

ASSOCIATION OF TEMPOROMANDIBULAR JOINT SOUNDS WITH MALOCCLUSION

¹SHAKEEL QUTUB KHAN

²DURRESHAWAR AGHA

³BABUR ASHRAF

⁴NABEEL QUTUB KHAN

ABSTRACT

Temporomandibular joint disorder is a multi-factorial condition affecting the joint or muscles of the jaw. A descriptive cross-sectional study was conducted to determine association of temporomandibular joint (TMJ) sounds with various categories of malocclusions. 384 subjects, who fulfilled the inclusion criteria of the study, were clinically examined for the presence or absence of temporomandibular joint sounds & type of malocclusion. A Chi-Square test ($p < 0.05$) was used to find any significant association of TMJ sounds with different categories of malocclusion. Joint sounds were found to be present in 100 (26%) subjects. Joint sound were present in 55 (22.6%) subjects with Class I malocclusion, 36 (32%) subjects with Class II malocclusion and only 9 (31%) subjects with Class III malocclusion. Chi-Square test revealed no significant association of TMJ sounds with malocclusion or gender. TMJ sounds can be a frequent finding in healthy individuals with no other symptoms of TMD. In the light of results of current study and other recent studies that have been carried out around the globe, it can be concluded that clicking itself is not indication of any active disease & it can rarely progress to any significant clinical problem, so there needless management must be avoided.

Key Words: Temporomandibular joint, Temporomandibular Disorders, Malocclusion, Clicking.

INTRODUCTION

Temporomandibular joint (TMJ) are usually soundless in majority of individuals but various structural and functional abnormalities like subluxation, disc displacement and osteoarthritic changes can lead to an increase in the friction between joint elements leading to generation of sounds.¹ Clicking sound during opening and closing of jaw is characteristic clinical sign of disc displacement with reduction.² Disc displacement can be defined as abnormal position of articular disc against condyle and articular eminence of TMJ. These clicking sounds can be heard in those individuals who may or may not present with tem-

poromandibular disorders (TMD).¹ TMD is a group of conditions affecting TMJ or muscle of the jaw and is linked to preauricular pain, articular sounds and limited mouth opening.³⁻⁵ Previously various terms like myofascial pain dysfunction syndrome or muscle hyperactivity disorder have been used to describe pain and discomfort associated with TMJ.⁶ TMD is found to be the least pejorative term which is currently used to label these above mentioned symptoms.⁶⁻⁹ Etiology of TMD is multifactorial and is usually related to trauma, stress, parafunctional habits, occlusal changes or masticatory disturbances with age.^{10,11} It has also been reported that mostly patients suffering from internal joint pathology, muscle spasms or psychogenic problems suffers from TMD as well.¹²

In some studies it has been stated that clicking sound from TMJ is the first and the foremost symptom of TMD, while other studies suggested that these joint sounds are harmless unless they are accompanied by another sign or symptom.¹³⁻¹⁵ In various studies it has been reported that 75% of the population shows at least one sign and 33% shows at least one symptom of TMD at some point of time in their lives.^{16,17} TMD is considered to affect females twice more frequently than males.¹⁸ It is generally believed that this condition is mostly seen in adult patients, however number of studies

¹ Shakeel Qutub Khan, Senior Registrar, Department of Orthodontics, Fatima Jinnah Dental College & Hospital, Karachi

² Durreshawar Agha, Lecturer & Clinical Instructor, Department of Orthodontics, Fatima Jinnah Dental College & Hospital, Karachi

³ Babur Ashraf, Professor & Head Department of Orthodontics, Fatima Jinnah Dental College & Hospital, Karachi

⁴ Nabeel Qutub Khan, Lecturer & Demonstrator, Hamdard College of Medicine & Dentistry, Karachi **Corresponding Author:** Dr Shakeel Qutub Khan, Senior Registrar, Department of Orthodontics, Fatima Jinnah Dental College & Hospital, Plot # 1, Street # 1 – 100 Ft. Road, Azam Town, Karachi, Pakistan
Email: shakeelqutubkhan@hotmail.com Cell: 0322-2195197

Received for Publication: February 2, 2016

Revised: March 11, 2016

Approved: March 12, 2016

have shown children being affected by the condition as well.¹⁹⁻²² Various studies have linked symptoms of TMD to various malocclusions traits.²³⁻²⁷ On the other hand number of carefully controlled longitudinal studies have reported weak link between them.^{18,28-32}

Literature review showed that lot of work has been done on TMD around the globe including Pakistan, but majority of work done has largely focused on other aspects of TMD and very few work has been done on TMJ sounds and their possible association with malocclusion. The objective of this study was to determine association of temporomandibular joint sounds with different categories of malocclusion.

METHODOLOGY

This descriptive cross-sectional study was conducted on subjects with malocclusion, visiting Orthodontic Department from June 2014 to August 2015. All subjects with malocclusion in their permanent dentition, ranging from 14 to 25 years of age, were included in the study. Any subject with congenitally missing or extraction of permanent tooth, active or previous orthodontic treatment, any systemic diseases or metabolic disorders affecting bone metabolism, joint disorders and of non-Pakistani descent was excluded from this study. Sample size was calculated using sample size calculator available on www.openepi.com at 95% confidence level at the prevalence of 50%. Probability Sampling Technique (Systemic Sampling Technique) was used to collect data. Subject who were included in the study were informed about it before hand and prior consent was obtained before including any subject in the study. A data entry sheet was formulated that recorded the demographic details along with detailed medical, dental and family histories from every subject. Consent was obtained from every subject to carry out their clinical examination. During initial Orthodontic diagnosis, each subject was clinically examined for the presence of Temporomandibular joint sounds. Furthermore, every subject was also examined for the type of morphological occlusion (Angle Class I, Class II and Class III).³³ Data tabulation and analysis was completed using SPSS software version 22. A Chi-Square test ($p < 0.05$) was used to determine any association between morphological occlusion and Temporomandibular Joint sounds.

RESULTS

Out of 384 patients examined, 267 (70%) were females and 117 (30%) were males (Fig 1). 243 (63%) subjects had Angle's Class I malocclusion, 112 (30%) subjects had Angle's Class II malocclusion and 29 (7%) had Angle's Class III malocclusion (Table 1). Out of 384 subjects, joint sounds were present in 100 (26%) subjects. Joint sound were present in 55 (22.6%) subjects with

TABLE 1: DISTRIBUTION OF JOINT CLICKING SOUNDS IN STUDIED SAMPLE ACCORDING TO MORPHOLOGICAL OCCLUSION

Joint Sounds	Angles Classification			Total
	Class I	Class II	Class III	
Present	55	36	9	100
Absent	188	76	20	284
Total	243	112	29	384

TABLE 2: DISTRIBUTION OF JOINT CLICKING SOUNDS IN STUDIED SAMPLE ACCORDING TO GENDER

Joint Sounds	Gender		Total
	Female	Male	
Present	71	29	100
Absent	196	88	284
Total	267	117	384

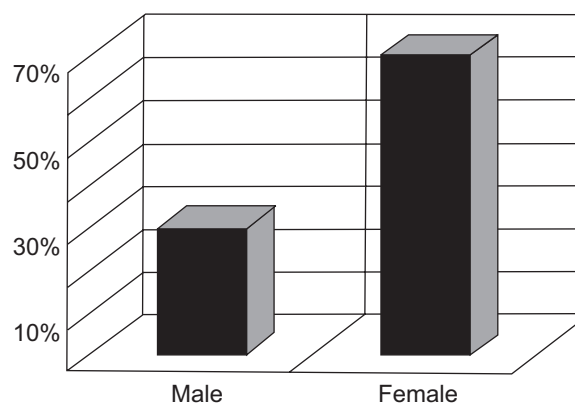


Fig 1: Distribution of gender in studied sample

Class I malocclusion, 36 (32%) subjects with Class II malocclusion and only 9 (31%) subjects with Class III malocclusion (Table 1). Chi-Square test revealed that relation of malocclusion with joint sounds was found to be statistically insignificant ($p > 0.05$).

Joint sounds were found to be slightly more prevalent in females than males (Table 2). Chi - Square test revealed that relationship of gender with joint sounds was found to be statistically insignificant ($p > 0.05$). Besides joint sounds, none of the subjects examined reported any other sign or symptom of temporomandibular dysfunction (TMD).

DISCUSSION

Temporomandibular joint sound is one of the symptoms of TMD mentioned in the literature.⁶⁻⁹ Various studies reported temporomandibular joint sounds as frequent finding in otherwise healthy individuals with no other symptoms of TMD and have

suggested that there needless management must be avoided as they rarely progress to severe clinical problems.^{34,35} Result of current study showed that those subjects who were diagnosed with temporomandibular joint sound, none of them reported any other sign or symptom of TMD.

The association between various morphological occlusion and different symptoms of TMD has long been debated.³⁶⁻³⁸ Previously it was considered that dental occlusion does play an important role in the etiology of TMD and few studies reported statistically significant association between morphological occlusion and severity of TMD symptoms.²³⁻²⁷ But over the period of time various studies conducted around the globe have found weak association between occlusal abnormalities and different symptoms of TMD.^{18,28-32,38} One study reported that lack of canine-guided occlusion during lateral movement in Class II malocclusion subjects could be at more risk of developing certain symptoms of TMD.³⁹ Another study reported that Class II Div 2 malocclusion subjects have greater TMJ sensitivity than those compared with Class I malocclusion.⁴⁰ Anjum S⁴¹ reported that all subjects with TMD were having malocclusion and stress with pain and clicking sounds in joint as the most common presenting symptom.

Results of this study are also in accordance with most of the recent studies conducted around the globe. John MT et al⁴² after conducting an extensive study on more than three thousand patients concluded that greatly increased or decreased values for overjet and overbite is not a risk factor for the presence of joint sounds. Another study reported that there is no significant association between TMJ clicking and several malocclusion features.⁴ A broad literature review conducted McNamara et al³² concluded that there is weak association between different symptoms of TMD and morphological or functional occlusal factors. Pullinger et al⁴³ after investigating the effects of eleven different malocclusions concluded that no single malocclusions alone could lead to symptoms of TMD. Mohlin et al³⁸ reviewed studies which were conducted on relationship of TMD with malocclusion from 1966 to 2000 and concluded that no association could be established between malocclusion and TMD. Dental occlusion is one of the most important factors that determine the amount of load distribution on the temporomandibular joint; therefore it should not be ignored and longitudinal studies are needed.

Results of this study do not necessarily reflect the trend of entire Pakistani population as it was conducted on a sample of Karachi population. Thus, possible role of malocclusion in TMD diagnosis and management is still valuable for exploration and more work needs to be done in this domain.

CONCLUSION

In the light of recent researches that have been carried out around the globe, it can be stated that morphological occlusion is presently a declining factor in the symptoms of TMD. Symptomless temporomandibular joint sound does not essentially indicate any disease process involving joint and it rarely requires any active treatment.

REFERENCES

- 1 Prinz JF. Physical mechanisms involved in the genesis of temporomandibular joint sounds. *J Oral Rehabil.* 1998; 25: 706-14.
- 2 Okeson JP. *Dores bucofaciais de bell.* 6. ed. São Paulo: Quintessence; 2006.
- 3 Emshoff R, Innerhofer K, Rudisch A, Bertram S. Clinical versus magnetic resonance imaging findings with internal derangement of the temporomandibular joint: an evaluation of anterior disc displacement without reduction. *J Oral Maxillofac Surg* 2002; 60: 36-41.
- 4 Manfredini D, Perinetti G, Nardini LG. Dental malocclusion is not related to temporomandibular joint clicking: a logistic regression analysis in a patient population. *Angle Orth* 2014; 84: 310-15.
- 5 Okeson JP. The classification of orofacial pains. *Oral Maxillofac Surg Clin North Am.* 2008; 20(2): 133-44.
- 6 Smith BG, Leslie C. *Planning and making crowns and bridges.* 4th ed. Abingdon, Oxon, UK: 2007: 34.
- 7 Khresat I, Al-Ma'ani MO. Temporomandibular dysfunction and malocclusion in south Jordanian children and adolescents. *PODJ.* 2011; 31: 361-64.
- 8 Oslen M, B lindvist. Occlusal interferences in orthodontic patients before and after treatment and in subjects with minor orthodontic treatment need. *Eur J Orthod.* 2002; 24: 677-87.
- 9 Mitchell DA, Mitchell L, McCaul L. *Oxford Handbook of Clinical Dentistry* 6th Edition. Oxford Medical Publications. 2014.
- 10 Fujita Y, Motegi E, Nomura M, Kawamura S, Yamaguchi D, Yamaguchi H. Oral habits of temporomandibular disorders patients with malocclusion. *Bull Tokyo Dent Coll.* 2003; 44: 201-07.
- 11 Widmalm SE, Christiansen RL, Gunn SM, Hawley LM. Prevalence of signs and symptoms of craniomandibular disorders and orofacial parafunction in 4-6 year old African – American and Caucasian children. *J oral Rehabil.* 1995; 22: 87-93.
- 12 Abrahamson C, Ekberg EC, Henrikson T, Nilner M, Sunzel B, Bonemark L. TMD in consecutive patients referred for orthognathic surgery. *Angle Orthod.* 2009; 79: 621-07.
- 13 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: 310-19.
- 14 Hans MG, Lieberman J, Goldberg, J, Rozencweig G, Bellon E. A comparison of clinical examination, history, and magnetic resonance imaging for identifying orthodontic patients with temporomandibular joint disorders. *Am J Orthod Dentofacial Orthop.* 1992; 101: 54-59.
- 15 Randolph CS, Greene CS, Moretti R, Forbes D, Perry HT. Conservative management of temporomandibular disorders: a posttreatment comparison between patients from a university clinic and from private practice. *Am J Orthod Dentofacial Orthop.* 1990; 98: 77-82.

- 16 Rugh JD, Solberg WK. Oral health status in the United States: temporomandibular disorders. *J Dent Educ.* 1985; 49: 398-406.
- 17 Schiffman EL, Friction JR, Haley DP, Shapiro BL. The prevalence and treatment needs of subjects with temporomandibular disorders. *J Am Dent Assoc.* 1990; 120: 295-303.
- 18 Bonjardim LR, Lopes-Filho RJ, Amado G, Albuquerque RL, Goncalves SR. Association between symptoms of temporomandibular disorders and gender, morphological occlusion, and psychological factors in a group of university students. *Indian J Dent Res.* 2009; 20(2): 190-94.
- 19 Beheshti M, Ghadimi S, Mirkarimi M, Ahmadi R, Seraj B. Temporomandibular disorders and parafunctional habits in children and adolescence: A review. *Tehran, Iran J.* 2009; 6: 37-44.
- 20 Levitt SR, McKinney MW. Validating the TMJ scale in a national sample of 10,000 patients: demographic and epidemiologic characteristics. *J Orofac Pain.* 1994; 8: 25-35.
- 21 Osterberg T, Carlsson GE, Wedel A, Johansson U. A cross-sectional and longitudinal study of craniomandibular dysfunction in an elderly population. *J Craniomandib Disord.* 1992; 6: 237-45.
- 22 Ow RK, Loh T, Neo J, Khoo J. Symptoms of craniomandibular disorder among elderly people. *J Oral Rehabil.* 1995; 22: 413-19.
- 23 Ramfjord, SP, Ash, MM. Occlusion WB. Saunders Co, Philadelphia; 1966.
- 24 Egermark I, Thilander B. Craniomandibular disorders with special reference to orthodontic treatment: An evaluation from childhood to adulthood. *Am J Orthod Dentofacial Orthop.* 1992; 101: 28-34.
- 25 Egermark I, Magnusson T, Carlsson GE. A 20-year followup of signs and symptoms of temporomandibular disorders and malocclusions in subjects with and without orthodontic treatment in childhood. *Angle Orthod.* 2003; 73: 109-15.
- 26 Henriksson T, Nilner M, Kurol J. Signs of temporomandibular disorders in girls receiving orthodontic treatment. A prospective and longitudinal comparison with untreated Class II malocclusions and normal occlusion subjects. *Eur J Orthod.* 2000; 22: 271-81.
- 27 Mohlin B, Derweduwen K, Pilley R, Kingdon A, Shaw WC, Kenealy P. Malocclusion and temporomandibular disorder: A comparison of adolescents with moderate to severe dysfunction with those without signs and symptoms of temporomandibular disorders and their further development to 30 years of age. *Angle Orthod.* 2004; 74: 319-27.
- 28 Turp JC, Schindler HJ. The dental occlusion as a suspected cause for TMDs: epidemiological and etiological considerations. *J Oral Rehabil.* 2012; 39: 502-12.
- 29 Gesch D, Bernhardt O, Kirbschus A. Association of malocclusion and functional occlusion with temporomandibular disorders (TMD) in adults: A systematic review of population-based studies. *Quintessence International.* 2004; 35(3): 211-21.
- 30 De Boever JA, Carlsson GE, Klineberg IJ. Need for occlusal therapy and prosthodontic treatment in the management of temporomandibular disorders: Part I. Occlusal interferences and occlusal adjustment. *J Oral Rehabil.* 2000; 27: 367-79.
- 31 Klasser GD, Greene CS. The Changing Field of Temporomandibular Disorders: What Dentists Need to Know. *JCDA.* 2009; 75(1): 49-53.
- 32 McNamara JA, Seligman DA, Okeson JP. Occlusion, Orthodontic treatment, and temporomandibular disorders: a review. *Journal of Orofacial Pain.* 1995; 9(1): 73-90.
- 33 Babbush CA. Mosby's dental dictionary. 2nd ed. St. Louis: Mosby Elsevier; 2008.
- 34 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: 310-19.
- 35 Magnusson T, Carlsson GE, Egermark I. Changes in clinical signs of craniomandibular disorders from the age of 15 to 25 years. *J Orofac Pain.* 1994; 8: 207-15.
- 36 Egermark-Eriksson I, Carlsson GE, Magnusson T, Thilander B. A longitudinal study on malocclusion in relation to signs and symptoms of cranio-mandibular disorders in children and adolescents. *Eur J Orthod.* 1990; 12: 399-407.
- 37 Koh H, Robinson PG. Occlusal adjustment for treating and preventing temporomandibular joint disorders. *Cochrane Database Syst Rev.* 2003.
- 38 Mohlin B, Axelsson S, Paulin G, Pietila T, Bondemark L, et al. TMD in relation to malocclusion and orthodontic treatment. *Angle Orthod.* 2007; 77: 542-48.
- 39 Selaimen CM, Jeronymo JC, Brilhante DP, Lima EM, Grossi PK, Grossi ML. Occlusal risk factors for temporomandibular disorders. *Angle Orthod.* 2007; 77: 471-77.
- 40 Pullinger AG, Seligman DA, Solberg WK. Temporomandibular disorders. Part II: occlusal factors associated with temporomandibular joint tenderness and dysfunction. *J Prosthet Dent.* 1988; 59: 363-67.
- 41 Anjum S, Khan NA, Ahmad M. Frequency, causes and effects of temporomandibular pain dysfunction syndrome among patients seen at Nishtar Institute of Dentistry, Multan. *PODJ.* 2014; 34(1): 54-56.
- 42 John MT, Hirsch C, Drangsholt MT, Mancl LA, Setz JM. Overbite and Overjet are not Related to Self-report of Temporomandibular Disorder Symptoms. *J Dent Res.* 2002; 81: 164-69.
- 43 Pullinger AG, Seligman DA, Gornbein JA. A multiple logistic regression analysis of the risk and relative odds of temporomandibular disorders as a function of common occlusal features. *J Dent Res.* 1993; 72: 968-79.

CONTRIBUTION BY AUTHORS

1 Shakeel Qutub Khan:	Devising Methodology, Data Collection & Tabulation, Manuscript Writing & Proof Reading
2 Durreshawar Agha:	Data Collection, Manuscript Writing & Proof Reading
3 Babur Ashraf:	Proof Reading
4 Nabeel Qutub Khan:	Data Collection & Tabulation