ABSTRACT

Introduction: Nasal Index is very useful in anthropology and it is one of the clinical anthropometric parameters recognized in nasal surgical and medical management. Nasal index is the most common nasal parameter which may be related to regional and climatic differences so that it would be further useful as an essential tool to the researchers, clinicians, rhinoplasty and facial reconstructive surgeons and forensic experts related to this field. The present study was designed to provide a normative data of nasal index and to classify their nose type and comparison of data with other studies.

Material & Methods: The study was conducted on 200 human dry skulls of north Indian population in Department of Anatomy, S.N. Medical College, Agra, UP, India. The measurements were taken using digital vernier caliper. Nasal Index was calculated by measuring nasal height and nasal width in order to determine the nasal type.

Results: In the present study, mean nasal height was 49.25±3.68mm whereas mean nasal width was 24.63±2.90mm. Mean nasal index was calculated as 51.00± 0.09.

Conclusion: The findings of our study suggest that according to the nasal index, the studied population of North India belongs to Platyrhine type.

Keywords: Nasal index, human dry skulls, digital vernier caliper.

INTRODUCTION

Anthropometry provides scientific methods and techniques for taking various measurements and observation on the living man and the skeleton [1]. Nasal anthropometry is the study concerned with the measurements of the proportion, size and shape of the human nose [2]. The importance of the nose is so great in determining regional, climatic differences and facial reconstructive surgery that one might label it “Nasal science” [3].

Nasal index is a sensitive anthropometric index. It is the most common nasal parameter which may be related to regional and climatic differences [4]. Before changing the state of the nose, analysis of the nasal index is the initial step a specialist takes before performing rhinoplasty.

It is useful in various branches of medicine such as reconstructive surgery, in forensic medicine for medicolegal assessment of individuality and race [5]. Nasal index is also useful in the analysis and classification of fossil remains as well as the study of living population [6].
MATERIAL AND METHODS

The present study was conducted on 200 human dry skulls in Department of Anatomy, S. N. Medical College, Agra out of which 125 skulls were from S. N. Medical College, Agra and 75 were taken from G.S.V.M. Medical College, Kanpur.

Nasal height and nasal width were measured with the help of digital vernier caliper (with an accuracy of 0.01 cm). All the measurements were taken thrice to minimize measurement error and mean of the three obtained value was used. After data collection, results were prepared in terms of mean and standard deviation using software SPSS version 23.0.

Measurements

In each skull following measurements were taken:

**Nasal Height (NH):** Nasal Height was measured from the nasion (where the internasal suture touches the frontal bone) to a point just at the base of nasal spine (Fig. 1).

**Nasal Width (NW):** Nasal Width is the greatest breadth of nasal aperture (Fig. 2).

**Nasal Index (NI):** Nasal Index is calculated by the following

\[
\text{Nasal Width} \times 100 \\
\text{Nasal Height}
\]

Above measurements were compared with studies of different authors as anthropometric measurements are different in different population and geographical areas.

**OBSERVATIONS AND RESULTS**

The maximum, minimum and mean value of Nasal height was 59.27 mm, 38.26 mm and 49.25 ± 3.68 mm respectively. The maximum, minimum and mean value of Nasal width was 36.22 mm, 17.46 mm and 24.63 ± 2.90 mm respectively (Table 1).

The maximum value of Nasal Index was 72.00, minimum value 40.00 and mean value was 51.00 ± 0.09 (Table 1, Fig. 3).
Table 1: Showing Nasal Height, Nasal Width & Nasal Index in 200 Human Dry Skulls

| Parameters     | Sample (human dry skulls) | Maximum | Minimum | Mean   | SD    |
|----------------|---------------------------|---------|---------|--------|-------|
| Nasal Height   | 200                       | 59.27mm | 38.26mm | 49.25mm| 3.68mm|
| Nasal Width    | 200                       | 36.22mm | 17.46mm | 24.63mm| 2.90mm|
| Nasal Index    | 200                       | 72.00   | 40.00   | 51.00  | 0.09  |

DISCUSSION

Nose is very important in racial determination [7]. The classification of nose into different categories is a function of Nasal Index in anthropology as it is applied in differentiating racial and ethnic variations. Based on nasal anthropometric parameters, nose has been classified into following types by Martin & Saller [8] as:

- Leptorrhine: Moderately narrow nose with nasal index ≤47.
- Mesorrhine: Moderate or medium size nose with nasal index 47-50.9.
- Platyrrhine: Moderately wide nose with nasal index 51-57.9.
- Hyperplatyrrhine: Very wide nose with nasal index ≥58.

Number of studies has indicated racial and ethnic differences in nasal index amongst different populations. Leptorrhine with a nasal index below 48 as in mixed Europeans, ancient egyptians, American Indians; Mesorrhine with an index ranging from 48 to 53 as in Chinese, Japanese, Malays; Platyrrhine with an index above 53 as in Australians, Negroes, Kaffirs, Zulus etc. [9].

Present study shows the comparison of Nasal Height and Width between different population groups (Table 2).
Table 2: Showing comparison of Nasal Index between different population

| Study                        | Population | Nasal Index       |
|------------------------------|------------|-------------------|
| Abdelkader et al. (2005) [11]| European   | 47.8- 69.8        |
|                              | Alaskan    | 47.8- 69.8        |
|                              | African    | 38.0-59.0         |
| Kulkarni (2010) [5]          | South Indian | 53.3 ± 5.3     |
| Howale et al. (2012) [10]    | Maharastha | 54.30             |
| Padala & Khan (2017) [12]    | South Indian | 51.95±7.20      |
| Present study (2019)         | North Indian | 51.00 ± 0.09 |

According to the classification of Martin and Saller (1957) [8], Nasal Index was 51.00 ± 0.09 in present study which clearly revealed that North Indians belongs to Platyrrhine Type of Nose (Table 2).

CONCLUSION

The present study is designed to provide a normative data of nasal index in north Indian population and to classify their nose type and comparison of data with other studies, so that it would be further useful as an essential tool to the researchers, clinicians, rhinoplastic and facial reconstructive surgeons and forensic experts related to this field.

Data collected in the present investigation could serve as data base for the quantitative description of human nasal morphology during normal growth and development considering region and race related variation. Findings of the present study are useful for quantification of the nasal features of north Indian population. The findings of our study suggest that Nasal Index of North Indian population belongs to Platyrrhine category.

REFERENCES

1. Choudhary A, Chowdhary DS. Comparative anthropometric study of nasal parameters between two ethnic groups of Rajasthan state. International Journal of Medicine and Public health. 2012; 2 (2).
2. Eliakim-Ikechukwu C, Bassey T, Ihentuge et al. Study of the nasal indices and bialar angle of the Ibo and Yoruba ethnic groups of Nigeria. Journal of Biology, Agriculture and Healthcare. 2012; 2(11):149-152.
3. Moore KL, Dalley AF, Agur AMR. Head and Neck: Clinically oriented anatomy. South Asian ed. Lippincott-Williams and Wilkins Publishers, 2018.
4. Hall RL, Hall DA. Geographic variation of native people along the pacific coast. Hum Biol. 1995; 67: 407-26.
5. Kulkarni V. Study of metrical & non metrical traits of skulls of south Indian population. 2010.
6. Alex FR., Steven B, Timothy GL. 1996. Human Body Composition. 4th ed. Human Kinetics Publishers. 1996; 4:167-172.
7. Madison G. The passing of the great race past 1 language and nationality 2004; chapter 2; 2-4.

8. Martin R, Saller K. Lehrbuch der Anthropolgie. Gustav Fisher Verlag Stuttgart. 1957.

9. Cunningham Appedixied: Measurements & indices employed in physical anthropology. 286-289.

10. Howale DS, Jain LK, Iyer K et al. Orbital & nasal indices of Maharastra region: A direct measurement study using dry skulls. International Journal of Current Research. 2012; 4(8): 158-161.

11. Abdelkader M, Leong S, White PS. Aesthetic proportions of the nasal aperture in 3 different racial groups of men. Arch Facial Plast Surg. 2005; 7(2):111-113.

12. Padala SR, Khan N. Assessment of cranio metric indices of adult human skulls of South Indian origin. International Journal of Medical and Health Research. 2017; 3(12): 155-160.