

A Comparative Study of Nasal Parameters between Bengali and Manipuri Ethnic Groups of Bangladesh

Kanta Sree Dutta^{1*} Pratik Chowdhury² Shantanu Dutta³ Nazmun Nur-E-Azam⁴
Sanjoy Kumar Chakraborty⁵ Md. Ashrafuzzaman⁶

Abstract

Background: One of the methods for determining a person's race, ethnicity and gender is to be familiar with nasal anthropometry. The nasal index determination is one of the most widely utilized anthropometric factors in categorizing human races. To measure and compare average nasal anthropometric measurements between Bengali and Manipuri adult male.

Materials and methods: This was a cross sectional observational study. Anthropometric analysis of the nasal characteristics of two Bangladeshi ethnic groups was carried out on 200 respondents, were collected through non probability convenience sampling. 100 were Bengali adult male and 100 were Manipuri adult male. The age of the subject ranged from 18 years to 50 years. Using a spreading caliper, measurements of the nasal height and breadth were made and the nasal index was computed from the results using an unpaired t-test.

Results: The collected data was statistically analyzed and the result was showing that there is significant difference of nasal height between Bengali (MEAN \pm standard deviation) (5.20 cm \pm 0.29 cm) and Manipuri male (4.66cm \pm 0.23) and Nasal breadth were found as (3.19 cm \pm 0.19cm) and (3.5cm \pm 0.19cm) with p value < 0.001 respectively. Mean nasal index for Bengali (61.41 \pm 3.23) and Manipuri (75.12 \pm 3.38) were found statistically significant. Bengali and Manipuri male have leptorrhine and mesorrhine type of nose respectively.

Conclusion: The attempt provided some baseline data for comparative evaluation of nasal parameters between

Bengali and Manipuri adult male, that might be used in different future research and clinical purposes like planning for nasal surgery and cosmetology.

Key words: Anthropometry; Ethnic group; Nasal parameters.

Introduction

Anthropometry is an area of morphometry that examines the various characteristics of the body of an individual.¹ Nasal anthropometry is the area of anthropometry that studies the dimension and form of the human nose in various populations.² In physical anthropology, studies on craniofacial relations and variations in man have long been utilized to distinguish among diverse ethnic groups. Different racial and ethnic groups' morphological traits are not dispersed randomly; rather, they occur in geographic clusters.³ It is commonly known that applying a single standard of face aesthetics to a wide range of racial and ethnic groupings is inappropriate.⁴⁻⁶ Therefore, in order to establish ethnically unique anthropometric data for populations with diverse ethnic backgrounds, investigation on the craniofacial study of numerous indigenous groups is ongoing.⁷

Since the figure of the nose is supposed to be a distinctive characteristic of a person's ethnic origin, studying the nasal anthropometric features can be helpful to rhinoplastic surgeons, particularly when patients seek nasal reconstruction to alter their nasal morphology to that of a different race. Therefore, the data correlation of nose anthropometry across different ethnic groups is highly helpful in the planning of such cosmetic procedures and nasal surgery.⁸ The nose shape varies between races and ethnic groups and is determined by long-term environmental variables.^{9,10}

Understanding nasal anthropometry is useful in physical anthropology and forensic science as one of the instruments for identifying an individual's gender, race and ethnicity.⁸ Nasal anthropometric measurements are used for reconstructive, aesthetic and forensic procedures.¹¹

1. ☐ Assistant Professor of Anatomy
☐ Army Medical College, Chattogram.
2. ☐ Assistant Professor of Medicine
☐ Chittagong Medical College, Chattogram.
3. ☐ Assistant Professor of Biochemistry
☐ Institute of Applied Health Sciences (IAHS) Chattogram.
4. ☐ Assistant Professor of Anatomy
☐ City Medical College, Dhaka.
5. ☐ Professor of Anatomy
☐ Army Medical College Chattogram.
6. ☐ Professor of Anatomy
☐ Chittagong Medical College, Chattogram.

***Correspondence:** Dr. Kanta Sree Dutta

☐ Cell : 01814 47 82 26

☐ E-mail: kantasreedutta@gmail.com

Submitted on ☐02.07.2023

Accepted on ☐28.11.2023

Bengalis are the third-largest ethnic group in the world, after the Han Chinese and Arabs. Bengalis constitute the largest ethnic group in Bangladesh, at approximately 98% of the nation's inhabitants and belong to the Indo-Iranian language family.^{12(a)}

Manipuri is an ethnic community in Bangladesh. Their original home is Manipur, once a sovereign state and now the northeastern zonal state of India. Most Manipuris now live in Sylhet town. Manipuris belong to the Kuki-Chin group of the Tibeto-Burman family of the Mongolian race.¹³

The present research work focuses to identify differences of nasal measurements among Bengali and Monipuri ethnic groups based on different nasal parameters. This may be useful to launch the baseline depths of these two ethnic groups and for future references to compare with same ethnic group of other region or different ethnic groups.

Materials and methods

Convenience sampling was used to select 200 mature men participants, aged between 18 and 50, for an observational, cross-sectional study with asystematic component that was conducted in the Anatomy Department of Chittagong Medical College from July 2016 to June 2017. Of these participants, 100 were Bengali and 100 were Manipuri.

Inclusion criteria

- Bangladeshi by nationality
- Bengali and Monipuri by ethnicity
- Adult male with age 18-50 years.

Exclusion criteria

- Congenital craniofacial abnormality. Major craniofacial trauma or reconstructive surgery
- Genetic, endocrine or neurological disorder such as down syndrome, acromegaly myxedema, facial palsy, cleft lip or palate.

A sliding caliper and a spreading caliper tools costumed in straight physical measuring procedures that include taking measurements from living people. Measurements were taken of the nasal index, height and width.

I) Nose Height

The scale was put to the side of the subject's nose and the internal edge of the secure arm was positioned at subnasale, held in place with the thumb and index fingers to measure the height of the nose. The articulating arm was slide up against Nasion.

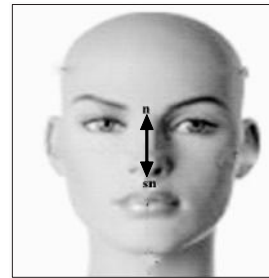


Figure 1A The manikin's highest point at the nose



Figure 1B Using a sliding caliper, measure the volunteer's maximum nose height

Nose height (cm) defining different types of the nose¹²

Short	4.0 cm to 4.4 cm
Below medium	4.5 cm to 4.9 cm
Above medium	5.0 cm to 5.4 cm
Large	≥ 5.5 cm

II) Nose Width

For measuring the nasal width, the participant was asked to sit relaxed, without flaring the nostrils or otherwise moving the nasal tip at the time taking the measurement, so that dimensions of the nose did not alter. The caliper was opened slightly wider than the width of participant's nose. Then the nose was approached with the caliper until the tips were just passing the maximum lateral curvature of alae. Carefully the tips were brought close until the inner edges of the arms of the caliper just touched the lateral edges of the alae.

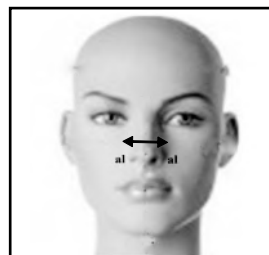


Figure 2A The maximum nose width in manikin



Figure 2B Procedure of assessing the extreme nose width in a volunteer consuming a sliding caliper

Nasal breadth use by Lebzelter and Saller¹⁴

Short	≤2.4 cm
Below medium	2.5 cm to 2.9 cm
Medium	3.0 cm to 3.4 cm
Above medium	3.5 cm -3.9 cm
Large	≥4.0 cm

Nasal Index: It is the proportion of the nasal breadth to the nasal length articulated as a percentage.¹⁴

The method is:

$$\text{Nasal index} = \frac{\text{Nasal width}}{\text{Nasal length}} \times 100$$

Depending on the nasal index, Martin and Saller¹⁴ classified the nose as:

Hyperleptorrhine	(Very narrow nose)	≤ 54.9
Leptorrhine	(Narrow nose)	55.0 to 69.9
Mesorrhine	(Medium nose)	70.0 to 84.9
Platyrrhine / Chamaerhine	(Broad nose)	85.0 to 99.9
Hyperplatyrrhine	(Very broad nose)	≥ 100

After collection of all data, it was analyzed by SPSS-20. Unpaired t-test was performed to see the difference between the variables. p value was considered significant if it is <0.05 at 95% level of significance.

The Chittagong Medical College's ethical review committee has granted its approval. Written consent will be obtained when all study participants have been notified about the investigation and given an explanation of it.

Results

Bengali male have noticeably taller noses than Manipuri male do. Manipuri male have noticeably wider noses than Bengali men do. Based on nose height, the majority of Bengali people had above-medium noses (62%) and Manipuri people had below-medium noses (73%). The majority of Bengalis (74%) and Manipuri (54%), in terms of nose width, were medium.

Table I Effects concerning the nasal variables in the Bengali and Manipuri individual males and the comparison between the two groups

Measurement	Group	Mean (±SD)	Significant of difference
	(n=100)	(cm)	
Linear measurements (cm)			
Nose height	Bengali	5.20 ± .29	p < 0.001
Highly significant	Manipuri	4.66 ± .23	
Nose width	Bengali	3.19 ± .19	p < 0.001
Highly significant	Manipuri	3.5 ± .19	
Index			
Nasal index	Bengali	61.41 ± 3.23	p < 0.001
Highly significant	Manipuri	75.12 ± 3.38	

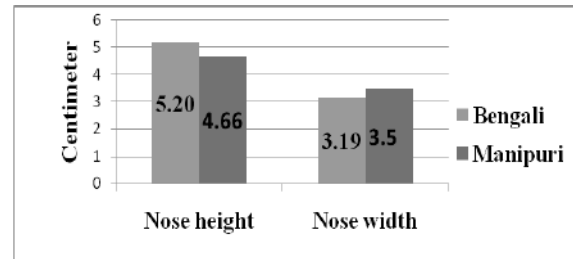


Figure 3 Contrast of nose variables amid Bengali and Manipuri male (n=100)

Manipuri men have a far higher nasal index than Bengali men do. In Manipuri, the nasal index is likewise noticeably higher in both age groups.

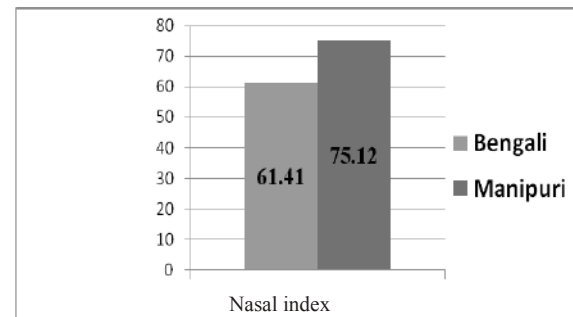


Figure 4 Contrast of nasal index amid Bengali and Manipuri male (n=100)

Figure displays the frequency of various nose categories grounded on the nasal index identified in male Bengali and Manipuri subjects. The nasal index type with the highest frequency in Bengali male is leptorrhine, or narrow nose, 97%. The predominant nasal index type among Manipuri men is mesorrhine or medium nose, 95%.

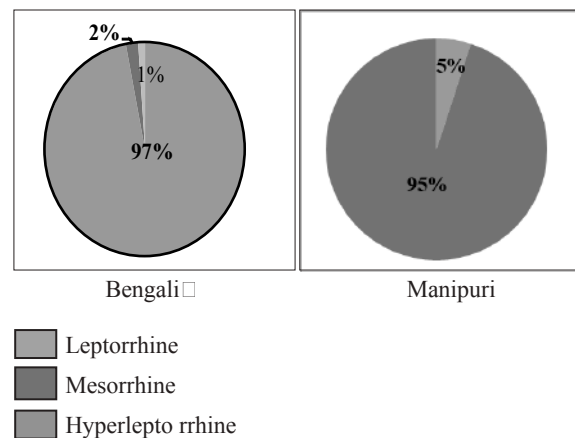


Figure 5 Relative proportion of various nose categories in adult male Bengali and Manipuri is based on nasal index

Discussion

The mean nose height of Bengali, 5.20 cm was similar to Bengali of Rangpur 5.4 cm, North American Caucasoid 5.3cm, German 5.2cm, among Mongoloid race Vietnamese's male 5.21cm and among Negroid Afro-American 5.19cm.^{12(b),15} According to nose height the Bengali were in above medium (62%) whereas in the study of Shah et al. Bengalis were in above medium (40%).^{12(b)} The present mean value was lower than Iranian 6.28 cm, Japanese 5.69 cm, Azerbaizan males 5.59 cm, Jat and sindhi ethnic groups of Rajasthan state of India 5.64 cm and 5.58 cm.^{15,16} However Yoruba group of Nigeria 4.18 cm, Mongoloid and Tharu race of Nepal 4.78 cm and 4.4 cm, Gwalior region of India 4.91 cm have lower mean value than Bengali male.¹⁷⁻¹⁹

The mean nose height of Manipuri 4.66 cm was similar to those of Indian 4.72 cm, Mongoloid race of Nepal 4.78 cm and Igala 4.51 cm, Ebira 4.56 cm and Okum 4.48 cm ethnic group of Nigeria.^{16,18,20} According to nose height Manipuri, males were below medium type (73%) which was similar to Santhal male 4.8 cm in Bangladesh and Meitei group of Manipuri in India 4.8 cm.^{12(b),21} The present value was lower than Caucasoid North American 5.3 cm, Mongoloid Japanese 5.69 cm and Thai male 5.15 cm and Iranian male 6.06 cm.^{15,21}

The mean nasal width of Bengali 3.19 cm was similar to those of Italian 3.2 cm and Egyptian male 3.2 cm.¹⁵ The present mean value was inferior than the research accomplished by Shah et al. on Bengali male 3.5 cm, which may be due to more hot temperature in Rangpur than Chittagong.^{12(b)} The nasal breadth of, Gwalior region 3.92 cm, Kogi state of Nigeria 4.5 cm, Qazvin residents of Iran 3.8 cm was higher than present study.^{19,20,22} According to nose width Bengalis were in medium type (74%), a like standard categories of nose girth was got in North American Caucasoid 3.47 cm, German 3.4 cm, Ahirwars group of Madhypradesh 3.4 cm.^{15,23} The mean value was higher than Western Uttar Pradesh 2.87 cm.²⁴

The mean nose width of Manipuri 3.5 cm were similar to, Mongoloid race of Nepal 3.57 cm, Dangis group of Madhypradesh 3.5 cm and Latvians 3.53 cm.^{18,23,25} According to nose breadth Manipuri male were mostly above

medium (54%) followed by medium type (46%) of nose. Similar above medium nose found among Santhal of Bangladesh 3.8 cm and Meitei males of Manipur in India 3.8 cm.^{12(b),21} The present value was lower than Vietnamese male 4.02 cm and Thai male 4.08 cm, Hindus of Gwalior region of India 3.92 cm, Kogi state of Nigeria 4.5 cm and Ijaws of Nigeria 4.06 cm.^{15,19,20,26} The mean value was higher than Caucasoid Italian 3.2 cm and Egyptian 3.24 cm and Western Uttar Pradesh of India 2.87 cm.^{15,24}

In this study, the nose width of Manipuri was higher than Bengali male. Milgrim investigated that there were ethnical variances in nasal breadth.¹⁸ Manipuri males have Mongoloid affinities.²¹ So development of wider nose among Manipuri is because of Mongoloid racial influence.

Bengali people's mean nasal index (61.41) was comparable to that of the Qazvin people in Iran (62.54) and the Alawite ethnic group in Syria (62.74).^{22,27} The figure, however, was less than that of the Mongoloid ethnic group in Nepal (74.6), the Gwalior region (80.59), the Kogi state of Nigeria (97.23), and the Jat (68.09) and Sindhi (70.72) of Rajasthan.^{16,18-20} The average value was greater than the Turkish male 59.40 and the Homs-Hama-Aleppo region's 58.66 in Syria.^{27,28}

Manipuri's mean score of 75.12 was comparable to that of Western Uttar Pradesh (75.86), Meitei (76.60), Madhya Pradesh's Dhangri ethnic group (76.5), and Manipur (75.93).^{11,21, 23,29} The average value exceeded that of the Jat (68.09), the Sindhi (70.72) ethnic group in Rajasthan and the Egyptians (73.55).^{16,30} Nonetheless, the figure was less than that of the Ahirwae ethnic group in Madhya Pradesh (81.8), the Kogi state of Nigeria (97.23), the Tharu ethnic race of Nepal (83.8), and Gwalior (80.59).^{18-20,23}

97% of Bengali male had narrow noses, called leptorrhine. Whereas Monipuris were mesorrhine nose (95%). Similar mesorrhine nose was originated in Santhal of Bangladesh, Mongoloid and Tharu ethnic group of Nepal, Gwalior region of India and Meitei male of Manipuri in india.^{12(b),18,19,21} Male Manipuris have mesorrhine noses, a trait common to the Mongoloid population that suggests genetics has a greater influence than climate.²¹

Leptorrhine nose was common type of nose among most of the Caucasian. The indo-Aryan is also alike to the European possessing a fine nose.¹⁸ This investigation also support to Bhasin who described that Caucasoid have medium narrow nose that is leptorrhine type.²⁹ Leptorrhine type of nose among Bengali also showed in Rangpur.^{12(b)} This type also found in Iranian male and Egyptians male.^{22,30}

According to anthropological studies, the climate of an area might have an impact on a person's nose shape.^{12(b)} Small nasal index suggests a narrow nose in a cool, dry environment, and large nasal index shows a broad nose in a hot, humid climate.²⁹ Because of Bangladesh's hot climate, Manipuri people are better able to adapt to and endure the heat conditions of their environment.

Limitation

- Because the participants in this study were selected by convenience sampling rather than simply random sampling, the findings might not be entirely demonstrative of the custom for the entire Bengali and Manipuri adult men. In addition, the sample size was somewhat small.
- There's a chance that some people in this study who may have disclosed characteristics of genetic, endocrine or neurological problems influencing craniofacial measures weren't included in the study.
- Because the skin is a soft tissue and the anthropometric measurements were taken from landmarks there, the results are often not repeatable when another researcher takes the same measurements.
- Minimal mistakes may have been produced by the direct touch method if non-contact techniques such as laser scanning, stereo-photogrammetry, ultrasound, infrared imaging, and computed tomography of MRI had been employed instead.

Conclusion

This study sheds light on the genetic and climatic influences on human nasal variation and found a statistically significant difference in nasal characteristics between male Bengali and Manipuri subjects. Plastic surgeons, forensic scientists, bioanthropologists and other medical professionals will find this work beneficial.

Recommendations

- Further research with larger samples is necessary to validate the results of this investigation.
- Similar studies should be carried out on other age groups of the Bengali and Manipuri people to investigate the variances in craniofacial customs through ages.
- Future studies with more widespread anthropometry might be conducted using non-contact techniques for example laser scanning, stereo-photogrammetry, ultrasound, infrared imaging, computed tomography and MRI to enhance the consistency of the results.
- Same study should be conducted on different age groups of the selected ethnical groups to find out the alterations in craniofacial norms amid ages.
- Another study might be carried out using non-contact techniques such as laser scanning, stereo-photogrammetry, ultrasound, infrared imaging, computed tomography, and MRI to assess the reliability of the outcomes.

Acknowledgement

Author acknowledges the participation of adult male Bengali and Manipuri volunteers.

Contribution of authors

KSD-Concept, design, data collection, manuscript preparation and final approval.

PC: Data interpretation, critical revision and final approval.

SD-Data analysis, data interpretation, critical revision and final approval.

NN-Design, data analysis, drafting and final approval.

MA-Data collection, preparation of the manuscript and final approval.

SKC-Data interpretation, writing the manuscript, critical revision and final approval.

Disclosure

All the authors declared no competing interest.

References

- 1.□Utkalp N, Ercan I. Anthropometric measurements usage in medical sciences. *BioMed research international*. 2015;1-7.
- 2.□Standring S. *Gray's anatomy: The anatomical basis of clinical practice*. 41st ed. Elsevier Health Sciences. 2015.

3. Argyropoulos E, Sassouni, V. Comparison of the dentofacial patterns for native Greek and American Caucasian adolescents. *Am. J. orthodontics and dentofacial orthopedics*. 1989;95:238-249.
4. Wuerpel E. On facial balance and harmony. *Angle Orthod*. 1936;7:81-89.
5. Moyers R. *Handbook of Orthodontics*. Chicago, Ill: Mosby. 1988;67.
6. Proffit W. *Contemporary Orthodontics*. St Louis, Mo: Mosby. 1999;160-175.
7. Krishan K, Kumar R. Determination of stature from cephalo-facial dimensions in a North Indian population. *Legal Medicine*. 2007; 9(3):128-133.
8. Esomonu U G, Ude RA, Lukpata PU and Nandi EM. Anthropometric study of the nasal index of bekwara ethnic group of cross-river state, Nigeria. *International Research Journal of Applied and Basic Sciences*. 2013;5(10):1262-1265.
9. Heidari Z, Mahmoudzadeh-Sagheb H, Khammar T, et al. Anthropometric measurements of the external nose in 18-25-year-old sistani and baluch aborigine women in the southeast of Iran. *Folia Morphol (Warsz)*. 2009;68:88-92.
10. Oladipo GS, Fawehinmi HB, Suleiman YA. The study of nasal parameters (Nasal height, nasal width, nasal index), amongst the Yorubas of Nigeria. *Internet Bio Anthro*. 2009;3: 1-11.
11. Ray SK, Saha K, Kumar A, et al. Anthropometric study of nasal index among the population of Western Uttar Pradesh Region. *Intern Sci Study*. 2016;4.
- 12(a). Bengalis. Wikipedia.
<https://en.wikipedia.org/wiki/Bengalis>.
- 12(b). Shah MRI, Anwar S, Mondal DK, Yesmin S, Ahmed S. Anthropometry of the nose: A comparative study between adult male Santhals and Bengalis in Bangladesh. *Mediscope*. 2015;2(2):28-32.
13. Monipuri. The-Banglapedia.
https://en.banglapedia.org/index.php/Manipuri,_The.
14. Singh TN, Devi AJ, Singh YI, Singh MM, Ajita RK, Pfoze K. Somatometric Measurement of the Meitei Population of Manipur Valley. *Journal of Dental and Medical Sciences*. 2015;14(10): 9-14.
15. Farkas LG, Katic, MJ, Forrest CR. International Anthropometric Study of Facial Morphology in Various Ethnic Groups/Races, *The Journal of Craniofacial Surgery*. 2005;16(4): 615-646.
16. Choudhary A and 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):46-48.
17. Anas IY and Saleh MS. Anthropometric Comparison of Nasal Indices between Hausa and Yoruba Ethnic Groups in Nigeria. *Journal of Scientific Research & Reports*. 2014;3(3):437-444.
18. Koirala S, Shah S, Khanal L. Nasal index of the Tharu and Mongoloid population of Nepal: a cross sectional study. *Russian Open Medical Journal*. 2014;3(2):1-3.
19. Sharma SK, Jehan M, Sharma RJ, Saxena S, Trivedi A, Bhadkaria V. Anthropometric Comparison of Nasal Parameters between Male and Female of Gwalior Region. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*. 2014;13(5):57-62.
20. Paul O, Yinka OS, Taiye AS, Gift AM. An Anthropometric Study of some Basic Nasal Parameters of Three Major Ethnic Groups in Kogi State, Nigeria *American Journal of Clinical and Experimental Medicine*. 2015;3(2):62-67.
21. Devi TB, Singh TN, Singh SJ, Tamang BK. Facial Morphology And Facial Index: A Study On Secular Trend Of Meitei Male Population Of Bishnupur District, Manipur, India. *International Journal of Anatomy and Research*. 2016;4(4):3279-3283.
22. Zolbin MM, Hassanzadeh G, Mokhtari T, Arabkheradmand A, Hassanzadeh S. Anthropometric Studies of Nasal Parameters of Qazvin Residents, Iran. *MOJ Anatomy and Physiology*. 2015;1(1):1-5.
23. Singh P, Purkait R. A Cephalometric Study among Sub Caste Groups Dangi and Ahirwar of Khurai Block of Madhya Pradesh. *Anthropologist*. 2006;8(3):215-217.
24. Ray SK, Saha K, Kumar A, Banjare S. Anthropometric Study of Nasal Index among the Population of Western-Uttar Pradesh Region. *International Journal of Scientific Study*. 2016;4(2):65-70.
25. Nagle E, Teibe U, Kapoka D. Craniofacial anthropometry in a group of healthy Latvian residents. *Acta Medica Lituanica*. 2015;12(1):47-53.
26. Oladipo G.S, Okoh PD, Hart JS. Anthropometric Study of Some Craniofacial Parameters: Head Circumference, Nasal Height, Nasal Width and Nasal Index of Adult Ijaws of Nigeria *Asian Journal of Medical Sciences*. 2010;2(3):111-113.
27. Daniel B. Racial Anthropology and Genetics of the Lebanese. 2002;1-2.
<http://www.phoenicia.org/ychromodrafteng.html>.
28. Uzun A, Akbas H, Bilgic S, Emirzeoglu M, Bostanc O, Sahin B, Bek Y. The average values of the nasal anthropometric measurements in 108 young Turkish males. *Auris Nasus Larynx*. 2006;33:31-35.
29. Bhasin MK. Genetics of Castes and Tribes of India: Somatometry *International Journal of Human Genetics*. 2006;6(4):323-356.
30. Hegazy AA. Anthropometric Study of Nasal Index of Egyptians. *International Journal of Anatomy and Research*. 2014;2(4):761-767.