

ESTABLISHING CEPHALOMETRIC NORMS FOR COASTAL ANDHRA CHILDREN WITH STEINER'S ANALYSIS

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ABSTRACT: The purpose of this study was to establish Cephalometric norms for Coastal Andhra school going children by Steiner analysis and compare with Caucasian norms. The method involved clinical examination, collection and analysis of 100 lateral cephalometric radiographs of Vijayawada children (70 males and 30 females, between 12 and 14 years of age). All cephalometric landmarks were located and tracing was done according to Steiner analysis. The mean value and standard deviation of each measurement were calculated. Statistical comparison was done using Student t-test. The result of this study showed that the Vijayawada children had retrusion of mandible relative to cranial base, proclination of bothmaxillary and mandibular teeth, showed greater convexity of face, with anteriorly placed occlusal plane to cranium and less prominent chin. In conclusion, all these ethnic differences should be considered during orthodontic treatment.

KEYWORDS: Lateral cephalometric radiograph, Steiner analysis, Coastal Andhra children, Cephalometric norms

INTRODUCTION

A thorough knowledge about craniofacial skeletal and dental inter relationship is necessary to the Orthodontist for understanding and setting goals for Orthodontic and functional jaw Orthopedic treatment. An important concept in the study of growth and development is variability. Everyone is not alike, in the way that they grow as in everything else. It can be difficult, but clinically very important to decide whether an individual is merely at the extreme of the normal variation or falls outside the normal range. Instead of categorizing people as normal or abnormal, it is more useful to think in terms of deviations from usual patterns and to express variability quantitatively. Radiographic cephalometrics was introduced & popularized in 1934 by HOFRATH in Germany and BROADBENT in US, is a radiographic technique of measuring the human skull into a geometric scheme and has become an important part of morphological diagnostic procedures to assess craniofacial growth and development. It allows changes associated with growth to be observed. To diagnose and classify a malocclusion, the measured values of cephalometric parameters are compared with standard values.

Cecil Steiner (1953)² published a method of interpreting both the hard and soft tissues using cephalometric radiographs. Steiner analysis offered specific guides for use of Cephalometric measurement in treatment planning and displayed measurements in a way that the interrelationship between them into a pattern.

Steiner proposed the appraisal of various parts of the skull separately, namely the skeletal, dental and soft tissue. The skeletal analysis relates the upper and lower jaws to the skull and to each other. The dental analysis relates the upper and lower incisor teeth to their respective jaws and to each other and the soft tissue analysis provides the balance and harmony of the lower facial profile.

The craniofacial features can be genetic, nutritionally acquired or dietary patterns acquired from parents and can be specific to some ethnic, racial, sub racial. As the awareness about Orthodontic treatment has increased in recent times, its become inevitable to determine pleasing or normal face for children of Coastal Andhra region. A comprehensive and accurate diagnostic assessment of any orthodontic patient involves the comparison of the patient's cephalometric findings with the norms of his or her ethnic groups or racial groups or subgroups.

Aims and Objectives

- To determine cephalometric norms for Coastal Andhra Children (males and females) of Vijayawada between the age group of 12 and 14 years using Steiner's analysis.
- To compare values obtained for Coastal Andhra children using Steiner's analysis with the values/norms given by Steiner for Caucasian population.



Fig.1-cephalostat



Fig-2-Lateral cephalogram



Fig-3- Armentarium

Materials and Methods

This cephalometric radiographic study was carried out for the children of age group of 12 to 14 years of different schools in Vijayawada and coastal Andhra region.

Method of Collection of Sample

- Patients with Angle's class I occlusion
- Normal overjet and overbite
- Competent lips
- Children with good health
- Consent from the parents of each children has been taken
- With pleasing facial features.
- Children with minimal or no mal occlusion.

Radiographic Technique

For standardization of Cephalometric radiographs, it is important that all the radiographs have to be obtained with same orientation of patient and also same amount of magnification. For this purpose all the lateral Cephalometric radiographs were obtained from the

standardized OPG machine with a Cephalostat on a standard 8 × 10 inch film with an anode- to-mid subject distance of 5 feet in Government Dental college & Hospital, Planmeca make machine. Patients were asked to look straight in a long mirror which was placed in front of them and plumb line was placed on right side of the subject to obtain natural head position (Fig. 1). Lead apron was worn by the subject to reduce radiation exposure (Fig. 2). All the films were exposed with 80 KVp, 7.5 mA and an exposure time of 2.5 seconds.

All the radiographs were traced on a standard matte acetate tracing paper in a random order by a single operator in order to reduce bias (Figs 3 and 4). Each landmark and point was rechecked and then Steiner's analysis was done. Routine Equipments for tracing like Lead acetate tracing paper, scale, eraser, protractor, pencil have been used

Results

The results with mean values and S.D. are tabulated (Table-1)

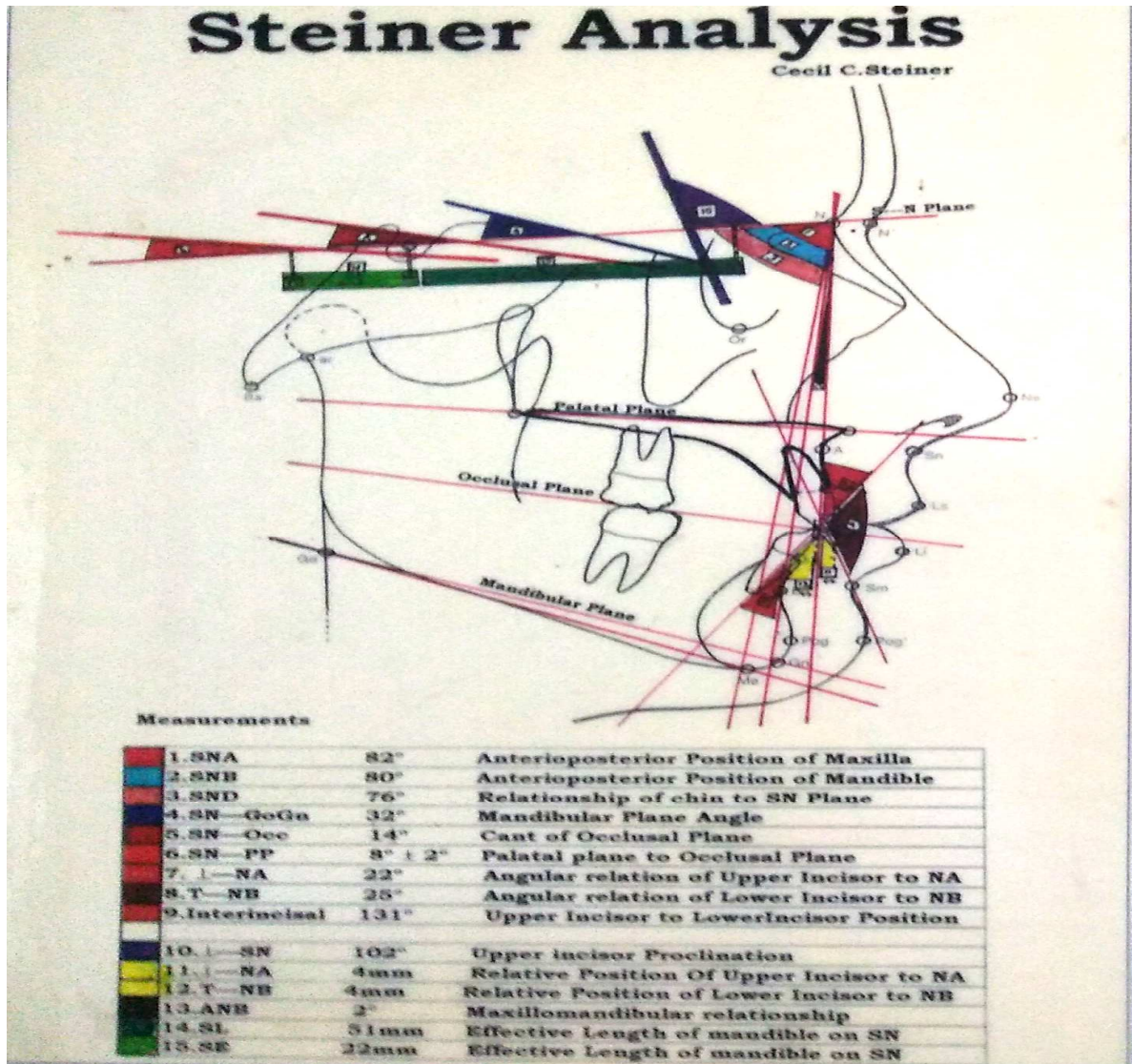


Fig.4. Steiners Analysis-parameters

Discussion

This study was carried out to determine Cephalometric norms for Coastal Andhra children of Vijayawada between the age group of 12 and 14 years. The ranges of most of the dimensions of the present study were significantly different than those obtained by Steiner, though all selected individuals had a pleasant appearance and good facial harmony.

SNA angle: The mean value of SNA angle in the present study was slightly less in Coastal Andhra children, i.e. (81.06° ± 2.93°) than those presented by Steiner (82 ± 2°),² indicating maxillary retrusion relative to cranial base for Coastal Andhra children as compare to those given by Steiner. The measurement of SNA angle for Coastal Andhra children (81.06 ± 2.93°) is in agreement with the study done by Chandranee³ (1982) on North Indian children (SNA-81.6°).

SNB angle: The mean value of SNB angle in the present study was significantly less in Coastal Andhra children (77.15° ± 2.52°) than those presented by Steiner (80 ± 2°),² indicating mandibular retrusion relative to cranial base. The SNB angle found in present study is in agreement with the studies done by Chandranee³ (1982), (SNB-78.5°) and Kharbanda OP⁴ et al, (1989), (SNB-78.52°) on North Indian and Aryo- Dravidians respectively

ANB angle: The mean value of ANB angles for Coastal Andhra (3.05 ± 1.38°) children was slightly more than those presented by Steiner² (2°), indicating greater convexity. This is in agreement with the study done by Chandranee³ (1982) on North Indian children (ANB-3.12°), Anuradha⁵ et al (1990) on North Indian preschool children (4.95°) and Abraham KK⁶ in (2001) on children of South Kanara (ANB- 3.2°) significant difference of ANB angle in all these studies was found when compared with those presented by Steiner.

Table 1: Cephalometric norms for children using Steiner's analysis (derived from 100 children)

Parameters	Min	Max	Mean	SD
SNA angle	73°	89°	81.06°	2.93°
SNB angle	69°	87°	78.01°	2.52°
ANB angle	1°	6°	3.05°	1.38°
Occlusal angle	14°	24°	19.73°	1.52°
Mandibular plane angle	24°	33°	30.36°	1.59°
Maxillary incisor (angular)	14°	34°	23.98°	5.19°
Maxillary incisor (mm)	0	11	5.11	2.39
Mandibular incisor (angular)	18°	37°	28.36°	4.18°
Mandibular incisor (mm)	1	11	5.345	2.07
Interincisal incisor angle	103°	140°	123.63°	7.19°
Lower incisor to chin (mm)	-2	4.5	1.71	1.38

Occlusal plane angle: In the present study, the mean of occlusal plane angle for Costal Andhra ($19.73^\circ \pm 1.52^\circ$) children showed a significant difference than measurements given by Steiner (14°).² This indicates more anteriorly placed occlusal plane as compared to those given by Steiner. This is in agreement with the study done by Anuradha⁵ et al (1990) on North Indian preschool children (occlusal angle— 21.7°) which is greater than those presented by Steiner.

Mandibular plane angle suggests growth patterns in individuals, the mean values of this angle for Costal Andhra ($30.36 \pm 1.59^\circ$) children was slightly less than those presented by Steiner² (32°). This finding is in agreement with the study done by Joshi⁷ (1975) on dentofacial patterns of Gurkhas (mandibular plane angle— 29.7°) and Kannappan JG⁸ et al (1976) on Madras population (mandibular plane angle— 31.0°), where mandibular plane angle was lesser than the value given by Steiner.

Maxillary incisor position represents the relative location and axial inclination of the upper incisors. The upper incisor to N-A reading in degrees indicates the relative angular relationship of the upper incisor teeth to N-A line, the mean value of maxillary incisor position in degrees in present study for Costal Andhra ($23.98 \pm$

5.19°) children is significantly higher than those presented by Steiner indicating more labial inclination of maxillary teeth in Costal Andhra children. The upper incisors to N-A reading in millimeters provides information on the relative forward or backward positioning of the incisor teeth to N-A line, the mean value in present study for Costal Andhra (5.11 ± 2.39 mm) children is significantly higher than those presented by Steiner indicating more forward positioning of maxillary teeth in Costal Andhra children.

This finding is in agreement with the study done by Valiathan A⁹ (1975) on Indian population in which she had concluded that the teeth of people from India were more labially placed. This finding is also in agreement with the study done by Kannappan JG⁸ et al (1976) on Madras population (Angular measurement 23.5° , linear measurement 4.2 mm) and also study done by Chandranee³ (1982) on North Indian children (angular measurement- 24.9° , linear measurement- 4.9 mm) where both the angular and linear measurements were more as compared to those given by Steiner.

Mandibular incisor position represents the relative anteroposterior location and angulation of the lower incisor teeth. The lower incisor to N-B line in degrees indicates relative angular relation. The mean value of mandibular incisor position in degrees in present study for Costal Andhra ($28.36 \pm 4.18^\circ$) children is significantly higher than those presented by Steiner indicating more labial inclination of mandibular teeth in Costal Andhra children. The lower incisors to N-B reading in millimeters provides information on the relative forward or backward positioning of the incisor teeth to N-B line, the mean values in present study for Costal Andhra (5.34 ± 2.07 mm) children is significantly higher than those presented by Steiner, indicating more forward positioning of mandibular teeth in Costal Andhra children.

This finding is in agreement with the study done by Valiathan A⁹ (1975), Valiathan A¹⁰ (1976) on Indian population in which she had concluded that the incisor teeth of people from India were more labially placed. This finding is also in agreement with the study done by Kannappan JG⁸ et al (1976) on Madras population (angular measurement- 26° , linear measurement— 5.2 mm) and also in a study done by Chandranee³ (1982) on North Indian children (angular measurement— 27.8° and linear measurement 6 mm) where both the angular and linear measurements were more as compared to that given by Steiner.

Interincisal angle relates the relative position of the upper incisor to that of the lower incisors. The mean value of interincisal angle in present study for Costal Andhra ($123.63 \pm 7.19^\circ$) children is significantly lower than those given by Steiner, indicating proclined maxillary and mandibular teeth.

This finding is in agreement with the study done by Nanda R¹¹ et al (1969) on North Indians in which they had reported acute interincisal angle suggesting more vertical incisors in North Indians, Valiathan A⁹ (1975) on Indian population (Interincisal angle-119°) in which she had concluded that the incisor teeth of people from India were more labially placed.

This finding is also in agreement with the study done by Elbe P¹² et al (2000) in which it was found that interincisal angle was less for North Indians as compared to Caucasians and was concluded that North Indians have more proclined lower incisors as compared to Caucasians and also most of our values are significantly correlating with the values of Ambika Singh et al¹³.

Lower incisor to chin indicates the prominence of chin when compared with lower incisors. The mean value of lower incisor to chin in present study for Coastal Andhra (1.71 ± 1.38 mm) children is significantly lesser than those presented by Steiner (4 mm), indicating less prominence of chin to lower incisors for Coastal Andhra children as compared to those given by Steiner.

CONCLUSION

Coastal Andhra children showed retrusion of mandible relative to cranial base

- Coastal Andhra children showed Greater convexity of face.
- Coastal Andhra children showed anteriorly placed occlusal plane to cranium
- Coastal Andhra children showed proclined maxillary and mandibular teeth
- Coastal Andhra children has less prominent chin. As we found more convexity of face in the study, can be due the remnant of late latent mandibular growth. However further study on grown individuals is needed as our sample has more of male children who may have residual growth when compared to female children who were in less number.

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