

## Association of Headache with Myogenous and Arthrogeous type of Temporomandibular Joint Disorders

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### Abstract

This study aimed to compare the headache severity and frequency among patients with TMD with headache and controls. A total of 49 subjects were included in the study, among which 29 had TMDs with headache and 20 with headache without the presence of any TMDs. Statistical Analysis was done using the Chi-square test and the one way ANOVA test. Out of 29 subjects with TMDs, 15 patients presented with myogenous cause and 11 presented with arthrogeous cause for TMDs. There was no statistically significant difference between the case and control group. Lateral pterygoid was the most commonly involved muscle in the myogenous group. Headache score may not be used as a predictor to differentiate headache associated with TMD and other headaches.

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### Introduction

Temporomandibular Joint disorders (TMDs) has been described as a group of musculoskeletal and neuromuscular conditions that involve the temporomandibular joint (TMJ), masticatory muscles, and associated tissues.<sup>1,2,3</sup> There are various factors that can cause TMDs: occlusal disharmony due to parafunctional habits, edentulous areas causing instability in maxilla-mandibular relationship, trauma, laxity of joint, psychological factors and comorbidities associated with systemic musculoskeletal disorders.<sup>4,5,6,7</sup> Symptoms associated with TMDs include pain around the TMJ or muscles of mastication, clicking or grating sounds, limitation in movement of mandible, headache, occasional tinnitus and a marked decrease in the quality of life of the affected individual.<sup>8,9,10,11,12</sup> TMDs were initially thought to be predominantly musculoskeletal disorders, and headache was

overlooked as a separate clinical symptom. Recently, the diagnostic criteria for TMDs (RDC/TMD) included a new classification-headache attributed to TMD (HATMD)<sup>8</sup> which suggested that myalgia and TMJ arthralgia were associated with headache. The purpose of the present study was to compare headache severity and frequency among patients with TMD with headache and control.

### Materials and methods

A prospective study was conducted for a one-year duration from the year 2016 to 2017. The participants were recruited from patients who were referred visiting the OPD. Institutional Ethics Committee granted the approval to carry out the study (ID no.140415) and written informed consent was obtained from the patients their before inclusion in the study. Patients in the age group of 20-70 years were included in the study. Patients with systemic disease and those presenting with simultaneous myogenous along with arthrogeous causes for TMDs were excluded from the study. After obtaining a detailed case history, patients were assessed for TMDs and classified under RDC/TMD criteria. Radiographs, if necessary were taken after the assessment of the individuals clinical signs and symptoms. Radiographic findings of the condyles

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were assessed to check for erosion (loss of continuity of articular cortex)<sup>1</sup> and other signs of degenerative changes.

After a detailed assessment for TMDs, patients with TMDs were classified into two groups; Group 1 was further divided into arthrogenous cause and myogenous cause. The controls were classified under Group II. Patients presenting with headache were asked to grade their frequency using a four-point verbal rating scale which included 0= none ,1= 1 to 2 per month, 2= 1 to 2 per week,3= more than three per week. Assessment of severity of headache was also done using four-point verbal rating scale i.e. 0= none, 1= mild, 2=moderate, 3=severe. After recording the parameters, the headache scores were calculated as the sum total of the recorded headache frequency & severity (minimum score of 0 and a maximum score of 6).<sup>13</sup>

Statistical Analysis: Collected data was analysed using the SPSS software 20.0 for windows (SPSS Inc., Chicago, USA). Descriptive statistics, Chi-square test and one way ANOVA test were utilized to analyze the data. p value of < 0.05 was considered statistical significant.

**Results**

Out of a total of 49 patients,38were females (including Group 1 & Group 2) and 11 were males. There was no statistically significant difference in age (p value =0.9) and gender (p value 0.187) distribution among the case a control group. The descriptive data of the subjects included in the study has been summarized in Table 1.

The age wise distribution of average scores of headache frequency, and headache severity are as follows: 20-30 years: 1.7, 2.1; 31-40 years: 1.3, 2.2, ; 41-50 years, 1.7, 2.2, ; and 51-60 years : 2, 2.7 respectively.

Comparison of Headache Score between the three groups shows that Myogenous group has the highest value of 4.2 and Arthrogenous has the least value of 3.64. This difference is statistically insignificant with a test value of 1.021 and p value of 0.368 (Table 2). Comparison of headache severity and frequency between the two groups were also not statistically significant.

	Categories	Group		
		Control (n=20) (N (%))	Myogenous (n=15) (N (%))	Arthrogenous (n=14) (N (%))
Age	<30 years	8 (40)	8 (53.3)	7 (50)
	31-40 years	8 (40)	3 (20)	3 (21.4)
	41-50 years	3 (15)	3 (20)	3 (21.4)
	>50 years	1 (5)	1 (6.7)	1 (7.1)
SEX	F	18 (90)	11 (73.3)	9 (64.3)
	M	2 (10)	4 (26.7)	5 (35.7)
CLICKING OF TMJ-LEFT	Present	0 (0)	0 (0)	7 (50)
CLICKING OF TMJ-RIGHT	Present	0 (0)	0 (0)	4 (28.6)
PAIN IN TMJ	Present	0 (0)	0 (0)	7 (50)
EROSION OF TMJ	Present	0 (0)	0 (0)	3 (21.4)
MASSETER PAIN-LEFT	Present	0 (0)	2 (13.3)	0 (0)
LATERAL PTERYGOID PAIN-LEFT	Present	0 (0)	4 (26.7)	0 (0)
MEDIAL PTERYGOID PAIN-LEFT	Present	0 (0)	1 (6.7)	0 (0)
TEMPORALIS PAIN-LEFT	Present	0 (0)	0 (0)	0 (0)
MASSETER PAIN-RIGHT	Present	0 (0)	4 (26.7)	0 (0)
LATERAL PTERYGOID PAIN-RIGHT	Present	0 (0)	10 (66.7)	0 (0)
MEDIAL PTERYGOID PAIN-RIGHT	Present	0 (0)	5 (33.3)	0 (0)
TEMPORALIS PAIN-RIGHT	Present	0 (0)	1 (6.7)	0 (0)
HEADACHE FREQUENCY	None	0 (0)	0 (0)	0 (0)
	1-2 per month	12 (60)	7 (46.7)	5 (35.7)
	1-2 per week	7 (35)	4 (26.7)	8 (57.1)
	more than 3 per week	1 (5)	4 (26.7)	1 (7.1)
HEADACHE SEVERITY	none	0 (0)	0 (0)	0 (0)
	mild	5 (25)	1 (6.7)	3 (21.4)
	moderate	4 (20)	7 (46.7)	9 (64.3)
	severe	11 (55)	7 (46.7)	2 (14.3)
HEADACHE SCORE	2	4 (20)	1 (6.7)	2 (14.3)
	3	3 (15)	3 (20)	4 (28.6)
	4	8 (40)	5 (33.3)	6 (42.9)

**Table 1.** Summary of the descriptive data among the case and control group.

	Control (n=20)	Myogenous (n=15)	Arthrogenous (n=14)	ONE WAY ANOVA	
				F value (*=welch test)	P VALUE
HEADACHE SCORE	3.75±1.16	4.2±1.15	3.64±1.08	1.021	0.368

**Table 2.** one way ANOVA test to compare the headache score between the groups

**Discussion**

Headache can occur due to discrepancies in temporomandibular structures or conversely pain may be referred to the TMJ, secondary to a diagnosis of primary headache. This overlap can be attributed to the anatomy and complex neural innervations present in the region. A deeper understanding of a cause and effect relationship based on treatment responses directed towards the trigeminal nerve is desirable, since in most instances, this important nerve appears to be the

final pathway for head ache and TMDs.<sup>14</sup> TMDs and headache are two separate entities but can act as aggravating or perpetuating factors for each other. Patients who suffer from primary headache may have their pain worsened when there is a coexisting TMD.

Myogenous pain is characterized as a regional muscle pain, described as dull or achy and associated with the presence of trigger points in muscles, tendons, or fascia.<sup>15,16</sup> The area of pain differs depending on the muscles of mastication involved. Lateral pterygoid muscle and masseter muscle tenderness may radiate towards the preauricular and cheek areas; temporal muscle tenderness may radiate towards the temporal, parietal and periorbital areas and medial pterygoid muscle tenderness is usually present below the lower border of mandible at its insertion.<sup>17</sup> According to International Headache Society, HATMD is usually most prominent in the temporal region(s) and preauricular area(s) of the face. It can be either unilateral or bilateral depending upon whether the pathology involves one or both temporomandibular regions.<sup>8</sup> In a study by Costa et al<sup>18</sup> they observed that their subjects reported of bilateral headaches in the frontotemporal region. TMDs and headache disorders share identical pain pathways and have an anatomical linkage through the trigeminal nucleus complex -the subnucleus caudalis.<sup>19,20</sup> This region is mainly responsible for the nociceptive inputs from the face and head and considered as the first 'converging site' between TMD and headache disorders.<sup>21</sup> Majority of the cases included in the study has reported of unilateral TMDs.

The prevalence of headache was more commonly observed among women and between the age group of 20-50 years like many other studies.<sup>22,23,24</sup> The findings were similar to results of the present study wherein females (70% of patients with TMD and 90% in controls) were more affected with headache than males. These findings were similar to our study. Gonçalves and Glaros in their studies have indicated that headache was more likely to occur in the myogenous group when compared to the arthroogenous group.<sup>25,26</sup> They stated that TMD severity was associated with headache frequency and this association suggests the presence of central facilitation of nociceptive inputs associated with myogenous type of TMD. The findings of their studies was consistent with

our study wherein 40% patients in the myogenous group had higher headache score (score of 5 and 6) in comparison to the 14% in the arthroogenous group.

Previous studies have indicated masseter as the most likely muscle that can cause headache and the reason was attributed to a possible internal derangement of the TMJ which was more likely to cause an increase in activity of temporalis and masseter muscle during movement.<sup>27</sup> However, in the present study we found that lateral pterygoid muscle was the most commonly associated muscle with TMDs followed by masseter and the medial pterygoid muscle. The insertion of lateral pterygoid muscle at the neck of the condyle makes it a highly likely contributor to induce and aggravate pain.<sup>28</sup>

Patients usually complain of headache accompanied by clicking, erosion, pain, deviation of mandible in the arthroogenous group.<sup>29</sup> The findings were similar to the observations recorded in our study wherein among the patients with a complain of headache in the arthroogenous group, 85.7% patients reported with clicking, 50% were associated with pain of TMJ and 21.4% were associated with erosion of the TMJ. It has been reported that the involvement of muscles of mastication may induce a greater probability for the occurrence of headache since the accompanying movement of the mandible or its functioning can increase the pain frequency or severity.<sup>19</sup> However in our study no significant difference was noted with respect to headache frequency and severity. The results should be validated in a larger sample size for generalizability.

## Conclusion

Headache score may not be used as a predictor to differentiate headache associated with TMD and other headaches. Improvements in the diagnostic accuracy of HATMD is presently in a dynamic ongoing process in both dentistry and medicine. The new diagnostic criteria for TMD (DC/TMD) have stressed the importance of familiar pain and clinical provocation of headache in the assessment of TMDs. Headache and other symptoms associated with TMDs have to be documented carefully so as to differentiate it from other primary headache disorders so that it can be treated with specific protocols including a comprehensive treatment plan and a holistic

approach towards its alleviation which shall be immensely beneficial in improving the quality of life in the affected individual.

### Declaration of Interest

The authors report no conflict of interest.

### Ethics Approval And Consent To Participate

This study was approved by the institutional ethics committee ( Ref No: 140415). Informed consent was obtained from all participants prior to inclusion in the study.

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