

Prevalence of Temporomandibular joint disorders in orthodontic patients of Mahakoshal Region, India

¹Dr. Tarulatha R Shyagali, Professor and Head, Department of Orthodontics and Dentofacial, Hitkarini Dental College and Hospital, Jabalpur

²Dr. Ruchi Jha, Post graduate Student, Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur

³Dr. Shanya Kapoor, Post graduate Student, Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur

⁴Dr. Payal Goyal, Post graduate Student, Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur

⁵Dr. Rahul Patidar, Post graduate Student, Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur

⁶Dr. Ayesha Ratore, Post graduate Student, Department of Orthodontics and Dentofacial Orthopedics, Hitkarini Dental College and Hospital, Jabalpur

Corresponding Author: Dr. Tarulatha R Shyagali, Professor and Head, Department of Orthodontics and Dentofacial, Hitkarini Dental College and Hospital, Jabalpur

Citation of this Article: Dr. Tarulatha R Shyagali, Dr. Ruchi Jha, Dr. Shanya Kapoor, Dr. Payal Goyal, Dr. Rahul Patidar, Dr. Ayesha Ratore, “Prevalence of Temporomandibular joint disorders in orthodontic patients of Mahakoshal Region, India”, IJDSIR- January - 2021, Vol. – 4, Issue - 1, P. No. 17 – 27.

Copyright: © 2021, Dr. Tarulatha R Shyagali, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Objectives: Temporomandibular Joint (TMJ) disorders are most commonly encountered problem in dental clinics. The study aimed to evaluate the prevalence of TMJ disorders in Mahakoshal population, India.

Methods: A questionnaire based cross sectional study was done on the sample of 400 Mahakoshal population 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.

Results: 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%).

Conclusions: Current population group showed higher prevalence TMJ disorder symptoms. 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, Temporomandibular joint, Temporomandibular joint disorder

Introduction

Temporomandibular joint (TMJ) is one of the most important joint and Temporomandibular Disorder (TMD) are most commonly encountered problems in day to day clinical practice.¹ TMD are a collection of pathologic and functional conditions affecting the temporomandibular TMJ and the muscles of mastication as well as adjacent tissue components.²

TMDs involve musculoskeletal pain, disturbances in the mandibular movement patterns, and/or impairment in functional movement.³ 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 are 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.⁴⁻⁶

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.⁷

There exists an uncertainty regarding the prevalence of temporomandibular disorders in the general population. And the study pertaining to the prevalence of TMDs specially in India are limited. Therefore, the current study was undertaken with the aim to evaluate the prevalence of TMDs in Central Indian population.

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. Mahakoshal (also Mahakaushal) is a region of central India. Mahakoshal lies in the upper or eastern reaches of the Narmada River valley in the Indian state of Madhya Pradesh. Most of the population belonging to this region is of tribal in nature.⁸ The Mean age of the study participants was 20.9 ± 2.72 years with the age range of 13-40 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.

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. ⁹ 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.

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 2 shows the Frequency distribution of responses of the participants on pain and its symptoms. 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%).

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 of table

3. 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.

Response to questions related to ear and eye symptoms are shown in table 4. With respect to eye & ear symptoms more than $2/3^{\text{rd}}$ (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.

The comparison of the pain related questionnaire response between the male and females is depicted 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.

The trauma and jaw related questionnaire comparison for male and female is represented in Table 6. 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. ($p < 0.05$).

The prevalence of ear and eye related problems (Table 7) 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%).

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.¹⁰ 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 these individual factor or due to the various combination of the above said factors.¹¹ Consecutively, TMJ disorder can be secondary symptoms of problems involving the other anatomic parts like Ear, nose and throat.¹² Thus, it is important to analyze the TMJ disorders in a whole in terms prevalence of various symptoms.

In most of the earlier studies, pain was the most common symptom of TMJ disorder.^{13, 14} 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 by Bertoli et al., on the Brazilian adolescent, it was reported that, the most frequently reported symptoms of TMJ disorders were headache and neck ache (20.9%).¹³ There is a positive association between TMJ disorder and headache.¹⁵ There is known association between Trauma to the head, neck or jaw and TMJ disorders.¹⁶ 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. Similar results are also reported in the earlier studies of similar nature.^{17, 18, 19, 20}

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.^{13, 14, 21,}

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.¹⁷ 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.²² Concurrent results are reported in the current study 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.^{13, 14, 17-25} In a study done on Indian origin undergraduate students, females double the prevalence of TMJ disorder in comparison to the males.¹⁰ Similar trend is also noticed in the earlier studies conducted in the population of Norway.²³ 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.^{24, 25}

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 Mahakoshal population of India, further it can be done on the other ethnic groups of India to have concrete knowledge about the prevalence of TMJ disorder signs and symptoms.

Conclusion

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%).
- About 3.25% study participants reported of past trauma or accidents which affected TMJ.
- Jaw joint problems were seen in 18% of the respondents.
- 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.
- Allergic problems were seen in 23% of the participants.
- 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.

Reference

1. Sari S, Sonmez H. Investigation of the relationship between oral parafunctions and temporomandibular joint dysfunction in Turkish children with mixed and permanent dentition. *J Oral Rehabil* 2002;29(1):108–112.
2. Kim MR, Graber TM, Viana MA. Orthodontics and temporomandibular disorder: A meta-analysis. *Am J Orthod Dentofacial Orthop* 2002; 121:438–446.
3. Sassi FC, Silva AP da, Santos RKS, Andrade CRF de. Oral motor rehabilitation for temporomandibular joint disorders: a systematic review. *Audiol Commun Res* 2018;23: e1871.
4. Dworkin RH, Breitbart WS. Psychosocial aspects of pain: a handbook for health care providers. Seattle: IASP Press; 2004.
5. Fillingim RB, Ohrbach R, Greenspan JD, et al. Psychological factors associated with development of TMD: the OPPERA prospective cohort study. *J Pain* 2013;14(12): T75–T90.
6. Tjakkes GH1, Reinders JJ, Tenverget EM, Stegenga B. TMD pain: the effect on health related quality of life and the influence of pain duration. *Health and Quality of Life Outcomes* 2010; 8: 46.
7. Schiffman EL, Friction IR, Haley DP, Shapiro BL. The prevalence and treatment needs of subjects with temporomandibular disorders. *JADA* 1990;120: 295–303.
8. Jha M. Anthropology of Ancient Hindu Kingdoms: A Study in Civilizational Perspective. M.D. Publications, Jan 1, 1997 - Religion - 206 pages.
9. Rondeau B. Establish Healthy TMJ Prior to Oral Appliance Therapy. *Sleep Review* 2015.
10. Karthik R, Hafila MIF, Saravanan C, Vivek N, Priyadarsini P, Ashwath B. Assessing Prevalence of Temporomandibular Disorders among University Students: A Questionnaire Study. *J Int Soc Prev Community Dent* 2017;7(1): S24–S29.
11. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: Review, criteria, examinations and specifications, critique. *J Craniomandib Disord* 1992; 6:301–355.

12. Amarante E de L, Lima JAS de, Bandeira RN, Moura APA de, Pessoa LS de F, Pernambuco L de A et al. Masseter muscle surface electromyography in college students with a high degree of anxiety and temporomandibular disorder. *Rev CEFAC* 2018;20(1):44-52.
13. Bertoli FMP, Bruzamolín CD, Pizzatto E, Losso EM, Brancher JA, de Souza JF. Prevalence of diagnosed temporomandibular disorders: A cross-sectional study in Brazilian adolescents. *PLoS One* 2018;13(2): e0192254.
14. Rani S, Pawah S, Gola S, Bakshi M. Analysis of Helkimo index for temporomandibular disorder diagnosis in the dental students of Faridabad city: A cross-sectional study. *J Indian Prosthodont Soc* 2017;17(1):48–52.
15. D'Urso A, Serritella E, Meshkova TD, Falisi G, Di Paolo C. Headache and temporo mandibular disorders: epidemiological assessment. *Minerva Stomatologica* 2016;65(2):85–96.
16. De Boever JA, Keersmaekers K. Trauma in patients with temporomandibular disorders: frequency and treatment outcome. *J Oral Rehabil* 1996 Feb;23(2):91-96.
17. Ryalat S, Baqain ZH, Amin WM, Sawair F, Samara O, Badran DH. Prevalence of temporomandibular joint disorders among students of the university of Jordan. *J Clin Med Res* 2009;1(3):158–164.
18. Kronn E. The incidence of TMJ dysfunction in patients who have suffered a cervical whiplash injury following a traffic accident. *J Orofac Pain* 1993;7(2):209–213.
19. Choi YS, Choung PH, Moon HS, Kim SG. Temporomandibular disorders in 19-year-old Korean men. *J Oral Maxillofac Surg* 2002;60(7):797–803.
20. Klobas L, Tegelberg A, Axelsson S. Symptoms and signs of temporomandibular disorders in individuals with chronic whiplash-associated disorders. *Swed Dent J* 2004;28(1):29–36.
21. AlShaban KK, Gul Abdul Waheed Z. Prevalence of TMJ Disorders among the Patients Attending the Dental Clinic of Ajman University of Science and Technology-Fujairah Campus, UAE. *Int J Dent* 2018; 2018:9861623.
22. Song HS, Shin JS, Lee J, Lee YJ, Kim MR, Cho JH et al. Association between temporomandibular disorders, chronic diseases, and ophthalmologic and otolaryngologic disorders in Korean adults: A cross-sectional study. *PLoS One* 2018; 31: e0191336.
23. Graue AM, Jokstad A, Assmus J, Skeie MS. Prevalence among adolescents in Bergen, Western Norway, of temporomandibular disorders according to the DC/TMD criteria and examination protocol. *Acta Odontol Scand* 2016; 74:449–455.
24. Pedroni CR, De Oliveira AS, Guaratini MI. Prevalence study of signs and symptoms of temporomandibular disorders in university students. *J Oral Rehabil* 2003; 30:283–289.
25. Celic R, Jerolimov V, Knezovic Zlataric D. Relationship of slightly limited mandibular movements to temporomandibular disorders. *Braz Dent J* 2004; 15:151–154.
26. Magnusson T, Egermark I, Carlsson GE. A longitudinal epidemiologic study of signs and symptoms of temporomandibular disorders from 15 to 35 years of age. *J Orofac Pain* 2000; 14:310–319.

Legend Tables

Table 1: Demographic Data

AGE				
N	Valid		400	
	Missing		0	
Mean			20.90	
Std. Deviation			2.728	
Minimum			13	
Maximum			40	
GENDER				
Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Female	320	80.0	80.0	80.0
Male	80	20.0	20.0	100.0
Total	400	100.0	100.0	

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

Questions on Pain Component	Responses	
	Yes N (%)	No N (%)
QA. Do you get headaches	241(60.3%)	159(39.7%)
QB. Do you get migraine headaches	66(16.5%)	334(83.5%)
QC. Do you frequently have neck aches or stiff neck muscles	131(32.8%)	269(67.3%)
QD. Have you ever had chronic shoulder or back pain	114(28.5%)	286(71.5%)
QE. Do you have trouble sleeping soundly	49(12.3%)	351(87.7%)
QF. Are your jaw tired when you awoken	9(2.3%)	391(97.8%)
QG. Are your teeth sore when you awoken	18(4.5%)	382(95.5%)
QH. Have your wisdom teeth been extracted	19(4.8%)	381(95.2%)
QJ. Do you get headaches in the right or left temple area	144(36%)	256(64%)
QK. Do you get headaches in the front or back temple of your head	195(48.8%)	205(51.2%)
QL. Do you Clench your teeth during the day	59(14.8%)	341(85.3%)
QM. Do you grinding Your teeth when asleep	25(6.3%)	375(93.8%)

Table 3: Frequency distribution of responses of the participants on TRAUMA & JAW and its components

Questions on Trauma Component	Responses	
	Yes N (%)	No N (%)
QA. Have you ever had a severe blow to the head or jaw	22(5.5%)	378(94.5%)
QB. Any whiplash neck injury	11(2.8%)	389(97.3%)
QC. Have you ever been involved in serious accidents	6(1.5%)	394(98.5%)
Questions on JAW Component		
QA. Does your jaw feel tired after a big meal	104(26%)	296(74%)

QB. Are there any foods you avoid eating	136(34%)	264(66%)
QC. Do you ever get dizzy	156(39%)	244(61%)
QD. Do you ever feel faint	135(33.8%)	265(66.2%)
QE. Do you ever feel nauseated	94(23.5%)	306(76.5%)
QF. Is there a family history of jaw joint problems or headache	50(12.5%)	350(87.5%)
QG. Do you feel a clicking popping	48(12%)	352(88%)
QH. cracking noise from either jaw joint	14(3.5%)	386(96.5%)
QI. Has your jaw ever locked when you were unable to open or close	22(5.5%)	378(94.5%)
QJ. Do you have difficulty opening wide or yawing	31(7.8%)	369(92.2%)
QK. Have you ever had pain with either jaw joint	48(12%)	352(88%)
QL. Does your jaw ache when you open wide	29(7.3%)	371(92.7%)

Table 4: Frequency distribution of responses of the participants on EAR & BREATHING and its components

Questions on EAR & EYE Component	Responses	
	Yes N (%)	No N (%)
QA. Do you have pain in either ear?	43(10.8%)	357(89.2%)
QB. Do you suffer from any loss of hearing?	28(7%)	372(93%)
QC. Do you have itchiness or stuffiness in either ear?	70(17.5%)	330(82.5%)
QD. Do you hear ringing, buzzing or hissing sounds in either?	74(18.5%)	326(81.5%)
QE. Do you wear glasses or contacts?	165(41.3%)	235(58.7%)
QF. Are there times when your eyesight blurs?	141(35.3%)	259(64.7%)
QG. Do you get pain in, around or behind either eye?	111(27.8%)	289(72.2%)
QH. Is your nose stuffed when you don't have cold?	61(15.3%)	339(84.7%)
Questions on BREATHING Component		
	Yes N (%)	No N (%)
QA. Do you have allergies?	92(23%)	308(77%)
QB. Do you have sinus problems?	46(11.5%)	354(88.5%)
QC. Have you been diagnosed with Sleep Apnea?	21(5.3%)	379(94.7%)
QD. Have you had a sleep study done at a Sleep Clinic (hospital)?	8(2%)	392(98%)
QE. Do you snore at night?	22(5.5%)	378(94.5%)

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

Questions	Responses	Females (N=320)	Males (N=80)	X ² /P Val
QA. Do you get headaches?	NO	108(33.8%)	51(63.8%)	X ² =24
	YES	212(66.2%)	29(36.2%)	P=0.001*
QB. 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*
QC. Do you frequently have neck aches or stiff neck	NO	214(66.9%)	55(68.8%)	X ² =0.102

muscles?	YES	106(33.1%)	25(31.3%)	P=0.79
QD. 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
QE. 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*
QF. Are your jaw tired when you awoken?	NO	311(97.2%)	80(100%)	X ² =2.3
	YES	9(2.8%)	0	P=0.214
QG. Are your teeth sore when you awoken?	NO	306(95.6%)	76(95%)	X ² =4.89
	YES	14(4.4%)	4(5%)	P=0.058
QH. Have your wisdom teeth been extracted?	NO	305(95.3%)	76(95%)	X ² =0.014
	YES	15(4.7%)	4(5%)	P= 1
QI. Do you get headaches in the right or left temple area	NO	185(57.8%)	71(88.8%)	X ² =26.58
	YES	135(42.2%)	9(11.3%)	P=0.001*
QE Do you have trouble sleeping soundly?	NO	154(48.1%)	51(63.8%)	X ² = 6.25
	YES	166(51.9%)	29(36.3%)	P=0.013*
QJ. Do you get headaches in the front or back temple of your head?	NO	278(86.9%)	63(78.8%)	X ² = 3.36
	YES	42(13.1%)	17(21.2%)	P=0.078
QK. Do you Clench your teeth during the day?	NO	297(92.8%)	78(97.5%)	X ² = 2.4
	YES	23(7.2%)	2(2.5%)	P=0.19
QL. Do you grind Your teeth when asleep?	NO	292(91.3%)	74(92.5%)	X ² = 0.12
	YES	28(8.2%)	6(7.5%)	P=0.82

*P<0.05- statistically significant

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
QA. 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
QB. 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*
QC. 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
QA. 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
QB. 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
QC. 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
QD. Do you ever feel faint?	NO	208(65%)	57(71.2%)	$X^2=1.11$
	YES	112(35%)	23(28.8%)	P=0.35
QE. Do you ever feel nauseated?	NO	240(75%)	66(82.5%)	$X^2=2$
	YES	80(25%)	14(17.5%)	P=0.18
QF. 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
QG. 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
QH. 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*
QI. 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
QJ. 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
QK. 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
QL. 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

*P<0.05- statistically significant

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)	$X^2 / P Val$
QA. 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
QB. 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
QC. 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
QD. 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*
QE. 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*

QF. 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
QG. 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
QH. 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)	$X^2 / P Val$
QA. Do you have allergies?	No	240(75%)	68(85%)	$X^2=3.61$
	Yes	80(25%)	12(15%)	P=0.07
QB. Do you have sinus problems?	No	290(90.6%)	64(80%)	$X^2=7.09$
	Yes	30(9.4%)	16(20%)	P=0.011*
QC. 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
QD. 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
QE. Do you snore at night?	No	302(94.4%)	76(95%)	$X^2=0.048$
	Yes	18(5.6%)	4(5%)	P=1

*P<0.05- statistically significant