



CHANGES OF FACIAL PARAMETER “DISTANCE FROM RHENION TO ZYGION” IN BETWEEN JAUNSARI AND GARHWALI ETHNIC GROUPS OF UTTARAKHAND REGION, INDIA.

Anatomy

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ABSTRACT

Background and Objectives: Anthropometry in forensic areas is a very important division of human medical anatomy. Ethical issues are avoided and no use of any invasive methods in this study. **Objectives:** 1) To study the distance between Rhenion and Zygion in the Jaunsari and Garhwali ethnic groups of the Uttarakhand region of India.; 2) To analyze the gender difference in facial parameters of the Jaunsari and Garhwali Tribe if any; 3) and statistical significance of the difference in the facial parameters of the Jaunsari and Garhwali Tribe if any. The main Aim is to study facial anthropometric parameters in adult Jaunsari and Garhwali Tribe of District Dehradun, Uttarakhand. **Materials and Methods:** This study has been carried out in the department of Anatomy, SGRRIMS & HS, ddn, 2021-2022. During this period, 200 subjects i.e- 100 males and 100 females in both ethnic groups, were born and brought up in the Uttarakhand region basically, aged 21 years and above up to 35 years young subjects taken up. Longitude 78.017198°, Latitude 30.302821°, 437, Chamanpuri, Niranjanpur, Dehradun, Uttarakhand 248001, India. The methodology adopted for the anthropometric measurements was of Singh and Bhasin (1968) and the concerned measurements were done. **Result:** Statistical data were obtained, observed and analyzed. It provided valuable data for the community for future use. There were significant variations in all the measured facial parameters distance between Rhenion and Zygion in the male and female populations of the Jaunsari and Garhwali Tribe. The differences in means of facial indices between the two races were statistically weak and nonsignificant (< 0.005). The mean values of facial indices found in the study were 63.70 ± 11.05 in Garhwali females and 77.97 ± 20.47 in Garhwali males. **Discussion and Conclusion:** In this study, the p-value is 8.08 in Jaunsari females and 2.25 in Jaunsari males; in the case of both males & females the p-value indicates that the result is statistically nonsignificant. On the other hand p- the value is 3.02 in Garhwali females and 7.15 in Garhwali males. In all cases, the p-value indicates that the result is again not statistically significant. **Conclusion:** So, we conclude that majority of all genders of Garhwali and Jaunsari ethnic groups; there is not any more difference in their facial indices distance between rhenion and zygion. The result of our study has confirmed that there was sexual dimorphism of facial parameter distance between Rhenion and Zygion. There were no significant differences in facial parameters distance between Rhenion and Zygion amongst the male and female populations of the Jaunsari and Garhwali Tribe.

KEYWORDS

Anthropology, rhenion, zygion, tribes, Ethnic groups.

INTRODUCTION

Most of the observations indicate that there are some specific changes in facial features of hilly and terai peoples of different ethnic groups, according with the change in the geographical location and ethnicity of the communities. There is lack of such type of Facial Anthropometric study on Garhwali and specially Jaunsari populations. Facial indices are the type of somatometric measurements in physical anthropology. It has importance in plastic and cosmetic surgeries, forensic medicine and other allied clinical sciences. So, the study was planned to observe the different facial anthropometric parameters in adult Jaunsari and Garhwali Tribes of District Dehradun, Uttarakhand. The Jaunsari and Garhwali Tribe have 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. (2, 6) They are very different than other tribal communities because of their minimal or no interaction with the external world. Because of this, they have relatively maintained their unique traditions and cultures, which have been a point of interest for researchers of different fields. The Jaunsaris with their facial features clearly distinguish them from other people of Garhwali, living close by. (3) There are various equipments that are used either as protective equipment, e.g., helmet, goggles or for other use, e.g., headphone etc, have to be designed in specific size and shape based on the cephalic and facial index of concerned ethnic group population. (1) Usually, forensic anthropologists, forensic pathologists, and forensic deontologists work in association to examine and authenticate historic and prehistoric remains.

A study of education, health, hygiene and nutrition. done by Bisht in Tribes of Uttaranchal. (14) In natural calamities like tsunami, natural mass disasters, war casualties with substantial skeletal remains, or in conditions of mass burials, forensic anthropology is quite useful. It is also helpful in investigations, dealing with living individuals like mixing up of babies in the hospital nursery, establishing individual's identity during immigration, thieves, burglars, robbers, and human trafficking, etc. (1) Physical anthropology mainly deals with external measurements and descriptions of the human body. (4) The methodology for anthropometric measurements was adopted from Singh and Bhasin. (5) Study on Traditional remedies in Terai Region of Kumaon, Uttarakhand done by Mathur A, Hema J. (15)

Inclusion Criteria

Individuals of more than 18 years of age, individual subjects and their parents both belong to the Jaunsari and Garhwali Tribe of Uttarakhand. Apparently and healthy individuals with no visible signs of facial and bony abnormalities included in the study.

Exclusion Criteria

Individuals below 18 years of age, individuals of Jaunsari and Garhwali Tribe other than Dehradun district were excluded from the study. Chakrata and Kalsi were selected, out of six tehsils of Dehradun district for this study because most of the Jaunsari tribes mainly inhabit these two tehsils of Dehradun district.

METHOD AND MATERIALS

Methodology:

This study is carried in the Department of Anatomy, in SGRRIMS & HS, Dehradun. Two hundred subjects aged between 21 and 35 years are analyzed because in this range of age categories the bones are completely grow and stabilized. The parametric data for the present study is distance between rhenion and zygion.

Statistical Data analysis:

Measurements and data collected is sorted out, coded, tabulated and compiled on an excel spread sheet. The mean, range and standard deviation of the facial dimensions is derived and correlations made. Statistical analyses are carried out using SPSS of 24.0 versions. The level of statistical significance is determined at $P < 0.05$ or 95% confidence interval. Standard Body Measurements (Anthropometry) is based on national health and nutrition examination survey III.

Material:

The tools used for this research include; transparent graded ruler and measuring tape, while Gliding and sliding machine or caliper are used for facial parametric length, measured to the nearest unit in millimeters (mm). The methodology for anthropometric measurements was adopted from Singh IR and Bhasin MK (1968) and Genetics of castes and tribes of India observed by Bhasin MK. (11) Vertical Proportions of face: A Cephalometry Study done by Kharbanda OP, Sidhu SS, Sundrum KR. (7) The nose in relation to head and face- an anthropometric study had done by Bhargava I, Sharma JC. (8)

Anthropometric data are the measurements of a human's size and shape, which are usually used to construct a digital human model. Study on Facial index in adult Indian Punjabi males jat Sikhs and banias get done by Singla M, Goel P, Ghai R, Khare S, Jain S, Gopichand P. (9). Variation in facial index of Gujarati males- a photometric study is done by Kanan U, Gandotra A, Desai A, Andani R. (10) Facial morphology and facial index: a study on secular trend of meitei male population of Bishnupur District, Manipur, India is done by Devi TB, Singh TN, Singh SJ, Tamang BK. (12) health status of Uttarakhand, Tharu tribe on the basis of blood clinical parameters done by Rajpoot A, Kumar VP, Sharma J. (16) Many studies were conducted to create databases used by doctors in medicine and cosmetic surgery or to simply survey to design protective clothing for workers. For example, in 2005, Farkas et al. [30] conducted a study on facial anthropometric factors of participants from different countries. The distribution of A1A2BO and Rh (D) Blood Groups in the Buksa. A primitive tribe of Uttarakhand, North India done by Singh A, Chahal SMS, Kaur MI. (17) Anthropological Survey of India done by Singh KS, Bhalla V, Kaul V. (18) A genetic survey among the rana Tharus of Nainital district in Uttar Pradesh observed by Kumar N. (19) Variation of Facial Parameter Interzygomatic Distance between Kumaoni and Terai Ethnic Groups in Uttarakhand Region is done by Sharma N and Ali S. (20) Respective ethnic group Subject measurements of present study are given below in figures as:-



Fig 1. Garhwali Female Rhenion to Zygion Distance



Fig. 2 Garhwali Male Rhenion to Zygion Distance.



Fig. 3 Jaunsari Female Rhenion Zygion Distance.



Fig. 4 Jaunsari Male Rhenion to Zygion Distance.



Fig. 5 Measuring Tape



Fig. 6 Vernier Caliper

OBSERVATION AND RESULT

Most of the journal papers indicate that there is not anymore study done on the basis of rhenion to zygion distance in ethnic groups of Jaunsari and Garhwali. The final results in the present study are linear regression equation derived for the rhenion to zygion distance. In Table no- 1, rhenion zygion distance in Garhwali males (77.97 ± 20.47) is more than Garhwali females (63.70 ± 11.05). And, in Table no- 2, the mean of rhenion zygion distance in Jaunsari males (73.30 ± 1.25) is more than that in Jaunsari females (70.44 ± 0.71). In table no 1, The Linear Regression equation (SE/ standard error) of Jaunsari males (0.12113287) and Jaunsari females (0.071355) showed a weak positive correlation (Pearson's $r = 0.1$) and p value in both Jaunsari females and males (0.09) were found to be more than the level of Significance (0.05), which is nonsignificant in Jaunsari females and males.

And In table no 2, The Linear Regression equation (SE/ standard error) of Garhwali males (77.764) and Garhwali females (0.173580353) showed a very weak positive correlation and p value in both Garhwali females and males is nonsignificant which is found to be more than the level of Significance (0.05). Hence there is weak statistical significant correlation between these two ethnic groups of Jaunsari and Garhwali.

Table 1: Descriptive analysis of various parameters in both genders of Garhwali ethnic group.

Parameters	Female Garhwali (Mean $\pm$ SD)	Male Garhwali (Mean $\pm$ SD)	Range of parameters (Female Garhwali)	Range of parameters (Male Garhwali)	P-value (Female Garhwali)	P-value (male Garhwali)
Distance between rhenion to zygion (mm)	63.70 $\pm$ 11.05	77.97 $\pm$ 20.47	36.37	77.76	3.02	7.15

Table 2: Descriptive analysis of various parameters in both genders of Jaunsari ethnic group.

Parameters	Female jaunsari (Mean $\pm$ SD)	Male jaunsari (Mean $\pm$ SD)	Range of parameters (Female jaunsari)	Range of parameters (Male jaunsari)	p-value (Female jaunsari)	P-value (male jaunsari)
Distance between rhenion to zygion (mm)	70.44 $\pm$ 5.02	73.30 $\pm$ 8.8	18.24	30.11	8.08	0.26

DISCUSSION

Nasofacial anthropometry of adult bini tribe in Nigeria is done by Omotoso DR, Oludiran OO, Sakpa CL. (13) Difference in the significant values in our study is may be due to the others factors that can be involved like different tropic areas, environment, culture, life pattern, biological etc. Ansari MS, Singla M, Ravi KS are did study on Facial anthropometry in adult Jaunsari tribe population of Dehradun District of Uttarakhand. (17) Very less or nil study has been done on these two ethnic groups of Jaunsari and Garhwali on the basis of rhenion zygon distance, that is there is unavailability for comparison with any other author's study. However, elaborate studies are still required to test their use in skeletal remains. There is a need for study about these parameters in these two ethnic groups of Jaunsari and Garhwali on the basis of rhenion zygon distance. Therefore, physical anthropometry provides the techniques to assess human facial dimensions like rhenion zygon distance to describe morphological variations that exist among different human populations. This data can be used as a standard measure for future reference in the Jaunsari and Garhwali populations, which can be useful for medico legal experts, clinicians, forensic and anthropological experts. Table no.3; - Comparison of Distance between rhenion to zygon (mm) and other facial parameters with different studies in relation to the different ethnic groups has been given below; -

Table 3: Comparison of Different Parameters with different studies in relation to Ethnic groups.

S. No.	Authors	Parameter	Difference across gender
1	Jaunsari Tribe-Uttarakhand	Cephalic Index	significant
2	Jaunsari Tribe Uttarakhand	Nasal Index	significant
3	Jaunsari Tribe Uttarakhand	Morphological-facial index	significant
4	Males and females of Tharu	BMI	significant
5	Adult Tharu Population	Nutritional Status	significant
6	Kumauni males	Interzygomatic distance	non significant
7	Kumauni females	Interzygomatic distance	non significant
8	Terai males	Interzygomatic distance	non significant
9	Terai females	Interzygomatic distance	significant
10	Present Study on Garhwali and Jaunsari subjects.	Distance between rhenion to zygon (mm)	Weak significant difference

Limitation

1. It is representation of a local population so it cannot be generalized.
2. The study has just focused on the measurement of anthropometric data but has not focused on the factors which might be responsible for this anthropometric presentation.
3. It has focused on a particular tribe of Garhwali and Jaunsari only.

Future Recommendation

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

CONCLUSION

All parameters were statistically weak significantly different in the male and female population of Jaunsari and Garhwali Tribe. The statistical analysis becomes statistically nonsignificant in Jaunsari females is (8.08 (NS)), Jaunsari males (2.25 (NS)), in Garhwali females (3.02 NS) and Garhwali males (7.15 NS). Therefore, the coefficient of correlation / Pierson's r, having weak correlation between all the parameters of males and females of respective ethnic groups with each other. It means they are not dependent on each other. So it should be kept in mind while designing protective equipment like helmet goggles or for other use, e.g., headphone, etc., for each ethnic groups of population. This information will helps surgeon while

planning for facial reconstruction in this population. The present study has provided valuable data for this particular community which can be used for further studies and as anthropometric standards in the future to find out any changes in the existing population. Anthropometric data are the measurements of a human's size and shape, which are usually used to construct a digital human model.

Acknowledgement

The author; thanks Dr. Sadakat Ali (Shri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun, India.) Prof. & Head, (Department of Anatomy), for their valuable support throughout the study. Thanks to my staff members those who helped me whenever i need.

Conflict Of Interest

None

Source Of Funding

None

Ethics Committee / Institutional Review Board's Permission

The study was assessed and approved by the institutional ethics committee / institutional review board and that the letter of approval is available with us for examination.

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