn't had any problems. Pain with either jaw was prevalent in 7.8% of the participants. The complaint or problem which was reported by maximum number of participants was Dizziness with 39% of prevalence (Table 3) [13-15].

Table 3 Frequency distribution of responses of the participants on trauma and jaw and its components

Questions on trauma component	**Responses**	
	Yes	**No**
	N (%)	**N (%)**
Have you ever had a severe blow to the head or jaw	22 (5.5%)	378 (94.5%)
Any whiplash neck injury	11 (2.8%)	389 (97.3%)
Have you ever been involved in serious accidents	6 (1.5%)	394 (98.5%)
Questions on JAW component		
Does your jaw feel tired after a big meal	104 (26%)	296 (74%)
Are there any foods you avoid eating	136 (34%)	264 (66%)
Do you ever get dizzy	156 (39%)	244 (61%)
Do you ever feel faint	135 (33.8%)	265 (66.2%)
Do you ever feel nauseated	94 (23.5%)	306 (76.5%)
Is there a family history of jaw joint problems or headache	50 (12.5%)	350 (87.5%)

Do you feel a clicking popping	48 (12%)	352 (88%)
Cracking noise from either jaw joint	14 (3.5%)	386 (96.5%)
Has your jaw ever locked when you were unable to open or close	22 (5.5%)	378 (94.5%)
Do you have difficulty opening wide or yawing	31 (7.8%)	369 (92.2%)
Have you ever had pain with either jaw joint	48 (12%)	352 (88%)
Does your jaw ache when you open wide	29 (7.3%)	371 (92.7%)

With respect to eye and ear symptoms more than 2/3rd (78.25%) of the participants had no symptoms. Eye symptoms were more frequent in the study participants than ear symptoms. Second part of Table 4 shows the response for the questions related to breathing. When asked about the presence or absence of allergies 23% of the participants positively responded. About 5.3% of participants said that they were diagnosed with Sleep Apnea. This was the least frequent complaint associated with breathing that was told by the study participants (Table 4) [16].

Table 4 Frequency distribution of responses of the participants on ear and breathing and its components

Questions on ear and eye component	**Responses**	
	Yes	**No**
	N (%)	**N (%)**
Do you have pain in either ear?	43 (10.8%)	357 (89.2%)
Do you suffer from any loss of hearing?	28 (7%)	372 (93%)
Do you have itchiness or stuffiness in either ear?	70 (17.5%)	330 (82.5%)
Do you hear ringing, buzzing or hissing sounds in either?	74 (18.5%)	326 (81.5%)
Do you wear glasses or contacts?	165 (41.3%)	235 (58.7%)
Are there times when your eyesight blurs?	141 (35.3%)	259 (64.7%)

Do you get pain in, around or behind either eye?	111 (27.8%)	289 (72.2%)
Is your nose stuffed when you don't have cold?	61 (15.3%)	339 (84.7%)
Questions on breathing component	**Yes**	**No**
	N (%)	**N (%)**
Do you have allergies?	92 (23%)	308 (77%)
Do you have sinus problems?	46 (11.5%)	354 (88.5%)
Have you been diagnosed with sleep apnea?	21 (5.3%)	379 (94.7%)
Have you had a sleep study done at a Sleep clinic (hospital)?	8 (2%)	392 (98%)
Do you snore at night?	22 (5.5%)	378 (94.5%)

The comparison of the pain related questionnaire response between the male and females are described in below Table 5. Significantly increased number of females (66.2%) had reported headaches than males (36.2%). The difference noted was highly significant ($p<0.05$) even for the other head related pains (Table 5) [17].

Table 5 Comparison of distribution of responses regarding Pain related questionnaire in males and females

Questions	**Responses**	**Females**	**Males**	**X^2/P Val**
		(N=320)	**(N=80)**	
Do you get headaches?	No	108 (33.8%)	51 (63.8%)	X^2=24
	Yes	212 (66.2%)	29 (36.2%)	P=0.001
Do you get migraine headaches?	No	260 (81.2%)	74 (92.5%)	X^2=5.87
	Yes	60 (18.8%)	6 (7.5%)	P=0.017

Do you frequently have neck aches or stiff neck muscles?	No	214 (66.9%)	55 (68.8%)	X^2=0.102
	Yes	106 (33.1%)	25 (31.3%)	P=0.79
Have you ever had chronic shoulder or back pain?	No	222 (69.4%)	64 (80%)	X^2=3.54
	Yes	98 (30.6%)	16 (20%)	P=0.07
Do you have trouble sleeping soundly?	No	275 (85.9%)	76 (95%)	X^2=4.89
	Yes	45 (14.1%)	4 (5%)	P=0.034
Are your jaw tired when you awaken?	No	311 (97.2%)	80 (100%)	X^2=2.3
	Yes	9 (2.8%)	0	P=0.214
Are your teeth sore when you awaken?	No	306 (95.6%)	76 (95%)	X^2=4.89
	Yes	14 (4.4%)	4 (5%)	P=0.058
Have your wisdom teeth been extracted?	No	305 (95.3%)	76 (95%)	X^2=0.014
	Yes	15 (4.7%)	4 (5%)	P=1
Do you get headaches in the right or left temple area QE Do you have trouble sleeping soundly?	No	185 (57.8%)	71 (88.8%)	X^2=26.58
	Yes	135 (42.2%)	9 (11.3%)	P=0.001
Do you get headaches in the front or back temple of your head?	No	154 (48.1%)	51 (63.8%)	X^2= 6.25
	Yes	166 (51.9%)	29 (36.3%)	P=0.013
Do you Clench your teeth during the day?	No	278 (86.9%)	63 (78.8%)	X^2= 3.36
	Yes	42 (13.1%)	17 (21.2%)	P=0.078
Do you grind Your teeth when asleep?	No	297 (92.8%)	78 (97.5%)	X^2= 2.4
	Yes	23 (7.2%)	2 (2.5%)	P=0.19
Do you get migraine headaches	No	292 (91.3%)	74 (92.5%)	X^2= 0.12
	Yes	28 (8.2%)	6 (7.5%)	P=0.82

The trauma and jaw related questionnaire comparison for male and female. When asked for any whiplash neck injuries comparatively increased number of (6.2%) males had responded positively than females (1.9%) this difference was statistically significant ($p<0.05$). A higher prevalence of crackling sound from either jaw was seen in males (7.5%) as compared to females (2.5%). And the difference noted was statistically significant (Table 6) [18].

Table 6 Comparison of distribution of responses regarding trauma and jaw related questionnaire in males and females

Questions	Responses	Females (N=320)	Males (N=80)	X^2/P Val
Have you ever had a severe blow to the head or jaw?	No	306 (95.6%)	72 (90%)	X^2=3.89
	Yes	14 (4.4%)	8 (10%)	P=0.057
Any whiplash neck injury?	No	314 (98.1%)	75 (93.8%)	X^2=4.58
	Yes	6 (1.9%)	5 (6.2%)	P=0.048
Have you ever been involved in serious accidents?	No	316 (98.8%)	78 (97.5%)	X^2=0.67
	Yes	4 (1.2%)	2 (2.5%)	P=0.34
Jaw related questions	**Responses**	**Females (N=320)**	**Males (N=80)**	**X^2/P Val**
Does your jaw feel tired after a big meal?	No	236 (73.8%)	60 (75%)	X^2=0.05
	Yes	84 (26.2%)	20 (25%)	P=0.88
Are there any foods you avoid eating?	No	206 (64.4%)	58 (72.5%)	X^2=1.88
	Yes	114 (35.6%)	22 (27.5%)	P=0.188
Do you ever get dizzy?	No	191 (59.7%)	53 (66.3%)	X^2=5
	Yes	129 (40.3%)	27 (33.8%)	P=0.08
Do you ever feel faint?	No	208 (65%)	57 (71.2%)	X^2=1.11
	Yes	112 (35%)	23 (28.8%)	P=0.35
Do you ever feel nauseated?	No	240 (75%)	66 (82.5%)	X^2=2
	Yes	80 (25%)	14 (17.5%)	P=0.18
Is there a family history of jaw joint problems or headache?	No	278 (86.9%)	72 (90%)	X^2=0.57
	Yes	42 (13.1%)	8 (10%)	P=0.57
Do you feel a clicking popping?	No	280 (87.5%)	72 (90%)	X^2=0.379
	Yes	40 (12.5%)	8 (10%)	P=0.7
Cracking noise from either jaw joint	No	312 (97.5%)	74 (92.5%)	X^2=4.73
	Yes	8 (2.5%)	6 (7.5%)	P=0.041
Has your jaw ever locked when you were unable to open or close?	No	302 (94.4%)	76 (95%)	X^2=0.04
	Yes	18 (5.6%)	4 (5%)	P=1

Do you have difficulty opening wide or yawing?	No	296 (92.5%)	73 (91.2%)	X^2=0.14
	Yes	24 (7.5%)	7 (8.8%)	P=0.64
Have you ever had pain with either jaw joint?	No	280 (87.5%)	72 (90%)	X^2= 0.37
	Yes	40 (12.5%)	8 (10%)	P=0.7
Does your jaw ache when you open wide?	No	298 (93.1%)	73 (91.3%)	X^2=0.335
	Yes	22 (6.9%)	7 (8.7%)	P=0.62

The prevalence of hear and eye related problems were more in females in comparisons to males and again the difference noted was statistically significant ($p<0.05$). Statistically significant ($p<0.05$) number of males (20%) had sinus problems in comparison to females (9.4%) (Table 7) [19].

Table 7 Comparison of distribution of responses regarding eye, ear and breathing related questionnaire in males and females

Questions	Responses	Females (N=320)	Males (N=80)	X^2/P Val
Do you have pain in either ear?	No	281 (87.8%)	76 (95%)	X^2=3.44
	Yes	39 (12.2%)	4 (5%)	P=0.07
Do you suffer from any loss of hearing?	No	298 (93.1%)	74 (92.5%)	X^2=0.038
	Yes	22 (6.9%)	6 (7.5%)	P=0.8
Do you have itchiness or stuffiness in either ear?	No	263 (82.2%)	67 (83.3%)	X^2=0.1
	Yes	57 (17.8%)	13 (16.2%)	P=0.87
Do you hear ringing, buzzing or hissing sounds in either?	No	254 (79.4%)	72 (90%)	X^2=4.79
	Yes	66 (20.6%)	8 (10%)	P=0.03*
Do you wear glasses or contacts?	No	178 (55.6%)	57 (71.2%)	X^2=6.44
	Yes	142 (44.4%)	23 (28.8%)	P=0.011*
Are there times when your eyesight blurs?	No	205 (64.1%)	54 (67.5%)	X^2=0.331
	Yes	115 (35.9%)	26 (32.5%)	P=0.6
Do you get pain in, around or behind either eye?	No	224 (70%)	65 (81.2%)	X^2=4.04

	Yes	96 (30%)	15 (18.8%)	P=0.05
Is your nose stuffed when you don't have cold?	No	271 (84.7%)	68 (85%)	X^2=0.257
	Yes	49 (15.3%)	12 (15%)	P=0.87
Questions reacted to breathing	**Responses**	**Females (N=320)**	**Males (N=80)**	**X^2/P Val**
Do you have allergies?	No	240 (75%)	68 (85%)	X^2=3.61
	Yes	80 (25%)	12 (15%)	P=0.07
Do you have sinus problems?	No	290 (90.6%)	64 (80%)	X^2=7.09
	Yes	30 (9.4%)	16 (20%)	P=0.011
Have you been diagnosed with Sleep Apnea?	No	303 (94.7%)	76 (95%)	X^2=0.013
	Yes	17 (5.3%)	4 (5%)	P=1
Have you had a sleep study done at a Sleep Clinic (hospital)?	No	316(98.8%)	76 (95%)	X^2=4.59
	Yes	4 (1.2%)	4 (5%)	P=0.054
Do you snore at night?	No	302 (94.4%)	76 (95%)	X^2=0.048
	Yes	18 (5.6%)	4 (5%)	P=1

DISCUSSION

Temporomandibular disorders are the set of disorder which may include ranging symptoms involving muscles of mastication, fatigue of muscles, the impaired joint movements and the joint sounds. What makes it more complicated is its multifactorial origin. Most common etiological factors cited so far range from occlusal interferences, psychosomatic factors, simple tooth loss, masticatory muscle dysfunctions, internal and external disarrangement of the joint. Joint disorder can occur due to one of this individual factor or due to the various combination of the above said factors. Consecutively, TMJ disorder can be secondary symptoms of problems involving the other anatomic parts like Ear, nose and throat. Thus, it is important to analyze the TMJ disorders in a whole in terms prevalence of various symptoms [20-24]. In most of the earlier studies, pain was the most common symptom of TMJ disorder. Similar results are seen in the current study, where headaches were the most commonly cited reason for the pain (60.3%) followed by the Stiff neck (32.8%). In a study done on the Brazilian adolescent, it was reported that, the most frequently reported symptoms of TMJ disorders were headache and neck ache (20.9%). There is a positive association between TMJ disorder and headache and it is reported that around 48% and 77% of TMJ disorder individuals had headaches, whereas, in general population 45% of people have headache [25-28]. There is known association between Trauma to the head, neck or jaw and TMJ disorders. The results of the current study also showed the similar trend. Around 3.25% study participants reported of past trauma or accidents which affected TMJ. Contrastingly, higher prevalence of injury to head, neck or jaw was reported in earlier study on the Brazilian adolescent population by 6.1%. Similar results are also reported in the earlier studies of similar nature.

Around 18% of the respondents had jaw joint problems along with the pain in 7.8% of the participants. Dizziness was prevalent in 39% of population. These findings are in accordance to the earlier studies done on UAE population, Brazilian population, and in the population of Faridabad in India [29-31]. The results of the current study, eye symptoms were more frequently spotted in the participants than ear symptoms. Nevertheless, the ear symptoms were more predominately seen in the university students of Jordanian origin. Whereas, the association between the xerophthalmia, dizziness, rhinitis and the TMJ disorder has been emphasized in the previous study done in the Korean adult population. Concurrent results are reported in the current study as well with 23% of study participants reporting allergies and 11.5% of them showed sinus problems. The gender wise prevalence of TMJ disorder showed that, females were more prone to TMJ problems in comparison to the males. Similar results are cited throughout the TMJ related literature. In a study done on Indian origin undergraduate students, females double the prevalence of TMJ disorder in comparison to the males. Similar trend is also noticed in the earlier studies conducted in the population of Norway. However, there was no gender wise difference for the TMJ disorder severity in Brazilian population [32-35].

The reason behind this increase in the prevalence of TMJ disorder in females can be linked to the uniqueness in their physiological and anatomical structure in comparison to the male counterparts. Present study was based on the self-evaluation of the individuals using the questionnaires, but it would be beneficial if the findings of the current study are evaluated clinical by an experienced physician. The study was done exclusively on Bundelkand population of India, further it can be done on the other ethnic groups of India to have concreate knowledge about the prevalence of TMJ disorder signs and symptoms [36].

CONCLUSIONS

The results of the study can be concluded as follows,

- Headaches were the most commonly cited reason for the pain (60.3%) followed by the Stiff neck (32.8%).
- 3.25% study participants reported of past trauma or accidents which affected TMJ.
- 18% of the respondents had jaw joint problems
- Pain with either jaw was prevalent in 7.8% of the participants.
- Dizziness was prevalent by 39%.
- Eye symptoms were more frequent in the study participants than ear symptoms.
- 23% of the participants had allergic problems.
- Significant difference was noted between males and females for most of the symptoms of TMJ disorder.
- Significantly increased number of females (66.2%) had reported headaches than males (36.2%).
- Increased number of (6.2%) males had met with whiplash injury than females (1.9%).
- A higher prevalence of crackling sound from either jaw was seen in males (7.5%) as compared to females (2.5%).

It can be suggested that the current group of population needs attention in terms of further diagnosis and the treatment plan to cure the existing TMJ disorder symptoms.

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