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Original Article

Anatomy Section

Facial Anthropometry in Adult Jaunsari Tribe Population of Dehradun District of Uttarakhand

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ABSTRACT

Introduction: Observations say that there are specific changes in facial features with the change in the geographical location and ethnicity of the communities. There is lack of such type of study on Jaunsari population. Facial anthropometric indices are of much importance in plastic and cosmetic surgery, forensic medicine and other allied clinical sciences. So, the project was planed.

Aim: To study facial anthropometric parameters in adult Jaunsari Tribe of District Dehradun, Uttarakhand. With objectives: 1) To study the facial anthropometric parameters of adult male and female population of Jaunsari Tribe of Dehradun district in Uttarakhand; 2) To analyse the sex difference in the facial anthropometric parameters of Jaunsari Tribe if any; 3) and statistical significance of the difference.

Materials and Methods: The study was carried on 100 adult males and 100 adult females of more than 18 years of age, belonging to Jaunsari Tribe, after due approval from Institutional Ethical Committee and informed consent. The methodology adopted for the anthropometric measurements was of Singh and Bhasin (1968) and concerned measurements were done.

Results: Important data were obtained, observed and analysed. It provided valuable data for the community for future use. It was found that according to Morphological Facial Index, 4%, 11%, 28%, 37%, 20% males and 5%, 14%, 27%, 32%, 22% females were Hypereuryprosopic, Euryprosopic, Mesoprosopic, Leptoprosopic and Hyperleptoprosopic whereas according to Morphological-upper facial Index, 0%, 0%, 3%, 81%, 16% males and 0%, 0%, 2%, 85%, 13% females were Hypereuryen, Euryen, Mesen, Lepten and Hyperlepten respectively. There were significant variations in all the measured facial parameters between male and female population of Jaunsari Tribe.

Conclusion: So, we conclude that majority of male (57%) and female (54%) population of Jaunsari Tribe are having Leptoprosopic and Hyperleptoprosopic type of face. Mesoprosopic is second dominant face type whereas least dominant face type is Euryprosopic and Hypereuryprosopic. Lepten is the most common face type in both male and female. There are significant variations in all measured facial parameters and morphological-upper facial Index between male and female population of Jaunsari Tribe.

Keywords: Ethnic groups, Face, Sex characteristics

INTRODUCTION

Change in the geographical location and ethnicity of the communities have direct or indirect influence on their facial features [1,2]. These variations in morphometric parameters have been point of interest for anthropologists for long time [3]. These features are very specific for particular ethnic group or geographical location [4,5]. There is lack of such type of study on Jaunsari population. Facial anthropometric indices are of much importance in plastic and cosmetic surgery, oral surgery, diagnostic comparisons between patients and normal population, forensic medicine and other allied clinical sciences [6].

The Jaunsari Tribe has got the highest number of people in the state of Uttarakhand. They have got the body features resembling that of both the Mongols as well as Indo-Aryan groups who have settled in the Himalayan provinces [7].

Because of being relatively isolated from population of rest of the country for a longer period, this tribal community may have retained their unique physical features, culture and traditions. This study will provide the facial anthropometric parameter of adult male and female population of Jaunsari Tribe of Dehradun which is the largest Tribe of Uttarakhand. These facial anthropometric parameters can be used as standard for future reference for Jaunsari population.

This study can be extended further to involve other Tribal population of Uttarakhand. The results of present study could be used to compare with that of other population of India. These basic facial anthropometric standards can be used in future to find out any changes in the existing population. So, the study was planned to study facial anthropometric parameters in adult Jaunsari Tribe of District Dehradun, Uttarakhand. With objectives: 1) To study the facial anthropometric parameters of adult male and female population of Jaunsari Tribe of Dehradun district in Uttarakhand; 2) To analyse the sex difference in the facial anthropometric parameters of Jaunsari Tribe if any; 3) and statistical significance of the difference.

MATERIALS AND METHODS

This is a cross-sectional type of study, carried (from March 2014 to August 2017) over 200 adult population of Jaunsari Tribe consisting of 100 males and 100 females individuals of more than 18 years of age, after due ethical clearance and their informed consent.

As per census report of 2011, available on the website of District Health and Family welfare society, Dehradun-Uttarakhand, the administrative set up of Dehradun district comprises of six tehsils, namely Dehradun, Chakrata, Tauni, Kalsi, Vikas Nagar and Rishikesh. Jaunsari Tribe is located in the northern part of Dehradun district in the hilly region of the block of Chakrata and Kalsi.

Two tehsils-Chakrata and Kalsi were selected, out of six tehsils of Dehradun district for this study, because Jaunsari tribes mainly inhabit these two tehsils of district Dehradun. Equal numbers of randomly selected male and female individuals were taken from randomly selected villages of Chakrata (Lakhwar and Hartar) and Kalsi (Jari and Koti). The individual selection was based on the voter list available at the tehsil office of chakrata and Kalsi.

The methodology for anthropometric measurements was adopted from Singh IR et al., [8]. Subjects were asked to sit on a low stool

of about 40 cm height for taking head and face measurements. The landmarks were marked on body by skin marking pencil. Head was kept in Frankfurt-horizontal plane i.e., infraorbital margin and tragion lie in same horizontal plane.

The subject was advised not to change his position while measurements were taken. Observer was standing on the right side of the subject while taking the various measurements of the face. Keeping left hand on the head of subject and holding the tips of the upper arm of the caliper with thumb and index finger on the desired landmark, lower arm of the caliper was slided upwards to the extent that the tip touches the landmark. The tip of the lower arm must only touch the different landmarks. The facial muscles were relaxed and the jaw was kept closed during the measurement. Breadth of Bizygomatic Arch (mm), Morphological Upper Facial Height (mm) and Height of Lower face were measured. With the help of these measurements Morphological-facial Index and Morphological-upper facial Index were calculated. Spreading caliper was used to measure Breadth of Bizygomatic Arch (mm) and sliding caliper was used to measure Morphological Upper Facial Height (mm) and Height of Lower face.

Morphological facial height or total facial height (n-gn): It measures the straight distance between nasion (n) (Nasion is a point at nasofrontal suture in mid-sagittal plane which can be felt by probing root of the nose) and gnathion (gn) which is the lowest point on lower margin of lower jaw in mid-sagittal plane. This point can be palpated on the lower jaw from behind and slightly anterior to chin [8].

Morphological upper facial height (n-sto): It measures the straight distance between nasion (n) and stomion (sto- It is the point where the slit of mouth with close lips cuts the mid-sagittal plane [8].

Breadth of Bizygomatic arch (zy-zy): It measures straight distance between the two zygion (zy) i.e., the most lateral points on the zygomatic arch [8].

Morphological Facial Index [8]

$$\frac{\text{Morphological facial height}}{\text{Breadth of bizygomatic arch}} \times 100$$

Morphological upper facial index [8]:

$$\frac{\text{Morphological upper facial height}}{\text{Morphological facial height}} \times 100$$

Depending upon values of morphological facial index, human population can be classified into different classes as per Martin and Saller [9]. Euryprosopic people have short or broad face or both with a facial index of 79.0 to 83.9, Mesoprosopic people have a face of average width with a facial index of 84.0 to 87.9 and Leptoprosopic people have a long, a narrow, or a long narrow face with a facial index of 88.0 to 92.9 [9].

RESULTS

After the completion of our study, collected data of all the desired morphometric parameters mentioned in the material and method were subjected to appropriate statistical tests (Mean, standard deviation, range-value) by using SPSS software version 21. Results are presented in the form of table [Table/Fig-1-3]. It is evident from [Table/Fig-1] that Breadth of Bizygomatic Arch (mm), Total Facial Height (mm), Morphological Upper Facial Height (mm) and Morphological-upper facial Index are significantly different in male and female Jaunsari population whereas Morphological-facial Index does not show any statistically significant difference. Further these data were used for the evaluation of different face types present in male and female Jaunsari population, which is presented in [Table/Fig-2,3].

DISCUSSION

The morphometric dimensions of the face and nose are the most important parameters in cephalometry used for description of human morphology [10]. Facial indexes are used to express the facial morphometric dimensions. It is the ratio of facial length to its width. So, broader faces are having low facial index while longer faces are having high facial index. In this study we used Morphological-upper facial Index and Morphological Facial Index to express the observed facial dimensions. It is reported that predominant facial type/facial index in North Indian population Is Leptoprosopic where as in other part of the country, Mesoprosopic is predominant face type [Table/Fig-4] [11]. The same study also mentioned the exception to this generalisation which includes people of Manipur, Mizoram and Tripura who are predominantly Leptoprosopic [Table/Fig-4]. Bhasin MK et al., and Bhasin MK reported that this might be because of smaller number of studies reported from these states [12,13]. Other studies reported that in Gujrat [14] and Jat Sikh [15] males dominant face type was Euryprosopic whereas in Banias [15] dominant face type was Hypereuryprosopic [Table/Fig-4]. In present study we found that 4%, 11%, 28%, 37%, 20% males and 5%, 14%, 27%, 32%, 22% females were Hypereuryprosopic, Euryprosopic, Mesoprosopic, Leptoprosopic and Hyperleptoprosopic respectively [Table/Fig-3]. According to Morphological-upper facial Index, 0%, 0%, 3%, 81%, 16% males and 0%, 0%, 2%, 85%, 13% females were found to be Hypereuryen, Euryen, Mesen, Lepten and Hyperlepten respectively [Table/Fig-2]. In the present study [Table/Fig-3] the predominant face type in male and female Jaunsari Tribe is Leptoprosopic which is in correlation to previous study [Table/Fig-4]. At the same time, it contradicts study by Bhargava I and Sharma JC [Table/Fig-5] which reported no significant variation in

S. No.	Parameters	Female jaunsari (Mean±SD)	Male jaunsari (Mean±SD)	Range of parameters (Female jaunsari)	Range of parameters (Male jaunsari)	p-value
1	Breadth of bizygomatic arch (mm)	125.03±7.75	132.71±5.92	120.00-150.00	110.00-139.00	<0.001
2	Total facial height (mm)	111.67±9.14	118.09±6.66	101.00-140.00	96.00-140.00	<0.001
3	Morphological upper facial height (mm)	69.96±7.01	72.89±5.30	63.00-89.00	58.00-99.00	0.001
4	Morphological-facial index	89.60±8.89	89.12±5.89	76.51-102.90	64.25-144.07	0.6
5	Morphological-upper facial index	62.70±4.20	61.72±2.76	55.46-70.17	41.18-81.19	0.002

[Table/Fig-1]: Comparison of facial parameters of male and female Jaunsari population.
SD: Standard deviation

Sr. No.	Class	Range	Male	Female
1	Hypereuryen	x-42.9	0%	0%
2	Euryen	43.9-47.9	0%	0%
3	Mesen	48.0-52.9	3%	2%
4	Lepten	53.0-56.9	81%	85%
5	Hyperlepten	57.0-x	16%	13%

[Table/Fig-2]: Range variation according to Martin and Saller of Morphological-upper facial Index.

Sr. No.	Class	Range	Male	Female
1	Hypereuryprosopic	x-78.9	4%	5%
2	Euryprosopic	79.0-83.9	11%	14%
3	Mesoprosopic	84.0-87.9	28%	27%
4	Leptoprosopic	88.0-92.9	37%	32%
5	Hyperleptoprosopic	93.0-x	20%	22%

[Table/Fig-3]: Range-variation according to Martin and Saller of Morphological facial Index.

male and female facial width [16]; whereas it can be seen from the present study [Table/Fig-1] that all the measured facial parameters were found to be significantly different between male and female population of Jaunsari Tribe. It means one should be aware of the differences in these parameters of male and female while planning for facial reconstructive surgery on them.

S. No.	Study/ authors	Dominant face type		Dominant face type	
		Male	Female	Male	Female
1	Bhasin MK et al., [12]	**Region**- North India and Manipur, Mizoram and Tripura		**Region**- Other parts of India	
		Leptoprosopic		Mesoprosopic	
2	Bhasin MK [13]	Leptoprosopic		Mesoprosopic	
3	Devi TB et al., [11]	**Region**- Manipur	----	----	------
		Mesoprosopic (31%) Leptoprosopic (31%)			
4	Kanan U et al., [14]	**Region**- Gujarat	-----	--------	-----
		Euryprosopic			
5	Singla M et al., [15]	**Region**- Punjab	--------	--------	--------
		Jat Sikh- Euryprosopic Banias- Hypereuryprosopic			
6	Present Study	**Region**- Dehradun, (Jaunsari Tribe)		--------	--------
		Leptoprosopic			

[Table/Fig-4]: Comparison of present study with other studies on basis of Morphological Facial Index [11-15].

S. No.	Authors	Parameter	Difference across gender
1	Bhargava I and Sharma JC [16]	Bizygomatic diameter	No significant difference
2	Kharbanda OP et al., [17]	Bizygomatic diameter	Significant difference
3	Pandey AK [18]	Bizygomatic diameter	Significant difference
4	Present Study	Bizygomatic diameter	Significant difference

[Table/Fig-5]: Comparison of bizygomatic diameter with different studies in relation to gender [16-18].

This is also supported by the studies done by Kharbanda OP et al., and Pandey AK, that there is significant variation in facial width between male and female population [Table/Fig-5] [17,18].

CONCLUSION

So, we conclude that according to Morphological Facial Index, majority of male (57%) and female (54%) population of Jaunsari Tribe are having Leptoprosopic and Hyperleptoprosopic type of face whereas according to Morphological-upper facial Index, Lepten was the most dominant face type both among male and female (81% and 85%) respectively, It means upper facial height is more than lower facial height in these individuals i.e., community is having long face. This information will helps surgeon while planning for facial reconstruction in this population. Mesoprosopic is second dominant face type whereas least dominant face type is Euryprosopic and Hypereuryprosopic. All measured facial parameters are found to be significantly different between male and female population of Jaunsari Tribe except one (Morphological-facial Index) which is not significantly different.

LIMITATION

1. It is representation of a local population so it can not be generalised.
2. The study has just focussed on the measurement of anthropometric data but has not focussed on the factors which might be responsible for this anthropometric presentation.
3. There is no comparison between Kumaon and Garhwal population as it has focussed on a particular tribe of Garhwal.

FUTURE RECOMMENDATION

Taking above limitations into consideration, it is recommended that there can be a robust anthropometric study taking adequate samples from both Garhwal and Kumaon region of Uttarakhand, so that their specification, comparison and generalisation can be done for the state of Uttarakhand.

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