Research Article

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2019;10:1:228-231.

Evaluation of Width of Condyle In Different Malocclusions In Central India Subjects

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ABSTRACT

Background: Evaluation of the width of condyle in temporomandibular joint (TMJ) in different malocclusions among subjects in age range of 18-25 years from central India.

Material and Methods: The study comprised of 90 subjects divided into three groups of 30 subjects each belongs to skeletal class I (Group A), class II (Group B) and class III malocclusion (Group C) based on lateral cephalometric analysis. Cone beam computed tomography (CBCT) of the patients was taken of right side of TMJ to measure the width of condyle. Mean and Standard Deviation was recorded and subjected to statistical analysis. Tukeys post hoc analysis was applied for inter group comparison.

Results: Width of condyle was slightly more in class III subjects as compare to class I and II. It was 15.43±2.25 mm, 14.21±2.32 mm and 16.39±3.34 mm among skeletal class I, II and III patients respectively. There was statistically significant difference found in width of condyle between class I, II and III study subjects (p=0.0090). Tukeys post hoc analysis showed statistically significant difference between class II and class III subjects (p>0.05).

Conclusion: Width of condyle was more in Class III skeletal pattern followed by Class I and Class II skeletal pattern. In different populations width of condyle may varies, so this variation in the healthy joints should be taken into consideration while planning any orthodontic treatment or to diagnose any underlying disease.

Keywords: Condyle, Malocclusion, Central India.

INTRODUCTION

The temporomandibular joint (TMJ) is the junction of articulation between the mandibular condyle and temporal bone, with a cartilaginous articular disc which separates the bony components.[1] Oral musculatures along with the associated muscles control the position and function of the mandibular condylar portion of the TMJ.[2] During childhood to adulthood mandibular condyle undergoes a continuous remodeling process. Many researchers had stated that condyle also undergoes changes due to certain diseases process. Mandibular condyle is considered to play a key role in the stability of long-term treatment results and it is very important to know about the normal condylar width so that any abnormality can be detected at earliest.[3-5]

Received: Aug. 11, 2019**: Accepted**: Oct. 2, 2019
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pISSN 2278-0076
eISSN 2321-9270

The morphology of the TMJ has been studied on human skulls through radiographic examinations, histological examinations, traditional computed tomography, magnetic resonance and Cone-Beam Computed Tomography (CBCT). Panoramic radiograph has its limitation to evaluate the accuracy of condylar morphology and to reveal minor osseous change.[6] CBCT allows the evaluation of articular space, bone structures and dynamic function in all three dimensions without superimposition and deformity.[5]

A normal variation of the condylar morphology may occurs with gender, age, facial type, occlusal forces, functional load, type of malocclusion and in between right and left sides of condyle.[6] In a study on condylar morphology related to malocclusion in children revealed that the condylar size in males was greater than in females and during growth the increased condylar size altered the midline significantly.[5] The present study aims to evaluate the width of condyle in TMJ among skeletal Class I, Class II and class III subjects in age range of 18-25 years from central India region.

MATERIAL AND METHOD

The study comprised of 90 subjects divided in to skeletal class I, class II and class III malocclusion based on lateral cephalometric analysis. CBCT of the patients were taken of right side of TMJ with subjects in the rest position of mandible, using standardized technique.[7]

A written informed consent was obtained from each participant or his or her parents and an ethical clearance was obtained from the Institutional Ethical Committee. Total sample size was of 90 subjects in age range of 18 to 25 years (young adult stage), which was divided into three groups of 30 subjects each belongs to skeletal class I malocclusion (Group A), skeletal class II malocclusion (Group B) and skeletal class III malocclusion (Group C). Subjects in age range of 18 to 25 years of age with no history of trauma or any disease to face, TMJ and jaws and having no difficulties in mandibular movements and should not have any pain, discomfort or clicking in their TMJ, and had not undergone any orthodontic treatment were included in the study. All subjects who do not belong to the particular age group, and central India region and having asymmetric face, traumatic injury and had signs and symptoms of TMJ aberrations, anomaly, trauma, disease or dysfunction were excluded from the study.

Lateral cephalometric radiographs were taken using a standardized technique and tracing was done. CBCT volume scans of all subjects were obtained by using the Master 3D dental-imagning system (Sirona orthophos SL Digital CBCT, Benstein, Germany). Width of condyle was measured as a greatest width of head of condyle in anteroposterior plane Figure 1.[8]

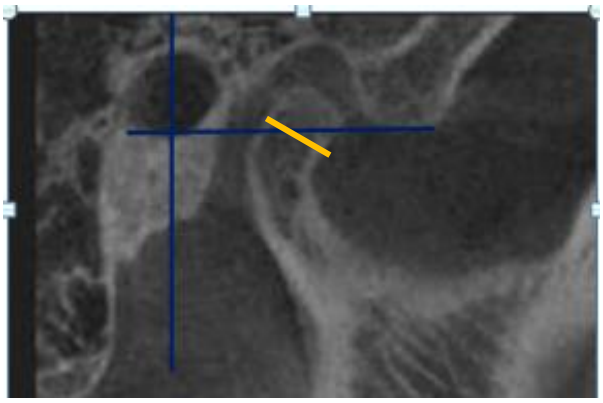


Figure 1: Measurement of width of condyle

The data thus collected was subjected to statistical tests using SPSS Software (Statistical Package for Social Sciences, IBM, 20.0 version). Mean and standard deviation was noted and subjected to statistical tests.The comparison between different groups were done using 't' test and P value < 0.05 was considered statistically significant. Tukeys post hoc analysis was applied for inter group comparison.

RESULTS

Table 1/Graph 1 reveals comparative evaluation of mean width of condyle in TMJ among skeletal Class I, Class II and Class III study subjects. Width of condyle was more in class III study subjects as compare to class I and II. It was 15.43±2.25 mm, 14.21±2.32 mm and 16.39±3.34 mm among skeletal class I, II and III patients respectively. There was statistically significant difference found in width of condyle between classes I, II and III study subjects (p=0.009). Tukeys post hoc analysis was applied for inter group comparison (Table 2). It shows there is statistically significant difference in group B (class II) and C (class III), but there is no statistically

significant difference between group A (class I) and B (class II), and A (class I) and C (class III) (p>0.05).

Table 1: Comparative evaluation of mean condylar width (WC) in TMJ among skeletal Class I, Class II and class III study subjects.

Groups			Width of condyle (mm)	
	Groups	Number	Mean	SD
Skeletal Class I	Group A	30	15.43	2.25
Skeletal Class II	Group B	30	14.21	2.32
Skeletal Class III	Group C	30	16.39	3.34
	Total	90	15.35	2.80
ANOVA 'F' Value	4.957			
Significance 'p' Value	0.009(S)			

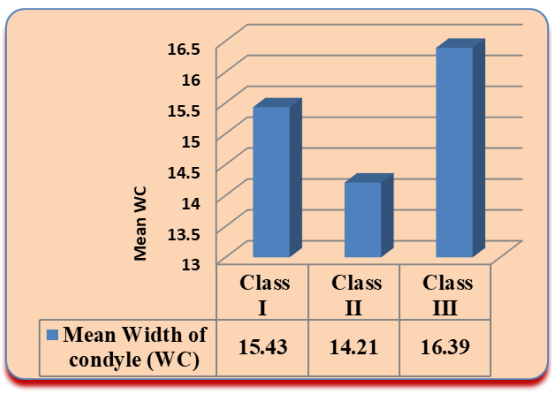
S: significant

Table 2: Tukeys post hoc analysis for inter group comparison of condylar width.

Groups	Mean Difference	Significance 'p' Value
Group A vs. Group B	1.220	0.190(NS)
Group A vs. Group C	-0.960	0.354(NS)
Group B vs. Group C	-2.180	0.006(S)

NS: not significant; S: significant

Graph 1: Comparative evaluation of mean width of condyle in TMJ among skeletal Class I, Class II and class III study subjects.



DISCUSSION

For years, dentistry used occlusal position as a gold standard for the correct mandibular position in diagnosis, although dental alterations may lead to anomalous mandibular position.[2] Imaging is an important diagnostic part in the determination and interpretation of TMJ disorders. With the rise of CBCT and its utilization in the head and neck region, due to its lower radiation dose and higher resolution compared to CT, the use of CT in TMJ evaluation has become very limited now a day.[9]

In the present study the width of condyle was measured as a greatest width of head of condyle in anteroposterior plane. The present study showed that mean value of height of condyle was more in class III study subjects as compare to class I and class II. It was 15.43mm ±2.25 mm, 14.21mm ±2.32 mm & 16.39mm ± 3.34 mm among skeletal class I, (Group A), class II (Group B) and class III (Group C) patients respectively. The mean value shows the significant difference in comparison between Group B and Group C, this may be attributed to large condyle in class III subjects which provide stable support for occlusal changes.

Krisjane *et al*[8] studied TMJ parameters in class II and class III patient. They found that mean value of width of condyle is 8.1mm ± 1.21mm in class II patients and 7.8mm ± 1.69mm in class III patients both values are significantly less when we compared with present study. Alhammadi *et al*[10] studied the morphological and spatial characteristics of the temporomandibular joints in different anteroposterior skeletal malocclusions. They analyzed the TMJ in class I, class II and class III malocclusions. Mean value of width of condyle is higher in class III malocclusions i.e 5.80mm ± 2.96mm followed by class I i.e. 5.79mm ± 2.41mm and than class II i.e. 5.11mm ± 4.30mm malocclusions and these values are less than our study results.

de Leeuw *et al.*,[3] reported that the shortening of the internal-external dimension of the condyle in patients suffering from osteoarthritis is evident. According to Kurita *et al.*,[4] the anterior-posterior dimension of the condyle, in more advanced stages of TMJ disorders, becomes bigger. The variation in width of condyle in the healthy joints should be taken into consideration to rule out whether they

are normal finding or any abnormality or underlying disease is present which needs immediate attention. Since various parts of TMJs are altered during TMDs and diagnosing these changes in time can help physicians to take a positive step towards preventing the development of osteoarthritis.[11]In different populations width of condyle may varies, so while planning any orthodontic or other treatment it should be known for that particular population to provide correct and successful treatments.

CONCLUSION

Width of condyle was more in Class III skeletal pattern followed by Class I and Class II skeletal pattern. In different populations width of condyle may varies, so this variation in the healthy joints should be taken into consideration while planning any orthodontic treatment or to diagnose any underlying disease.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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