ORIGINAL ARTICLE

Morphometric Analysis of Skull & Face in Males

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ABSTRACT

Aim: To determine the mean values of different morphometric measurements from skull and face of males in the study population and to explore the variations in their size.
Study design: Cross sectional study.
Place of study: This study was conducted in Department of ENT, Mayo Hospital, Lahore associated with King Edward Medical University, Lahore.
Method: A total of 300 male patients visiting ENT Department Mayo Hospital, Lahore were randomly selected and recruited for the study. Surface measurements were taken directly from the head and face of all subjects included in the study, by inch tape. Each variable was measured twice in centimeters and millimeters by the same investigator. Demographic profile and relevant data was recorded in a standard Performa. Mean of different morphometric values of skull and face were taken.
Results: Mean vertical facial height was 19.08cm, length of dorsum of nose 5.39cm, circumference of head 54.66cm, maximum oral aperture 44.7mm, intercanthal distance 3.18cm, intertragal distance 28.08cm, nasolabial angle 95.58 degree and nasofrontal angle 135.68 degrees.
Conclusion: This study provided the metric data of head and face for normal Pakistani Males between 11 to 86 years of age. It may be helpful to correct congenital malformations of face and for aesthetic surgery.
Keywords: Morphometric, anthropometry, head & face

INTRODUCTION

Anthropometry is the science which deals with measurements of the size, weight and proportions of human body. Face is the most cared part of human body and defining feature of a person. Every part of face plays a vital role in producing a natural and harmonious look and an aesthetically fine facial appearance.

Measurement of the human face as part of the body have been performed since the Greek Era[1]. Beauty is the finest expression of human emotions[6]. Disfigurement of face causes psychosocial problems. So normal measurements of face should be available to improve its figure. The improvement of facial aesthetics has rapidly become one of the desired objectives of orthodontic treatment[6]. Aesthetic features are different from one race to another, and this should be considered for treatment planning[2]. The great variation in soft tissue drape of the human face complicates accurate assessment[2].

For reconstructive and cosmetic surgery, realistic sizes and proportions are assessed using anthropometric techniques and used as guidelines to correct deformities and disproportions[1]. Data on growth and maturation of face in the normal population can be useful in choosing the optimal time for reconstruction. Population norms are useful in calculating the amount of tissue needed to reconstruct. The accurate assessment of the size of head provides the base line measurements to define microcephaly and macrocephaly in any individual. In the investigation of a child with an apparently isolated abnormality of head circumference, examination should also include parental head circumference as studies have shown that up to 50% of normal variations in head size is familial[9]. The purpose of the present study was to obtain average morphometric values and variations in different parameters of face and head in our country.

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MATERIAL & METHOD

A total of 300 male volunteers from different areas of Lahore and others cities of Punjab, visiting ENT Department of Mayo Hospital, Lahore were randomly selected and recruited for this study. Surface measurement was taken directly from head and face of the subjects included in this study by inch tape. Each variable was measured twice in centimeters or millimeters by the same investigator.

Measurements included were vertical facial height, length of dorsum of nose, circumference of head, maximum oral aperture, intercanthal distance, intertargal distance, nasolabial angle and nasofrontal angle.

Demographic profile and relevant data was recoreded in a standard Performa. Mean and standard deviation were computed for qualitative variables like age. Mean of various morphometric measurements of head and face were taken.

RESULTS

In our study, mean age of all 300 patients was 35.48±14.31 years. All patients were male. Minimum and maximum age of patient was 16 yrs and 86 yrs respectively. Mean vertical facial height was 19.08±1.06cm. Minimum and maximum vertical facial height was 17 and 29cm. Mean length of dorsum of nose was 5.39±0.44cm. Mean circumference of head was 54.70±1.69cm. Mean oral aperture was 44.72±6.71mm. Mean inter canthal and inter tragal distance was 3.18±0.28 and 28.10±1.16cm respectively. Mean nasolabial and nasofrontal angle was 95.46±7.19 and 135.68±6.37 respectively.

Table 1: Descriptive Statistics for Age & different Facial & Skull measurements

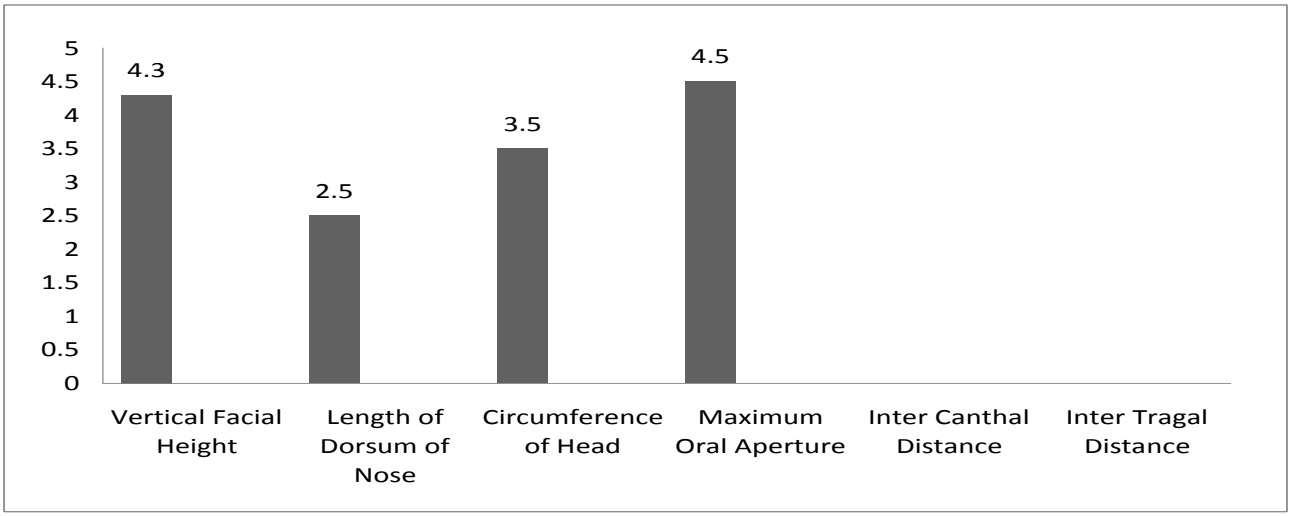
	Units	Mean	SD	Minimum	Maximum
Age	Years	35.48	14.31	16	86
Vertical Facial Height	cm	19.08	1.06	17	29
Length of Dorsum of Nose	cm	5.39	0.44	4.50	6.6
Circumference of Head	cm	54.70	1.69	49	59
Maximum Oral Aperture	mm	44.72	6.71	30	62
Inter Canthal Distance	cm	3.18	0.28	2.60	4.20
Inter Tragal Distance	cm	28.10	1.16	25	32
Naso Labial Angle	Degree	95.46 ^{o}	7.19	70 ^{o}	130 ^{o}
Naso Frontal Angle	Degree	135.68 ^{o}	6.37	120 ^{o}	160 ^{o}

Table 2: Correlation between age and different facial & Skull measurements.

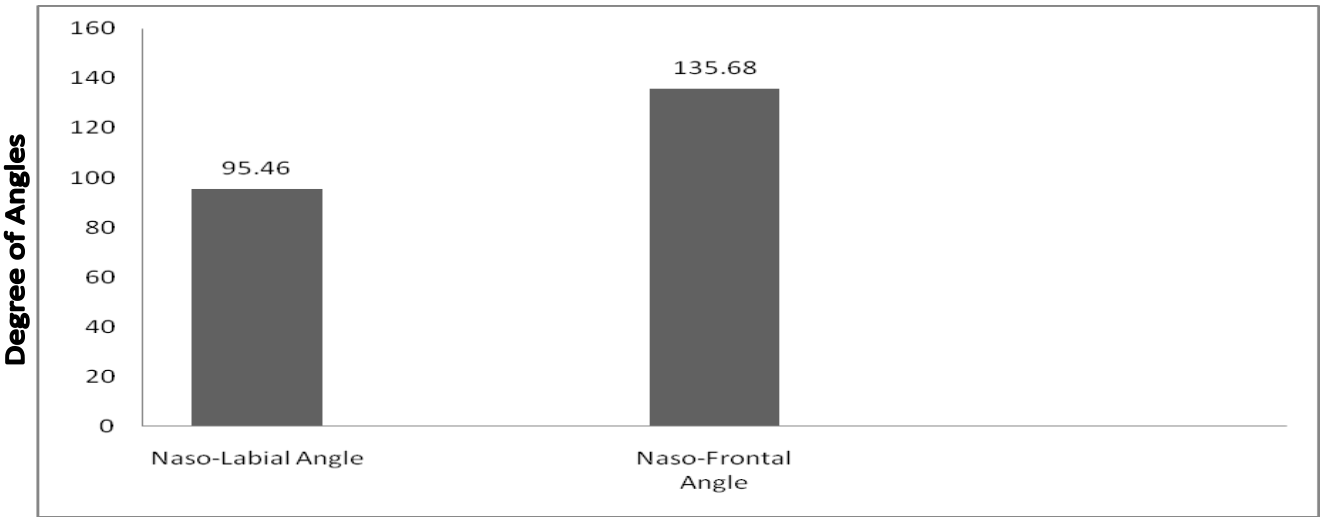
		Pearson Correlation	p-value
Age (years)	Vertical Facial Height	.116(*)	0.045
	Length of Dorsum of Nose	.195(**)	0.001
	Circumference of Head	-0.037	0.544
	Maximum Oral Aperture	-0.037	0.523
	Inter Canthal Distance	-0.114	0.049
	Inter Tragal Distance	.124(*)	0.032
	Naso Labial Angle	-.243(**)	0.000
	Naso Frontal Angle	-0.007	0.907

*Correlation significant at 0.05 level, **Correlation is signification at 0.01 level. Significant weak correlation was observed between age and vertical facial height, length of dorsum of nose, intertragal distance and naso-labial angle. Correlation co efficient and p-value are given in above table in detail.

Average dimension in centimeters



Mean nasal angles



DISCUSSION

The nasolabial angle is defined as the angle between the line drawn through the midpoint of the nostril aperture and a line drawn perpendicular to the Frankfurt horizontal line while intersecting sub-nasal[3]. An arbitrary range of 90-120 degrees is usually stated in the literature[3]. In our study the mean naso-labial angel was found to be 95.46 degrees ±7.19 ranging from 70 to 130, an observation also made by Armijo BS, Brown M and Guyuron B[3]. But countrary to this in a foreign study by Kandhasamy K et al, the normative data showed nasolabial angle 116±0 in men[2].

Nasofontal angle is located between a line drawn from the radix tangential to the glabella and a second line from the same point tangential to the nasal tip[4]. A normal nasofrontal angle is 130±7 in men[4]. But in our study the mean nasofrontal angle is 135.68±6.37 with range of 120-160.

In studies maximum oral aperture for adults has generally been around 50mm with range from 32mm to 77mm. In our study the mean maximum oral aperture was found to be 44.72mm± 6.71mm with the range from 30-62mm which is very close to the study done by Zawawi KH et al which showed it 47mm[5].

The face is divided into thirds using horizontal lines tangent to hair line, eyebrow, nasal base and chin. The upper third between hair line and eye brow is the most variable as it depends upon the hair line and hair style. Therefore is the least important[7]. So mostly in literature total facial height is measured from menton to nasion. We took the measurements of vertical facial height from a point 7cm superior to nasion up to the lower border of chin (menton). In our study mean vertical facial height was found to be 19.08cm ± 1.06cm which is nearly equal to that of measured by John R ed al[8] who measured nasion to mention distance to be 12.27cm±0.8cm (NM).

In our study the mean occipitofrontal head circumference was found to be 54.70±1.69cm with the range of 49-59cm. Contrary to this in a study done by KMD Bushby et al, the range of head circumference in males was 53-58cm[9].

In another study conducted by Oladipo Gabrial S et al in school children aged 3-18 years the mean values from male subject was found to be 52.42±2.22cm for head circumference[10].

In our study the mean intercanthal distance was found to be 3.18±0.28cm with the range of 2.60 to 4.20cm. In differs from the measurements of intercanthal distance done by Gupta VP et al in normal Indian Population aged 3-80 yrs, who found it to 20-36mm[11]. In our study, the mean length of the dorsum of nose, was 5.39±0.44cm ranging from 4.50 to 6.6cm. In contrast, literature shows this length in reference to other measurements of face as Byrd and Hobar calculated nasal length as being equal to the distance between Stomion and Menton (SM)[12]. SM (Stomion to Menton) distance is 2/3rd of the lower 1/3rd of face[7].

The ideal nasal length is assessed as a ratio of nasal length to tip projection, with tip projection equaling 0.67 times the nasal length[12]. For assessment of tip projection, a line is drawn from alar – cheek junction to the tip of the nose. If 50-60% of the tip lies anterior to the vertical line adjacent to the most projecting part of upper lip, then tip projection is normal[7].

In our study mean intertragal distance was found to be 28.10±1.16cm with the range of 25-32cm. This distance measurement is not present in previous literature.

CONCLUSION

With analysis of normative data, this study explored aesthetic differences in face and size difference in heads of males. Data collected in present investigation can serve as a data base for the quantitative description of the human face & head morphology. It is also helpful for assessment of mouth opening prior to general anesthesia.

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