

Naso-facial anthropometric study of Female Sikkimese University Students

Dr. M N Chettri¹, Dr P Sinha², Dr S Chakraborty³, Dr H Jain⁴

¹MBBS, MS Ent, Assistant Professor Of Ent, SMIMS, Gangtok, Sikkim, India.

²MBBS, Msc Anatomy, Assoc Professor Of Anatomy, SMIMS, Gangtok, Sikkim, India.

³MBBS, MS, MAMS, FICS, Professor & Head Ent, SMIMS, Gangtok, Sikkim, India.

⁴MBBS, Junior Resident, Ent, SMIMS, Gangtok, Sikkim, India.

Abstract:

Background: The face and nasal dimensions are most important cephalometric parameters describing human morphology. Nose is the most important aesthetic unit of face. There is wide variation in size and shape of nose and face due to ethnic influences. Nasal and Facial Index can be used to into various categories.

Method: Prospective study undertaken by the department of Otorhinolaryngology, Sikkim Manipal Institute of Medical Sciences, Gangtok after taking Institutional Ethical Committee clearance over a period of 1 year in ethnic females of Sikkim between the ages of 17-25yrs.

Results: The average Nasal Index was found to be 70.7 with majority being leptorrhine. Average Facial Index was calculated to be 103.1, majority were hyperleptoprosopic. Further analysis were done on basis of ethnicity.

Conclusion: This study is an effort to group the naso-facial measurements of female of Sikkim.

Keywords: Anthropometry; Nasal Index; Facial Index; Sikkim; Ethnicity

I. Introduction

The face and nasal dimensions are the most important cephalometric parameters that describe human morphology. The nose is one of the most important aesthetic units of the face [1]. There is a wide variation in the size and shape of the nose and ethnic influences can result in different appearance of the nose [2]. The nose has been attributed to natural selection in human evolution, the cold and dry climates having narrower noses while the warm and moist climates have broader noses [4]. Nasal elongation is also said to be influenced by adaptation to environment [5]

Morphologically the human nose can be classified into Roman or aquiline nose, the Greek or straight nose, the Nubian nose, the hawk nose, the snub nose and the celestial or turn up nose [6]

The human nose can also be classified using the nasal index. The nasal index is a ratio of the nasal width to the nasal length multiplied by 100 [4]. It is an ethnic sensitive anthropometrical index [7] and has become a useful tool in forensic science [8].

Williams et al [9] has grouped the human nose using the nasal index. The human nose can be grouped into three classes, the leptorrhine (long and narrow nose), the mesorrhine (medium) and the platyrrhine (broad nose) nose types using the nasal index. A nose type is said to be leptorrhine if the nasal index is 69.9 or less, mesorrhine if the nasal index is between 70-84.9 and platyrrhine if the nasal index is 85 and above.

There is a very strong correlation between the nasal index and absolute humidity [10] meaning that in a moist climate, the nasal index is high. Farkas et al., [11] has also documented that nasal index is related to regional and climatic differences.

The human face type can be classified into the following types according to the facial Index, which is a ratio of the facial width to the facial height multiplied by 100. According to Williams et al [9] there are five categories of face based on the facial index namely: hyper euryproscopic (very broad, short face with Facial Index <80), Euryproscopic (broad, short face with Facial Index 79.0-83.9), Mesoprosopic (normoprosopic, average face with Facial Index 84.0-87.9), Leptoprosopic (tall, narrow face with facial Index 88.0-92.9) and hyperleptoprosopic (very tall, narrow face with Facial Index >=93).

Sikkim, a state in the Republic of India is a multi-ethnic state. The ethnic groups comprise of the Lepchas, the Bhutias, the Sherpas and the Nepalese. [12]

This study is an effort to group the naso-facial measurements of the female University Students of the state of Sikkim and compare it with the national reference naso-facial measurements of various ethnic groups. This will enable the Rhinoplastic and Reconstructive Surgeon in understanding the naso-facial morphology of the studied population and plan any reconstructive surgeries likewise.

To treat congenital, post-traumatic facial disfigurements in members of these groups, surgeons require access to craniofacial databases based on accurate anthropometric measurements [13]

II. Materials And Methods

Setting: The study was done by the Department of Otorhinolaryngology, Sikkim Manipal Institute of Medical Sciences, Tadong, Gangtok in collaboration with other constituents of the Sikkim Manipal University.

Ethical Clearance: Institutional Ethical Committee clearance was taken prior to commencement of study. Written Informed consent has been taken from the subjects before including the subject.

Study design: It is a prospective descriptive design.

Study period: It was for a period of 1 calendar year

Study population: Ethnic Female Sikkim Population between the ages of 17-25 during the study periods attending Sikkim Manipal University was considered as subjects for the study. Sampling was non randomized convenience sampling

Sample size: All eligible candidates during the study period.

Inclusion Criteria: SMU Female Students between 17-25 years

Exclusion Criteria: Students not willing to give consent.

Students having h/o or evidence of facial injury affecting the nose

Students having undergone prior septo- rhinoplasty procedures.

Study variables: Demographical data including the age, origin, duration of stay in the land of origin, parental and grandparental origin.

Measurements of nasal and facial length and width.

Procedures: The subjects were made to sit comfortably on a chair with the head held out straight in the anatomical position. The nasal length and nasal width will be measured in centimeters using spreading calipers. The nasal length is measured as the straight distance from the nasion to the subnasale, while the nasal width is measured at the nasal base from ala to ala. Each measurement was taken twice and the average taken. The nasal index is then calculated by dividing the nasal width by the nasal length and multiplying by 100. The facial height is measured as the straight distance from the nasion to the gnathion, while the facial width is measured from zygion to zygion. Each measurement was taken twice and the average taken. The facial index is then calculated by dividing the facial width by the facial height and multiplying by 100 [14].

III. Results

There was a total of 192 female students included in the study. The average age of the subjects was 19.5 years with a range of 17-22.

East District had 121 subjects accounting for 63.02%, West District had 32 subjects accounting for 16.67%, South District accounted for 16.14% of cases with 31 subjects whereas the North District accounted for only 4.17% of the sample with 8 subjects.

Community wise Nepali with 148 subjects comprised 77.08% of the sample, Bhutias with 24 subjects 12.5%, Lepchas with 14 samples formed 7.3% whereas Sherpas were only 6 subjects contributing 3.1% of the sample size.

The average Nasal Index was found to be 70.7 with a Standard Deviation ± 18.35 minimum being 50 and maximum being 96.20. Classified on the Nasal Index 95 subjects were found to be Leptorrhine with an average NI of 63.82, 87 as Mesorrhine with an average NI of 75.8 and the remainder 10 as Platyrhine with an average NI of 90.4

The average Facial Index was calculated to be with a 103.1 Standard Deviation of ± 12.65 and a minimum value of 83.2 and maximum of 152.17. The majority of the sample was hyperleptoprosopic with 154 subjects and an average facial index (FI) of 106.7. 21, 13 and 4 subjects were found to be Leptoprosopic, Mesoprosopic and Euryprosopic type with average facial indexes being 90.4, 86. and 83.4 respectively. Hypereuryprosopic type of facial structure was not encountered

The tables I & II shows the community wise distribution of Nasal & Facial Type

Nepali young adult's majority had facial index of 106.2 ± 5.53 and nasal index of 64.2 ± 18.35 , implying hyperleptoprosopic face type and leptorrhine nose type. Facial index of Bhutia young adults showed 107.5 ± 12.67 with nasal index of 62.1 ± 5.87 , indicating the dominance of the hyperleptoprosopic face type and Leptorrhine nose type. Lepcha young adults revealed facial index and nasal index of 103.4 ± 8.8 and 76.0 ± 8.6 , respectively. They had hyperleptoprosopic face type and Mesorrhine nose type. The nasal index of the Sherpa is Mesorrhine 80.2 ± 5.5 and facial index is hyperleptoprosopic 119.5 ± 12.6

IV. Statistical Analysis

Data was entered in SPSS 16.0 and descriptive and analytical statistics were used. The Paired-Samples T Test procedure was used to compare the means of two variables for a single group in each case. The Sig. (2-tailed) column displayed the probability of obtaining a t statistic whose absolute value was equal to or greater

than the obtained t statistic. The confidence interval was taken to be 95 % (0.05) and all values were found to be statistically significant.

Paired Samples Correlations between Nasal_Index & Facial_Index was found to be 0.223 with a sigma value of 0.001. (Table III).

V. Discussion

Racial and ethnic morphometric differences in the nasal ergonomics in the world population have been the focus of investigation [11]. The size, shape and proportion of the nose is very valuable for cosmetic and plastic surgeons, undertaking repair and reconstruction of the nose [15]. Present study demonstrated that there were racial dimorphism in nasal ergonomics. Several studies showed sexual differences in NL, NB, NH and CI. [16] The study conducted by Milgrim also showed that there were racial differences in nasal breadth [17]. They found the mean nasal breadth of white females was 31mm and South American females 34.4mm.

Compared to a study on Facial Index as seen at the University of Ilorin Teaching Hospital (UIH), Ilorin Nigeria [18] the type of face structure was Euriprosopic face shape (72%), Mesoprosopic (14%), Leptoprosopic (9%), Hypereuriprosopic (5%) and Hyperleptoprosopic (0%) whereas in our study the majority of the sample was hyperleptoprosopic with 114 subjects and an average facial index (FI) of 107.9. 12, 6 and 4 subjects were found to be Leptoprosopic, Mesoprosopic and Euryprosopic type with average facial indexes being 90.4, 86.7 and 83.2 respectively. Hypereuryprosopic type of facial structure was not encountered in our study.

According to another study on university students from Malaysia [19] the mean facial index of Malay subjects showed 88.82 ± 6.63 with nasal index of 81.00 ± 7.48 , showing dominance of the leptoprosopic face type and mesorrhine nose type. Chinese subjects showed facial index and nasal index of 85.65 ± 6.50 and 79.56 ± 8.62 , respectively, having mesoprosopic face type and mesorrhine nose type. Indian students had facial index of 92.57 ± 7.19 and nasal index of 76.27 ± 7.39 , having leptoprosopic face type and mesorrhine nose type in that study.

In a study of Bhasin M.K [20], Nepalese dominant facial type was mesoprosopic but in our study the Sikkimese Nepalese predominantly had hyperleptoprosopic which is quite opposite in our study.

In the case of morphological facial index, the types of faces vary among the people of Indian states where people of Madhya Pradesh are Mesoprosopic [21], people of Bengal and Assam are Euryprosopic [22,23], people of Rajasthan are Hyperleptoprosopic [24], and people of Maharashtra [25] Gujarat are Leptoprosopic [26] and Sikkim are hyperleptoprosopic (present study). The values of the index for the population of other different countries make the people of Arab Mesoprosopic [27], people of Persia and Australia Hypereuryprosopic [28] and Malaysian Indians Mesoprosopic [29].

There are characteristic differences among populations in the shape and the size of the nose; it is likely that the nasal bone and the piriform aperture also have some differences, which can provide useful insights for the population affinity in anthropology. The nasal index is highly depending on the temperature of that region. This index distinctively differs from other anthropological indices, in being based upon both bony and cartilaginous landmarks. Anthropological studies suggest that climatically influenced selection acts to increase the efficiency of the nose in both warming and moistening of inspired air [30]. As such, in colder and drier climates, the length of the nasal passage is increased and the base is narrowed, thus increasing the surface area and the period of time over which inspired air is warmed and moistened. So the warmer regions of India e.g. South Indians have very broad noses (Hyperchamaerhinae). On the other hand in North India, where temperature is moderate to high, have medium to broad noses (Chamaerhinae). People of Gujarat are Mesorrhinae. People of Sikkim present study are predominantly leptorrhine. The Nigerian population (warm region) is reported to have the broad nose to very broad nose [31]. The Indian Negroids also have broad nose (Hyperchamaerhinae) [33].

Several studies have indicated the racial and ethnic differences in nasal index amongst different populations [34]. Most Caucasians are leptorrhine having long and narrow nose with nasal index of 69.9 or less. The Indo-Aryan was also similar to the Europeans, possessing a fine nose [35]. Jingpo people in China are mesorrhine [36]. Indo-African [35] and Afro-American [37] people have platyrrhine nose type [38].

Kaushal et al. [39] stated that nasal index of a race appears to be markedly related to climate; the narrow and long noses favored cold and dry climate, as there was more surface area for warming the air, whereas flat and broad nose types were seen in warm and moist climate, as a consequence of natural selection in human evolution [40].

P Sinha et al [41] in a study on craniofacial anthropometry in newborns of Sikkimese origin in 2014 found the mean prosopic index percentages for male and female newborns in Sikkim were 100.02 and 97.26 respectively. This indicated a hyperleptoprosopic skull which is the same as in our study

More similar studies with a larger and varied sample size and ethnic concentration from the region are required to authenticate the values obtained.

VI. Summary

- People of Sikkim in present study are predominantly leptorrhine and hyperleptoprosopic.
- Nepali young adult's majority hyperleptoprosopic face type and leptorrhine nose.
- Bhutia's dominant hyperleptoprosopic face type and Leptorrhine nose type.
- Lepcha young adults had hyperleptoprosopic face type and Mesorrhine nose type.
- Sherpa's are Mesorrhine and hyperleptoprosopic

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Table I shows the community wise distribution of Nasal Type

Community Distribution	Nasal Index									
	Average NI	Std Dev	Minimum	Maximum	L		M		P	
					n	avg	n	avg	n	avg
Nepali	70.52	18.10	50	96.2	76	64.2	62	75.6	10	90.4
Bhutia	68.6	5.81	59.6	96.2	11	62.1	13	76.1	-	-
Lepcha	70.6	8.6	56.6	96.2	6	65.1	8	76.0	-	-
Sherpa	74.0	5.5	61.7	83.7	2	61.7	4	80.2	-	-

L=Leptorrhine: M=Mesorrhine: P=Platyrrhine: n = no of subjects

Community Distribution	Facial Index											
	Average FI	Std Dev	Minimum	Maximum	EP		MP		HLP		LP	
					n	avg	n	avg	n	avg	n	avg
Nepali	103.3	5.53	83.2	152.2	2	83.7	9	86.3	119	106.2	18	90.5
Bhutia	102.9	12.67	83.2	152.2	-	-	2	86.6	19	107.5	3	90.0
Lepcha	103.0	8.8	83.2	120.1	2	83.2	-	-	12	103.4	-	-
Sherpa	109	12.6	87.9	129.1	-	-	2	87.9	4	119.5	-	-

Table II shows the community wise distribution of Facial Type
Euryprosopic =EP, Mesoprosopic=MP, Hyperleptoprosopic HLP, Leptoprosopic LP

Nasal_Index - Facial_Index	Paired Samples Test							
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
	-3.286E1	±13.594	.940	-34.714	-31.006	-34.948	191	.000

Table III

LEGEND
Table I showsthe community wise distribution of Nasal Type
Table II showsthe community wise distribution of Facial Type
Table IIIshows Paired Samples Test

