

Inter-Generational Variation of Nasal Morphology of Meitei Males of Manipur, India

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ABSTRACT

Introduction: In the present era of knowledge, study of Nasal Morphology is one such area which contributes theoretically in the understanding of human biological evolutionary process of human face on one hand, and clinical applications in identification of age, sex, ethnicity of unknown identity in forensic medicine and correcting nasal anomalies and nasofacial contour in reconstructive surgery on the other. Quite a number of scholars have worked on Nasal Morphology of different population groups of the world. However, such study is comparatively very rare for the Meitei Population of Manipur, India.

Aims and Objectives: The present study is carried out with the main objective of providing a baseline data of nasal features of Meitei males and also to see if any intergenerational change has taken place in the nasal morphology in the said population.

Materials and Methods: A cross-sectional random sample of Meitei males of Manipur belonging to 20-60 years of age were recruited for measurement of Nasal Height and Nasal Breadth. Nasal Index was also calculated and classified accordingly following conventional categories of Martin and Saller. Appropriate statistical tools were used for systematic analysis and interpretation of the data.

Results and Conclusion: The findings of the present study reveals that the Meitei males of the two generations show significant difference in the frequency percent distribution as

well as in mean value of Nasal Breadth thereby showing a positive secular trend, though no such difference is observed in Nasal height. The value of Nasal Index show an increase from previous generation to the past generation thereby experiencing a positive secular trend though both the population have Mesorrhinae nose, a characteristic of Mongoloid population suggesting that genetic factor play more important role than climatic factor. Even though a secular trend is observed, the intrinsic character of a mongoloid population cannot be altered.

Key words: Nasal Breadth, Nasal Height, Nasal Index, Mesorrhinae, Rhinoplastic Surgery.

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INTRODUCTION

Secular trend in physical growth pattern is one of the biological evolutionary phenomena taking place almost in all human population groups of the world. Study on secular trend for the first time was described on human stature by Quetelet in 1835¹, but now it is not restricted to only stature but also to axial, appendicular, facial parts of the body and even in the timing and sexual maturation of the body.²⁻⁵ The present study is attempted keeping in view of the fact that there are hardly few works specifically on study of secular trend in nasal parameters, even though quite a good number of studies have been carried out on secular trend of different parts of human body.

Human nose that protrudes forward from the face⁶ and considered as an important part in an individual's facial appearance⁷,

accepted to be part of the facial features used in assessing beauty⁸ has been used for study of ethnic and racial differences.⁹⁻¹⁴ Size and shape of nose is found to differ in different population.¹⁵⁻¹⁷ Based on ratio of Nasal Breadth and Nasal Height referred to as Nasal Index, human nose is broadly classified into five types: Hyperleptorrhinae (long narrow nose) if the Nasal Index falls between 40 to 54.9, Leptorrhinae (Moderately narrow nose) Nasal Index falling between 55.0 to 69.9, mesorrhinae (medium nose) Nasal Index falling within 70.0 – 84.9, Chamaerhinae or platyrrhinae (moderately high nose) Nasal Index ranging between 85.0 to 99.9 and Hyperchamaerhinae or Hyperplatyrrhinae (very wide nose) if Nasal Index falls 100 and above.¹⁸ Quite a number of scholars have worked on different aspects of human nose and

put forward the implications and significance of their findings. Nose is considered as one of the clues to the racial origin.¹⁹ Nasal characters vary with age, sex and ethnic background.²⁰⁻²⁵ Findings of many of the scholars reveal that Nasal Index or shape of the nose has a strong co-relation of with climatic conditions as a result of evolutionary adaptation.²⁶⁻³⁰ The narrower noses are favoured in cold and dry climates whereas broader noses in warmer, moister ones as a consequence of natural selection in human evolution.³¹ These features have got genetic basis.³² The Caucasians have Leptorrhine nose; Orientals with medium nose are Mesorrhine while the Negroid have Platyrrhine.³³ The external nose continues to modify and enlarge beyond the attainment of skeletal maturity.³⁴ Modifications went on with reduced speed after 20 years of age.³⁵ The nose continues to grow throughout life and old age people often have large noses.³⁶ Variation in the form of nose is much greater than those found in the cranium and other body parts.³⁷ The study of nasal parameters is gradually gaining ground as it has significance in biological evolution, genetic counseling, reconstructive surgery, forensic investigation, in distinguishing age, sex and ethnicity of individuals whose identity is unknown apart from providing baseline data of nasal anthropometric measurements. Though a number of scholars have worked on nasal anthropometry of different populations of the world, no such study have ever been conducted exhaustively among the Meitei Male population of Manipur, India excepting a few literatures which says Meiteis have Mongoloid affinities³⁸ and the population groups of Manipur with Mongoloid affinities have the value of 75.93 nasal index.³⁹ Keeping this in view the present study is designed with a view to provide baseline data of the nasal features and also to see if inter-generational changes have taken in the nasal parameters of the Meitei males of Manipur so that the findings would have clinical importance in rhinoplastic and facial reconstructive surgery and forensic investigation apart from biological evolutionary significance.

MATERIAL AND METHODS

A total of one hundred (100) subjects belonging to the age group 20 - 60 years with normal nose configuration and both parents of indigenous Meitei males ethnic group of Manipur State, Bishnupur District were recruited for this research. Ethical clearance and written consent were obtained from the subjects. The subjects with trauma of the nose and congenital anomalies were excluded. Subjects who had no trauma or surgery of the face or nose, no history of cleft lip or palate were included in the study. All the measurements were taken with the subject sitting on a chair in a relaxed condition with the head oriented in eye ear plane. The facial muscles were relaxed in order not to alter the size of the nose. The relevant nasal surface landmarks were selected with shortest distance between two points of the nose was taken with a Martin's Sliding caliper with accuracy of 0.01 mm.

The landmarks considered for the concerned nasal measurements are:

- **Nasion:** the point on the root of the nose where it intersects with the mid- sagittal plane.
- **Subnasal:** the point at which the nasal septum merges with the upper cutaneous lip in the mid-sagittal plane.
- **Alare:** the point at the most laterally prominent point on the nasal wing

The measurements taken in this study includes:

1. Nasal Height (NH): measured from nasion to subnasal
2. Nasal Breadth (NB): measured from alare to alare

The following relevant index i.e. Nasal Index was calculated using the formula:

$$\text{Nasal Index} = \frac{\text{Nasal breadth} \times 100}{\text{Nasal Height}}$$

and classified based on the conventional categories of Saller. The findings of the present study have been compared with that of Singh⁴⁰ who also worked among the same population. Appropriate statistical treatment was given for a systematic and scientific presentation of data.



Fig 1: Measuring Nasal Height

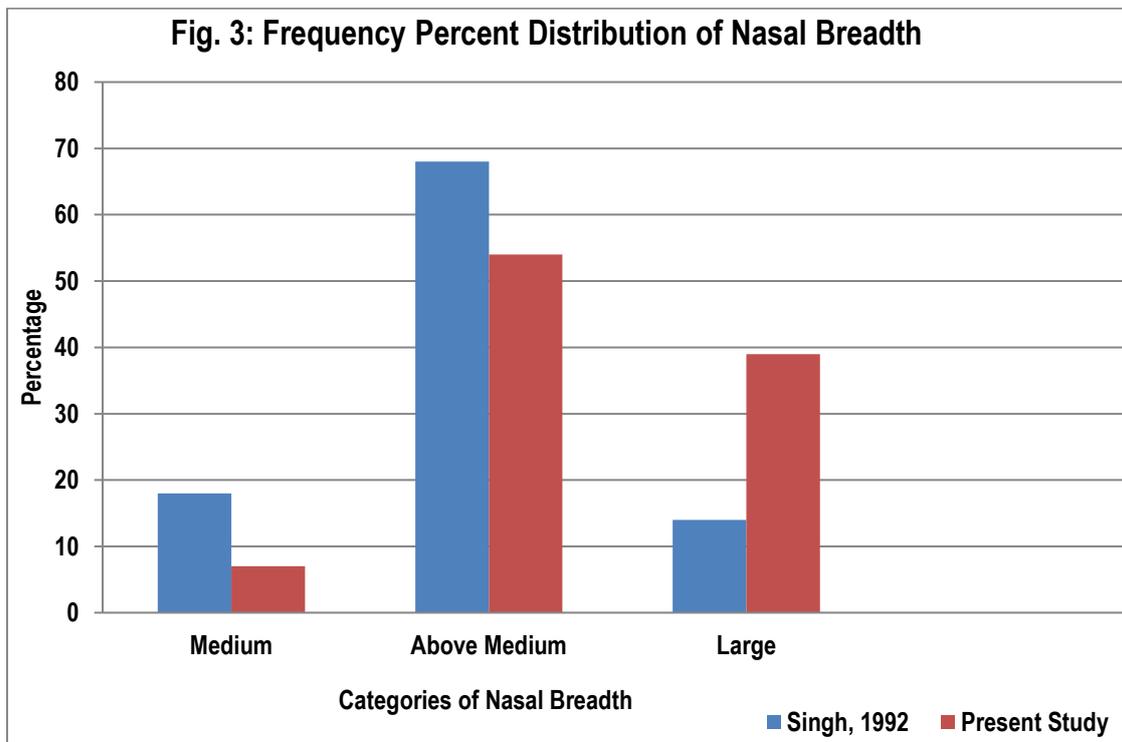


Fig 2: Measuring Nasal Breadth

Table 1: Frequency Percent Distribution of Nasal Breadth according to Conventional Categories

Nasal Breadth (Category)	Range in (cm)	Singh (1992)	Present study (2016)
Medium	3.0-3.4	18	7
Above Medium	3.5-3.9	68	54
Large	4.0-∞	14	39
		100	100

$\chi^2_2 = 18.24$



RESULTS AND DISCUSSION

Based on the analysis of the data collected during the survey period (2016) and comparison of the said findings with the available data of previous generation, the following paragraphs deals with the results and discussions.

It is observed from table 1 that majority of the Meitei population of the present generation (54%) as well as the previous generation (68%) have above medium category of Nasal Breadth falling under the range variation of 3.5-3.9 cm. A trend of increasing Nasal Breadth is taking place from previous generation to the present generation as evident from the fact that Medium Nasal Breadth has decreased from 18% observed in previous generation to only 7% in the present generation, while large Nasal Breadth has increased from 14% observed in previous generation to 39% in the present generation. Increasing mean value of the Nasal Breadth from previous generation (3.70±0.03cm) to present

generation (3.89±0.03 cm) by 0.19 cm has clearly shown a significant difference (t=4.75). This broadening of the nose may probably be associated with change in the climatic condition more particularly increase in annual mean temperature by 0.03°C/year and rainfall by 1.94 mm/year during the last few decades.⁴¹ The present findings also agrees with the findings of⁴² that narrower noses are favoured in cold and dry climates whereas broader noses in warmer, moister ones as a consequence of natural selection in human evolution. The present finding therefore indicates a secular trend of increasing Nasal Breadth among the Meitei population (table 4). This trend is also evident from the range of Nasal Breadth between previous generation (3.1-4.3 cm) and present generation (3.1 -5.0 cm). The chi square value of 18.24 also reveals a statistically significant difference between the previous and present generation as far as frequency percent distribution of Nasal Breadth is concerned.

Table 2: Frequency Percent Distribution of Nasal Height

Nasal Height in cm	Singh (1992)	Present study (2016)
4.0-4.2	4	4
4.3-4.5	16	12
4.6-4.8	31	37
4.9-5.1	30	31
5.2-5.4	14	11
5.5-5.7	5	5
Total	100	100

$\chi^2_5 = 1.4$

Table 3: Frequency Percent Distribution of Nasal Index According to Conventional Categories

Type of Nose	Range	Singh (1992)	Present study (2016)
Leptorhinae	55-69.9	19	8
Mesorhinae	70-84.9	65	67
Chamaerhinae	85-99.9	16	24
Hyperchmaerhinae	100-∞	-	1

$\chi^2_2 = 6.47^*$

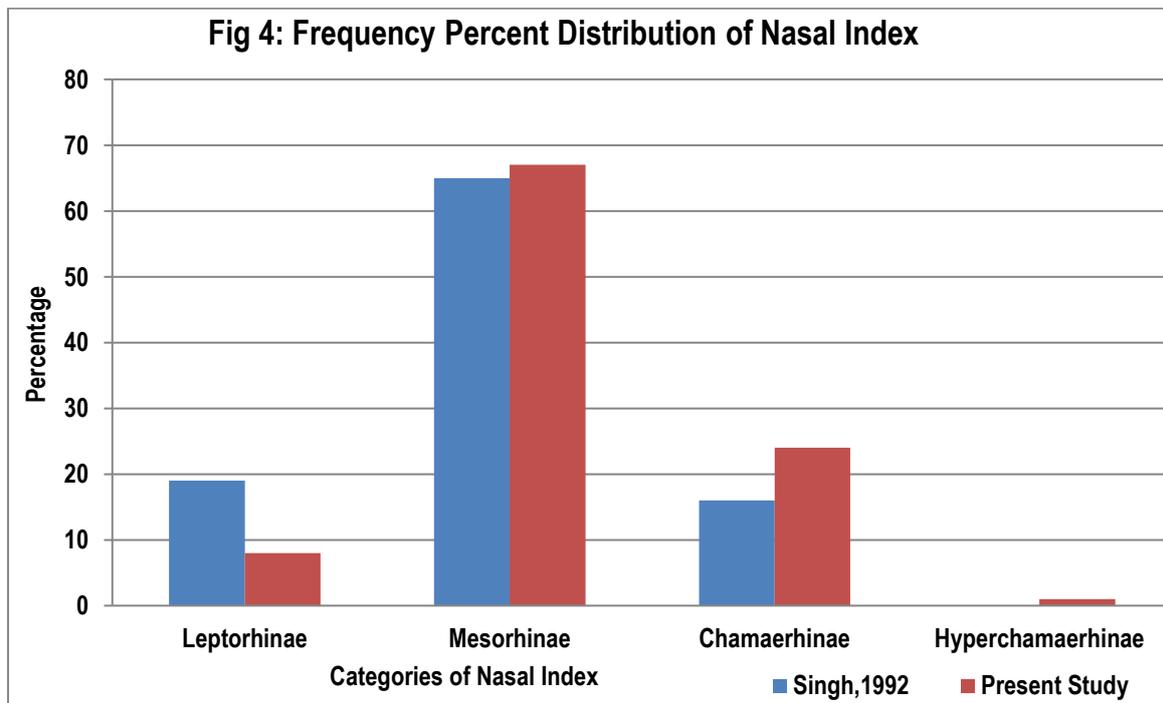


Table 4: Obtained Mean and t-Values of Meitei Males

Parameter	Population	Range	Mean	Difference of Mean	Standard Deviation	t Value
Nasal Breadth	Meitei (Singh, 1992)	3.1-4.3 cm	3.70±0.03	0.19	0.27±0.02	4.75*
	Present Study	3.1 -5.0 cm	3.89±0.03			
Nasal Height	Meitei (Singh, 1992)	4.0-5.7 cm	4.85±0.04	0.00	0.35±0.03	0.00
	Present Study	4.1-5.6 cm	4.85±0.03			
Nasal Index	Meitei (Singh, 1992)	61.40-95.65	76.60±0.80	3.88	7.96±0.56	3.43*
	Present Study	59.62-116.28	80.48±0.80			

*Significant at 5% probability

As regards frequency percent distribution of Nasal Height is concerned, statistically there is no significant difference in between the Meitei population of previous and present generation ($\chi^2_5 = 1.4$) as a very close similarity is observed between them (table 2). It is also seen that only 4% each of both the populations have Nasal Height as short as 4.0 to 4.2 cm and 5% of each of both the population as long as 5.5 to 5.7 cm. Though the range of Nasal Height fall between 4.1 to 5.6 cm for the present Meitei Population and 4.0 to 5.7cm for the previous Meitei population (table 4), majority of them (68%, present generation; 61%, previous generation) have Nasal Height ranging between 4.6 to 5.1 cm (table 2). Apart from showing no significant difference in the frequency distribution, the Mean value of Nasal Height of both the population is exactly the same (4.85 cm), thus revealing no statistical significant difference between the population ($t=0.00$). The present finding which says that no intergenerational change has taken place with regards to height of nose as well as its distribution pattern also subscribe to the views that, the intrinsic variation in Nasal Breadth is greater than that of Nasal Height within population.⁹

Even though Nasal Height shows no significant difference ($t=0.00$, table 4) between the two generations, type of nose, expressed as Nasal Index i.e. the ratio of Nasal Breadth and Nasal Height, show statistically significant difference both in frequency percent distribution pattern ($\chi^2_2 = 6.47$, table-3) as well as in mean value ($t = 3.43$, table 4) because of inter-generational difference observed

in the Nasal Breadth ($t=4.75$, table 4). i.e. increase in Nasal Breadth probably as a result of increase in mean annual temperature and humidity as also revealed in many of the earlier studies that, Nasal Index has been found to be associated with variation in average in humidity and temperature.^{42,43} Considering the type of nose, majority of the population of both the generation (present- 67% and previous- 65%) have mesorhinae nose (medium size nose). Though mesorhinae nose occur most frequently in both the population, leptorhine nose (moderately narrow nose) occur more frequently among the Meiteis of Previous generation (19%) than the present generation (8%). On the other hand Chamaerhinae (moderately wide nose) occur more frequently among Meiteis of present generation (24%) than the previous generation (16%). This difference in the frequency percent distribution clearly indicates that the value of the Nasal Index is experiencing a positive trend of increase. In short there is a trend of increasing mean value of Nasal Index from previous generation (76.60 ± 0.80) to the present generation (80.48 ± 0.80), thereby showing a positive secular trend in the Nasal Index. Even though a secular trend is observed in the general shape of the nose, mesorhinae characteristic of the Mongoloid population is still retained in the metei population irrespective of intergenerational variations. The mesorhinae nose type observed among the mongoloid population is also supplemented by the findings of Koirala¹⁴ who studied Nepali population, and Xu. et al.⁴⁴ who studied Jingpo people of China. This findings is in agreement with

the view that, Nasal characteristics are under rather strict genetic control of a multifactorial nature⁴⁵. Again ethnic genetic variability play more important role than the climatic condition as two ethnic groups living in the same climatic condition show variation in their nasal type.⁴⁶ This simply means that despite living in different climatic conditions some ethnic groups have the same nasal type.^{47,48}

CONCLUSION

Overall findings of the present work which aims at studying the nasal morphology of the present Meitei Population of Manipur and comparing the same with the findings of the previous generation reveals that, majority of the Meitei population in general have nose with a Nasal Breadth of above medium category of falling under the range variation of 35-39 mm.

A trend of increasing Nasal Breadth from previous generation to the present generation is observed, which may probably be because of change in climatic condition. However, no intergenerational change is observed as far as Nasal Height is concerned.

Considering the overall nasal shape, there is a trend of increasing mean value of Nasal Index from previous generation to the present generation, thereby showing a positive secular trend in the Nasal Index.

Even though such a trend is observed, both the population still have Mesorrhinae nose which is one of the characteristics of a Mongoloid population. These findings therefore suggest that genetic factor play more important role than natural environmental factor in determining the shape of human nose. Having learnt from the above findings, one of the clinical applications of the study is that, the findings of the present study would definitely be useful to the clinicians more particularly the rhinoplastic surgeons in carrying out the rhinoplastic surgery of the nose of mongoloid population.

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