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Dr. Mukesh Fulwaria
Department of Anatomy,
S. P. Medical College, Bikaner,
Rajasthan, India

Dr. Mohan Singh
Department of Anatomy,
S. P. Medical College, Bikaner,
Rajasthan, India

Dr. Rakesh Mani
Department of Anatomy,
S. P. Medical College, Bikaner,
Rajasthan, India

Dr. Garima Khatri
Department of Anatomy,
S. P. Medical College, Bikaner,
Rajasthan, India

Dr. Geeta
Department of Anatomy,
S. P. Medical College, Bikaner,
Rajasthan, India

Dr. Jaskaran Singh
Department of Anatomy,
S. P. Medical College, Bikaner,
Rajasthan, India

Correspondence
Dr. Jaskaran Singh
Assistant Professor,
Department of Anatomy,
S. P. Medical College, Bikaner,
Rajasthan, India

A cross-sectional study of facial index of migrant Tibetan population trading in north western Rajasthan

Dr. Mukesh Fulwaria, Dr. Mohan Singh, Dr. Rakesh Mani, Dr. Garima Khatri, Dr. Geeta and Dr. Jaskaran Singh

Abstract
Introduction: Human facial contour has always been an interesting subject for anatomists, anthropologists, plastic surgeons, and artists and also the identification of an individual's race is an essential component in forensic identification and reconstructive surgery. Sizes of Migrant Tibetan Population increasing in India, a significant number of Migrant Tibetan people have also traveled to Rajasthan for earning their bread and butter hence less number of studies has been conducted on the facial index of this population.
Aim: The present study was aimed to access the facial index of Migrant Tibetan Population in North Western Rajasthan.
Material and Methods: The study incorporated 200 subjects of Migrant Tibetan Population of North Western Rajasthan, out of which 93 were female subjects and 107 were male subjects of the age 18 years or above. Convenience sampling was used. The facial index was classified as Banister's classification of facial index for facial types.
Results and discussion: The mean Facial index was found as 83.78±1.83 in males and 84.78±2.0 in females. Minimum Facial index for the males and females were found as 75.38 and 78.95 whereas Maximum Facial index for the males and females were found as 91.24 and 91.43. Mean Facial index in total cases was found as 84.25±1.9.
Conclusion: In the present study, we concluded that the dominant type of face phenotype in the studied adult Migrant Tibetan Population, was Euryprosopic with an incidence of 70% (79.4% males and 59.1% females), which was followed by mesoprosopic with an incidence of 25% (15.8% males and 35.48% females).

Keywords: Facial index, face phenotype, migrant Tibetan population

Introduction
Human facial morphology has attracted special attention of anatomists, anthropologists, plastic surgeons, and artists and also the identification of an individual's race has been an essential component in forensic identification and reconstructive surgery.
Authors stress upon variations establishment for a particular population for evaluation of facial contours as they believe that the form of skull remain the same in each race and only different races show different facial index and cephalic index. Special emphasis is given to the facial index as it shows significant gender difference in the ethnic group [1-3].
In 1939, The Races of Europe' described facial index of different races of Europe, in his book Facial index is a number denoting the relation between face height and Bizygomatic diameter. In facial index the length is expressed as a percentage of breadth [4]. In 1995, Banister's [5] has classified face in to five facial types based upon facial index as Hyper Euryprosopic (very broad face), Euryprosopic (Broad face), Mesoprosopic (Roundface), Leptoprosopic (long face), Hyper Leptoprosopic (very long face). Facial index of both sex in Malaysian and Indian students were studied by Vaishali R. Shetti *et al* [6]. In 1966, Joseph Antenor Firmin [7] has recorded average facial index in different races.
In 2015, Twisha Shah [8] studied assessment of Facial Indices of Gujarati and Non-Gujarati of India. The mean facial index in study was 75.19 in Gujarati and 75.17 in Non-Gujarati respectively. According to them both the studied groups are mainly distributed into hypereuryprosopic followed by euryprosopic types of the face. Uttekar Kanan *et al.* [9] has

reported the dominant face was euriprosopic (42.96%) and found significant variation in the adult males of Gujarat. In North Indian population, mesoprosopic is the most common facial type in both males and females; Euriprosopic and Hypereuriprosopic facial types are more commonly seen in females whereas mesoprosopic, leptoprosopic and hyperleptoprosopic facial types are common in males [10]. In an another study on haryanvi adults the dominant type of face was found to be mesoproscopic in males (49.66%) and in females it was mesoproscopic (35%) and hypereuriprosopic (25%) [11]. In a similar study on population of Visakhapatnam, Andhra Pradesh, India, males were leptoprosopic and females were mesoprosopic [12].

Rakesh Mani [13] In a Comparative Study of Facial Index of Rajput Community of Bikaner District of Rajasthan and other communities has reported that Rajput individuals were hyperleptoprosopic and Leptoprosopic, which was not comparable to any other Indian groups studied so far, but it was very close to North European groups. In another north Indian study that shows ethnicity can affect the form of face, the dominant type of face shape in Jat Sikhs males was euryprosopic (39.94%) whereas hypereuryprosopic type of face was in dominance (44.51%) in Bania [14].

Political scientists, Joshi [15] and Rose in 1991, broadly classify the Tibetan Population into three major ethnic groups in terms of their origin: Indo-Tibetan (IND), Tibeto-Tibetan (TN) and Indigenous (IN). In 2015, the same authors have broadly classified the Nepalese population into three major ethnic groups in terms of their origin: Indo-Nepalese (IND), Tibeto-Nepalese (TN) and Indigenous (IN). Indo-Nepalese presents with long face (Leptoprosopic) while Indigenous and Tibeto-Nepalese have and round face (Mesoprosopic) [16].

The dominant facial type in students of Kathmandu University School of Medical Sciences was found to be euriproscopic in male and mesoproscopic in female [17]. In Karanth study the overall picture that emerges from all the established indices is that Tibetan has euryprosopic or wide face and a brachycephalic head [18]. In 2015, Zhong hua *et al*. [19] studied the morphological facial index characteristics of the native Tibetans youths, he concluded morphological facial indexes as hypereuryprosopy (38. 4%), euruprosopy (33. 5%), mesoprosopy (19. 4%).

Sizes of Tibetan Population increasing in India, a significant number of Migrant Tibetan people have also traveled to Rajasthan for earning their bread and butter. Less number of studies has been conducted on the facial index of this population, so the present study is aimed to access the facial index of Tibetan Population in North Western Rajasthan.

Aims and Objectives

The study was aimed to measure the Facial index in Migrant Tibetan Population.

Material and Methods

The present study was a cross-sectional study conducted in Department of Anatomy, Sardar Patel Medical College, Bikaner, Rajasthan. This study incorporated 200 subjects of Migrant Tibetan Population of North Western Rajasthan, out of which 93 were female subjects and 107 were male subjects, aged 18 years or above. Convenience sampling was used. Subjects 18 years or above age were included. It was ensured that Subjects were from Migrant Tibetan Population of North Western Rajasthan

A pre-structured proforma was administered to participants. After obtaining informed consent, individuals were interviewed as per proforma and examined for facial index. The subjects were asked to sit on a stool in a relaxed position keeping the mouth closed and teeth in Central occluded position.

Face Breadth (Bizygomatic Diameter): The tips of spreading caliper were placed over the zygomatic arches, the reading showing the maximum face breadth was recorded.

Face Height: Face height was taken from nasion, to the point just above the median sagittal plane to mention, the point on the lower surface of mandible in the median sagittal plane with the help of Sliding Caliper.

Facial index was calculated using the formulas

$$\text{Facial Index} = \frac{\text{Face height}}{\text{Bizygomatic diameter}} \times 100$$

The facial index was classified as Banister's[5] classification of facial index for facial types which was used as such and the classification is given as follows:-

Banister's[5] classification of facial index	
Facial type	**Facial index range**
Hypereuryprosopic (very broad face)	< 79.9
Euryprosopic (Broad face)	80-84.9
Mesoprosopic (Round face)	85-89.9
Leptoprosopic(long face)	90-94.9
Hyperleptoprosopic(very long face)	>95

Result

In the study, 200 subjects of Migrant Tibetan Population of North Western Rajasthan were included. Out of which 93 were female subjects and 107 were male subjects. The readings were taken in centimeters, mean age of male and female subjects were found as 37.34 years and 37.34 years respectively.

Table 1: Mean of Bizygomatic width in Males and Females.

Gender	Minimum	Maximum	Mean	±S D
Male (N=107)	11.0	15.3	13.618	±0.8080
Female (N=93)	10.8	15.0	13.154	±0.9527
Total (N=200)	10.8	15.3	13.402	±0.9062

$t(200) = 3.727$, $p < 0.001$

*t= student test, p= significant value

*All the values in centimeters.

*S D= Standard Deviation

Table 1 shows the mean of Bizygomatic width in males and females. Mean facial breadth in males and females was found as 13.61±0.80 cm and 13.15±0.95 cm respectively. On statistical analysis the comparison between males and females was found to be statistically significant ($p<0.001$).

Table 2: Mean of Facial height (cm) in Males and Females.

Gender	Minimum	Maximum	Mean	±S D
Male (N=107)	8.8	13.1	11.418	±0.8338
Female (N=93)	8.9	13.2	11.161	±0.9583
Total (N=200)	8.8	13.2	11.299	±0.9007

$t(200) = 2.024$, $p = 0.04$

*t= student test, p= significant value

*All the values in centimeters.

*S D= Standard Deviation

According to Table 2 the mean facial height in males and females were found to be 11.41±.83 cm and 11.16±0.95cm respectively, the comparison between males and females facial height was found statistically significant (p<0.04).

Table 3: Mean of Facial Index in Males and Females

Gender	Minimum	Maximum	Mean	±S D
Male (N=107)	75.38	91.24	83.7875	±1.83240
Female (N=93)	78.95	91.43	84.7880	±2.05635
Total (N=200)	75.38	91.43	84.2527	±1.99842

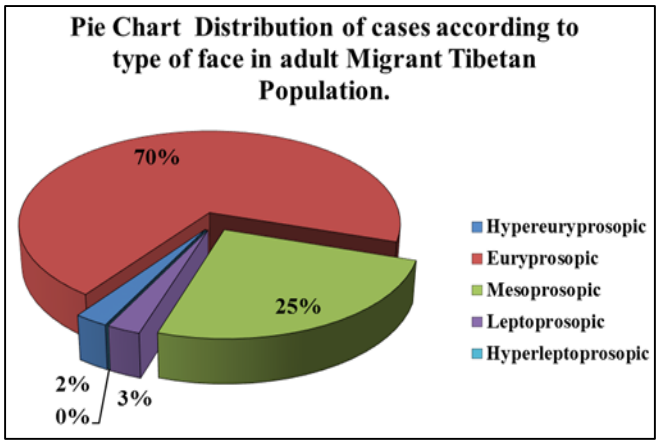
T = 3.638 p<0.001
*t= student test, p= significant value
*S D= Standard Deviation

Table 3 shows the mean value of Facial index in males and females. Mean of Facial index in total cases was found as 84.25±1.9, while comparing mean facial index in males and females the difference was found to be highly significant (p<0.001).

Table 4: Distribution of cases according to type of face

Type of face	Percentage (%)
Hypereuryprosopic	2.5%
Euryprosopic	70.0%
Mesoprosopic	25.0%
Leptoprosopic	2.5%
Hyperleptoprosopic	0%
Total	100%

Table No. 4 shows distribution of case according to type of face in total cases, maximum number of cases were found to be Euryprosopic and minimum number of cases were found in Hypereuryprosopic and Leptoprosopic. No case was found to be Hyperleptoprosopic.



Discussion

The present study deals with the observation on Facial index among Migrant Tibetan Population of North Western Rajasthan. The findings of the present study were compared with themselves and with other studies and are presented below. In the present study it was found that width of the face was greater (male13.6 cm, female 13.15 cm) than the height of the face (male 11.41 cm, female 11.61 cm). Ngeow and Aljunid [20] carried out a similar study on young adult Malaysian Malays and found that width of the face was greater (male 12.1–15.3, female 12.3–14.2 cm) than the height of the face (male 10.63–13.47, female 9.39–12.89 cm) which was similar to the present study.

Facial Index

In present study, we found that overall mean facial index in Tibetan Population was 84.25±1.99, while in males mean was 83.78±1.83 and in females mean was 84.78±2.05.

Table 15A: Comparison of mean facial index with other previous studies.

Author's Name	Studied Population	Male		Female	
		Mean	SD	Mean	SD
Heidari K *et al*. 2008 [27]	Turkman (Iran)	87.25	5.2	81.48	5.2
Vaishali R. Shethi *et al*. 2011 [6]	Indian	87.19	8.2	86.75	6.3
Vaishali R. Shethi *et al*. 2011 [6]	Malasian	85.72	5.4	87.7	5.1
K M Chandimal *et al*. 2012 [21]	Sri Lanka	92	5.1	90	6.2
Mahesh Kumar *et al*. 2013 [11]	Haryana	86.09	5.1	84.84	5.7
Prasanna Lc *et al*. 2013 [22]	North Indian	101	1.9	107	7.6
Prasanna Lc *et al*. 2013 [22]	South Indian	100	1.7	85.39	6.3
D. Jeremic *et al*. 2013 [3]	Serbia	94.04	7	92.38	6.7
Rakesh Mani *et al*. 2013 [13]	Rajasthan Rajput	92.91	-	-	-
Sushma K. Kataria *et al*. 2013 [23]	Rajasthan sindhi	-	-	-	-
Sharma K *et al*. 2014 [17]	Kathmandu	87.2	6.4	86.81	4.8
Deepu S. katariya *et al*. 2015 [10]	North Indian	86.44	5.4	85.02	6.2
Sandip Shah *et al*. 2015 [16]	Nepal	88.47	2.8	89.12	1.6
Twisha shah *et al*. 2015 [8]	Gujrat	74.28	6.5	76.95	4.6
Ranjana *et al*. 2016 [24]	Chattisgargh	91.13	10	93.03	8.6
Anwar Ahmad *et al*. 2016 [25]	Kurdis	91.05	9.5	90.05	9.7
Present Study 2017	Migrant Tibetan Population	83.78	1.83	84.78	2.05

This study showed that mean facial index of males and females of Migrant Tibetan Population (83.78±1.8 and 84.78±2.05) is similar to the mean facial index of males and females in populations of Indian 87.19/86.75 and Malasian 85.72/87.7 (Vaishali R. Shethi *et al*. 2011 [6]), Haryana 86.09/84.84 (Mahesh Kumar *et al*. 2013 [11]), Kathmandu 87.2/86.81 (Sharma K *et al*. 2014 [17]), North Indian 86.44/85.02 (Deepu S. katariya *et al*. 2015 [10]), Nepal 88.47/89.12 (Sandip Shah *et al*. 2015 [16]), It was observed that facial index of Migrant Tibetan Population is greater than to the study conducted on Gujrati population (Twisha shah *et al*. 2015 [8]).

It was observed that mean facial index of males for Migrant Tibetan Population is less than to the mean facial index of males reported in populations of Sri Lanka 92/90 (K.M. Chandimal *et al*. 2012 [21]), North Indian 101/107 (Prasanna

Lc *et al*. 2013 [22]), Serbia 94.04/92.38 (D. Jeremic *et al*. 2013 [3]), Rajasthan Rajput (Males only) 92.91 (Rakesh Mani *et al*. 2013 [13]), Rajasthan Sindhi (Males only) 92.89 (Sushma K. Kataria *et al*. 2013 [23]), Chattisgargh 91.13/93.03 (Ranjana *et al*. 2016 [24]), Kurdis 91.05/90.05 (Anwar Ahmad *et al*. 2016 [25]).

Facial Type

In males and females maximum number of cases was found to be Euryprosopic facial type (79.4% and 59.1%) respectively. This study showed that the dominant facial phenotype of Migrant Tibetan Population is Euryprosopic followed by Mesoprosopic similar to the findings of North Indian population Deepu Singh Kataria *et al*. [10] where second common type was Euryprosopic.

Twisha *et al*. [8] found Hypereuryprosopic followed by Euryprosopic in Gujarati Indian population, which is almost similar to our findings. The study conducted on Tibetan Poulatioin by Karanth *et al*. [26] in 1998 and found the similar results as reported that the Euryprosopic type of face was dominant face type which is in support to the present study. Another study by Zhong Hua *et al*. [19] in Tibetan youth population showed the result (Euryprosopic 33.5%) similar to the present study. For the Far ethnic group of northern Iran [27] it was shown that the dominant facial phenotype in males was Mesoprosopic (44%), and Euryprosopic (37.7%) for females finding are almost similar to our study. On the other hand, R. Praveen Kumar Doni *et al*. [28] had made a study in South Indian population and found that the dominant face type was Hyper-leptoprosopic, which was the least common type in Migrant Tibetan Population (0%).

The finding of present study also differs from those observed by C. Eliakim Ikechukwu *et al*. [29] in Ibo and Yoruba ethnic groups of Nigerian population. D. Jeremic *et al*. [3] carried out a study in Central Serbia and showed a similar result of sexual dimorphism which was significant as in the present study ($p<0.001$), but the dominant face type was Leptoprosopic followed by Mesoprosopic which was dissimilar to our study.

Summary and Conclusion

After conducting the research, it was concluded that the dominant facial phenotype in the Migrant Tibetan Population of the India was found Euryprosopic (broad Face). The data obtained in our study may be useful in anthropological research, forensics, genetic research, as well as in medical clinical practice (reconstructive surgery).

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