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Anthropometric Study of Craniofacial Parameters of Adult Population of Tribals of Mewar Region in Southern Rajasthan

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Article

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ABSTRACT

Facial features differ amongst different races and ethnic groups. For evaluation of deviations in craniofacial morphology, standards of anthropometric measurements for a particular population should be established. The study was carried out to determine the mean values of facial, nasal, maxillary, mandibular and oro-facial heights of the adults of the Bheel – Meena tribes of Southern Rajasthan. 1000 subjects purely of the ethnic tribe group comprising of 500 males and 500 females, aged between 18 – 50 years were used for the study. The parameters were measured using a sliding vernier caliper. The resultant means of the measurements for the male populations were, for facial height 11.731 cm, nasal height 4.761 cm, maxillary height 2.011 cm, mandibular height 4.599 cm and oro-facial height 6.610 cm. The same readings for the females were 10.559 cm, 4.570 cm, 1.987 cm, 4.002 cm and 5.989 cm respectively. Statistical analysis using students 't' test showed that the mean values of males had significantly higher values than the females in all facial parameters measured, except for maxillary height ($p < 0.001$). The data was found to be sexually dimorphic and the values thus obtained are recommended to the craniofacial surgeons, forensic experts and anthropologists.

INTRODUCTION

Anthropometry is concerned with the measurements of physical sizes and shapes of human body. It is a technique used in both physical and clinical anthropology comprising of precisely and systematically measured human body parts.

Craniofacial anthropometry is an important stem of anthropometry, which includes measuring nasal height, maxillary height, mandibular height, oro-facial height, facial height and others. It is a well known fact that facial features differ amongst different races and ethnic groups. They change with age and depend on variations in the dimensions of the skeleton, development of muscles, sex, fat content which in turn are related to climatic conditions, eating habits, health and environmental factors [1].

Human face is not only important anatomically, but it is best used socially for its expression, beauty and an individual identity. Facial appearance is fundamental for communication and interaction with the environment [2]. One often recognizes a person at a glance, through his/her face. An attractive face is seldom forgotten. A beautiful face is the one which has symmetrically, balanced facial parts in harmonies proportions [3].

Anatomical beauty is relatively easy to define and measure these include full head of hair, smooth complexion, large eyes, small nose, full lips, slightly protrusive lower face and high cheekbones [4].

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Greeks were fascinated by beauty and considered mathematics to be unedifying basis of life art, gods and universe. It is therefore no surprise that they defined beauty with mathematics :- The golden proportion [5,6,7].

Golden aesthetic proportions: *Nasal height (N_A) : Maxillary height (M_A) :: 1.000 : 0.618*

($N_A + M_A$) : M_D (Mandibular height) :: 1.618 : 1. 000

Naso-facial analysis allows surgeons to identify and define specific facial disproportions and to establish surgical goals for their corrections.

These are widely used in preoperative assessment of rhinoplasty or nasal reconstructions surgeries, orrthognathic surgeries, genioplasty or chin augmentation surgeries, cleft lip rhinoplasty, occlusal or bite abnormality surgerirs, face malformations or in significant asymmetry of the face [6,8]. The growing demand for the above mentioned cosmetic and therapeutic surgical procedures reflects the importance for the need for pooling of local data on facial parameters.

MATERIALS AND METHOD

1000 adults Mewaris (of the Bheel – Meena descent), with ages ranging from 18-50 years were used in the study. The subjects belonged to the local communities in and around Udaipur district, who were selected at random. All the participants declared an ancestral Mewari history of at least three generations. Participants with any facial deformity or surgical interventions were excluded from the study. Measurements were taken with the aid of sliding vernier caliper (with least count of 0.001). Volunteers were asked to sit in relaxed state with face held in anatomical position. A single reading was noted by the same investigator to avoid bias.

1. Facial height ($N_A + M_A + M_D$) : was measured as the distance from nasion to menton.
2. Nasal height (N_A): was measured from nasion to subnasale.
3. Maxillary height (M_A): was measured from subnasale to stomion.
4. Mandibular height (M_D): was measured from stomion to menton .
5. Orofacial height ($M_A + M_D$): was measured as the sum of maxillary height and mandibular height, where:
   Nasion: the most anterior point of the frontonasal suture
   Subnasale: point at which columella merges with the upper lip in mid – sagital plane.
   Stomion: most inferior point of upper lip.
   Menton: lowest point on the soft tissue profile of chin in mid – sagital plane.
   The data thus obtained was subjected to statistical analysis using descriptive statistics and students 't' test to test the significance at the level of 0.001.

RESULTS AND DISCUSSION

The face consists of 6 major aesthetic units forhead, eyes, and cheeks, of these the nose, lips and chin have been awarded the utmost importance surgically [9]. The growth of the neurocranium takes place mainly in the early years of childhood. Facial growth has two major periods, one upto eight years of age and other from puberty to maturity. Upto first five years growth takes place chiefly in breadth, being more pronounced in lower than upper part of face. From fifth to eighth year the growth occurs mainly in length and occurs around nasal cavity. Despite this differential growth, these structures reach a state of equilibrium in adults.

The definition of aesthetic standards brings together the scientist, clinician, artist who have tried to codify which facial dimensions, angles and ratios make a person more attractive. No universal canons seem to exist, as aesthetic characteristics are often particular to each cultural background. Thus the present study was conducted to derive our baseline standard aesthetic parameters.

The results of the above study have been tabulated in Table 1. The mean value of craniofacial parameters were compared statistically using students't' test. The results thus obtaine, indicate a sexual dimorphism with significantly higher values of all the parameters in males except for the maxillary height.

The mean values for the nasal height, maxillary height, mandibular height, orofacial height and facial height for the males were 4.761 cm, 2.011 cm, 4.599 cm, 6.610 cm and 11.371 cm respectively, whereas the same mean values for the females were found to be 4.570 cm, 1.987 cm, 4.002 cm, and 5.989 cm nad 10.559 cm respectively. A comparative data on the parameter with the other ethical group is shown in Table 2. The readings of the table clearly shows that our data is significantly lower than those of the Ameriacan, Egyptian, Nigerian and Caucasian populations [10, 11, 12]. Reconfirming the need of data for individual populations.

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Table 1: Minimum, Maximum, Mean, Standard Deviation Of Total Nasal Height, Maxillary Height, Mandibular Height, Oro Facial Height and Total Facial Height Of Male And Female Of Bheel – Meena Tribe.

Parameters	Males N=500	Females N=500
Total Nasal height		
Minimum	3.92	3.70
Maximum	5.846	5.580
Mean	4.761*	4.570*
Standard deviation	0.790	0.343
Maxillary height		
Minimum	1.19	1.052
Maximum	2.728	2.600
Mean	2.011	1.987
Standard deviation	0.486	0.233
Mandibular height		
Minimum	3.320	2.910
Maximum	5.746	5.080
Mean	4.599*	4.002*
Standard deviation	0.465	0.411
Oro facial height		
Minimum	4.462	5.264
Maximum	7.324	8.070
Mean	5.990*	6.610*
Standard deviation	0.470	0.564
Total Facial height		
Minimum	8.274	9.670
Maximum	12.108	13.490
Mean	10.560*	11.371*
Standard deviation	0.640	0.797
P value < 0.001* Highly significant		

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Table 2: Comparative Data On Various Ethical Tribes In Relation To Their Nasal Height, Maxillary Height, Mandibular Height, Oro Facial Height And Total Facial Height Of Male And Female Of Bheel – Meena Tribe.

Parameter	Ethnic groups	Males	Females	Authors	Year
Nasal height	American	5.640	5.240	Stark & *Epkar*	1996
	Egyptian	5.721	5.224	Mohamed et al	2007
	Nigerian	4.50	4.48	Didia and Dapper	2005
	Ibibios	4.15	3.39	Oladipo et al	2010
	Bheel – Meena	4.761	4.570	Present study	2012
Maxillary Height	Nigerian	2.44	2.30	Didia & Dapper	2005
	Ibibios	2.53	2.48	Oladipo et al	2010
	Bheel – Meena	2.011	1.987	Present study	2012
Mandibular Height	American	5.360	4.910	Strak & Epkar	1996
	Egyptian	5.254	4.805	Mohamed et al	2007
	Nigerian	4.49	4.20	Didia & Dapper	2005
	Ibibios	4.46	4.11	Oladipo et al	2010
	Bheel – Meena	4.599	4.002	Present study	2012
Oro facial height					
	American	7.360	6.730	Stark & Epkar	1996
	Egyptian	7.344	6.726	Mohamed et al	2007
	Nigerian	6.90	6.32	Didia & Dapper	2005
	Ibibios	6.99	6.63	Oladipo et al	2010
	Bheel – Meena	6.610	5.989	Present study	2012
Facial height					
	Nigerian	12.28	11.77	Didia & Dapper	2005
	Ibibios	11.14	10.55	Oladipo et al	2010
	Bheel – Meena	11.371	10.559	Present Study	2012

CONCLUSION

Beauty is ill defined concept that is obvious to observer and recognized cross-culturely. However, it is difficult to quantify and it may vary in its perception across different ethnic groups. The main adventage of the present study is to postulate baseline standards for people of Southern Rajasthan in for both genders, helping the surgeons to take surgical descision pre operatively to imrove post operative outcomes.

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