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ORIGINAL RESEARCH ARTICLE

VARIATION OF FACIAL PARAMETER INTERZYGOMATIC DISTANCE BETWEEN KUMAONI AND TERAI ETHNIC GROUPS IN UTTARAKHAND REGION

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ABSTRACT

Background and Objectives: Forensic Anthropology is one of the most important and valuable sections of medical human anatomy. The objective of this study is to use a few facial indices namely Interzygomatic distance used to predict anthropometric relationships between the ethnic groups with the help of anthropometric tools. The aim of this study is to observe the variation of facial indices in different ethnic groups of hilly peoples of the Uttarakhand region. ***Methods:*** After proper searching of past published literature databases, statistical analysis was applied to get proper findings. This study has been carried out from the year 2021 to May of the year 2022. The study sample comprised randomly selected (100; 50 males + 50 females) Kumaoni and (100; 50 males + 50 females) Terai ethnic groups subjects from overall two hundred (200) subjects of my study from remote areas of tribes of Uttarakhand region born and brought up in Uttarakhand region aged 21 years and above up to 35 years young subjects, have been chosen for the reason that by this age, there is the completion of facial skeletal growth by ossification of bones. ***Result:*** With the help of reviewing most of the papers of past publications, we analyzed some of the essential final results in our present study: the linear regression equation derived for the Interzygomatic distance. The statistical analysis becomes statistically significant in Terai females (0.02 (S)) but in Kumaoni males (0.09 NS), Kumaoni females (0.2 NS) and Terai males (0.2 NS) it becomes nonsignificant. ***Discussion and Conclusion:*** In this study, the p-value is 0.2797 in Kumaoni females and 0.0913 in Kumaoni males, in the case of females the p-value indicates that the result is statistically significant. In the case of Kumaoni males, the p-value is more than 0.05; it is statically nonsignificant. The p-value is 0.0279 in Terai females and 0.2678 in Terai males. In the case of males and females both, the p-value is less than 0.05, in the case of males and females, the p-value indicates that the result is statistically significant. Interzygomatic distance is a very good parameter to observe the facial widths in hilly people like Kumaoni and Terai.

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INTRODUCTION

Human face is a distinct criterion in personal identification and is a reflection of uniqueness of every individual. Although there are several methods for the metric (anthropometry) and morphological (anthroposophy) assessment of characteristics of living subject. A study was done by Ansari, mohd. salahuddin; singla, mukesh; ravi, kumar satish, on facial Anthropometry in Adult Jaunsari Tribe Population of Dehradun District of Uttarakhand.[3] Anthropometric measurements especially facial measurements are important for determining various face shape. Climatic adaptations and nutritional factors are found to be detrimental to shape and size whereas Anthropological studies have document differences in craniofacial features among different populations. These are controlled by a number of factors which include genetic heritage, climate and environment in which we live. Mohd Salahuddin Ansari, Mukesh Satish Singla, Rachna Pasi, Kumarsatishravi, they did study on Cephalic Index in Adult Jaunsari Tribe Population of Dehradun District of Uttarakhand- A Cross-sectional Study.[4] This analysis is a noninvasive quantitative method employed to determine the measurements of the different body parts in either living or dead for scientific purposes. Also 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. There are specific changes in facial features with the change in the geographical Location and ethnicity of the communities. Another study done by Singla M, Ravi KS, Ansari MS. On Morphometric study of nasal parameters in adult jaunsari tribe population of dehradun district of Uttarakhand.[5] Three anatomical facial prominences i.e. lips, nose, and chin which play an important role in the characterization of the profile of an individual. Because of this, these three, have been the great source of attention. All these facial indices could be successfully used to predict anthropometric relationships between the ethnic groups

METHOD AND MATERIALS

This study will be carried in the Department of Anatomy, Faculty of Anatomy, and SGRRIMS & HS Dehradun. One hundred fourteen subjects aged between 21 and 35 years are analyzed because in this range of age categories the bones are completely grow and stabilized. Selected facial linear distances, angles, volumes and areas collected from both areas peoples.

Methodology; The tools used for this research include; transparent graded ruler and measuring tape, while Gliding and sliding machine or caliper will be used for upper facial length, lower facial length and total facial length measured to the nearest unit in millimeters (mm).

Anthropometric measurement: Interzygomatic distance / Bizygomatic arch / bizygomatic distance'. Facial indices are sexually dimorphic and depend on sex hormones. Singla M, Ravi KS, Ansari MS, they has been done study on Facial Anthropometry in Adult Jaunsari Tribe Population of Dehradun District of Uttarakhand.[6]

Respective ethinic group Subject measurements are given below in figures as;-

Fig 1. Kumaoni Female Interzygomatic Parameter

Fig. 2. Kumaoni Male Interzygomatic Parameter

***Sample collection*:** In this study we include two hundred subjects in which approximately 2 Ethnic groups of races in hilly and Terai region of people occurs. Peoples of hilly and plane are Kumaoni and Terai. Subjects are collected from remote areas of Uttarakhand region.

Fig. 3. Terai Female Interzygomatic Parameter

Fig. 4. Terai Male Interzygomatic Parameter

Fig. 5. Measuring Tape

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.

Fig. 6. Vernier Caliper

Inclusion and Exclusion criteria: Those participants with facial deformities or previous history of facial trauma or surgery, or any antecedents of craniofacial dismorphologies, orthodontics treatments or severe facial trauma, craniofacial trauma, chronic illness, facial paralysis, visible tumors, oedema and those with physical signs of endocrine disorders such as Dwarfism or Gigantism are included in the study. (95.95± 8.24). And, in Table no-2, the mean of Interzygomatic distance in Terai males (89.04±10.47) is less than that in Terai females (89.86± 7.17). In table no 1, The Linear Regression equation (SE/ standard error) of Kumaoni males (1.25) and Kumaoni females (1.16) showed a weak positive correlation (Pearson's r = 0.1) and p value in both Kumaoni males (0.09) were found to be more than the level of Significance (0.05) is nonsignificant and in Kumaoni females (0.27) which is again more than 0.5 value which is nonsignificant. And In table no 2,

RESULTS

As depicted in Table no.1 above, mean Interzygomatic distance in Kumaoni males (96.81± 8.81) is more than Kumaoni females

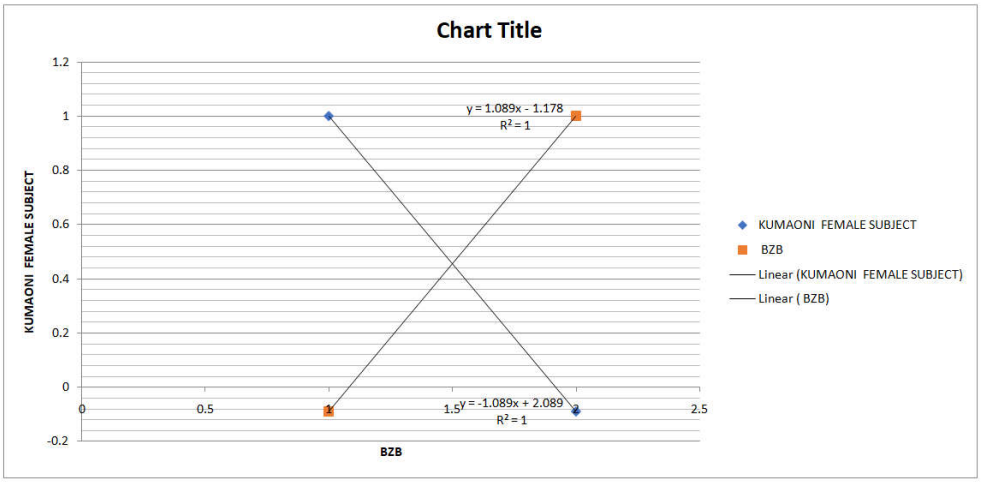
The Linear Regression equation (SE/ standard error) of Terai males (1.48) and Terai females (1.01) showed a very weak positive correlation (Pearson's r = 0.006) and p value in both Terai males (0.26) is nonsignificant and in Terai females (0.02 were found to be less than the level of Significance (0.05). Hence there is statistical significant correlation and The same findings were also corroborated in Normal Probability diagram of Interzygomatic distance of both males and females of two ethnic groups Kumaon and Terai , which showed weak positive correlation respectively as showed in graph no.1,2,3 and 4. Scattered Diagram is plotted, showing correlation between male and females of two ethnic groups, in graph no- 5, 6, 7 and 8. Graph 5, 6, 7, & 8 shows scattered diagrams of the coefficient of correlation / Pierson's r, there is weak correlation in between the parameters of male and females of respective ethnic groups. It means they are dependent on each others.

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

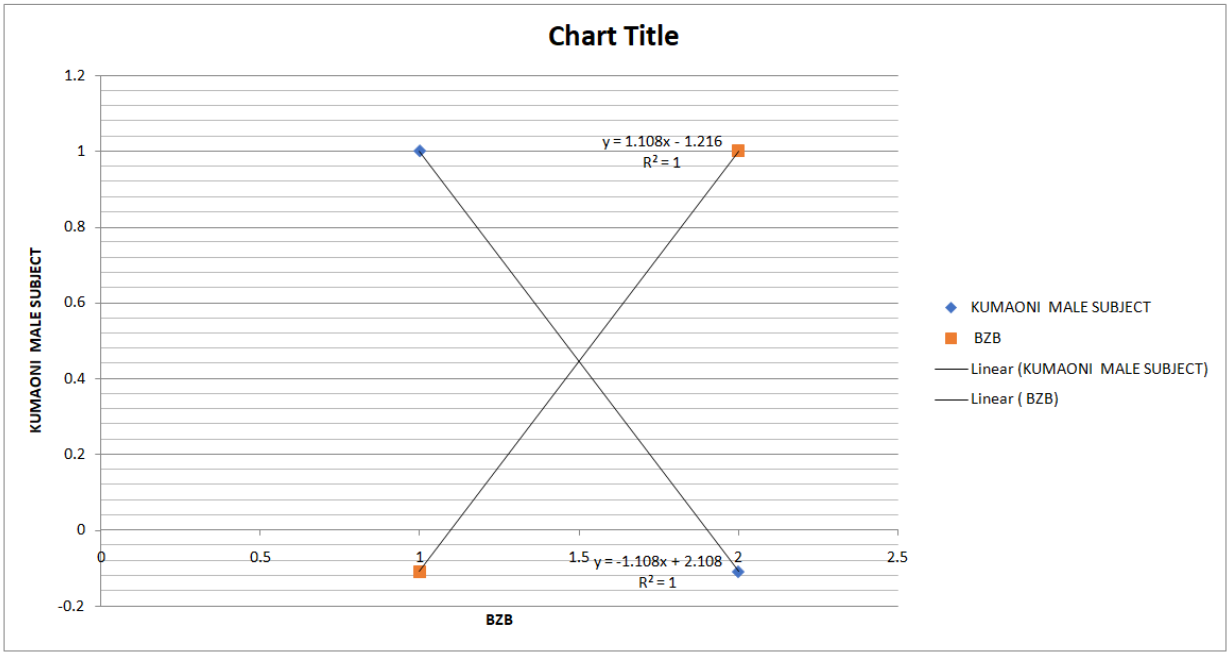
Gender	Parameter	Mean	SD (Standard deviation)	Regression equation (SE/standard error)	CI (Confidence interval)	Pearson's r (coefficient of correlation) value	P-value
Kumauni males	Interzygomatic distance	96.81	8.81	1.25	96.81 ±2.443	-0.1 (no correlation)	0.09 (NS)
Kumauni females	Interzygomatic distance	95.95	8.24	1.16	95.9556 ±2.287	-0.09 (no correlation)	0.2 (NS)

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

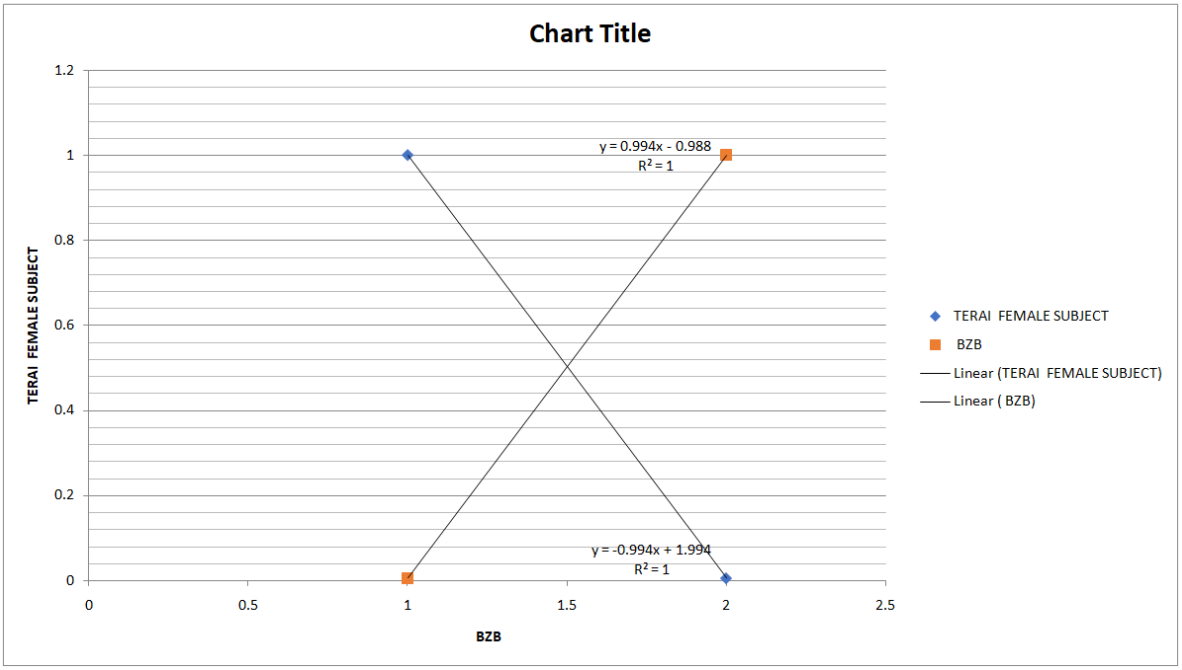
Gender	Parameter	Mean	SD (Standard deviation)	Regression equation (SE/ standard error)	CI (Confidence interval)	Pearson's r (coefficient of correlation) value	P-value
Teraimales	Interzygomatic distance	89.04	10.47	1.48	89.0422 ±2.904	0.0302(weak correlation)	0.2 (NS)
Terai females	Interzygomatic distance	89.86	7.17	1.01	89.8654 ±1.989	0.005(very weak correlation)	0.02 (S)



Graph 5. Scatter diagram shows Pierson's r for Kumaon females with Bizygomatic distance



Graph 6. Scatter diagram shows Pierson's r for Kumaon males with Bizygomatic distance



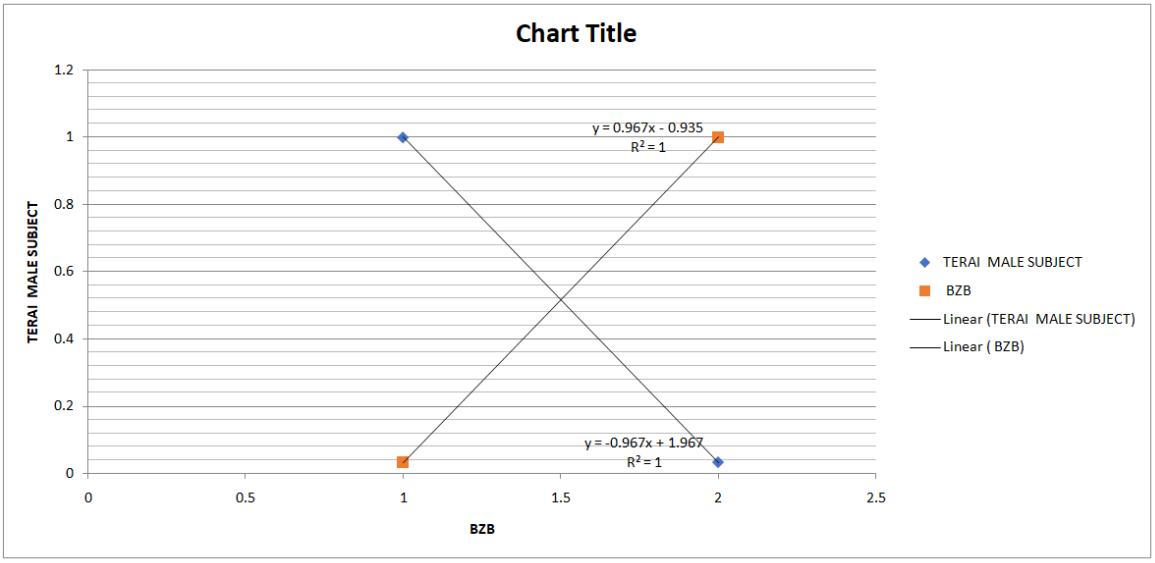
Graph 7. Scatter diagram shows Pierson's r for Terai females with Bizygomatic distance

DISSCUSSION

The mean Interzygomatic Distance for Kumauni males is found to be more than that for Kumauni females. This is consistent with the study of some authors. Variation in the result as compared to present study could be attributed to factors in current study such as smaller sample group, single races & restricted age groups. In present study, both male (1.25/ Regression equation (SE/ standard error)) and females (1.16 / Regression equation (SE/ standard error)) of Kumauni ethnic group showed a weak positive correlation between Interzygomatic Distance and number of subjects and the p value in both Kumauni males (0.0913) were found to be more than the level of significance and in Kumauni females (0.2797) were found to be less than the level of significance. Some studies have been conducted which failed to establish correlation between Interzygomatic Distance.

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 Kumaoni and Terai on the basis of Interzygomatic 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 Kumaoni and Terai on the basis of Interzygomatic distance.



Graph 8. Scatter diagram shows Pierson's r for Terai males with Bizygomatic distance

CONLUSION

In this era of advanced technology, the Facial indices parametric observations can prove to be more beneficial if measurement of Interzygomatic distance of human face may be integrated with them, in order to establish the identity. One of the most reliable tools for identification in cases of Facial skull remains where DNA or fingerprinting is not possible and also can be used on living subject observations on the basis of facial indices by surface bony landmarks. Medico legal importances of facial anthropometric indices are of much importance in plastic surgeries, forensic medicine and anthropometric studies, Hence physical anthropometry provides the techniques to assess and to describe morphological variations that exist among different human population.

There are so many natural limit disasters and landslides occurring in Uttarakhand region of India due to which many people's get injured with body as well as facial disfiguration. in such instances our study can help to recognize the injured by studying their facial features as people of different hilly regions ethnic races because they have different facial features. Facial anthropometric indices are of much importance in plastic surgeries, cosmetic surgery, reconstructive facial surgeries, forensic medicine, anthropometric studies and other allied clinical sciences.

Therefore, physical anthropometry provides the techniques to assess human facial dimensions and to describe morphological variations that exist among different human 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. So it should be kept in mind while designing protective equipment like helmet goggles or for other use, e.g., headphone, etc., for this population. This information will helps surgeon while planning for facial reconstruction in this population.

Conflict of Interest: No conflict of interest associated with this work.

Source of Funding: None.

Ethics committee / Institutional review board's permission: We also declare that 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. Please attach a copy of the approval letter. A scanned copy of the same can be uploaded as supplemental file.

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