

## Nasal index: A cross sectional study among South Indian population

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### Abstract

**Introduction:** Anthropometry is the measurement of human body parts and is used in anthropology for classifying people into various races and ethnicity. Nasal index serves as an important anthropometric tool and also very useful in reconstructive surgeries of nose along with nasal height and breadth.

**Aim:** To study the values of the nasal height, nasal breadth and nasal Index in South Indian population.

**Materials and Methods:** The study was conducted in Vinayaka Missions Medical College, Karaikal including volunteers aged between 17-23 years and of both sexes. Nasal height and breadth were measured using Digital Vernier Caliper. Nasal index was calculated and the results were statistically analysed.

**Results:** The present study showed the mean height and breadth of nose in males were 55.75 mm and 37.26 mm and for females were 53.89 mm and 34.59 mm. Nasal index was found to be 67.0 for males and for 64.8 females. And moreover the most common nasal type was found to be Leptorrhine followed by Mesorrhine type.

**Conclusion:** The data obtained from the present study will be useful when repairing the nose and also in forensic investigation.

**Keywords:** Nasal height, Nasal breadth, Nasal index, Leptorrhine, Mesorrhine.

### Introduction

Nose is the beauty defining feature of face of a person since it is at the centre of face.<sup>1</sup> Nose can be divided into two parts – External and internal part.<sup>2</sup> External nose is the projection from the face. Its supporting framework is made of cartilages and bones. It is pyramidal in shape with an upper end called as root which merges with forehead and lower end called as nostrils and with the sides which meet in the midline forming the dorsum or bridge of the nose.<sup>3</sup> Nose is respiratory in function which helps in breathing, warming and moistening the inspired air.<sup>4</sup>

External nose serves the cosmetic function by enhancing person's beauty and personality.<sup>5</sup>

The variability in size and shape of human nose is huge and is influenced by factors like age, sex, environment, ethnicity and region.<sup>6</sup>

Race, ethnicity and sex can be predicted from the shape of the nose to a large extent.<sup>7</sup>

Rhinoplasty is the plastic surgery procedure for correcting and reconstructing the nose. And it is the third most popular cosmetic surgery performed in India next to liposuction and breast enhancement.<sup>8</sup>

Nasoplasty surgeons require a normal database to achieve optimum correction of nose in both sexes. Anthropometric data specific to South Indian population will be helpful for rhinoplastic surgeons to enhance the results.

The knowledge about the dimensions of the nose viz length and breadth is important for the reconstructive and aesthetic surgeries. It also helps in for the determination of degree of congenital deformities and traumatic injuries.<sup>9</sup>

Nasal index which is calculated from nasal length and breadth is the common anthropometric tool for identifying

the unknown person and also sex and age of that person. Nasal index is the most indispensable tool in classifying the race and ethnicity of the people.<sup>10</sup>

This study is undertaken in effort to obtain the values for nasal dimensions of South Indian population.

### Materials and Methods

The study was conducted in 203 persons (100 Males and 103 Females) aged between 17-23 years. Ethical clearance was taken from the Institutional Ethical Committee before conducting the study. All the participants were volunteers and Informed consent was obtained before conducting the study and after explaining the procedures clearly.

The people with congenital deformities of nose and history of trauma and surgeries in the nose were not included in the study.

The measurements were taken with the persons sitting relaxed in the chair and with natural head position. The muscles of the face were relaxed so that not to alter the size of the nose.

The following measurements were taken.

Height of the nose (NH) from nasion (midpoint of nasofrontal suture) to subnasale (junction between lower border of the nasal septum and the cutaneous portion of the upper lip) (Fig. 1).



**Fig. 1:** Measurement of nasal height

Breadth of the nose (NB) is the maximum distance from one ala to other ala (Fig. 2).



**Fig. 2:** Measurement of nasal breadth

All the measurements were taken using Digital Vernier Caliper. All the measurements were done by a single observer to prevent inter-observer error.

Nasal index was calculated using the formula  $\text{Nasal breadth (NB) / Nasal height (NH)} \times 100$

All the values were tabulated and statistically analysed. Anthropometric measurements of nose were compared between the sexes by using "Independent t test".

**Results**

From Table 1 and 2, the mean nasal height for males was found to be 55.75 mm and nasal breadth to be 37.57 mm whereas for females it was 53.89 mm and 34.59 mm.

**Table 1:** Nasal parameters and standard deviation of male subjects

Nasal Parameters	Mean	Standard deviation	Minimum	Maximum
Nasal height (mm)	55.75	7.28	16.02	84.32
Nasal width (mm)	37.27	5.27	3.39	58.34
Nasal Index	67.05	9.53	21.07	100.90

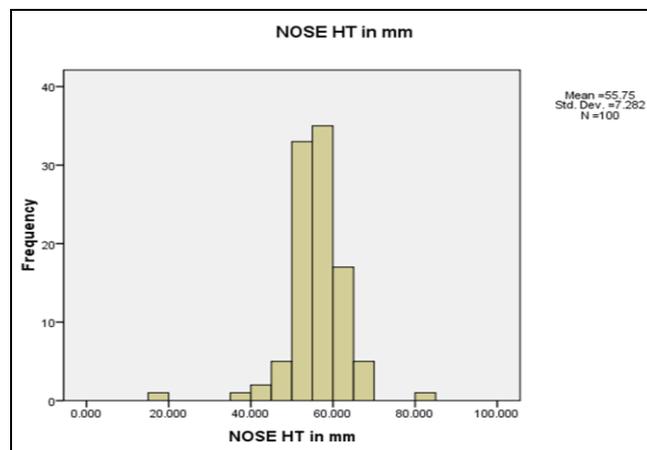
**Table 2:** Nasal parameters and standard deviation of female subjects

Nasal Parameters	Mean	Standard deviation	Minimum	Maximum
Nasal Height (mm)	53.89	5.92	32.54	67.69
Nasal Width (mm)	34.59	4.13	26.11	56.18
Nasal Index	64.84	9.52	45.55	100.0

**Table 3:** Distribution frequency of various types of nose in males and females

Gender	Leptorrhine	Mesorrhine	Platyrrhine
Male	67	32	1
Female	80	19	4

Considering the various types of nose, the most common type was found to be leptorrhine followed by mesorrhine type in both males and females (Table 3).



**Fig. 3:** Distribution of nasal height in males

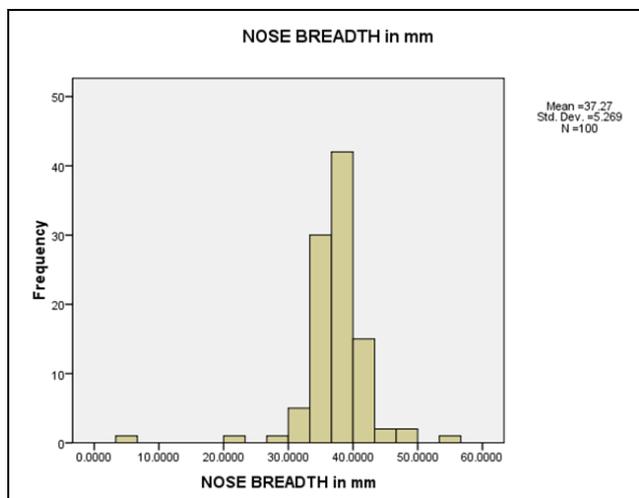


Fig. 4: Distribution of nasal breadth in males

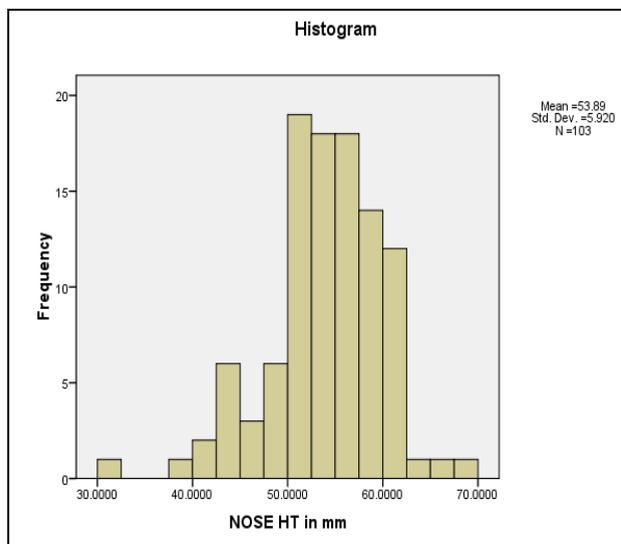


Fig. 5: Distribution of nasal height in females

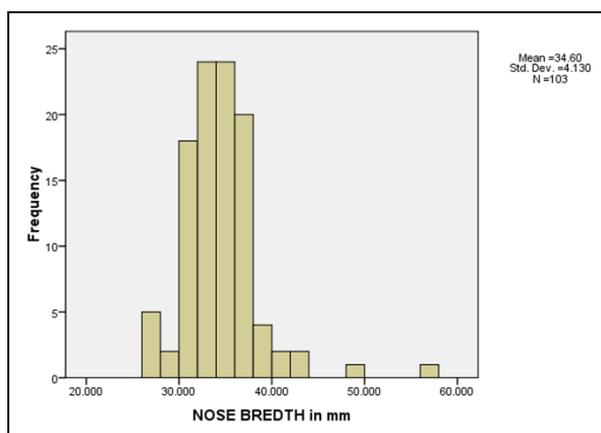


Fig. 6: Distribution of nasal breadth in females

**Discussion**

Nasal and facial dimensions are most important cephalometric parameter to define human morphology.<sup>9</sup>

Variations in the form of nose is the greatest variation in cranium and it is the greater than the body variation as a whole.<sup>11</sup>

Human nose has various shapes and size and influenced by ethnicity.<sup>10</sup> Normative data about nasal dimensions are obligatory for assessing the degree of deviation of the congenital and post traumatic deviation.<sup>12</sup> And it is useful for the surgeons doing repair and reconstructive procedures.<sup>13</sup> The slightest variation in a person’s nose can make a distinct change in their outlook.

And moreover nasal height and width are the measurements which are very useful in anthropology and forensic science.<sup>14</sup>

In the present study, the mean nasal height was found to be 55.75±7.28 mm for males which is slightly higher than females (53.89±5.91). And also nasal breadth for males was 37.27±5.27 mm which is slightly higher than females (34.59±4.13).

**Table 4:** Comparative data on nasal height, breadth and nasal index of males in various Indian population

	Mean Nasal Height	Mean Nasal Breadth	Nasal index
<b>Present Study</b>	<b>55.75</b>	<b>37.27</b>	<b>67.04</b>
Patil et al (South Indian Population) <sup>15</sup>	58.04	49.28	84.91
Jagadish Chandra et al <sup>16</sup>	56.82	37	-
Khanderkar et al <sup>17</sup>	55.75	37.27	-
Sudhakar Kumar Ray et al <sup>18</sup>	37.8	28.7	75.86

**Table 5:** Comparative data on nasal height, breadth and nasal index of females in various Indian population

	Mean Nasal Height	Mean Nasal Breadth	Nasal index
<b>Present Study</b>	<b>53.89</b>	<b>34.59</b>	<b>64.84</b>
Patil et al (South Indian Population) <sup>15</sup>	56.12	38.02	67.75
Jagadish Chandra et al <sup>16</sup>	58.58	37.98	-
Khanderkar et al <sup>17</sup>	53.89	34.59	-
Sudhakar Kumar Ray et al <sup>18</sup>	34.7	24.9	72.89

The present values for mean nasal height and breadth of nose was lower than that found by Patil et al on their study on South Indian population<sup>15</sup> but coincides with values done by Jagadish Chandra et al and Khanderkar et al.<sup>16,17</sup> The mean nasal height and breadth was very high when compared with population of Uttar Pradesh reported by Sudhakar.<sup>18</sup>

The mean values for nasal parameters reported by various authors in different population (Table 4&5) could be

due to difference in methods adopted for studying and also due to geographical and regional variations.

Topinard in 1878 made the statement that the nasal index is one of the best characteristic used for distinguishing various races.<sup>19</sup> Anthropological classification of nose were leptorrhine (Nasal index of 69.90 or less), Mesorrhine (Nasal index between 70 & 84.90) and Platyrhine (nasal index of 85 & above).<sup>20</sup> Nasal type is unique to each race and have a marked relation to climatic conditions.<sup>21</sup> Narrower nose is for cold weather and dry climate and broad nose is for warmer and humid climate.<sup>22</sup> One of the adaptation to the environment is the elongation of nose.<sup>23,24</sup>

And moreover nasal index is useful in determining the sex and identity of unknown persons.

In the present study, the commonest type of nose was found to be leptorrhine for both sexes with the frequency of 147 (72.4%). The next common type was mesorrhine with the frequency of 51(25.12%). Small frequency of platyrhine type was also found. This finding contradicts the findings of Patil et al who stated that the common type of nose in South Indian population<sup>10</sup> was Mesorrhine in males and leptorrhine in females and also that of Kannan et al<sup>25</sup> and Gangrade and Babe<sup>26</sup> who found the predominant type was mesorrhine pattern in North Indian population.

But the present study agrees with the finding that even in same geographical locations, there are different types of nasal indices and types can be seen.<sup>27</sup>

Shape difference in nasal anatomy between male and female are important because feminisation of male nose is an undesirable effect.<sup>18</sup> It also agrees with the statement that the sexual dimorphism was seen in all ethnic groups with the males having higher nasal index than females.<sup>25</sup>

## Conclusion

There is multiplicity in the various measurements of nose and its understanding can be used in reconstructive surgeries, forensic anthropology and scientific research and also it helps the physical anthropologists to recognize and make out the migration pattern of early civilisation.

**Conflicts of Interests:** None.

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