A Comparative Anthropometric Study of Mongoloid and Tharu Ethnic Races in Eastern Nepal

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Anthropometry
A Comparative Anthropometric Study of Mongoloid and Tharu Ethnic Races in Eastern Nepal

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Abstract

Anthropometry is the hallmark technique that deals with the study of body proportion and absolute dimensions that vary widely with age and sex within and between racial groups. Over the centuries, there have been remarkable changes in Anthropometric measurements due to geographical, cultural, genetic and environmental factors as well as worldwide mingling of races. The aim of this study was to find effect of ethnicity on cranio nasal anthropometric measurement and to establish mean indices of cranio nasal parameters. There was a racial as well as sexual dimorphism in nasal ergonomics and Cephalic Index. Standing height helps in determining the levels of nutritional support and monitoring the effect of nutritional intervention. The results of this study revealed a clear ethnic as well as sex variations in physical parameters. The sex and ethnicity had considerable effect in cranial, facial and height related anthropometric measurements. The two communities studied though belongs to different race (mongoloid) and Tharu showed significant variation possibly due to environment, genetic, geography and nutrition. Stature is essential in determination of nutritional level support and intervention. To treat congenital, posttraumatic facial disfigurements in members of these groups, surgeons require access to craniofacial databases based on accurate anthropometric measurements.

Introduction

Anthropometry is the hallmark technique that deals with the study of body proportion and absolute dimensions that vary widely with age and sex within and between racial groups. Over the centuries, there have been remarkable changes in Anthropometric measurements due to geographical, cultural, genetic and environmental factors as well as worldwide mingling of races. Therefore, isolation of pure races has proved to be a difficult problem. However, anthropometric studies continue to play an important role in distinguishing pure race and local mingling of races. Anthropometric variables differ in different parts of the world and is influenced by sex, age, ethnicity, geographical distribution and since few studies related to anthropometry have been carried out in Eastern Nepal, therefore present study was designed to provide database of certain Anthropometric measurements for Tharu and Mongoloid ethnic races of Eastern Nepal so that it would be further useful as essential tool to the researchers, clinicians and forensic experts related to this field.

Materials and methods

In the present study, subjects whose parent and grandparent (both maternal and paternal) did not have intercaste marriage were considered as pure race. Rai, Limbu, Magar, Gurung, and Tamang communities are placed in Mongoloid groups who have migrated from Tibet as well as from Northen Burma, Assam, Bhutan and Sikkim during 200 B.C. These people are scattered in eastern and central hill districts of Nepal. Mongoloid features include depressed nasal groove and rounded jaws. The overall face presents rounded and short slanted integumental lip, straight black hair, short medium build and muscular bodies. Following the Research and Ethical committee of Institute clearance, a total number of 1000 healthy people (500 males and 500 females) aged between 25-45 years belonging to pure race of Tharu and Mongoloid communities of Sunsari and Morang district of Eastern Nepal were selected with door to door visit using non random sampling, snowball technique (Table-1). Purpose of the study was conveyed and confidentiality and anonymity was assured for each member involved in this study. Consent was received from each subject. Persons with any genetic , growth related disorders such as diabetes mellitus and other endocrine, gastro intestinal, cardiac and renal disorders or having any visible tumor or cyst in the face and head region, history of trauma etc were not included in this study. Pregnant lady and the subjects born of parent and grandparents (maternal and paternal) of two different ethnic races were also excluded (mixed races). Considering the convenience of each subject, the personal, present and past histories were taken. Presence of any growth related disorders and visible edema was also noted. Following this, the subject was asked to sit comfortably in a stool with arm hanging by side and head positioned in
Frankfurt plane. All the measurements i.e. maximum head length (g-op), head breadth (eu-eu), nasal length (n-Prn), nasal breadth (ala-ala), nasal height (Sn-Prn) were taken by using sliding caliper (straight and curved type). Finally, the person was advised to stand straight against the vertical scale (Martin type anthropometer) without shoes or slippers and measurement for total stature was taken. All the collected data were summarized using SPSS 11.5 version and their significance was tested by student 't' test.

Results

The statistical analysis was done firstly between both sexes of same race and later on analysis was performed between Tharu and Mongoloid community persons of both sexes by using student ‘t’ test. All the parameters were taken in millimeters and weight in Kg. When different parameters were compared among males and females of both races (Table-1), higher value was observed in Mongoloid male with respect to HB, HL, NL, NH. Higher value was observed for NB and height among the Tharu male.

Table-1 also showed statistically a highly significant difference (P< 0.001) between MHB, NL, NH, CI, Weight and Height in both sexes of Tharu and Mongoloid. Whereas, no significant difference (p>0.05) was observed with respect to MHL and NB between both sexes of Tharu and Mongoloid.

Table 3. Table-1 revealed highly significant differences exist in MHL between Tharu and Mongoloid female (p< 0.001) whereas, moderately significant difference was present between Tharu and Mongoloid male (p< 0.05). A highly significant difference was observed between both sexes of Tharu and Mongoloid (p< 0.001). The value for cephalic index, NL, Weight, and Height was found highly significant between both sexes of Tharu and Mongoloid. Table 1 showed p-value less than 0.001 with respect to NH between both sexes of Tharu and Mongoloid except for Tharu and Magar female where no significant difference was observed (p>0.05). A highly significant difference was observed in NB between male and females of Tharu and Rai, Tharu and Tamang male (p< 0.001) whereas no significant difference was seen in Tharu and Limbu, Tharu and Tamang female (p>0.05). No significant difference was revealed in weight between Tharu and Limbu, and Tharu and Gurung female (p>0.05). Moderate significant difference was observed between males of Tharu and Tamang (p< 0.05) whereas no significant difference present between Tharu and Limbu females in Height (p>0.05).

Discussion

The result of this study showed significant difference (P< 0.001) in head breadth, NL, CI, NH, Weight and Height between males and females of Tharu and Mongoloid, with males having higher values except for the females CI was observed higher in females. Whereas no significant difference (p>0.05) was noted in CI, NH between both sexes of Gurung, and NB of Tamang male, females. For pure ethnic races Tharu and Mongoloid (Rai, Limbu, Magar, Gurung, Tamang) no such scientific somatometric data was available which indicate the head length, head breadth, nasal ergonomics and total stature to mark the difference.5 However critical survey suggested that race as well as sex can be determined accurately with head measurements (Cephalic Index), which varied between major races and even smaller ethnic groups.6 Besides this, several studies revealed marked differences exist in cranial shape between males and females 7 head length of males being larger than the females.8 The human nose differs in anatomy and morphology among racial groups. The racial and ethnic morphometric differences in the nasal ergonomics in the world population have been the focus of investigation 9. The size, shape and proportion of the nose is very valuable for cosmetic and plastic surgeons, undertaking repair and reconstruction of the nose 10. Present study demonstrated that there were racial as well as sexual dimorphism in nasal ergonomics. Several studies showed sexual differences in NL, NB, NH, CI.11 The study conducted by Milgrim also showed that there were racial differences in nasal breadth 12. They found the mean nasal breadth of white females was 31 mm and South American females 34.4mm. We also found differences in nasal breadth between females of two communities. Nasal breadth of females of Tharu was 33.4 and Mongoloid 33.5 respectively. According to his study, the mean nasal height of Caribbean females were 18.4 mm, Whites 19.7 mm and Central Americans 19.3 mm which showed considerable difference than the results in the present study population which ranged from 11.8-11.3 mm among Tharu and 11.2- 13.4 mm among Mongoloid. However, nasal length of Rai females 44.7 mm, Limbu females 44.5 mm, Magar 43.9 mm, Gurung 44.4mm, Tamang 43.2mm and Tharu 40.5mm as observed in this study, presented similar values like Carolibeans 39 mm, Central Americans 39.5 mm and South Americans 42 mm. However we could not find any reference to compare the values obtained for nasal height in males.
Standing height is an ideal technique for estimating the stature of individuals, which helps in determining the levels of nutritional support and monitoring the effect of nutritional intervention 13. Both genetic and environmental influences on stature had a significant carry over effect from birth to late adolescence 14. When community wise and sex wise comparisons were performed by us, it showed statistically significant difference with males being taller than females. Study conducted by Kertzman H et al found significant difference (p< 0.001) in total height between different ethnic groups in both sexes 15. Researchers found differences in the average height of Caucasian Americans (180.6 cm) and Japanese (171.8 cm) revealing that the Caucasian Americans were significantly taller (p< 0.001) than Japanese which they suggested due to genetic effect. Results from several other studies have shown that the height of male and female varies with males being taller than the females. Singh SP et al found the average height of Jat-Sikh male to be 170.4 cm which was significantly different from the mean height of females 16. The results of this study revealed a clear ethnic as well as sex variations in physical parameters. The sex and ethnicity had considerable effect in cranial, facial and height related anthropometric measurements. The two communities studied though belongs to different race (mongoloid) and Tharu which showed significant variation possibly due to multi factorial etiological factors i.e. environment, genetic, geography, nutrition and other related. Stature is essential in determination of nutritional level support and intervention. This study has provided data on physical variations but the actual scientific reasons for this sexual and ethnic variations are still not clear. Therefore, there is a need for further studies to establish the scientific reasons for variation in measurements among these pure race ethnic study populations of Nepal.

References

Illustrations

Illustration 1

Table 1

<table>
<thead>
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<th>Parameters</th>
<th>Races</th>
<th>Mean ± S.D.</th>
<th>P value</th>
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<tbody>
<tr>
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<td>Male</td>
<td>Females</td>
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<td>Head breadth</td>
<td>Tharu</td>
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</table>

***p< 0.001 highly significant, NS p>0.005 not significant
Illustration 2

No significant difference was revealed with relation to head length (g-op) in Tharu and Mongoloid males, also nasal breadth (al-al) was found non significant in Tharu and Mongoloid females (p>0.05).

Comparison between both sexes of Tharu and Mongoloid:

Table 2
Illustration 3

No significant difference was revealed with relation to head length (g-op) in Tharu and Mongoloid males, also nasal breadth (al-al) was found non significant in Tharu and Mongoloid females (p>0.05).

Table 3

Illustration 4

Map of Nepal showing Mongoloid distribution
Illustration 5

Map of Nepal showing Tharu people distribution

Illustration 6

Gurung male and females
Illustration 7

Rai males and females

Illustration 8

A Gurung Female
Illustration 9

Rai male and females

Illustration 10

Limbu male and females
Illustration 11

Magar females

Magar females
Illustration 12

Tamang females
Illustration 13

Tamang males at their festival

Illustration 14

Tharu females at their house
Tharu females at their house
Illustration 15

Tharu males

Illustration 16

A Tharu female at her house work
A Tharu female at her house work
Illustration 17

Tharu females in their festivals
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