

**Prevalence of Mandibular Asymmetry in Different Occlusion Patterns in Chennai Population- A pilot study**

<sup>1</sup>Mary Sheloni Missier, Post Graduate, Department of Orthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical & Technical Sciences, Tamilnadu, India

<sup>2</sup>Dr S P Saravana Pandian, Senior Lecturer, Department of Orthodontics, Saveetha Dental College And Hospitals, Saveetha Institute of Medical & Technical Sciences, Tamilnadu, India

**Corresponding Author:** Mary Sheloni Missier, Post Graduate, Department of Orthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical & Technical Sciences, Tamilnadu, India

**Citation of this Article:** Mary Sheloni Missier, Dr S P Saravana Pandian, “Prevalence of Mandibular Asymmetry in Different Occlusion Patterns in Chennai Population- A pilot study”, IJDSIR- January - 2021, Vol. – 4, Issue - 1, P. No. 366 –371.

**Copyright:** © 2021, Mary Sheloni Missier, 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**

It is known that mandible forms the lowest third of face has a direct effect on the facial appearance which causes not only aesthetic but also functional problems due to its role on stomatognathic system. The highest growth potential of the mandible are the condylar cartilage. This study was done to evaluate the effect of different malocclusion on mandibular asymmetry different types of malocclusions. A total of 30 subjects were taken within the age group of 19 to 50, 10 under each type of malocclusion (class I, class II, class III). The subjects were skeletally classified by evaluating the cephalometric norms (ANB angle), they were dentally classified based on their molar relation. The panoramic radiographs of all patients were taken under standardized conditions and processed. The outline of the condyle and ascending ramus of both sides on the panoramic image was traced on lead acetate paper. a line was drawn connecting the most

lateral points of the condylar image(O1) and ascending ramus image (O2). A perpendicular line was drawn from the most superior point of the condyle(B) to the ramus tangent(A). Measure from B point to O1 gives the condylar height. It was found that there was significant mandibular asymmetry in different malocclusions with class II type of malocclusion having the greatest amount of mandibular asymmetry. There was mandibular asymmetry in different malocclusions therefore it should be considered in treatment planning.

**Keywords:** mandibular asymmetry, malocclusion, condylar cartilage.

**Introduction**

Symmetry is defined as the equal proportion of all the parts in correspondence to size and shape, and their relative position in comparison to the opposite side. The word symmetry is derived from the Greek word symmetria which means “of like measure”. It is described

as asymmetry when one side doesn't correspond with the opposite side in relation to size and shape.

When the human face is taken into account any imbalance in their proportion when comparing right side with left side then it is termed as asymmetry. The human face is divided into upper third, middle third and lower third. The mandible is set to occupy the lower third of the face, any asymmetry in the mandible will have a direct effect in the facial aesthetics. It is also said that the asymmetry of the mandible will not only affect its function because it plays a major role in stomatognathic system. The aetiology of asymmetry unknown, it would be congenital acquired or developed mental. Some other causes for asymmetry are secondary to condylar hyperplasia or hypoplasia, ankyloses, or hemifacial microsomia (2,3). According to Matthew et al, aetiology is classified into developmental pathological, traumatic, functional (4).

In the mandible condylar cartilage is said to have the highest growth potential. Any injury during the growth period can disturb the growth of the mandible in downward and forward direction, resulting in mandible displacement towards the affected side. Therefore, condylar asymmetry is found to be one of the major reasons for mandibulofacial asymmetries (5-7). Habet et al in his article stated that there is a correlation between condylar asymmetry and craniomandibular disorder (8). Shreya Gupta et al in a study used digital panoramic radiography to study the mandibular asymmetry (10). Kjellberg et al developed and used a new method of quantitatively measuring the effects of condylar heights on panoramic radiographs (9). Francesca et al in his study used orthopantomogram and used asymmetry index to determine the mandibular asymmetry (11)

The aim of this study is to determine whether there is any correlation between mandibular asymmetry and different malocclusions.

## Materials and Methods

A total number of thirty patient, ten each malocclusion set taken. Subjects with the age group of (19 – 50 years). Inclusion criteria for the present study (i) subject of different malocclusion (ii) No history of previous orthodontic treatment (iii) No history of crossbite (iv) No history of trauma, injury, deviated jaw. The following exclusion criteria was applied in the study (i) Previous history of trauma, injury, deviated jaw (ii) Previous history of orthodontic treatment.

The study group consists of total number of 30 subjects which are divided into three groups as 10 in each. Based on angles classification of malocclusion, they were divided into three groups (Class 1, Class 2, Class 3, ten subjects in each group). Based on the methods suggested by Habet et al from the panoramic radiograph, the outline of the ascending ramus of the mandible and the condyle (8). A line connecting the lateral points of the ascending ramus mandible and the condyle

- The outline of the condyle and ascending ramus of both sides on the panoramic image was traced. A line was drawn connecting the most lateral points of the condylar image(O1) and ascending ramus image (O2). A perpendicular line was drawn from the most superior point of the condyle(B) to the ramus tangent(A). Measure from B point to O1 gives the condylar height. The condylar height for both right and left side was measured and the asymmetry index was estimated using the following formula:
- Condylar Asymmetry Index (AI)=  $\frac{[(CH \text{ right}-CH \text{ left})]}{(CH \text{ right}+CH \text{ left})} * 100$

**Figure 1:**



**Results**

The asymmetry values for different types of malocclusion were carried out using condylar asymmetry index. The

Table 1: ANOVA Assymetry

|                | Sum of Squares | Df | Mean Square | F     | Sig. |
|----------------|----------------|----|-------------|-------|------|
| Between Groups | 9741.728       | 2  | 4870.864    | 3.861 | .034 |
| Within Groups  | 34062.384      | 27 | 1261.570    |       |      |
| Total          | 43804.112      | 29 |             |       |      |

**Interpretation**

H<sup>o</sup>: There is no significant correlation between condylar asymmetry and malocclusion

H<sub>a</sub>: There is significant correlation between condylar asymmetry and malocclusion

Sig value is .034, ie .034 <= .050, H<sup>o</sup> is not accept and H<sub>a</sub> is accepted.

Table 2: Multiple Comparisons Dependent Variable: asymmetry Bonferroni

| (I) malocclusion | (J) malocclusion | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval |
|------------------|------------------|-----------------------|------------|------|-------------------------|
|                  |                  |                       |            |      | Lower Bound             |
| class 1          | class2           | -43.589*              | 15.884     | .032 | -84.13                  |
|                  | class3           | -15.773               | 15.884     | .989 | -56.32                  |
| class2           | class 1          | 43.589*               | 15.884     | .032 | 3.04                    |
|                  | class3           | 27.816                | 15.884     | .274 | -12.73                  |
| class3           | class 1          | 15.773                | 15.884     | .989 | -24.77                  |
|                  | class2           | -27.816               | 15.884     | .274 | -68.36                  |

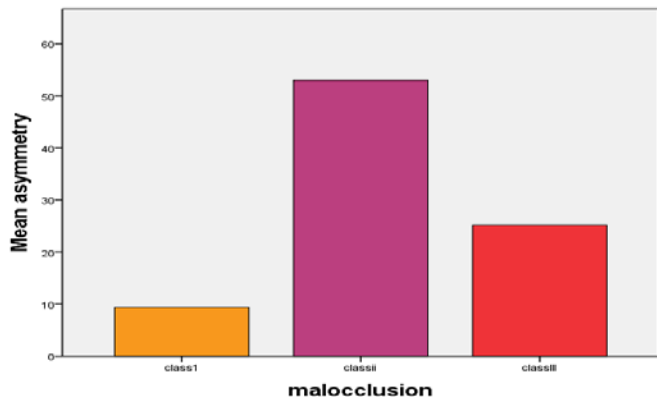
values for different malocclusions were tabulated and statistically analysed using anova test and Post Hoc.

According to Anova test, there is significant correlation between condylar asymmetry and malocclusion. Post Hoc test states that on comparing the three malocclusion the occurrence of condylar asymmetry is found higher in class II malocclusion followed by class III malocclusion showing the second highest followed by class I malocclusion.

Statistical analyses were performed using SPSS version 22.0. ANOVA test was performed. If P-value was less than 0.05, then it was statistically significant

Post Hoc Tests

Figure 2



## Discussion

Recent advancement in orthodontics paved way to the invention of various other diagnostic aids such as submentovertex, postero-anterior cephalometric, radiography, CT and MRI. However, these advances are used in diagnostic of condylar asymmetry but they require an additional radiation exposure and cost. In order to reduce the additional radiation exposure and cost, various studies are being done to introduce a new method to use panoramic radiography in the diagnosis of condylar asymmetry. Panoramic radiographs are now being used as a diagnostic tool in more complicated situations, such as the evaluation of vertical mandibular asymmetry, condylar and ramus height, TMDs, and gonial angle measurement (12-19). But the disadvantage in using panoramic radiography in evaluating mandibular asymmetry is magnification error, head position which may vary the results in assessing vertical and horizontal asymmetry. Any change in the effect of magnification will affect the vertical dimension whereas the small changes in head position will affect horizontal dimension of radiographic image (12, 20, 21)

Various experiment has been done by various authors using panoramic radiographs comparing the ramus height and condylar height in different experimental group such as denture wearers and patients with TMD or orthodontic anomalies (22,23,24)

Habets et al use panoramic radiograph in the diagnosis of TMD by comparing the right and left condylar measurement (21). Habet and co-workers in one of his study, he analysed the vertical asymmetry using panoramic radiograph (8).

In this present study we used condylar asymmetry index to compare the prevalence of condylar asymmetry in different malocclusion pattern. Kambylafkas et al states that muscular compensatory mechanism could be responsible for the more symmetrical ramus height found on both sides of the subjects with malocclusions (26). Miller et al stated that condylar asymmetry is related to the strong forces affecting the articular surface of the TMJ (25). In this study we find that TMD is consider as the main factor for condylar asymmetry. Miller and smith stated that there is a reported on the relationship between condylar asymmetry and malocclusions (14). Miller and Bonder used condylar asymmetry index to investigate the relation between condylar and asymmetry and malocclusion pattern (15). In both the above study (14,15), no statistical difference between these groups. Therefore, there is significance between condylar asymmetry and malocclusion.

## Conclusion

In our study we found that the highest prevalence of mandibular asymmetry was found in class II malocclusion followed by class III malocclusion, very minimal asymmetry was found in class I malocclusion pattern which shows that is a strong relation between the condylar asymmetry & malocclusion pattern.

## Reference

1. Omer Said sezgin, peruse celenk, selim arici. Mandibular asymmetry in different occlusion patterns A radiological evaluation. Angle orthodontist vol 77, no 5, 2007:803-807

2. Fong JH, Wu HT, Huang MC, Chou YW, Chi LY, Fong Y, et al. Analysis of facial skeletal characteristics in patients with chin deviation. *J Chin Med Assoc.* 2010;73(1):29-34.
3. Reyneke JP, Tsakiris P, Kienle F. A simple classification for surgical treatment planning of maxillomandibular asymmetry. *Br J Oral Maxillofac Surg.* 1997;35(5):349-51.
4. Matthew Sy chia, Farhad B Naini and Daljit S Gill. The Aetiology, diagnosis and management of mandibular asymmetry. *Orthodontic update* 2008; 1:44-52.
5. Schellhas KP, Piper MA, Omlie MR. Facial skeleton remodelling due to temporomandibular joint degeneration: an imaging study of 100 patients. *Am J Neuroradiol.* 1990;11: 541–551.
6. Westesson PL, Tallents RH, Katzberg RW, Guay JA. Radiographic assessment of asymmetry of the mandible. *Am J Neuroradiol.* 1994;15:991–999.
7. Yamashiro T, Okada T, Takada K. Case report: facial asymmetry and early condylar fracture. *Angle Orthod.* 1998;68: 85–90.
8. Habets LLMH, Bezuur JN, Naeiji M, Hansson TL. The orthopantomograph, an aid in diagnosis of temporomandibular joint problems. II. The vertical symmetry. *J Oral Rehabil.* 1988;15:465–471.
9. Kjellberg H, Ekestubbe A, Kiliaridis S, Thilander B. Condylar height on panoramic radiographs. *Acta Odontol Scand.* 1994;52:43–50.
10. Shreya Gupta, sandhya jain. Orthopantomographic analysis for assessment of mandibular asymmetry. *The journal of Indian orthodontic society*, January – march 2012; 46 (1): 33-37
11. Francesca silvertrini – Biavati, Alessandro Ugolini, Nicola Laffi, Carola Canevello, Armando silvestrini Biavati. Early diagnostic evaluation of mandibular symmetry using orthopantomogram. *Indian journal of Dental Research*, 25(2), 2014.
12. Habets LLMH, Bezuur JN, Naeiji M, Hansson TL. The orthopantomograph, an aid in diagnosis of temporomandibular joint problems. II. The vertical symmetry. *J Oral Rehabil.* 1988;15:465–471.
13. Kjellberg H, Ekestubbe A, Kiliaridis S, Thilander B. Condylar height on panoramic radiographs. *Acta Odontol Scand.* 1994;52:43–50.
14. Miller VJ, Smidt A. Condylar asymmetry and age in patients with Angle’s class II division 2 malocclusion. *J Oral Rehabil.* 1996;23:712–715.
15. Miller VJ, Bodner L. Condylar asymmetry measurements in patients with Angle’s class III malocclusion. *J Oral Rehabil.* 1997;24:247–249.
16. Miller VJ. Variation of condylar asymmetry with age in edentulous patients with craniomandibular disorder of myogenous origin. *J Prosthet Dent.* 1994;71:384–386.
17. Saglam AM. The condylar asymmetry measurements in different skeletal patterns. *J Oral Rehabil.* 2003;30:738–742.
18. Brooks SL, Brand JW, Gibbs SJ, et al. Imaging of the temporomandibular joint: a position paper of the American Academy of Oral and Maxillofacial Radiology. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1997;83:609–618.
19. Tu`rp JC, Vach W, Harbich K, Alt KW, Strub JR. Determining mandibular condyle and ramus height with the help of an orthopantomogram a valid method? *J Oral Rehabil.* 1996; 23:395–400.
20. Larheim TA, Svanaes DB. Reproducibility of panoramic radiography: mandibular linear dimensions and angles. *Am J Orthod Dentofacial Orthop.* 1986;90:45–51.

21. Habets LLMH, Bezuur JN, VanOoij CP, Hansson TL6. The orthopantomogram, an aid in diagnosis of temporomandibular joint problems. I. The factor of vertical magnification. *J Oral Rehabil.* 1987;14:475–480.
22. Miller VJ, Myers SL, Zeltser CH, Yoeli Z. The relation of age and handedness to condylar asymmetry in a group of edentulous patients with a temporomandibular disorder of arthrogenous origin. *J Oral Rehabil.* 1995;22:311–313.
23. Raustia AM, Salonen MAM. Gonial angles and ramus height of the mandible in complete denture wearer-A panoramic radiographic study. *J Oral Rehabil.* 1997;24:512–516
24. Saglam AM, S,anlı G. Condylar asymmetry measurements in temporomandibular disorders. *J Contemp Dent Pract.* 2005;5:59–65
25. Miller VJ, Yoeli Z, Barnea E, Zeltser C. The effect of parafunction on condylar asymmetry in patients with temporomandibular disorders. *J Oral Rehabil.* 1998;25:721–724
26. Kambylafkas P, Kyrkanides S, Tallents RH. Mandibular asymmetry in adult patients with unilateral degenerative joint disease. *Angle Orthod.* 2005;75:305–310