

Anthropometric Analysis of India's Nasal Index

¹Dr. M.P. Ambali, ²Dr. Priya P. Roy, ³Dr. S. S. Mohite,

¹Professor, Department of Anatomy, Krishna Institute of Medical Sciences, Karad, Maharashtra

²Professor, Department of Anatomy, Krishna Institute of Medical Sciences, Karad, Maharashtra

³Professor, Department of Anatomy, Krishna Institute of Medical Sciences, Karad, Maharashtra

ABSTRACT

The Greek words (Anthropos) and Metrôn are the roots of the word "anthropometry," which means "measurement of man." The study of human body components is a branch of morphometry. Population anthropometry is a branch of anthropology that studies nose size and shape in human groups. Several studies have shown that people's nose sizes and other nasal indices differ worldwide. Previous studies have shown India's population is varied in terms of language, religion, ethnicity, and genetics. "A century ago, anthropological studies stated that the people of Kashmir had an Indo-Aryan majority, the people of Bihar and the United States had an Aryo-Dravidian majority, and the people of southern India had a Dravidian majority." If national standards are to be set, research must be done throughout India due to its varied population.

Keywords: Anthropometry, India's population, Nasal Indices.

INTRODUCTION

The term "anthropometry" originates from the Greek words "Anthropos: a man" and "Metron: measure," which may be translated as "measurement of the man".¹ "It is usually defined as a branch of morphometry and is the study of the many properties of human body components".² "Nasal anthropometry is a branch of anthropology that studies variations in nose size and shape among human societies".³ "Numerous studies have shown that there is a worldwide variation in nose size and other nasal indices".^{4,5,6} "The nasal index is used to quantify nasal width as a percentage of nasal height. The nasal anthropometric index is the most often used parameter".^{7,8}

"Based on the nasal index ratio, three unique nose types have been identified: leptorrhine (69.9 and below), mesorrhine (70–89.4), and platyrrhine (85 and above). The shape of the nose changes over time as a result of environmental stimuli and varies by race and ethnicity".^{9,10} "According to various previous study we know that nasal anthropometric data is atmost important in forensic investigations and cosmetic and reconstructive surgeries and may be utilized to establish an individual's ethnic origins".

"Furthermore, as we know from past studies that the Indian population is as diverse as they come in terms of language, religion, ethnicity, and genetics".¹¹ "A century ago, anthropological studies defined Kashmir people as having an Indo-Aryan majority, Bihar

people and the United States as having an Aryo-Dravidian majority, and India's southern parts people as having a Dravidian majority".¹² "In addition, although, the anthropometric parameters such as the nasal index, orbital index, and stature may be used to differentiate between subtypes yet a clear genetic and morphological difference is present between North and South Indian people".¹¹ It has been concluded from various studies that the Indian population is made up of races such as Negrito Mongoloid, Caucasoid, and Australoid.¹² "Several studies have documented previous about the differences in the genetic and anthropometric characteristics of the Indian population across geographical localities and ethnic groupings".^{13,14}

However, as we know that "nose is an obvious and important facial feature of our body". Therefore, nasal anthropometry is an important method for investigating sexual dimorphism and the presence of multiple sexes in various communities. The shape of the nose may be utilized to establish ethnicity. One of the markers impacted by climate is the nasal index. In contrast to a narrow nose, which is often linked to a cold and dry climate, a wide nose is frequently linked to a hot and humid climate. A low, wide nose, according to a few studies, helps to disperse heat, which changes the shape of the nose in hot, humid circumstances. Children of African heritage who are born in very cold locations grow at a different pace than children of Caucasian ancestry who are born in

extremely hot and humid environments. In either situation, the size and shape of the nose are mostly unaffected by environmental factors such as temperature and humidity in either situation. It implies that environmental factors have a less important role in defining a person's nasal index. A surgeon may learn a lot about the patient's nose before doing rhinoplasty. This is especially true when the patient's ethnicity and facial features are taken into account.¹²

BACKGROUND OF "NASAL MEASUREMENTS"

"During the 17th and 18th centuries, European anthropologists devised a variety of ways for classifying the human population into races by utilizing visible physical features such as skin tone, hair texture, body proportions, and cranial dimensions. When anthropologists measured human skulls to create racial categories, the field of craniofacial anthropometry developed. The size and shape of a person's nose was one of the distinguishing features utilized to classify human races throughout the nineteenth and early twentieth centuries.¹⁵

"It's wonderful to know that M. Broca discovered a highly effective method of differentiating between various human races using the nasal index, as Topinard reported in 1878. It's great that he was able to define the "anthropological nasal index" as the ratio of the nose's maximum nasal width (pyriform aperture) to its maximum nasal length. It's great that the "cephalometric nasal index" has been defined by him as the ratio of the width of the anterior nares to the length of the live nose. It's interesting to know that the distance between the nasofrontal suture (nasale) and the subnasal point (sub-nasale) determines the skin length! It's great to know that the width of an alae can

be easily defined by measuring the maximum spacing between its lateral rims".¹⁶

"Studies also revealed that the indigenous population's exposure to climate caused the nasal index to change.^{17,18} According to anthropologists, the variable nasal shape and size are thought to be a result of the nose's evolutionary adaptation to climate."¹⁸

"The nasal index is calculated from the following formula

$$\text{Width of the nose} \times 100 / \text{Height of the nose}.$$
¹⁵

"The nasal index is a metric for determining nasal width; a high index implies a wide nose, while a low index suggests a narrow nose. Nasal indexes less than 70 are referred to as leptorrhine, whereas nasal indexes more than 85 are referred to as platyrrhine". The term "mesorrhine" is used to describe a nasal index that falls within the range of 70 to 85".¹⁹ "Various studies have concluded the nasal types i.e. leptorrhine, platyrrhine, and mesorrhine have been associated with Caucasians, Asians, and Africans".^{20,21} "However, it should be noted that these racial classifications lack scientific validity. In the 1970s and 1980s, morphometric nasal measurements evolved as metric surgeons started to show an interest in nasal reconstruction and cosmetic surgery".¹⁵ "Furthermore, during the time period of between 1983 to 1986 another group of researchers team i.e. Farkas and his associates developed a series of nineteen metrics aimed at aiding plastic surgeons in the assessment of the dimensions and configuration of the nasal region".^{22,23}

NASAL MEASUREMENT

"Classical landmarks described by Farkas are as follows^{24,25} :-

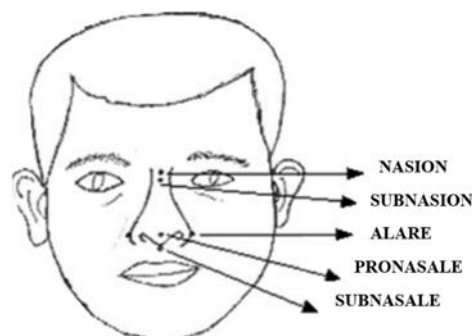


FIG 1: NASAL LANDMARK¹⁵

1. "Nasion (n): It is the anatomical location where the nasofrontal suture intersects with the nasal root in the midline. The individual conducting the observation may perceive the presence of a ridge

upon which their fingernail is positioned. The point is consistently positioned superiorly to the line that connects the two medial canthi".

2. "Subnasion or Sellion (Se): It is the lowest point of the nasofrontal angle".
3. "Subnasale (sn): It is the midpoint of the angle at the columella base where the lower border of the nasal septum and the surface of the upper lip meet".
4. "Pronasale (prn): the most prominent point on the nasal tip identified in lateral view".
5. "Alare (al): the most lateral point on each alar contour".
6. "Alar curvature (alar crest) point (ac): the most lateral point in the curved base line of each ala indicating the facial insertion of the nasal wingbase".
7. "Subalare (sbal): It is the point at the deepest limit of each alar base, where the alar base disappears into the skin of the upper lip"

METHODS OF ANTHROPOMETRIC EVALUATION¹⁵

A. "Direct anthropometry: It is the direct measurement of surface dimensions.

Advantage:

1. The method give accurate results.
2. The method is very simple so clinicians can easily used the same.
3. Method is non-invasive
4. Very minimal equipments are required to record the details with this method .
5. Cost friendly
6. Method is well accepted by many anthropologist also.

Disadvantage :-

1. Require proper training and experience to use this method for analysis.
2. Data is not easy to develop with this technique.
3. Bias like Intra-observer error or Inter-observer error may occur".¹⁵

B. "Indirect Anthropometry Or Photogrammetry:- This type of anthropometric method helps in analysis of photographs.¹⁵

Advantage:

1. Photographs is easy & quickly obtain.

2. As it is a photography therefore, it provide a permanent record.

Disadvantage:

1. In this type of method error may happen due to defining bony landmarks .
2. Error can also occur because it is a photograph compare to direct measurements , so we can take fewer measurements only.
3. Difficult to accurately measure distance and angles on photographs.

Problem can be solved by:

"Eliminating constructing ratios from the primary measurements. These measurements are based on soft tissue landmarks may be more amenable to photogrammetry, while direct anthropometry is preferable for dimensions dependent on bony landmarks which are easily palpated but difficult to identify in photographs".¹⁵

C. "Cephalometry: This type of anthropometric analysis uses imaging, traditionally X-rays".¹⁵

Disadvantage-

1. Radiation exposure
2. 2- D measurement of 3-D head, so it leads to superimposition of structures.
3. Landmark identification become difficult in this method".
4. This method use soft tissue as a landmark".¹⁵

D. 3-D anthropometry: "There is a growing realization that the aforementioned three techniques cannot capture the three-dimensional complexity of the human face. In the last three decades, a number of relatively non-invasive, three-dimensional imaging techniques designed to acquire topographical surface data of the face have been developed. These more recent techniques include stereophotogrammetry, laser surface scanning, and 3D photogrammetry. The laser surface scanner is currently the most prevalent type of three-dimensional technique".¹⁵

It's exciting to see that there is a diverse range of anthropometric types across the world, and different cultures have their own unique standards of beauty. It's great to know that rhinoplasty surgeons have found that many patients value their primary ethnic features and want to retain them while undergoing cosmetic

augmentation, even though the human nose varies in shape and morphology across racial groups.^{26,27} It's exciting to consider how different racial and ethnic groups have unique standards of beauty when it comes to facial features. This means that we have the opportunity to celebrate and appreciate the diversity of our patients' appearances. While the traditional way of producing consistent features may have its challenges, there are always new and innovative approaches to explore that can lead to success. Researchers explored the fascinating variations in nasal morphology among different racial groups. Although there is limited research on Indian populations, it is exciting to explore how this data can be applied to such a vast and diverse population of 1.2 billion people. This study aimed to contribute to the knowledge of Indian noses by assessing male and female patients using standard surface markings to identify any differences in external nasal anthropometric measurements. It's great that we were able to compare our data to studies on North Americans, Koreans, Africans, and Chinese published in the literature. This will help us objectively evaluate racial differences in metrics that may affect esthetic nasal surgery judgments.²⁸

CONCLUSION

In comparison to the white demographics of North America, Africa, Korea, and China, the Indian nasal structure exhibits distinct characteristics. The study's results suggest that standardization of measurements and proportional values for the Indian nose is necessary. Although a multitude of subjects were studied in the capital city of New Delhi, which harbors individuals from diverse regions of India, the vast magnitude of the Indian populace poses a significant constraint. To establish benchmarks for the populace, it is imperative to conduct research on diverse regions of India owing to its vast population diversity.

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