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A Study Of Facial Morphometry Amongst Children With Congenital Hearing Impairment From An Urban Area Of Mumbai, Maharashtra, India.

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ABSTRACT

Facial reconstruction for forensic purpose or in plastic surgery is a scientific art and requires visualizing faces on bony framework of face. To achieve this lofty goal baseline data on facial parameters and indices will be helpful. Anthropometric studies on face have been found useful in craniofacial surgery, Otorhinolaryngology, Syndromology, Orthodontic and in reconstruction of face from skull in medico-legal cases. Scarcity of data on facial morphometry in Indian population prompted this study. To have the facial morphometric database in children with congenital hearing impairment and normal children. Present study was descriptive study with total 1600 students, aged between five to fifteen years were selected as the subjects for the study. Among the 1600 students, 800 were from schools for congenital hearing impaired students and 800 were from normal schools of urban area. Two measurements: morphological facial height and facial width were taken by using digital vernier calliper and spreading caliper respectively. Facial classification according to Martin Saller Scale in 5 to 10 years majority control group as well as majority Hearing Impaired group have Hyerleptoproscopic type of faces. In 10 to 15 years Age Group control as well in hearing impaired groups majority of males have Hyperleptoproscopic type of faces. In 5 to 10 years Control females have Leptoproscopic type of face whereas in Hearing Impaired females have majority of Hyperleptoproscopic type of face. In 10 to 15 years Control females as well as and Hearing-Impaired Females have Hyperleptoproscopic type of face. 5 to 10 years: Hearing Impaired males and females and control group males also shows Hyperleptoproscopic type of faces. Normal females show Leptoproscopic type of faces. 10 to 15 years: As the age advances from 5 to 15 years, in control as well as in Hearing Impaired groups the shape of the face does not change besides control group females shows Hyperleptoproscopic type of face from Leptoproscopic type of face

Keywords: Morphological facial height, facial width, Facial index, type of faces

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INTRODUCTION

Facial reconstruction for forensic purpose or in plastic surgery is a scientific art and requires visualizing faces on bony framework of face [1]. To achieve this lofty goal baseline data on facial parameters and indices will be helpful. Anthropometric studies on face have been found useful in craniofacial surgery, Otorhinolaryngology, Syndromology, Orthodontic and in reconstruction of face from skull in medico-legal cases [2].

Even medical illustrators use this information while reconstructing normal facial appearances [3]. Manufacturer's producing objects of daily wear; defence and medical equipment's are also benefited from the anthropometric data [4]. Forensic facial approximation is the process by which an individual's face is reconstructed from the skull. Various guidelines are used to determine certain characteristics of facial features such as the width and position of the mouth [5-7]. and also position of the eyeball [8]. Thus, the significance of various facial anthropometric (morphometric) measurements in facial reconstruction surgery, rhinoplasty and in forensic medicine are beyond doubt. Physical anthropologist has in recent years become increasingly concerned with the dimensions, proportions and shape of man's immediate physical environment. They have made significant contributions in formulating standard sizes for various equipments used in defence services as well as production of industrial goods, anaesthetic and equipment etc [9].

It is apparent that what is considered beautiful and acceptable for one culture may differ for another culture.Scarcity of data on facial morphometry in Indian population prompted this study and is an attempt to have facial morphometric database to find the differences of facial growth in children with congenital hearing impairment (since they are known to have hyper-nasal voice) [10] and its comparison with normal children of 05 to15 years from an urban area.

MATERIAL AND METHODS

The present study entitled "A study of facial morphometry amongst children with congenital hearing impairment from an urban area of Mumbai" conducted for duration of 2 years. The age groups for the study were divided into two age groups viz. i) 5 -10 years and ii) 10 - 15 years.

Subjects for the study were selected by random sampling from schools of children with congenital hearing impairment as well as normal children as a control group from schools of an urban area.

The field work was carried out at respective schools for hearing impaired children and schools for normal children.

The subjects consist of 400 males and 400 females of each age group with total number of subjects were 1600, distributed as follows:

- Children with congenital hearing impairment = 400 subjects (200 males and 0 females of age group 5 to 10 years)
- Normal Children = 400 subjects (200 males and 200 females of age group 5 to 10 years)
- Children with congenital hearing impairment = 400 subjects (200 males and 200 females of age group 10 to 15 years)
- Normal Children = 400 subjects (200 males and 200 females of age group 10 to 15 years)

External facial measurements were taken after approval of institutional and university Ethical Committees. Written informed consent were obtained from parent of subjects since all the subjects were minor however in addition ascent was also obtained from the subjects between 7 to 15 years prior to the measurements [11].

Material used in the study are as follows: 1. Calibrated Digital Point Vernier Calliper 2. Calibrated Spreading Calliper 3. Micro-pore Pen with Removable Ink 5. Digital Camera.

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Methods

Criteria for selection of Subjects

The subjects with congenital hearing impairment are known to have hyper-nasal voice. Hence the proposed study also aimed at to find out the differences of morphological facial growth in children with congenital hearing impairment and normal children (as control group).

Criteria for selection of Age groups

Size and shape of the face markedly altered with the growth of paranasal air sinuses. Paranasal air sinuses are rudimentary at birth but they enlarge appreciably during eruption of permanent teeth and after puberty [12]. As far as face is concerned, Schiltz (1955), Silomen (1955) and Montacer-Kuhssary (1955) found that, major growth bouts occurred between 6-8 years and then 11-15 years [13].

Based on this information the age groups were selected from 05 to 10 years and 10 to 15 years from both the gender. School registers which had the record, date of birth of subjects was taken as the reliable reference for the age.

Other criteria for selection

- The subject should not have any obvious facial and nasal deformity.
- The subjects should not have undergone any facial and nasal surgical procedures.
- The subject should not have any history of facial and nasal trauma.
- The subject should hail originally from that particular urban area over at least three generations.

Fowling relevant facial surface landmarks were selected [3, 9, 10, 14, 15].

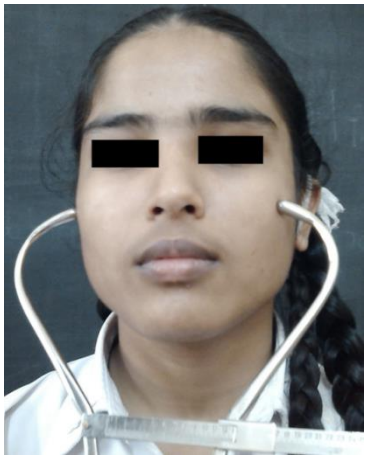
1. Nasion (n), 2. Menton (m), 3. Zygion (zy): Left (zy-L) and Right (zy-R)

Above points were marked with removable ink with the help of micro pore pen on the subject's face [16, 17].

To improve the consistency and to decrease the error in measurements great care were taken to locate and mark the landmarks.

1. Nasion (n): The point above the line that connect the two inner canthi. 2. Menton (m): The midpoint on the lower border of mandible. 3. Zygion (zy): The most lateral point of each left and right zygomatic arch.

The following projective measurements (i.e. shortest distance was taken with calibrated point vernier and sliding callipers). The data obtained in millimeters were converted to centimeters.



[Photograph No.1]
Facial Width (FW): (zy-R to zy-L)

[Photograph No.2]
Morphological facial Height (FH): (n to m)

Facial index was calculated in different age groups and both genders of above-mentioned subjects.

Morphological Facial Index (FIx) = Facial Breadth (FB) / Facial Height (FH) X 100.

Standard abbreviations were used in present study as mentioned by Farkas Leslie. The measurements were projective (i.e. the shortest distance between two points). Nasion (n): A point in the midline of fronto-nasal suture and the nasal root was felt by palpating with the right index fingertip. The point usually was above the line that connects two inner canthi.

The head position varied according to the measurement to be taken. The most frequently head position was used the rest position, which was determined by the subject's own feeling of natural head balance. Facial Width (FW): (zy-R to zy-L) The shortest distance between Zygion-R to Zygion-L was recorded.

Morphological Facial Height (FH): (n to m) The shortest distance between Nasion to Menton. Facial breath was taken (FW) The shortest distance between Zygion right to Zygion left.

All measurements were taken only by the author. An average of the three readings was taken for every measurement to minimize the error.

Statistical Analysis [20-22]

The following parameters were measured in each subject viz. Facial Breadth (FB), Morphological Facial Height (MFH). The data obtained was analysed statistically with the help of Statistical Package for Social Sciences (SPSS) Version 16.0 Window.

To compare between two independent groups (In between Age Groups and gender and for comparison between Hearing Impaired with control group) unpaired t test was used to compare variable Facial Index (FIx). Bar diagrams were plotted to show comparison between gender as well as hearing impaired with control group in the age groups of 5 to 10 years and 10 to 15 years.

To determine classification of faces on the basis of Facial Index (FIx) Martin - Saller's scale formulae were used [23].

RESULTS

Group Statistics: Age group 5 to 10 years: Comparison between Control/Normal (N) males and Hearing Impaired (HI) males

Facial Index: Mean Facial Index in control male is 92.37 whereas in Hearing Impaired male is 97.82 showing no statistically significant difference ($p = 0.481$)

Comparison Between Control/Normal (N) females and Hearing Impaired (HI) females in 5 to 10 years age group

Facial Index: Mean Facial Index in Control females have 90.52 whereas in Hearing Impaired female 98.73 Showing no statistical difference ($p= 0.344$).

Comparison between Control/Normal (N) males and females in 5 to 10 years age group.

Facial Index: Mean Facial Index in control males have 92.37 whereas in females have 90.52 showing statistically significant difference ($p = 0.000$).

Comparison between Hearing Impaired (HI) males and in 5 to 10 years age group.

Facial Index: Mean Facial Index in Hearing Impaired group males have 97.82 whereas in females have 98.73 showing statistically significant difference ($p = 0.000$).

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Geovana de Paula Bozan [24] observed and determined facial type from morphological facial index (FIx) or Facial Index, a centesimal relation between the height and facial width / breadth. The higher the Facial Index, the longer and narrower is the face.

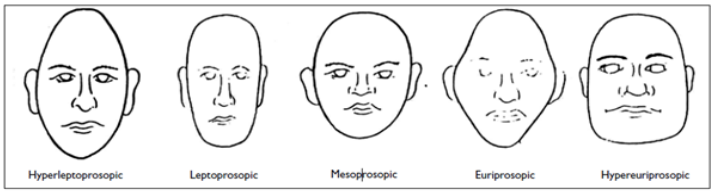

Figure 1: Type of Faces

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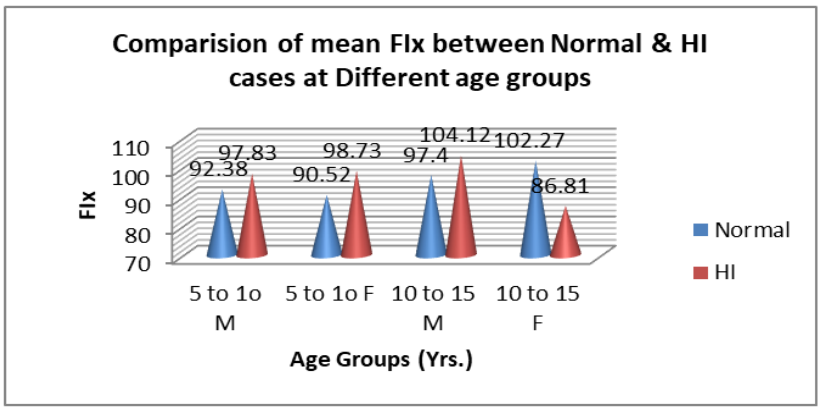

Chart 1: Comparison of mean Facial Index in Control/ Normal (N) and Hearing Impaired (HI) Subjects at 5 to 10 years and 10 to 15 years age groups

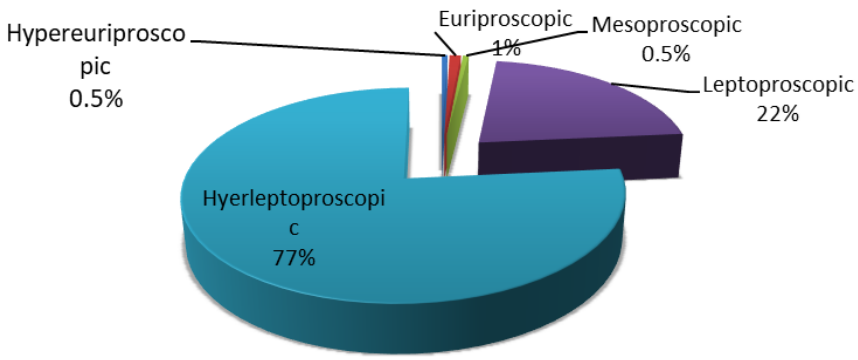

Chart 2: Distribution of type of faces in Hearing Impaired (HI) males at 5 to 10 years age group

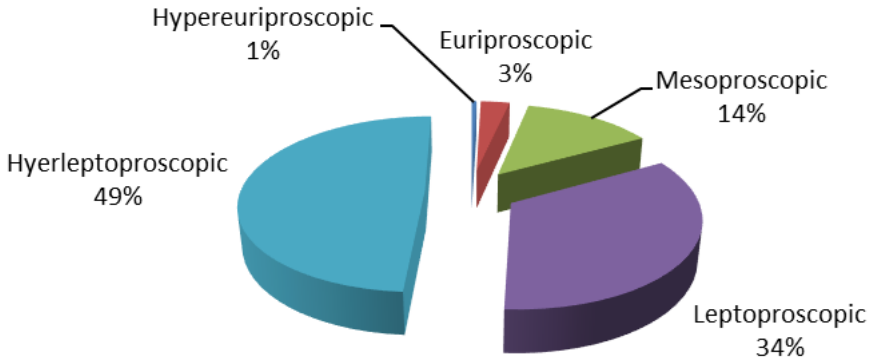

Chart 3: Distribution of type of faces in Control/Normal (N) males at 5 to 10 years age group

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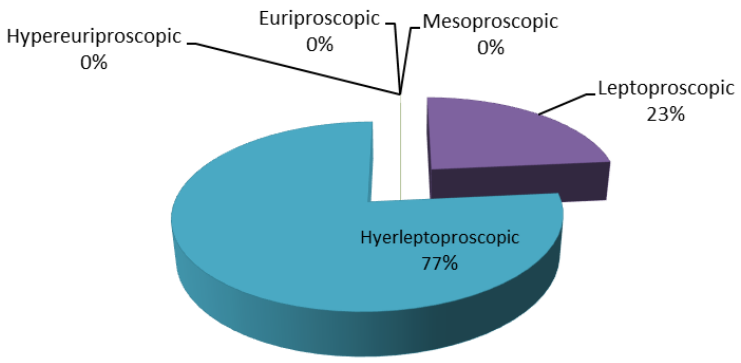

Chart 4: Distribution of type of faces in Hearing Impaired (HI) males at 10 to 15 years age group

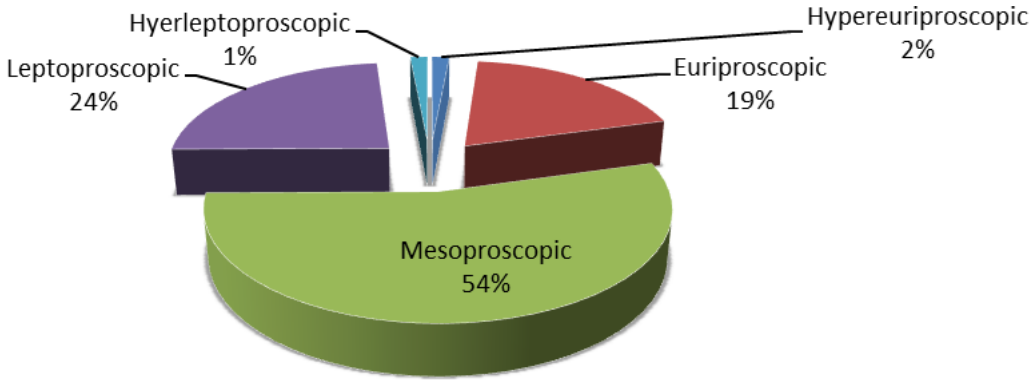

Chart 5: Distribution of type of faces in Control group females at 10 to 15 years age group

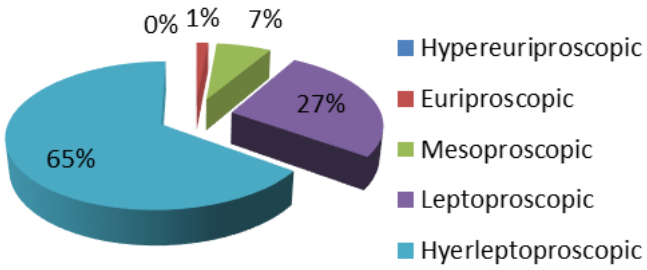

Chart 6: Distribution of type of faces in Hearing Impaired (HI) females at 10 to 15 years age group

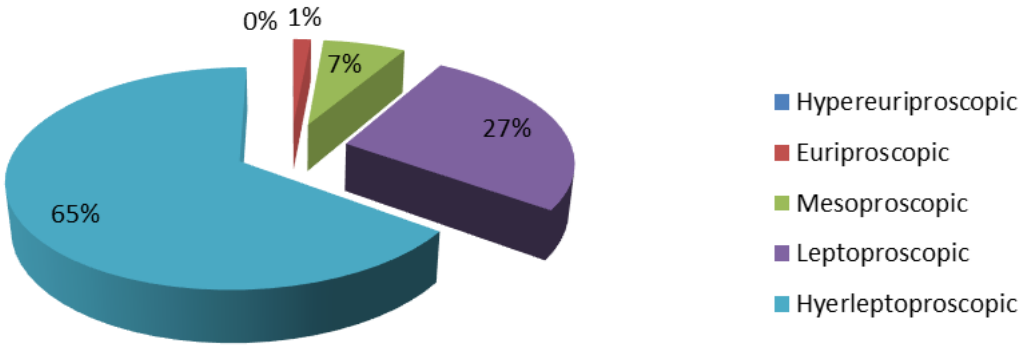

Chart No. 7. Distribution of type of faces in Hearing Impaired (HI) Females at 10 to 15 years age group

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DISCUSSION

The purpose of present study is aimed at throwing light on changing facial patterns as the age advances by comparing them in different age groups and both the genders from congenital hearing impaired children with their control group counterpart (normal subjects). The present study was conducted in two different age groups (5 to 10 years and 10 to 15 years) in which there is maximum growth spurt occurs in all facial and nasal parameters in addition among the two groups congenital hearing impaired subjects are known to have hyper nasal voice [10] which may have due to facial and nasal growth pattern so this need to be quantified and statistically proved.

In present study we selected two age groups of subjects from an urban area viz. i) 5 to 10 years and ii) 10 to 15 years of congenital hearing-impaired children from both the gender and also compared them with normal children as a control group of similar age.

Age 5 to 10 years: I) 5 to 10 years Control Group males and females

Facial Index: In control groups majority of the males have Hyperleptoproscopic type of faces whereas majority of females have Leptoproscopic type of faces respectively.

In Hearing Impaired group majority of males as well as females have Hyperleptoproscopic type of faces.

In hearing impaired as well as control groups majority of males and females showing Hyperleptoproscopic type of faces.

Age 10 to 15 years: I) 10 to 15 years Control Group males and females:

Facial Index: In control groups majority of the males as well as females have Hyperleptoproscopic type of faces.

In Hearing Impaired group majority of males as well as females have Hyperleptoproscopic type of faces.

In hearing impaired as well as control groups majority of males and females showing Hyperleptoproscopic type of faces.

Facial Index in adults Ethnicity/Community/Cast/Tribe /General Population/State/Country
Facial Index observed in different population ranges from 62.00 to 95.86 [25].

CONCLUSION

Comparative observations regarding facial parameters in majority subjects of the present study can be summarized as follows

Age group 5 to 10 years

Hearing Impaired males and females shows Hyperleptoproscopic type of faces and control group males also shows Hyperleptoproscopic type of faces however their female counterpart shows Leptoproscopic type of faces

Age group 10 to 15 years

As the age advances from 5 to 15 years, in control as well as in Hearing Impaired groups the shape of the face does not change besides control group females shows Hyperleptoproscopic type of face from Leptoproscopic type of face

From the observations of present study, following conclusions are drawn:

By virtue of this study, the design industry will be benefited to provide better and more comfortable masks, spectacles, nasal specula etc.

Application of facial and nasal morphometric data base of this study will bring not only fineness in rhinoplasty but also establish newer frontiers in facial and nasal morphometry. Facial and nasal morphometric database of this study will also be useful for forensic experts in reconstruction of face form the skull in medico - legal cases

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