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A Study On MRI Evaluation Of TM Joint And It's Lesions.

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ABSTARCT

Imaging of the temporomandibular joint (TMJ) is continuously evolving with advancement of imaging technologies. Many different imaging modalities are currently used to evaluate the TMJ. Magnetic resonance imaging is commonly used for evaluation of the TMJ due to its superior contrast resolution and its ability to acquire dynamic imaging for demonstration of the functionality of the joint. The purpose of the present prospective study is to evaluate the temporomandibular joint and commonly occurring lesions in reference with age and sex with help of MRI. Patients were selected on basis of the of symptoms and clinical finding suggestive of TMJ abnormality. CT is ideal for evaluating bone structures, while MRI allows the evaluation of soft tissues, the intra-articular disk included. Frequently, these methods are complementary in the study of the TMJ abnormalities, playing a relevant role in the differential diagnosis of several conditions affecting this region. Additionally, other studies demonstrate that differentiated and symmetrical morphological alterations of the styloid process radiographically evaluated in patients with temporomandibular joints disorder occur independently from gender and age

Keywords: Temporomandibular joint, MRI, Anatomy, Pathologies, Lesions.

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INTRODUCTION

The term temporomandibular dysfunction (TMD) encompasses several pathological conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and surrounding structures [1]. It is estimated that 50–75% of the general population will present with one TMD sign and 20–25% with one TMD symptom during their lives [2]. Females are almost twice as prone to TMD, and the peak occurrence of these disorders is between 20 and 40 years of age, with pain in the TMJ as the most common symptom [3]. Some authors estimate that the prevalence of TMD is 5–12% in the general population, thus representing the second most frequent location of musculoskeletal pain (after low back pain) and a very frequent cause of absenteeism [4]. The TMJ is a morphologically and functionally complex joint [5, 6]. Musculoskeletal disorders of the masticatory system (the TMJ together with masticatory muscles) are hidden behind the name temporomandibular dysfunction and are heterogeneous in etiology and clinical presentation [1]. The TMJ as a ginglymoarthrodial joint distinguishes itself from other synovial joints by several features: articulating surfaces are covered by fibrous cartilage, a dense fibrocartilaginous articular disc is interposed between the condyle and articular eminence, it provides a wide range of motions in three planes, it is nearest to the middle cranial fossa, and it plays a crucial role in mastication, swallowing, respiration, and speaking. The articular disc divides the TMJ into upper and lower joint spaces, which do not communicate in physiological conditions. The TMJ allows rotation in the lower joint space and translation in the upper joint space [7]. Active parts of the orofacial system are both muscles and nerves. The masticatory muscles belong to the cervical muscular chain, and every disturbance in this segment will lead to the reorganization and adaptation of other muscular segments [8]. It is important to emphasize the relationship between poor body posture and the incidence of TMD. However, the causality must not be taken for granted, because it is commonly not possible to establish whether TMD is a cause or a result of body posture deviations. Saito et al. concluded that patients with the most common TMD anterior disc displacement had associated changes in body posture, particularly in the pelvic position, lumbar and thoracic spines, head, and mandibles, in support of the theory that a deviation in one joint subunit may lead to compensations in other joints [9]. Patients with TMD present with an overload in cervical muscles due to increased activity of the masticatory muscles to compensate for the joint disorder. Such an overload can produce mandibular and spinal deviations and cervical hyperlordosis, due to shoulder elevation and head protrusion in patients with TMD. Therefore, the main complaint of TMD—the pain and mandibular opening limitation—may be accompanied by muscle fatigue and postural problems in the patient [10].

METHODOLOGY

30 patients with history of click in the tempero-mandibular joint, history of tempero-mandibular joint pain and trauma who are attending the Department Of Radio diagnosis, Government Royapettah Hospital, Kilpauk Medical College, Tamil Nadu India.

Inclusion criteria

Patients were selected on basis of the of symptoms and clinical finding suggestive of TMJ abnormality.

Exclusion criteria

Patients with no radiological evidence of TMJ abnormalities. Patients with cardiac pacemakers & other metallic implants Patients with claustrophobia. An MRI was performed after the clinical examination, using a TMJ surface coil, with parasagittal and coronal tomograms of both condyles. The proton density sequence was used (time of repetition 1850 ms, time of echo 15 ms, field of view 13 cm, matrix size 256 × 256, slice thickness 2 mm, total time 4:09 min). The TMJ was analyzed in the position of a closed, half-opened, and fully opened jaw. A plastic mechanical mouth opener, made of polymethyl methacrylate in the form of an arrow, with incisures on the upper and lower surfaces (places to put incisors inside) at distances of 15 mm, 20 mm, 25 mm, 30 mm, and 35 mm was used for dynamic imaging of TMJ These distances represent the possible variations in jaw opening. While inside the MR unit, after having completed sequences performed with a closed jaw, the patient herself placed the applicator in the mouth, according to the instructions given by the radiographer. Sequences with an opened jaw were performed subsequently.

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Protocol

- T1 & PD weighted sequences in sagittal and coronal planes.
- T2- weighted in axial, coronal and sagittal planes.
- Fat suppressed T2 or STIR sequences wherever indicated.

RESULTS

Table 1: Descriptive Analysis Of Age Group In Study Group (N=30)

Age Group	Frequency	Percentage
< 30	11	36.67%
> 30	19	63.33%
Total	30	100.00%

The number of people with the age less than 30 were 11 (36.67%) and with the age greater than 30 were 19 (63.33%). (Table1)

Table 2: Descriptive Analysis Of Sex In Study Group (N=30)

Sex	Frequency	Percentage
Female	20	66.67%
Male	10	33.33%
Total	30	100.00%

Out of 30 subjects, 20 (66.67%) were females and 10 (33.33%) were males. (Table 2)

Table 3: Descriptive Analysis Of Internal Derangement In Study Group (N=30)

Internal Derangement	Frequency	Percentages
Yes	15	50.00%
• Unilateral	10	33.33%
• Bilateral	5	16.67%
No	15	50.00%
Total	30	100.00%

In the study group of 30, 15 (50.00%) people have internal derangement. In these 15 people 10 (33.33%) has unilateral derangement and 5 (16.67%) has bilateral derangement. 15 (50.00%) people doesn't have any type of internal derangement. (Table 3).

Table 4: Descriptive Analysis Of Displacement In Study Group (N=30)

Displacement	Frequency	Percentages
Yes	15	50.00%
• Anterior	10	33.33%
• Posterior	5	16.67%
None	15	50.00%
Total	30	100.00%

Out of 30 subjects, 10 (33.33%) subjects has anterior displacement and 5 (16.67%) subjects has posterior displacement. 15 (50.00%) subjects don't have any kind of displacement. (Table 4)

Table 5: Descriptive Analysis Of Early degenerative changes In Study Group (N=30)

Early Degenerative Changes	Frequency	Percentage
No	26	86.67%
Yes	4	13.33%
Total	30	100.00%

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In the study group of 30, 4 (13.33%) people have early degenerative changes and 26 (86.67%) people have no signs of early degenerative changes. (Table 5).

Table 6: Descriptive Analysis Of Arthrosis In Study Group (N=30)

Arthrosis	Frequency	Percentage
Yes	2	6.67%
No	28	93.33%
Total	30	100.00%

Out of 30 subjects, 2 (6.67%) subjects have the signs of arthrosis and remaining 28 (93.33%) subjects doesn't have any signs of arthrosis. (Table 6).

Table 7: Descriptive Analysis Of Trauma In Study Group (N=30)

Trauma	Frequency	Percentage
Yes	2	6.67%
No	27	90.00%
Total	30	100.00%

In the study group of 30, 2 (6.67%) people experienced trauma and remaining 27 (90.00%) had no trauma. (Table 7).

Table 8: Descriptive Analysis Of Growth In Study Group (N=30)

Growth	Frequency	Percentage
Yes	1	3.33%
No	29	96.67%
Total	30	100.00%

Out of 30 subjects, 1 (3.33%) subjects have the signs of growth and remaining 29 (96.67%) subjects had no signs of growth. (Table 8).

Table 9: Descriptive Analysis Of Congenital In Study Group (N=30)

Congenital	Frequency	Percentage
Yes	1	3.33%
No	29	96.67%
Total	30	100.00%

In the study group of 30, 1 (3.33%) people have congenital abnormality and remaining 29 (96.67%) doesn't have congenital abnormality. (Table 9).

Table 10: Association Of Sex With Age Group Of Study Population (N=30)

Age Group	SEX		Chi square	P-value
	Female	Male		
< 30	5	6	3.517a	0.06
	25.00%	60.00%		
> 30	15	4		
	75.00%	40.00%		

The number of females with age less than 30 were 5 (25.00%) and males with age below 30 were 6 (60.00%). Females with age more than 30 were 15 (75.00%) and males with age greater than 30 were 4 (40.00%). (Table 10).

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Table 11: Association Of Sex With Internal Derangement Of Study Population (N=30)

Internal Derangement	Crosstab		Chi square	P-value
	Female	Male		
Unilateral	6	4	.600a	0.74
	30.00%	40.00%		
Bilateral	4	1		
	20.00%	10.00%		
No	10	5		
	50.00%	50.00%		

The number of females with unilateral internal derangement were 6 (30.00%) and males with unilateral internal derangement were 4 (40.00%). The number of females with bilateral internal derangement were 4 (20.00%) and males with bilateral internal derangement were 1 (10.00%). 10 (50.00%) females don't have any internal derangement and 5 (50.00%) males doesn't have any internal derangement. (Table 11).

Table 12: Association Of Sex With Displacement Of Study Population (N=30)

Displacement	Crosstab		Chi square	P-value
	Female	Male		
Anterior	6	4	.600a	0.74
	30.00%	40.00%		
Posterior	4	1		
	20.00%	10.00%		
None	10	5		
	50.00%	50.00%		

The number of females with anterior displacement were 6 (30.00%) and males with anterior displacement were 4 (40.00%). The number of females with posterior displacement were 4 (20.00%) and males with posterior displacement were 1 (10.00%). 10 (50.00%) females doesn't have any displacement and 5 (50.00%) males doesn't have any displacement. (Table 12).

Table 13: Association Of Sex With Early Degenerative Changes Of Study Population (N=30)

Early Degenerative Changes	SEX		Chi square	P-value
	Female	Male		
No	17	9	.144a	0.70
	85.00%	90.00%		
Yes	3	1		
	15.00%	10.00%		

Out of 20 females, 3 (15.00%) have early degenerative changes. 9 (90.00%) and out of 10 males 1 (10.00%) doesn't have early degenerative changes. (Table 13).

Table 14: Association Of Sex With Arthrosis Of Study Population (N=30)

Arthrosis	SEX		Chi square	P-value
	Female	Male		
No	19	9	.268a	0.60
	95.00%	90.00%		
Yes	1	1		
	5.00%	10.00%		

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Out of 20 females, 19 (95.00%) of them had no arthrosis and 1 (05.00%) doesn't have arthrosis. 9 (90.00%) males out of 10 had no evidence of arthrosis and 1 (10.00%) had signs of arthrosis. (Table 14).

Table 15: Association Of Sex With Trauma Of Study Population (N=30)

Trauma	SEX		Chi square	P-value
	Female	Male		
No	18	9	.000a	1.00
	90.00%	90.00%		
Yes	2	1		
	10.00%	10.00%		

Out of 20 females, 18 (90.00%) of them had no trauma and 2 (10.00%) experienced trauma.9 (90.00%) males out of 10 had no experience of trauma and 1 (10.00%) experience trauma. (Table 15).

Table 16: Association Of Sex With Growth Of Study Population (N=30)

Growth	SEX		Chi square	P-value
	Female	Male		
No	20	9	2.069a	0.15
	100.00%	90.00%		
Yes	0	1		
	0.00%	10.00%		

Out of 20 females, 20 (100.00%) of them had no sign of growth. 9 (90.00%) males out of 10 had no sign of growth and 1 (10.00%) had sign of growth. (Table 16).

Table 17: Association Of Sex With Congenital Of Study Population (N=30)

Congenital	SEX		Chi square	P-value
	Female	Male		
No	19	10	.517a	0.47
	95.00%	100.00%		
Yes	1	0		
	5.00%	0.00%		

DISCUSSION

Imaging of the temporomandibular joint (TMJ) is consistently developing with headway of imaging advancements. A wide range of imaging modalities are at present used to assess the TMJ. MR imaging is generally utilized for assessment of the TMJ because of its better difference determination and its capacity than obtain dynamic imaging for showing of the usefulness of the joint [11]. MR imaging permits point by point assessment of temporomandibular (TMJ) structures in view of its characteristic tissue complexity and high determination. Joint biomechanics can be evaluated through imaging patients in the closed and open jaw positions. Translation of MR imaging requires learning of the ordinary life structures and a comprehension of typical and non-typical biomechanics. [12]. Current study was attempted to record reports of patients who are subjected to MRI within 4 days of clinical assessment. Study considers 30 patients as study members. The extent of subjects with age < 30 years and > 30 years were 36.67% and 63.33% individually. Among 30, 20 individuals were female and 10 were male [13]. As per this study findings among 30 study participants internal derangement were seen in, 15 (50.00%) people. Of these 15 people 10 (33.33%) has unilateral derangement and 5 (16.67%) has bilateral derangement. In 30 subjects, anterior displacement has been found in 10 (33.33%) subjects and posterior displacement has been found in 5 (16.67%) subjects [14]. Out of 30 people , early degenerative changes has been identified in 4 (13.33%) people and 26 (86.67%) people have no signs of early degenerative changes. In the study group of 30 persons, signs of arthrosis was found in 2 (6.67%) persons and rest of

the people 28 (93.33%) doesn't have any signs of arthrosis [15]. Out of 30 subjects, trauma was experience by 2 (6.67%) subjects and rest of 27 (90.00%) subjects hasn't experienced any trauma. In 30 people, 1 (3.33%) person have the signs of growth and congenital lesions was found in 1 (3.33%) [16]. The number of people with the age less than 30 were 5 (25.00%) females and 6 (60.00%) were males. 15 (75.00%) females and 4 (40.00%) males were with the age more than 30 [17]. In the study group, 6 (30.00%) females and 4 (40.00%) males have unilateral internal derangement. 4 (20.00%) females and 1 (10.00%) male have bilateral internal derangement. 10 (50.00%) females and 5 (50.00%) males doesn't have any internal derangement. 6 (30.00%) females and 4 (40.00%) males have anterior displacement. 4 (20.00%) females and 1 (10.00%) male have posterior displacement. 10 (50.00%) females and 5 (50.00%) males doesn't have any displacement. Out of 20 females, 17 (85.00%) females have early degenerative changes and 3 (15.00%) doesn't have early degenerative changes [18]. 9 (90.00%) males out of 10 have early degenerative changes and 1 (10.00%) doesn't have any sings of early degenerative changes. In a group 20 females, 19 (95.00%) has arthrosis and 1 (05.00%) doesn't have arthrosis. 9 (90.00%) males out of 10 have arthrosis and 1 (10.00%) doesn't have arthrosis. 18 (90.00%) females out of 20 females have experience trauma and 2 (10.00%) females doesn't experienced trauma. 9 (90.00%) males out of 10 have experience trauma and 1 (10.00%) doesn't experience trauma. Out of 20 females, all 20 (100.00%) of them has sign of growth. 9 (90.00%) males out of 10 have sign of growth and 1 (10.00%) doesn't has sign of growth [19]. Out of 20 females, 19 (95.00%) of them has congenital and 1 (05.00%) doesn't have congenital. 10 (100.00%) males out of 10 have congenital. In this present study, out of 30 subjects, anterior displacement has been found in 10 (33.33%) subjects and posterior displacement has been found in 5 (16.67%) subjects. None of the displacements has been found in 15 (50.00%) subjects [20].

CONCLUSION

The agreement between the clinical findings of pathological processes and the detection on MRI is fair, especially in the means of anterior disc dislocation with reduction, where the sensitivity of clinical examination remains low compared with 3T MRI. However, the number of false positive diagnoses established using RDC/TMD is low, especially in the group of asymptomatic patients, thus limiting unnecessary treatment. Nevertheless, in patients who report symptoms that could be explained by changes in the TMJ for which clinical examination shows low sensitivity, it would be reasonable to include an MRI examination at a certain point of the management and diagnostics. The RDC/TMD criteria remain a sensible method for both establishing a relevant clinical diagnosis and avoiding the overtreatment of patients. However, further improvements in the field of diagnostic criteria are desirable in order to increase the sensitivity of this method. The inclusion of multidisciplinary intervention for the management of TMD pain that would take into account all the neuromuscular structures of the masticatory system, findings on the clinical examination, self-reported symptoms, and findings on the MRI might be the desirable direction of future research. In addition, constant training and calibration of the clinical examiners will certainly improve the diagnostic capability, sensitivity, and specificity of the clinical findings.

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