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Analysis of Tweed’s Facial Triangle in Black Brazilian youngsters with normal occlusion

Abstract
A cephalometric study was carried on a sample of 37 Black youngsters of both genders (16 males, 21 females), descending from Black Brazilian parents or grandparents, age varying from 10 to 14 years, from the city of Piracicaba, Brazil, and all of them with normal occlusion. None of them has ever undergone orthodontic treatment. This study aimed to ascertain the mean values for the cephalometric measures which take part on the Tweed’s Facial Triangle: FMA, FMIA and IMPA, and we also tried to verify the occurrence of sexual dimorphism in this ethnic group. Statistical analysis (Student’s test, 5%) of the results show that this ethnic group presented lower incisors with greater inclination and a more convex facial profile, but no sexual dimorphism.

Key Words:
cephalometrics, normal occlusion; Orthodontics

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Introduction
The introduction of cephalometric radiographs and the arrival of cephalometric analyses have extraordinarily aided orthodontic diagnosis procedures, allowing accurate evaluations of skeletal relations of patients with different types of malocclusion.
Tweed’s Facial Triangle is a feasible diagnosis, classification and prognosis establishing method. Tweed has linked the inclination of the lower incisor to Frankfurt horizontal plane. If FMA has a value of 30º or greater, FMIA value must measure 65º; if FMA measures 25º +/- 4º, FMIA must have 68º, and if FMA is lower than 20º, IMPA should not be greater than 94º1-2.
The variability of craniofacial characteristics of different ethnical and racial groups was described in many studies which mention to adopt mean normal values for each specific ethnic group as a reference3-8. Thus, every group should be separately evaluated, considering their individual characteristics. Black patients present a more protruded upper jaw, in relation to the cranial base, and more inclined upper and lower incisors than White patients3,9-11.
Brazilian individuals also present other different craniofacial characteristics from North Americans: incisors are more protruded and labial tipped, and the facial profile is more convex5,8,12.
This study aimed to verify the mean values of cephalometric measures which constitute the Tweed’s Facial Triangle: FMA, FMIA and IMPA, and also to verify the existence of sexual dimorphism in Black subjects.

Material and Methods
The sample was formed from the files of the Scientific Sector of Documentation of the Postgraduation Course in Orthodontics, Piracicaba Dental School, UNICAMP, and comprised 37 lateral telerradiographs and dental casts, all from Brazilian 10-14 years-old subjects of both genders (16 males, 21 females), from Piracicaba – SP, who were descendants from Black parents/grandparents; these subjects have never undergone orthodontic treatment before and presented excellent occlusion, with Class I molar and canine relationships and ANB ranging from 1 to 3º.
Cephalometric tracings were performed on standard acetate paper (17.5 x 17.5 cm and 0.07 mm thickness) with a 0.3mm graphite mechanical pencil, transparent ruler to the nearest 0.5 mm, protractor to the nearest 0.1º, template, adhesive tape and illuminator. All tracings were performed in a darkened room, by the same researcher. Anatomical structures of skull and face were outlined, and the central lower incisor longitudinal axis, Frankfurt horizontal plane and mandibular plane were traced, in order to build the Tweed’s Facial Triangle and its cephalometric measures, FMA, FMIA e IMPA (Figure 1).
Results were submitted to statistical analysis (Student’s test at 5%), in order to obtain mean values and standard deviations.

Results
Following data were collected, and means and standard deviations were calculated for both genders (Table 1, Figure 2). All results were submitted to the Student’s test in order to verify the existence of sexual dimorphism. According to the test, our sample did not present sexual dimorphism. Mean values and standard deviations are listed on Table 2.

Table 1 - Mean values and standard deviation for both genders

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th>Males</th>
<th></th>
<th>p(t test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMA (mean)</td>
<td>27.375</td>
<td>5.084</td>
<td>30.875</td>
<td>8.115</td>
<td>0.1562</td>
</tr>
<tr>
<td>FMIA (mean)</td>
<td>52.938</td>
<td>7.5764</td>
<td>8.875</td>
<td>8.663</td>
<td>0.1682</td>
</tr>
<tr>
<td>IMPA (mean)</td>
<td>99.500</td>
<td>4.412</td>
<td>100.250</td>
<td>4.539</td>
<td>0.6390</td>
</tr>
</tbody>
</table>

Fig. 1 - Tweed’s Facial Triangle

Fig.2 – Mean values of the Tweed’s Triangle of both genders.
Table 2 – Mean and standard deviation of all sample.

<table>
<thead>
<tr>
<th></th>
<th>mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMA</td>
<td>29.125</td>
<td>6.894</td>
</tr>
<tr>
<td>FMIA</td>
<td>50.906</td>
<td>8.267</td>
</tr>
<tr>
<td>IMPA</td>
<td>99.875</td>
<td>4.419</td>
</tr>
</tbody>
</table>

Discussion
The advent of cephalometric radiographs enabled to study the craniofacial bones as a whole. Since then many studies and researches have been raised in the field of cephalometrics, and thus have originated many cephalometric analyses which have assisted orthodontic diagnosis and treatment planning. However, one must remember that most of these cephalometric values were standardized from North American subjects. Brazilians present different facial characteristics8-12, specially those of Black ascendency, who constitute a significant portion of Brazilian population, and present a bimaxillary protrusion as an inherent and esthetically acceptable characteristic of this ethnic group3,9-11.

The values which were obtained for the current study differ from those established by Tweed, who stated that ultimate facial esthetics and balance are achieved only when lower incisors are vertically positioned on the basal bone with IMPA at 90º +/- 5º, thus disagreeing with our present results, where IMPA showing a mean value of 99.87º. Our results showed that there is a greater dental protrusion and a more convex facial profile in Brazilian Blacks, which was confirmed by the excessive labial tipping and lower incisor protrusion when in comparison to White subjects3,9-10,13. Thus, it is important that orthodontic treatment planning considers the ethnical factor. This statement seems much more relevant, specially when the treatment planning includes tooth extractions.

Conclusion
According to our proposal and by the results obtained from the studied sample, our conclusions are:
• Brazilian Black subjects present a greater inclination of lower incisors and a more convex facial profile when related to White ones, that represent inherent ethnic characteristics;
• There is no sexual dimorphism.

References