

**Anthropometric and Anthroposcopic Examination of Various Facial Shapes in Adult Population**Sameer Sathe<sup>1</sup>, Ashok Najan<sup>2</sup>, Anil Mangeshkar<sup>3</sup>, Harsh Kumar Chawre<sup>4\*</sup><sup>1</sup>Professor and Head, Dept. of Anatomy, GMC, Datia (M.P.)<sup>2</sup>Associate Professor, Dept of Forensic Medicine & Toxicology, NSC GMC, Khandwa (M.P.)<sup>3</sup>Associate Professor, Dept of Forensic Medicine & Toxicology, GMC, Datia (M.P.)<sup>4</sup>Associate Professor, Dept. of Anatomy, GMC, Datia (M.P.)

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**Abstract:**

**Background and Objectives:** Isolating characteristics that can be regarded as individualization factors is the main goal of facial identification research. Anthroposcopy typically deals with the morphological study of immeasurable traits. Hence, this study aims to assess different human faces using anthropometry and anthroposcopy.

**Methods:** After receiving informed written consent, the study comprised a total of 100 adults, 50 of whom were male and 50 of whom were female and between the ages of 19 and 45. The study's exclusion criteria included congenital aberrant profiles, evident baldness, post-operative head and facial injuries, and individuals that had received orthodontic treatment.

**Results:** After calculating the prosopic index for all the subjects 48% were Hyperleptoprosopic, 23% were Leptoprosopic, 15% mesoprosopic, 10% Euriprosopic and only 4% were of Hypereuriprosopic facial types. The hyperleptoprosopic facial type had the highest average measures of the trignon to glabella, glabella to pronasaliae, and nasion to subnasaliae when comparing the average measurements of all vertical and horizontal dimensions across the facial types.

**Conclusion:** The majority of Adults in our study have an oval face and a hyperleptoprosopic facial type, with the middle third of facial dimensions showing less gender variation. So, gathering information on the average measurements of all prosopic indices among adults and additionally contributing morphological traits that are typical of them may aid forensic anthropologists in reconstructing facial features through composite artist rendering sketches that are based on details provided by eyewitnesses.

**Keywords:** Prosopic index, Forensic Anthropology, Anthropometry, Anthroposcopy, Face.

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**Introduction**

A person's uniqueness is reflected in their face. Numerous components of the persona, such as personality, temperament, general health, and stress levels, may be hinted at. From a biological perspective, the face phenotype is a combination of genetics and environment that represents characteristics of local populations. [1] As a result, the face is a dynamic structure that can convey a vast spectrum of expression, from subtle to dramatically exaggerated. Others may interpret even the smallest shifts in expression differently. With one-sixth of the world's population, India has a very diverse historical past and rich demographic makeup. [2] Moreover, it is a distinctive fusion of several cultures, thoughts, beliefs, and faiths. One of the oldest civilizations in the world, discovered in India, set the stage for the growth of complex societies that gave rise to a wide range of complex human forms. [3]

Numerous information systems have developed throughout time to collect personal data, but they are constantly confronted with a different set of difficulties. It is now essential to design, implement, and maintain an efficient identification method in order to consistently link data with any certain category of people. A person's personal identity is what distinguishes them from others and serves as a means of identification. [4]

Research on face identification has as its main goal the isolation of traits that may be regarded as individualization variables. It is true that everyone has the same characteristics that set them apart from other people, even though populations have some clear basic traits. Even though we might not be aware of the process, we use these characteristics to identify and recognize one other in daily life. [5]

The two most crucial research instruments in biological and forensic anthropology have been anthropometry and anthroposcopy. Both skeletonized human remains and living people can be seen and data collected using these two techniques. Anthropometry is essentially the scientific study of human measurements. [4,5]

However, anthroposcopy is typically involved in the morphological examination of traits that cannot be measured. The following elements influence the dimensions of the human body: age, sex, geography, biology, race, and ecology. The human face remains a unique characteristic for identification despite all of these variances.

Therefore, the current study's goal is to use anthropometry and anthroposcopy to examine the various human faces found in adults.

**Materials and Methods-**

After receiving informed written consent the study comprised a total of 100 adults, 50 of whom were male and 50 of whom were female and between the ages of 19 and 45. The study's exclusion criteria included congenital aberrant profiles, evident baldness, post-operative head and facial injuries, and individuals that had received orthodontic treatment.

Face width was measured as the separation between the zygoma points, and face length as the distance between the nasion and gnathion. All of these places were noted on the individuals' faces while they were seated in a chair, calm, and with their heads in their normal positions. Manual measurements were taken using a DIGITAL CALLIPER (Product Number: 150199; Accuracy: 0.001), which is made in Japan.

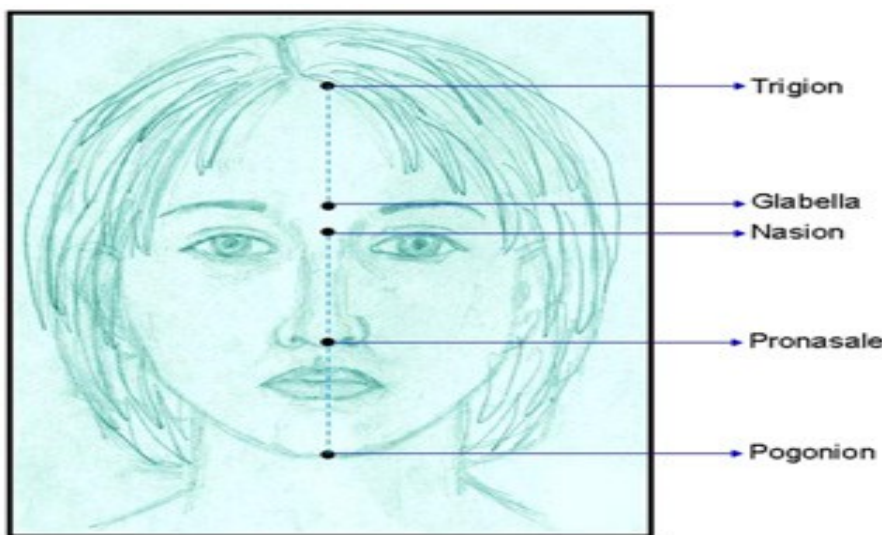
**Table 1: Classification of facial types according to Martin and Saller.**

Facial Type	Range of Prosopic index	Facial Skeleton
Mesoprosopic	84- 87.9 mm	Average Facial skeleton
Euryprosopic	79.0-83.9 mm	Low facial skeleton
Hypereuryprosopic	<78.9 mm	
Leptoprosopic	88.0-92.9 mm	High facial skeleton
Hyperleptoprosopic	>93.0 mm	

For each individual a prosopic/face index was calculated using the formula as given by Martin and Saller in Frontal view to determine the type of the face. [5]

$$\text{Prosopic index} = \frac{\text{Face length}}{\text{Face width}} \times 100$$

Anthropometric vertical and horizontal measurements were noted.



**Figure 1-Parameters considered for Anthropometric Vertical Dimensions of Face**

**Statistical Analysis**

Data analysis was conducted using SPSS Statistics version 22 (IBM Corporation, Armonk, New York). The data were analyzed using descriptive statistics. Categorical variables were expressed as numbers

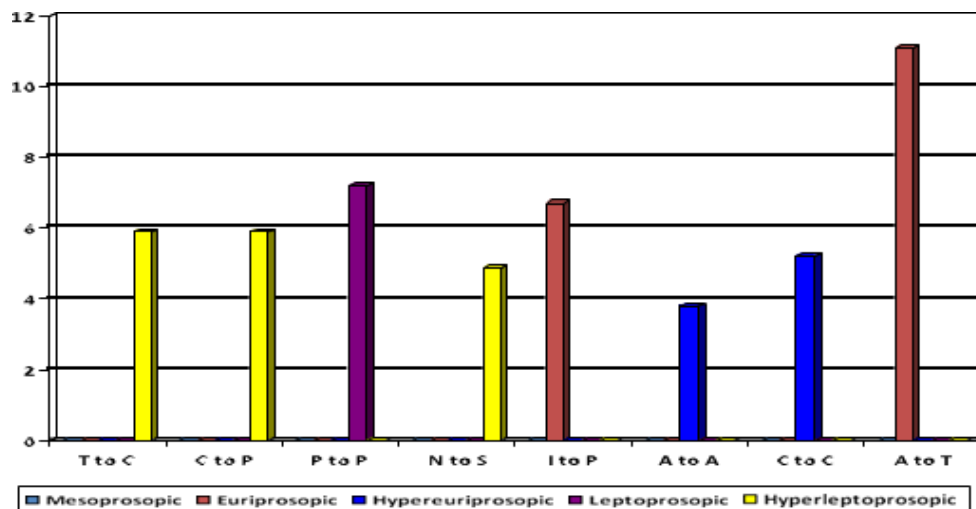
and percentages. Continuous variables were expressed as mean ± standard deviation if normally distributed and median with range if skewed. A p-value of <0.05 is considered statistically significant.

**Results**

**Table 1: Prosopic index of all subjects.**

	Male	Female	Total
Mesoprosopic	8	7	15
Euriprosopic	7	3	10
Hypereuriprosopic	3	1	4
Leptoprosopic	12	11	23
Hyperleptoprosopic	20	28	48
Total	50	50	100

As per table 1 After calculating the prosopic index for all the subjects 48% were Hyperleptoprosopic, 23% were Leptoprosopic, 15% mesoprosopic, 10% Euriprosopic and only 4% were of Hypereuriprosopic facial types.



**Figure 2: Distribution of highest anthropometric vertical and horizontal dimensions in prosopic indices.**

The hyperleptoprosopic facial type had the highest average measures of the trigion to glabella, glabella to pronasalae, and nasion to subnasalae when comparing the average measurements of all vertical and horizontal dimensions across the facial types. Leptoprosopic facial types had greater average pronasalae to pogonion distances, while euriprosopic facial types had greater average interpupillary and alae to tragus lengths. The average dimensions of chilion to chilion and alae to alae were more characteristic of the hypereuriprosopic face type. All of the parameters in mesoprosopic were significantly smaller than those in other facial types. Male and female individuals' measures were compared in both the vertical and horizontal directions. Four millimeters separated the pronasale from the pogonion, six millimeters separated the nasion from the subnasale, and one millimeter separated the glabella from the pronasalae. The difference in interpupillary distance was 5 mm, alare to alare was 4 mm, ala to tragus was 7 mm. There was a statistically significant difference between them for all the measurements with 'p' value being 0.008 except glabella to pronasalae.

**Discussion**

The role of the forensic anthropologist has grown in complexity and sophistication in recent years, much

like the crime scene investigative process. There is much that forensic anthropologists can provide to law enforcement and would be happy to help such investigation come to a satisfactory conclusion. Comparing dental photos taken before and after death is the most popular use of forensic anthropology in head and neck cases.

Scientists have been interested in human physical variability for a very long time. [5] The face is the primary emphasis for any person's identity since it is the most beautiful feature of the human body and reflects each individual's uniqueness. [6]

The scientific field of anthropometric evaluation focuses on measuring human dimensions, including size, shape, proportion, composition, maturation, and gross function. The quantitative interface between anatomy and physiology has been defined as this field. It places the person at the center of attention and gives a clear assessment of their structural status at any given moment. [7] By establishing standard sizes, anthropometry of the head and face is helpful in the design of several head and face equipment such as helmets, head phones, goggles, etc.

All of the facial types' averages for the four vertical and four horizontal measurements were compared. The hyperleptoprosopic facial type had the greatest

average three vertical measurements (trigion to glabella, glabella to pronasale, and nasion to subnasale), while the leptoprosopic facial type had the highest average vertical dimension (pronasale to pogonion). Most leptoprosopic and hyperleptoprosopic patients had faces with an oval shape. Accordingly, it may be concluded from this data that people with oval faces will either be leptoprosopic or hyperleptoprosopic. The euriprosopic with heart-shaped face had the largest average interpupillary distance and alae to tragus among the horizontal measurements, whereas the hypereuriprosopic with round-shaped face had the highest alae to alae and chelion to chelion dimensions. Hence by this observation the individuals with either round or heart shape face can be considered as either euriprosopic or hypereuriprosopic, with highest horizontal dimensions. [8,9]

It is challenging to determine racial affiliation because, despite certain biological components, social affiliation is the primary basis for racial classification. However, certain physical features, particularly those related to the face, may allude to a person's race.

### Conclusion

Therefore, we draw the conclusion that the majority of adults in our study have an oval face and a hyperleptoprosopic facial type, with the middle third of facial dimensions showing less gender variation. So, gathering information on the average measurements of all prosopic indices among adults and additionally contributing morphological traits that are typical of them may aid forensic anthropologists in reconstructing facial features through composite artist rendering sketches that are based on details provided by eyewitnesses. Additionally, by using photographic superimposition to positively identify the victim's face, it could aid plastic surgeons in reconstructing the victim's face in three dimensions using soft tissue build-up on unidentified skulls.

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