


**ORIGINAL ARTICLE****Study to Establish Occlusal Plane Relationship to Three Different Facial Lines**Aneri Doshi<sup>1</sup>, Bankim J. Mistry<sup>2</sup>, Hitesh Doshi<sup>3</sup><sup>1</sup> General Dentist, <sup>3</sup> Prosthodontist, Adarsh Dental Care and Implant Centre, Surat, Gujarat, India<sup>2</sup> Professors, Department of Prosthodontics, Karnavati School of Dentistry, Ahmedabad, Gujarat, India**ABSTRACT:****Introduction:** The aim of the study is to compare the relationship of the occlusal plane to 3 different ala-tragal lines, namely the superior, middle and inferior lines, in individuals having different head forms and its relation to the Frankfort horizontal plane.**Materials & Methods:** A total of 75 lateral cephalometric radiographs of subjects with natural dentition, having full complement of teeth, between the age group of 18-25 were screened and selected. Prior to making the lateral cephalogram, radiopaque markers were placed on the superior, middle and inferior tragus points and on the inferior border of the ala of the nose. Cephalometric tracing was done over each cephalogram. **Results:** In mesiocephalic head form the middle ala-tragal line was most parallel to the occlusal plane having a mean angle of (1.96°). In dolichocephalic headform the superior ala-tragal line was most parallel to the occlusal plane having a mean angle of (0.48°). In brachycephalic head form the middle ala-tragal line was most parallel to the occlusal plane having a mean angle of (2.08°). **Discussion & Conclusion:** The relationship between occlusal plane and Frankfort horizontal plane which is considered a reference line in orienting the maxilla does not vary much in the three different head forms.**Keywords:** Tragus line, FH plane, Facial Lines, Head form.

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This article may be cited as: Doshi A, Mistry BJ, Doshi H. Study to Establish Occlusal Plane Relationship to Three Different Facial Lines. J Adv Med Dent Scie Res 2017;5(9):19-21.

Access this article online	
<b>Quick Response Code</b> 	Website: <a href="http://www.jamdsr.com">www.jamdsr.com</a>
	DOI: 10.21276/jamdsr.2017.5.9.05

**I**ntroduction  
 In complete denture prosthodontics facial and functional harmony is achieved when teeth are set in their proper relation. Orientation of the occlusal plane is an essential part of clinical complete denture preparing procedures.<sup>1</sup> Considering the importance of the accurate establishment of its location and the effect of its inclination on function, aesthetics and speech, a method to guarantee its conformity with the occlusal plane of the missing teeth seems necessary.<sup>2</sup> Estimation of the occlusal plane is an important clinical procedure in the care of complete denture prosthetic patients. In all cases where stable contact of the dental arches has been lost, it is necessary to reconstruct intermaxillary relations in the vertical and horizontal dimension, and to establish the occlusal plane.<sup>3</sup> The main consideration with regard to the occlusion of the artificial teeth is to find a compromise between biological requirements, which the denture must satisfy as part of a live and dynamic area, and static principle on which the stability and durability of the denture depends. At the end of the growth period the individual shape of occlusion forms, which is characteristic for each person. Such an occlusal complex is a presupposition for normal functioning of the whole system, particularly the function

of mastication and speech.<sup>4</sup> The basic neuromuscular activity in the stomathognathic system, conditioned by inheritance and determined throughout life, is maintained after loss of teeth. It is possible to restore it by making dentures which reconstruct the previous, original plane of occlusion. Reconstruction of individual inclination of the occlusal plane, based on relations with the referent plane, is an essential precondition for successful therapy.<sup>5</sup> Though Camper's line is the most commonly used extraoral land mark to establish occlusal plane in edentulous subjects, it still remains controversial. This controversy is primarily due to the disagreement on the exact point of reference on the tragus (superior, middle or inferior) to establish the ala-tragal lines. This study is aimed at comparing the relationship of the occlusal plane with three different ala-tragal lines, namely the superior, middle and inferior lines, in individuals.

**Materials & Methods:**

75 dentulous subjects were screened and selected from the outpatients and students of Dental College. Inclusion criteria of the individuals were as follows: Patients with full complement of teeth (third molar excluded), Age group of subjects between 18 to 25 years, Subjects were grouped according to their head forms, having an equal

distribution of 25 each in three different groups namely- mesiocephalic, dolichocephalic and brachycephalic. Whereas exclusion criteria were as follows: Subjects having undergone any orthodontic treatment, Malocclusion, Periodontal disease, Tooth attrition.

Lateral cephalograms were made for each of the subjects in an open mouth position. Prior to making the lateral cephalogram 1mm diameter lead sticker were placed on the superior, middle and inferior tragus points and on the inferior border of the ala of the nose. The patients were positioned on the cephalostat as mentioned in its operator manual (color plate-1). Right side lateral cephalogram were made for each subject. The cephalogram thus obtained were subjected to cephalometric tracing using standard protocols and the following skeletal reference lines were traced.( color plate-2 and 3)

a) Frankfort horizontal plane (FH plane) – Line connecting the portion to orbitale.

b) Occlusal plane (OP) - Line connecting the tip of the maxillary central incisor to the cusp tips of the maxillary first molar.

c) Ala tragal lines- Lines connecting the superior, middle and inferior points of the tragus to the ala of the nose, as established by the radiopaque markers.

SAT-Superior ala tragal line.

MAT-Middle ala tragal line.

IAT- Inferior ala tragal line.

The relative parallelism between the occlusal plane to three different ala tragal lines and Frankfort horizontal plane were studied by measuring the angle between them. The angles were measured with the help of a scale and protractor

**Statistical Analysis**

Data was analyzed using one sample ‘t’ test and ANOVA test

**Results:**

**Table 1:** Statistical summary of the angular relationship of occlusal plane to SAT, MAT, IAT and FH Plane in Mesiocephalic head form

Occlusal Plane	Mean	Stddev	SE of Mean	P-Value
SAT	-3.12	4.48	0.90	0.001*
MAT	1.96	3.97	0.79	0.011*
IAT	2.64	3.84	0.77	0.001*
FH plane	11.04	1.54	0.31	<0.001*

The tabulated results in table-1 shows that there exist a statistically significant difference between the angles formed by the three ala tragal lines and FH plane to the occlusal plane in mesiocephalic head forms. But since the mean angle between the middle ala-tragal line (MAT) to occlusal plane was the least or closer to zero (1.96°). It can be considered as being most parallel to the occlusal plane in mesiocephalic head form and this co-relation has been confirmed statistically.

There exist a statistically significant difference between the angles formed by the three ala tragal lines and FH plane to the occlusal plane in mesiocephalic head forms. But since the mean angle between the middle ala-tragal line (MAT) to occlusal plane was the least or closer to zero (1.96°). It can be considered as being most parallel to the occlusal plane in mesiocephalic head form and this co-relation has been confirmed statistically.

there exist a statistically significant difference between the angles formed between the three ala tragal lines and FH plane to the occlusal plane in brachycephalic head forms. Since the mean angle between the superior ala-tragal line (SAT) to occlusal plane was least (2.08°), it can be considered as being most parallel to the occlusal plane in brachycephalic head form, which has been confirmed statistically.

**Table 2:** Statistical summary of the angular relationship of occlusal plane to SAT, MAT, IAT and FH plane in Dolichocephalic head form

Occlusal plane	Mean	Std. deviation	SE of Mean	P-Value
SAT	0.48	2.33	0.47	0.268
MAT	1.56	2.60	0.52	0.003*
IAT	4.28	3.34	0.67	<0.001*
FH plane	10.16	0.80	0.16	<0.001*

**Discussion:**

The parallelism of occlusal plane to ala tragal line may also thus vary in different head forms viz the mesocephalic, dolichocephalic and the brachycephalic. Thus this study was aimed at comparing the relationship of the occlusal plane to 3 different ala-tragal lines, (SAT, MAT and IAT) to evaluate the ala tragal line that is most parallel to occlusal plane in individuals having different head forms and to verify the relation of the occlusal plane to the Frankfort horizontal plane.<sup>1</sup>

The study comprised of three groups of subjects viz mesiocephalic, dolichocephalic and brachycephalic head forms who were evaluated separately. The sample sizes in each group were 25 subjects. The subject who met all the inclusion

and exclusion criteria were included in the study. Students and the patients from OPD of Dental College were selected and grouped according to their head forms, viz-mesiocephalic, brachycephalic and dolichocephalic.

The cephalic index for each of these head forms was calculated. Cephalic index is the ratio of the maximum width to maximum length of the head multiplied by 100. For dolichocephalic head form, the cephalic index should be less than 75.9mm. 76.0mm to 80.9mm for mesiocephalic head form and 81.0 to 85.4 for brachycephalic head form.

From the result obtained it may be concluded that, the middle ala tragal line (MAT) is more parallel to occlusal plane in mesiocephalic head form and the average angulation between occlusal plane to FH plane is 11.04 degrees. These results were statistically significant. From the result obtained it may be concluded that, the superior ala-tragal line (SAT) is more parallel to occlusal plane in dolichocephalic head form and the average angulation between occlusal plane to FH plane is 10.16 degrees and these results were statistically significant. From the result obtained it may be concluded that, the superior ala tragal line (SAT) is more parallel to occlusal plane in brachycephalic head form and the average angulation between occlusal plane to FH plane is 10.60 degrees and these results were statistically significant.

Hence from the present study it may be concluded that the middle ala-tragal line could be taken as a reference line to establish the occlusal plane in mesiocephalic head forms and the superior ala-tragal line as the reference line to establish the occlusal plane in dolichocephalic and brachycephalic head forms.

The current study was in partial accordance with the studies done by different authors in the orientation ala tragal lines to occlusal plane. As the study was done to verify the variation in the ala tragal lines to the occlusal plane in individuals with different head form, this could provide a benchmark in suggesting which of the ala tragal line could be selected to establish the occlusal plane after verifying the individual head form viz- mesiocephalic, dolichocephalic and brachycephalic, as the study suggests, the middle ala tragal line may be considered as a reference plane in establishing occlusal plane in mesiocephalic head form and superior ala tragal line may be considered as a reference plane in establishing occlusal plane in dolichocephalic and brachycephalic head forms

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**Source of support:** Nil

**Conflict of interest:** None declared

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