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Norms for Jharkhand population using tweeds analysis

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Abstract
Objective: This study comprised of creating norms for Jharkhand population using tweeds analysis.
Materials and Methods: The study sample consisted of Standardized lateral cephalograms obtained from 100 subjects (50 males and 50 females) belonging to Jharkhand population of 18-25 years comprising of normal occlusion and pleasing facial profile. Tweeds cephalometric analysis was performed and difference between male and female samples was recorded. Mean values were evaluated and compared to Caucasian population and norms were created for Jharkhand population.
Results: Mean FMA value for females was found to be significantly higher than that of males (t48 = 2.97; $p<0.01$) and the mean value of IMPA for males was significantly higher than that of females (t48 = 2.45; $p<0.01$). However, no statistical difference was seen when compared to Caucasian population.
Conclusion: Results showed no statistical difference between the Jharkhand population and the Caucasian population but difference were observed between the male and female population.

Keywords: Jharkhand, Caucasian, tweeds analysis

Introduction

Cephalometrics being an indispensable tool can be utilized to describe, compare and classify the nature of orthodontic problems. Since its inception, different analysis have been introduced and their corresponding norms have been formulated by various authors for interpretation. Though many analysis were all developed, the cephalometric norms and analyses were constrained only to the Caucasian population. Thus, with time it became apparent that cephalometric standards for one ethnic group did not necessarily apply to other ethnic groups.

Dr Charles Tweed developed the Diagnostic facial triangle using three planes namely Frankfort horizontal plane, mandibular plane and long axis of lower incisor. In 1946, Tweed introduced the Frankfort Mandibular plane angle (FMA) which, as the name indicates, is formed between Frankfort horizontal plane and the mandibular plane. The angle is an indicator of prognosis according to Tweed (1946) [2]. The mean value of Frankfort Mandibular plane angle for Caucasian population as developed by Tweed is 24.57±3.27 degrees. The Second Angle is Frankfort mandibular incisal angle (FMIA). He established a standard of 68 degrees for individuals with a Frankfort mandibular angle (FMA) of 22 to 28 degrees. The standard should be 65 degrees if the FMA is 30 degrees and above, and FMIA increase if the FMA is lower. Tweed believed that this value was significant in stabling balance and harmony of the lower face. The third and most important measurement is Incisal mandibular plane angle (IMPA). It is the angle between the axial inclinations of incisor in relation to the mandibular plane. The standard of 88 degrees indicates an upright position of lower incisors. With a normal FMA this position reflects optimum balance and harmony of the lower facial profile. Though many studies using tweed's analysis have been conducted and norms are created for the various populations in India, no studies are done for Jharkhand population. The purpose of this study is to establish the Tweed's norms for Jharkhand population, compare the values between the male and female samples as well as to compare with the Caucasians.

Materials and Method

The materials used in this study consist of cephalometric radiographs of 100 subjects (50 males and 50 females) developed from Kodac 8000C (85 kVp-10mA) in the natural head position. The cephalograph obtained were traced using conventional tracing technique for which the tweeds analysis were performed.

The criteria for the selection of the sample were:

1. Male and female belonging to Jharkhand state aged between 18 to 25 years
2. Class I molar relationship
3. Normal over jet and overbite
4. No history of previous Orthodontic treatment,
5. Harmonious profile,
6. Resident of Jharkhand.
7. No congenital or acquired malformations of the skeletal or dental origin

The following three planes that form Tweed's diagnostic triangle were used.

1. Frankfort horizontal plane: Line joining from external auditory meatus to orbitale
2. Mandibular plane: Line passing tangent to the lower border of mandible
3. Long axis of lower incisor.

The following three angles formed in Tweed's triangle (Fig. 1) were measured

1. Frankfort Mandibular plane Angle (FMA),
2. Frankfort Mandibular Incisal Angle (FMIA),
3. Inciso Mandibular Plane Angle (IMPA)

Statistical analysis

Microsoft Excel was used for data management. Descriptive statistics, including the mean, standard deviation and the range were computed for each variable. The paired t- test was performed to compare the sexual differences within the sample. The t- test was also used to compare the racial difference with the Steiner's means. The statistical significance for all the tests carried out was defined as $p<0.05$.

Results

Table 1: Range, mean, standard deviation of Jharkhand male subjects

Measurement	Min	Max	Mean	SD
FMA	18	39	23.86	4.41
FMIA	43	69	60.18	6.46
IMPA	84	105	95.88	6.96

Table 2: Range, mean, standard deviation of Jharkhand female subjects

Measurement	Min	Max	Mean	SD
FMA	15	38	27.82	5.01
FMIA	42	75	58.04	7.02
IMPA	85	105	91.14	6.74

Table 3: Test of significance for the difference between two groups

Measurement	Male	Female	Significance
FMA	23.86	27.82	0.01
FMIA	60.18	58.04	0.05
IMPA	95.88	91.14	0.01

Table 4: Combined range, mean, standard deviation of Jharkhand male and female subjects

Measurement	Male	Female	Mean	SD
FMA	23.86	27.82	26.83	5.9
FMIA	60.18	58.04	59.66	6.8
IMPA	95.88	91.14	93.60	5.8

Table 5: T-test of significance for the difference between Jharkhand subjects and Caucasian population.

Measurement	Caucasian	Nepalese	P-value	Significance
FMA	25	28	.001	Significant
FMIA	65	57	.001	Significant
IMPA	90	95	.001	Significant

Results

The Result Obtained Are Tabulated In Tables 1 to 4. The study included 100 samples comprised of 50 males and 50 females subjects in the age group of 18 to 25 years. The range, mean and standard deviation of all the Tweed's parameters of male and female are depicted in Table-2, 3. Table-4 analyzes the statistical difference along with the combined mean value of male and female subjects of Jharkhand population while Table-5 analyzes the statistical difference between Jharkhand subjects and Caucasian. Table-5 shows combined values of Jharkhand population to that of Caucasian population.

Discussion

An orthodontic treatment planning depends vastly on the accuracy of the measurement of the inter jaw relationships in the sagittal plane.

The present study which was aimed at establishing tweeds norms for Jharkhand population by comparison with the Caucasian population, was based on a large sample of 18 to 30 -year-old individuals representing its original population. The mean values obtained by tracing of the cephalographs by the dolphin imaging software 11.8. e results showed no statistical difference between the male and female subjects of Jharkhand. But when compared to that of Caucasian population, statistical difference existed between the two populations. Various authors reported ethnic differences in cephalometric variables between the populations belonging to the Asian and Caucasian ethnicity [2]. However, the correlation of the mean values for tweeds analysis in subjects possessing a class I malocclusion of Jharkhand and Caucasian population groups concludes the relative difference that exist in the facial features between the two population.

Conclusion

The present study can be concluded as follows

- No statistical significant difference for the FMA, IMPA, FMIA measures exists in the male and female subjects of Jharkhand population.
- Statistical significant difference exists in the FMA and IMPA angle of tweeds analysis in the Jharkhand population when compared to that of Caucasian population.

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