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ANGULAR RELATION OF VARIOUS ANTERO-POSTERIOR FACIAL PLANES WITH FRANKFORT HORIZONTAL PLANE IN ANGLE'S CLASS-I AND CLASS-III BENGALI POPULATION

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ABSTRACT

Facial beauty depends on proper facial proportion. To give the best esthetic result to the patients, proper knowledge of facial measurements in every malocclusion is important. Class III malocclusion, being the most challenging case, has been chosen for this study. This study was carried out to find different vertical cephalometric measurements in class III patients. Patients with class I malocclusion were taken as control. 50 samples were taken (20 class III, 30 class I). Cephalometric analysis was carried out to compare different vertical angular measurements between two groups. Results showed that maximum angulations are greater in class III that means in majority cases class III patients show hyperdivergent growth pattern.

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INTRODUCTION

Beauty cannot be defined. Facial beauty depends on suitable proportion of its counterparts. The subject orthodontics deals with this kind of facial beauty and its suitable proportion. Different orthodontic study revealed different facial measurements. The intercuspation of upper and lower teeth is called occlusion. Any deviation from normal occlusion is called mal occlusion. Angle classified malocclusion in saggital plane into Class I, class II and class III (Angle 1899). From them the study of class III malocclusion is one of the interesting and challenging thing. It is defined as the mesio-buccal cusp of upper permanent first molar lies distal to the mesial groove of lower permanent first molar. Many studies are there defining vertical relationship of maxilla and mandible in class III malocclusion by the help of cephalomegram developed by Broadbent (Broadbent 1931) in 1931. In 1948, Williams B. Downs (Down 1948) from Illionis published an article on "Variations in facial relationship, their significance in analysis and treatment planning". He developed mandibular plane angle taking the FH plane as reference. In 1955 Richard Tisdale found that the occlusal plane was steeper in class III (Tisdale 1955). In 1947 Margolis published his cephalometric diagnosis based on thirty skulls. He introduced the maxillofacial triangle constructed on a standardized headplate (Margolis 1947). In 1955 Viken Sassauni found that craniofacial proportion is established by balance between certain growth loci (SassauniV 1955). In 1961 Schwarz developed roentgenostatics for determination of facial proportion (Schwarz 1961). In 1969 Tweed developed Tweed triangle to determine facial balance (Tweed 1969). In 1981 McNamara did study about various components of class III in juvenile (McNamara 1986) and adult populations (McNamara 1984). But maximum of these studies were done in American populations. There are few studies in Brazil (Marcus 2014), Chinese (Caili 2016), Iranian (Roodabeh 2009) populations. But there are fewer studies done in Bengali populations. So this study has been carried out to find out the vertical proportion of class III malocclusion in Bengali population.

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Aims and Objectives

So the aims and objectives of the current study are

A)To obtain data variation of

- Angle between Frankfort Horizontal plane and mandibular plane
- Angle between Frankfort Horizontal plane and palatal plane
- Angle between Frankfort horizontal plane and occlusal plane
- Angle between palatal plane and mandibular plane
- Angle between mandibular plane and occlusal plane
- Angle between palatal plane and occlusal plane

B) To compare the variations of these Cephalometric values in Angle's Class-I and Class-III malocclusion

MATERIALS AND METHODS

The study had been carried out in the Dept of Orthodontics , Dr. R Ahmed Dental College and Hospital, Kolkata. 50 samples were taken to conduct this study from Bengali population. Amongst them 20 patients were class III and 30 class I patients were taken as control group. A cross sectional study had been carried out for this study. Patients were examined intra orally and then lateral cephalometric radiograph were taken. Cephalometric analysis was done for every patient. The values were compared between class III and class I samples. Statistical analysis was carried out.

RESULTS AND ANALYSIS

Statistical Analysis was performed with help of Epi Info (TM) 3.5.3. EPI INFO is a trademark of the Centers for Disease Control and Prevention (CDC). Using this software, basic cross-tabulation, inferences and associations were performed. X^2 test was used to test the association of different study variables with the study groups. t-test was used to compare the means. $p < 0.05$ was considered statistically significant. The collected data was statistically analyzed for comparison between different groups as shown in the TableI 1-7.

Table 1. Distribution of the patients in the two groups

Group	Number	%
Class-I	30	60.0%
Class-III	20	40.0%
Total	50	100.0%

30 patients (60.0%) were from Class-I and other 20 patients (40.0%) were from Class-III.

Comparison of different parameters of the two classes (Class-I and Class-III)

Table 2. Distribution FH-Mandibular Plane of the patients of the two classes

FH-Mandibular Plane (in °)	Class-I (n=30)	Class-III (n=20)
Mean±s.d.	23.46±4.28	28.35±4.35
Median	23.0	27.5
Range	15 - 31	20 – 40

t-test showed that the mean FH-Mandibular Plane of the patients of Class-III was significantly higher than that of the patients of Class-I (t_{48}=3.91;p=0.0004).

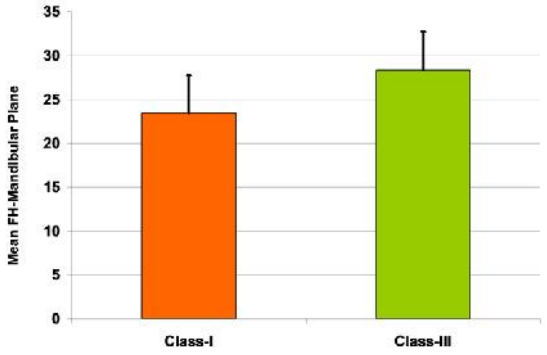


Table 3. Distribution of FH-Palatal Plane of the patients of the two classes

FH-Palatal Plane (in °)	Class-I (n=30)	Class-III (n=20)
Mean±s.d.	1.10±1.66	1.80±2.85
Median	1.0	2.0
Range	-1 - 5	-2 – 10

Though the mean FH- Palatal Plane of the patients of Class-III was higher than that of the patients of Class-I, t-test showed that there was no significant difference between the mean FH- Palatal Plane of the patients of the two classes (t_{48}=0.97;p=0.33).

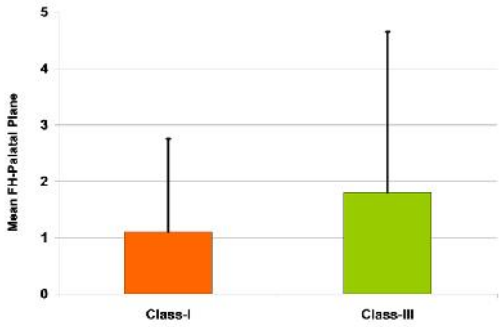


Table 4. Distribution of FH-Occlusal Plane of the two classes

FH-Occlusal Plane (in °)	Class-I (n=30)	Class-III (n=20)
Mean±s.d.	4.86±2.92	5.95±4.38
Median	4.50	4.0
Range	0 - 11	1 – 16

Though the mean FH- Occlusal Plane of the patients of Class-III was higher than that of the patients of Class-I, t-test showed that there was no significant difference between the mean FH- Palatal Plane of the patients of the two classes (t_{48}=0.99;p=0.32).

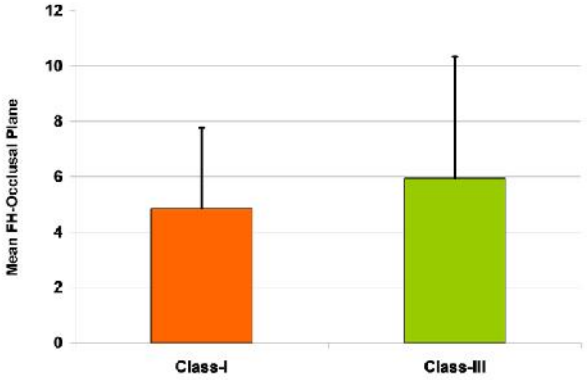


Table 5. Distribution of Palatal –Mandibular Plane of the two classes

Palatal –Mandibular (in °)	Class-I (n=30)	Class-III (n=20)
Mean±s.d.	22.50±4.46	26.15±4.77
Median	22.0	25.0
Range	14 - 31	18 – 38

t-test showed that the mean Palatal -Mandibular Plane of the patients of Class-III was significantly higher than that of the patients of Class-I (t_{48}=2.72;p=0.0096).

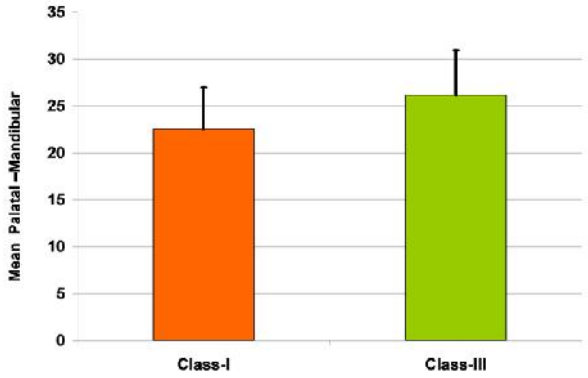


Table 6. Distribution of Mandibular-Occlusal Plane of the two classes

Mandibular- Occlusal (in °)	Class-I (n=30)	Class-III (n=20)
Mean±s.d.	17.36±3.68	21.40±4.21
Median	17.0	21.5
Range	10 – 26	12 – 31

t-test showed that the mean Mandibular- Occlusal Plane of the patients of Class-III was significantly higher than that of the patients of Class-I (t_{48}=3.49;p=0.0012).

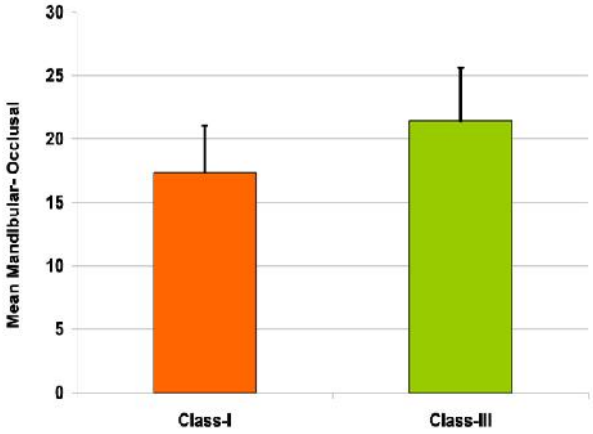
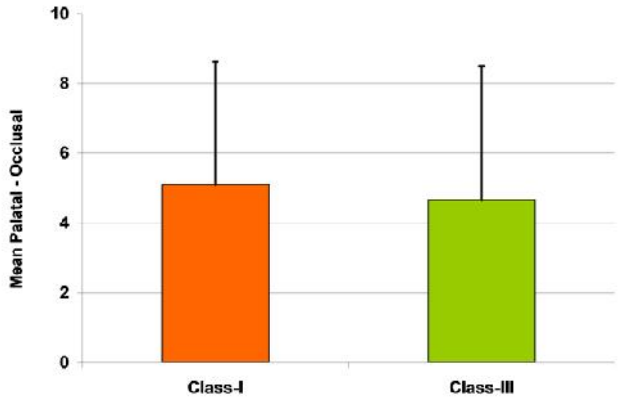


Table 7. Distribution of Palatal - Occlusal Plane of the two classes

Palatal - Occlusal (in °)	Class-I (n=30)	Class-III (n=20)
Mean±s.d.	5.10±3.52	4.65±3.85
Median	5.0	3.5
Range	0 - 14	0 – 17

Though the mean Palatal - Occlusal Plane of the patients of Class-I was higher than that of the patients of Class-III, t-test showed that there was no significant difference between the mean Palatal - Occlusal Plane of the patients of the two classes (t_{48}=0.41;p=0.67).



DISCUSSION

In this present study the mean Frankfort to mandibular plane angle in class I patients is 23.46º with a standard deviation of 4.28 º. In class III samples mean angle is 28.35 º with a standard deviation of 4.35 º which was 28.39 º found by P. Toms (Tom 1989), 21 by Downs(Down 1948). So the FH to mandibular plane angle is significantly larger in class III samples than in class I samples with *P* value of 0.0004. Though there are variations, it can be said that the class III patients are generally vertical grower. In this current study the mean angle between FH plane and palatal plane was found to be 1.10º with a standard deviation of 1.66º in class I samples. In class III samples the mean is 1.80 º with a standard deviation of 2.85 º. Though the mean FH- Palatal Plane of the patients of Class-III was higher than that of the patients of Class-I, t-test showed that there was no significant difference between the mean FH- Palatal Plane of the patients of the two classes (t48=0.97;p=0.33). . Hong-Po-Chang Kinoshita Z, Kawamoto T(chang HP 1992), Saad Gasgood , Neam et al,(Gasgood 2007) C .M Reddy, A. Rathee(M Reddy 2015) also found the same in their study. So it can be said that palatal plane in most of the class I and class III patients are almost parallel to the Frankfort Horizontal plane with slight downward and forward rotation. The rotational tedency of maxillary jaw base is very little compare to the mandibular jaw base.

The mean angle between FH plane and occlusal plane was 4.86 º with a standard deviation of 2.92 º.In class III the mean is 5.95 º with a standard deviation of 4.38 º. Though it seems that this value is higher in class III, statistical result shows that there is no significant difference of this value in class I and class III same as found by Osama Bahaa, Md. Fadhli Khamis (Osama 2014). It means occlusal orientation in class I and class III is almost same. The occlusal plane is slightly rotated downwards in both class I and class III patients. The mean angle between palatal plane and mandibular plane is 22.5 º with a standard deviation of 4.46 º in class I and 26.15 º with a standard deviation of 4.77 º in class III samples which was similar to the study done by Gyer , McNamara and Behrents (McNamara 1986) which was 26.2 , Marwan Moukeh (Marwan 2001). This means that mandible is rotated more downward and backward with the maxillary base in class III cases. The mean value of angle between mandibular plane and occlusal plane is 17.36 º in class I with a standard deviation of 3.68 º and 21.40 º in class III samples with a standard deviation of 4.21 º. So this present study showed that this angular value is significantly larger in class III than class I with a p value of 0.0012 which was almost similar to the study of Zegan,

Crastina Gena, R B.Mavru (Zegan 2015). This mean the occlusal plane does not follow the inclination of the mandibular plane. There is compensatory mechanism in the teeth eruption that gives the occlusal plane a proper orientation. The angle between palatal plane and occlusal plane is 5.10 º with standard deviation of 3.52 º in class I. In class III the value is 4.65 º with a standard deviation of 3.85 º. This result is also very similar to the study of Richard Tisdale (4). Though this value is greater in class I, statistical analysis shows there is no significant difference of this value in class I and class III population.

Conclusion

The following conclusion were made from this study. The mean mandibular plane angle is larger in class III than class I. There is no sex difference in class I and class III with this angle. There is no significant difference in FH to palatal plane angle in class I and class III. There is no sex difference in class I but the angular value is more in class III females than males of this angle. There is also no significant difference between Frankfort and Occlusal plane in class I and class III. There is also no sex difference in the both classes. The mean angle between the palatal and mandibular plane is more in class III patients than in class I. But there is no sexual variation. The mean angle between mandibular and occlusal pane is more in class III than class I. But there is no sexual difference. In conclusion it can be said that most of the class III have vertical growth pattern. But few may be of average or even horizontal growth tendency (Range 20º-40º). The class I samples are mainly average grower but they can be horizontal and vertical too. In class III vertical grower the hyperdivergent growth pattern is mainly due to excessive mandibular growth rotation while the maxillary base and occlusal plane grow almost parallel with little clockwise or anticlockwise rotation.

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REFERENCES

Angle EH. 1899. Classification of malocclusion. Dental Cosmos 41: 248-264.

Broadbent, 1931. A new X ray technique and its application to Orthodontia : Angle Orthod 1, 45-86

Downs WB. 1948. Variations in facial relationship; their significance in treatment and prognosis. *Am J Orthod.*, 34:812-834.

Richard Tisdale Sanborns, 1955. Differences between the facial skeletalpatterns of class III malocclusion and normal occlusion. *Angle Orhod.,* 25 :208-222

Herbert I. Margolis, 1947. A basic facial pattern and its application in clinical orthodontics Am j. orthodontics and oral surg. 33: 631.

Sassauni V. 1955. Aroentgenographiccephalometric analysis of cephalo-facio-dental relationships. *Am J Orthod.,* 41: 735-64

Martin Schwarz, 1961. Roentgenostatics; *Am J. Orthod* 47;8

CH Tweed: The diagnostic facial triangle in the control of treatment objectives. Am J orthod 1969;55 :6 ,651-667

Guyer, E. C. E. E. Ellis R. G. 1986. Brhrents,Mcnamara :Components of class III malocclusion in juvenile and adolescents. Angle Orthod 1, 7-29

Ellis, E. Mcnamara, 1984. Componens of Adult class-III malocclusion. *J Oral Maxillifac Surg.,* 42:5,295-305

Marcus Barreto, C.R.M. 2014. Pinzan-Vercelino, Julio De Araujo, F. da S. Bramante: Cephalometric characteristics of class III malocclusion in Brazilian individuals. *Braz J Oral Sci.,* 13(4):314-318

Cai Li, Ying Cai, Sihui Chen, Fengshan Chen: Classification and characterization of class III malocclusion in Chinese individuals. Li et al. Head and Face medicine 2016 ;12(31):1-8

Roodabeh Koodaryan, Ali Rafighi:Components of adult class III malocclusion in an Iranian population. Journal of Dental research, dental clinics,dental prospects 2009;3(1):20-23

Andrew P. Toms :Class-III malocclusion: A cephalometric study of Saudi Arabians .British J. Orthod1989;16:3, 201-206

Chang HP, Kinoshita Z, Kawamoto T. Craniofacial pattern of Class III deciduous dentition. Angle Orthod 1992;62:139-44.

Saad S Gasgood, Ne'am R Al-Salem, K M Awni: Cephalometric features of skeletal class I, II and III (A comparative study).Al-Rafidain Dent J 2007;7:122-130

Reddy, M Akshi Rathee: Reliability of occlusal plane: Determinant of Dentoskeletal framework in Western Uttar Pradesh population. Journal of Dentofacial Sciences 2015;3(4):7-11

Osama Bahaa, Md Fadhli Khamis,Md K Alam: Comparative cephalometric analysis between class III and class I Malay females. International Medical Journal 2014;21(3): 283-86

Marwan Mouakeh : Cephalometric evaluation of craniofacial pattern of Syrian children with class III malocclusion. Am J. Orthod 2001;119:640-49

Zegan G,Mavru RB, Anistoroaei D: Cephalometric features of class III malocclusion. Rev Med Chir Soc Med Nat Lasi 2015 119(4):1153-60

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