

Anthropometric Study of Facial Index in Nepalese Population: A Cross-sectional Study

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ABSTRACT:

Introduction: The face is an important part of the body that determines the unique features of each and every individual. Anthropometric study of the face includes the measurement of the facial bones of humans to analyze the morphology of the face, which provides valuable information regarding ethnicity and sexual dimorphism. The facial index, which is determined on the basis of facial height and facial width, is the most important parameter to evaluate the face. The present study aimed to determine the mean facial index, types of face, and sexual dimorphism among Nepalese undergraduate students. **Methods:** The cross-sectional study was conducted in the Department of Anatomy of Lumbini Medical College and Teaching Hospital. The study was carried out in 200 normal and healthy Nepalese undergraduate students (95 males and 105 females) within the age group of 18-25 years old. The data were recorded and analyzed using PSPP 2.1.1. **Results:** The present study reported that the mean male facial index was significantly higher than the mean female facial index at $p=0.015$. The present study observed the higher incidence of mesoprosopic face (30.50%) followed by leptoprosopic (27.50%), euryprosopic (22%), hypereuryprosopic (11.50%) and hyperleptoprosopic face (8.50%). **Conclusions:** The first step in the evaluation of patients undergoing surgical, orthodontic, and cosmetic procedures is facial analysis. So, the present study may be helpful to provide baseline facial index data for the Nepalese population, thereby contributing valuable information about the type of faces and to evaluate sexual dimorphism.

Keywords: Bi-zygomatic breadth; Facial Index; Gnathion; Mesoprosopic; Nasion.

INTRODUCTION

The analysis and measurements of size, shape and proportions of the human body are an important part of the anthropometric study.¹ Every individual exhibits a different and distinctive anatomical structure which can be affected by heredity, nutritional factors, climate, age, and environmental factors.^{2,3} Face is an important part of the body that reflects the unique features of an individual, and anthropometric

evaluation of facial structures using standardized anatomical landmarks provides valuable information regarding population diversity, sexual dimorphism, and ethnic variation of an individual.^{3,4} The human face can be analyzed by the facial index, which is also known as the prosopic index, which depends on the facial parameters including facial height and facial breadth. Facial index is defined as the ratio of the morphological facial height to breadth of the bizygomatic arch multiplied by 100.⁵ According to Banister's classification,⁶ the face is usually divided into five types: Hypereuryprosopic face with facial index less than 80, Euryprosopic face with facial index between 80-85, Mesoprosopic face with facial index between 85-90, Leptoprosopic face with facial index between 90-95, Hyperleptoprosopic face with facial index more than 95. The knowledge of facial dimensions will provide valuable information for researchers and clinicians to establish baseline facial index data for plastic and cosmetic surgeries, orthodontic procedures, and forensic applications.^{7,8}

Several studies have been conducted to determine the distribution of faces in different population across the worldwide, but limited studies

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have been conducted among the Nepalese population to determine facial dimensions. Therefore, the present study was undertaken to determine the mean facial index, assess the distribution of facial types, and evaluate sexual dimorphism among Nepalese undergraduate students.

METHODS

The cross-sectional descriptive study was conducted in the Department of Anatomy of Lumbini Medical College and Teaching Hospital from March 2026 to May 2026. The ethical approval was obtained from the Institutional Review Committee, Lumbini Medical College and Teaching Hospital, with protocol no:11/26/V1.R1. Informed consent was obtained from each participant.

A non-probability and convenience sampling method was used to calculate the sample size using formula; $N = Z^2 pq / e^2$ where, N= required sample size, $z=1.96$ at 95% confidence interval, p =prevalence (50%) and $q=(1-p)$, e = error margin (10%), with minimal number of 97 sample size. So, the present study was carried out in 200 Nepalese undergraduate students (95 males and 105 females).

Normal and healthy students within the age group of 18-25 years old were selected for the study. Students with craniofacial deformities, inflammation, trauma, or facial surgeries were excluded. We asked the subject to sit straight on a chair in a relaxed position and with their head in Frankfort's plane to measure the facial height and facial breadth.⁹ We used the aerospace digital vernier caliper with 0-150 mm caliper and 0.01 mm resolution to measure the facial height and facial width in mm. Then, the facial length was measured from nasion to the lowest point on the lower border of the mandible in the midsagittal plane(gnathion), and facial breadth or Bi-zygomatic breadth was measured transversely between two zygomatic arches. Then the facial index is calculated by: Facial index= (Facial length/ Facial breadth) $\times$ 100.¹⁰

The data were collected and recorded in Microsoft Excel and analyzed using PSPP 2.1.1. Based on facial index, the subjects were categorized into five groups.⁶

RESULTS

The study was undertaken in normal and healthy 200 undergraduate students within the age group of 18-25 years old. There were 95 (47.50%) male and 105 (52.50%) female students. The mean age of the students was found to be 20.22 ± 1.48 years,

with the mean facial index about 87.64 ± 6.21 (**Table 1**). The mean facial index in males was statistically significantly higher than in females.

Table 1. Descriptive statistical analysis of facial index with respect to sex

S. No.	Particulars	Male facial index	Female facial index	Overall facial index	Statistics
1.	Mean	89.12	86.31	87.64	$p=0.0015$, $t=3.22$
2.	SD	5.84	6.46	6.21	

Distribution of facial index in both genders is presented in **Table 2** which illustrates that the most common type of face in Nepalese undergraduate students is mesoprosopic with round face, followed by leptoprosopic face, mesoprosopic face, leptoprosopic face and hyperleptoprosopic face. The male and female both had a higher incidence of mesoprosopic face.

Table 2. Distribution of Facial Index in males and females

Type of face	Male (n=95)	Female (n=105)	Overall
Hypereuryprosopic	6 (6.31%)	17 (16.20%)	23 (11.50%)
Euryprosopic	16 (16.84%)	28 (26.66%)	44 (22.00%)
Mesoprosopic	31 (32.63%)	30 (28.58%)	61 (30.50%)
Leptoprosopic	30 (31.58%)	25 (23.80%)	55 (27.50%)
Hyperleptoprosopic	12 (12.64%)	5 (4.76%)	17 (8.50%)

DISCUSSION

The present study was conducted to determine the facial index with the most dominant facial types present among the undergraduate Nepalese students and to compare the facial index between males and females. The present study reported that the mean facial index was about 87.64 ± 6.21 with the mesoprosopic face as a dominant one which is almost similar to the findings in a study conducted among Nepalese population by Sharma K et al.⁴ (mean facial index: 87.01 ± 5.633) and Yadav SK et al.¹¹ (87.43 ± 4.83), resulting in almost similar dimensions of the face in the Nepalese population.

Higher facial index was reported among males in the present study, which indicates that the proportion of the facial height to the facial width is

relatively more in males than in females. Similar findings with higher mean facial index in males was reported by Rao V et al.¹² (males: 91.5, females:88.1), Shetti V(males:87.19, females:86.75),¹ Khainar KB et al.¹⁰(males:90.5, females:87.2). This may be due to the influences of hormonal factor such as testosterone produced during the puberty and cranio-facial growth factor which results in the growth of facial skeleton in males than in females. However, a study done by Shetti VR et al. in 200 Malaysian population found that the mean facial index in males (85.72 ± 5.42) was lower than the mean facial index in females (87.71 ± 5.13), which is in contrast to this study.¹ An independent t-test was also conducted to compare facial index between males and females, which showed a statistically significant difference in facial index of males and females at $p=0.0015$. Findings similar to the present study were found among the Nepalese population in a study conducted by Yadav SK et al., with significant higher male facial index (89.32 ± 5.01) than female facial index (85.81 ± 4.01) at $p<0.001$.^{11,13} The independent t-test was also statistically significant at $p<0.001$. The findings of the current study reflect the presence of sexual dimorphism and can be used in sex determination during forensic identifications.

Variations in the facial dimensions have been studied worldwide among different ethnic groups, genders and populations to establish baseline data of facial index. The present study observed the mesoprosopic face as a dominant face, which indicates that the Nepalese population has an average or balanced facial proportion. The finding is in agreement with the studies conducted among the Nepalese population by Sharma K et al.,⁴ Pandey N et al.¹⁴ and among Indian population, by Kataria DS et al.,¹⁰ Kumar M et al.,⁵ Shetti VR et al.¹ However, higher facial index with hyperleptoprosopic face was reported by Vangara SV et al.¹³ in 71.5%, Prasanna LC et al.⁷ in 74.5%, Radha K et al.¹⁵ in 51.3%, Doni RRK et al.¹⁶ in 33%. Barma MD et al.¹⁷ (45.71%) and Shah T et al.¹⁸ (72%) also observed a higher prevalence of the hypereuryprosopic facial type.

In the present study, both the males and females had a higher prevalence of mesoprosopic face which demonstrates that medium sized and round type of face was present in Nepalese population irrespective of sex which is in consistent with the research conducted by Kumari KL et al.¹⁹ (26.43%), Pandey N et al.¹⁵ (48.66%). Conversely, Vangara SV et al.¹³ (75.2%) and Radha K et al.¹⁵ (33.2%) reported the presence of a hyperleptoprosopic face as the dominant face, and a higher incidence of a leptoprosopic face in males

was also observed by some authors.^{11,17} Furthermore, the incidence of eryprosopic face in females was reported by Gupta K et al.²⁰ in 45%, Kumari LK et al.¹⁹ in 27.14%, and Barma MD et al.¹⁷ in 54%, which is different from the present study. The presence of mesoprosopic face in females was reported by many authors which is in agreement with the present study.^{1,4,5,11,15} So, the variations in facial index and the predominance of facial types may depend on the basis of ethnic background, body mass index, genetic factors, environmental factors, gender, and population diversity.

Limitations

This study has several limitations. First, data were collected from undergraduate Nepalese students of a single institution, introducing possible selection bias, and the sample is not representative of the entire Nepalese population. Second, the required sample size was calculated using a 5% margin of error (minimum ~400), which was revised to a 10% margin due to limited access to the target population, reducing the required minimum to 97; although the final sample of 200 exceeded this revised minimum, the wider margin of error yields less precise estimates than a 5% margin would provide. Third, the study was restricted to a limited age group, so findings cannot be generalized to other age groups. Finally, other craniofacial parameters were not measured, limiting the comprehensiveness of the facial morphology assessment.

CONCLUSIONS

The present study concludes that the sexual dimorphism in mean facial index is significant, with the significantly higher mean facial index in males than in females. The mesoprosopic face was observed as the most common facial type in both sexes. Knowledge of facial index and the type of face is a must to perform any surgical and orthodontic procedure. So, the current study may be helpful to establish baseline facial index data for the Nepalese population, contributing valuable information for regional clinical practice, anthropological research, and forensic applications to help to identify the identity of an individual in burn cases.

Conflict of Interest:

The authors declare that no competing interests exist

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REFERENCES

- Shetti VR, Pai SR, Kalthur SG, Gupta C, Chetan P, Soumya. Study of prosopic (facial) index of Indian and Malaysian students. *International Journal of Morphology*. 2011;29(3):1018-21. DOI: [10.4067/S0717-95022011000300060](https://doi.org/10.4067/S0717-95022011000300060)
- Farkas LG. *Anthropometry of the Head and Face*. 2nd ed. New York: Raven Press; 1994. p. 3-25. Available from: <https://openlibrary.org/books/OL1077764M/>
- Johra B, Paswan D, Potdar P, Sharma J. Morphometric study of facial index in North Indian population. *Journal of Pharmaceutical Negative Results*. 2022;13(S6):567-70. DOI: [10.47750/pnr.2022.13.S06.079](https://doi.org/10.47750/pnr.2022.13.S06.079)
- Sharma K, Khanal K, Mansur DI. Variation in total facial index among students of Kathmandu University School of Medical Sciences. *Nepal Med Coll J*. 2014;16(2):173-6. PMID: [26930740](https://pubmed.ncbi.nlm.nih.gov/26930740/)
- Kumar M, Lone MM. The study of facial index among Haryanvi adults. *International Journal of Science and Research*. 2013;2(9):51-3. DOI: [10.21275/12013156](https://doi.org/10.21275/12013156)
- Gray H, Williams PL, Banister LH. *Gray's Anatomy: the anatomical basis of medicine and surgery*. 38th ed. New York: Churchill Livingstone; 1995:607p. Available from: <https://www.ncbi.nlm.nih.gov/nlmcatalog/9503696>
- Lc P, S B, As D, H M, Rh T, Ks S. Facial indices of north and South Indian adults: reliability in stature estimation and sexual dimorphism. *J Clin Diagn Res*. 2013;7(8):1540-2. PMID: 24086833 DOI: [10.7860/jcdr/2013/5497.3204](https://doi.org/10.7860/jcdr/2013/5497.3204)
- Patnaik GVV, Singla RK, Bala S. Anatomy of a beautiful face and smile. *Journal of Anatomy Society of India*. 2003;52(1):74-80. Available from: <https://www.researchgate.net/publication/309078276>
- Kataria DS, Ranjan RK, Perwaiz SA. Study of variation in total facial index of North Indian population. *International Journal of Health Sciences and Research*. 2015;5(4):122-7. Available from: https://www.ijhsr.org/IJHSR_Vol.5_Issue.4_April2015/20.pdf
- Khairnar KB, Khathe DP, Shinde S. Study of facial index in both sexes of Northern Maharashtra. *Indian Journal of Public Health Research & Development*. 2023;14(3):118-121. DOI: [10.37506/ijphrd.v14i3.19372](https://doi.org/10.37506/ijphrd.v14i3.19372)
- Yadav SK, Chaudary D, Pandey N. Anthropometric Study of facial index and its clinical implications among medical students in Devdaha Medical College and Research Institute, Rupandehi, Nepal. *Medical Journal of Eastern Nepal*. 2023;2(1):26-8. DOI: [10.3126/mjen.v2i01.56199](https://doi.org/10.3126/mjen.v2i01.56199)
- Rao CV. Study of facial index in Andhra Pradesh population. *Medico-Legal Update*. 2019;19(2):227-9. DOI: [10.37506/mlu.v19i2.777](https://doi.org/10.37506/mlu.v19i2.777)
- Vangara SV, Kumar D, Arora NK. A cross-sectional study of facial index in Western Uttar Pradesh population between 18-25 years of age. *Asian Journal of Medical Sciences*. 2021;12(6):95-100. DOI: [10.3126/AJMS.V12I6.34059](https://doi.org/10.3126/AJMS.V12I6.34059)
- Pandey N, Gogoi P, Budathoki D, KC G. Anthropometric study of facial index of medical students. *Journal of Kathmandu Medical College*. 2015;4(4):131-4. DOI: [10.3126/jkmc.v4i4.18256](https://doi.org/10.3126/jkmc.v4i4.18256)
- Radha K, Srinivasan KR. Characterization of facial anthropometrics and correlation with sexual dimorphism in 18-25 years South Indian adult population. *Online Journal of Health and Allied Sciences*. 2020;19(2):11. Available from: <https://www.ojhas.org/issue74/2020-2-11.html>
- Doni RPK, Janaki CS, Vijayaraghavan V, Raj UD. A study on measurement and correlation of cephalic and facial indices in males of South Indian population. *International Journal of Medical Research & Health Sciences*. 2013;2(3):439-46. DOI: [10.5958/j.2319-5886.2.3.076](https://doi.org/10.5958/j.2319-5886.2.3.076)
- Barma MD, Ahlawat H, Ankita. Study on measurement of facial index to determine the type of face in healthy population in Vidarbha region of Central India. *International Journal of Current Science*. 2022;12(4):954-62. Available from: <https://rjpn.org/ijcspub/papers/IJCSP22D1116.pdf>
- Shah T, Thaker MB, Menon SK. Assessment of cephalic and facial indices: a proof for ethnic and sexual dimorphism. *Journal of Forensic Science & Criminology*. 2015;3(1):101. DOI: [10.15744/2348-9804.2.401](https://doi.org/10.15744/2348-9804.2.401)
- Kumari KL, Babu PVSSV, Kumari PK, Nagamani M. A study of cephalic index and facial index in Visakhapatnam, Andhra Pradesh, India. *International Journal of Research in Medical Sciences*. 2015;3(3):656-8. DOI: [10.5455/2320-6012.ijrms20150324](https://doi.org/10.5455/2320-6012.ijrms20150324)
- Gupta K, Choudary S, Batra APS. Facial index of Haryanvi adults and sexual dimorphism. *International Journal of Current Medical and Pharmaceutical Research*. 2022;8(8):349-52. DOI: [10.24327/23956429.ijcmpr20220081](https://doi.org/10.24327/23956429.ijcmpr20220081)