

Cranio facial anthropometric measurements among *Rai* and *Limbu* community of Sunsari District, Nepal

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ABSTRACT

Anthropometry is applied to obtain measurements of living subjects for identifying age, stature, and various dimensions related to particular race or an individual. Population based cross sectional study was carried out in Dharan and its neighbouring areas with the help of departments of Anatomy and Community Medicine, B.P. Koirala Institute of Health Sciences, Dharan. This study included 444 healthy people aged 25-50 years belonging to pure race of *Rai* and *Limbu* communities. Head length, nasal ergonomics and total stature were measured for each selected individual. Student 't' test was applied to identify significance of the variables. Except nasal breadth of *Limbu*, the results showed a significant variation ($p < 0.001$) in all parameters between male and female of both the communities. It was also revealed that *Limbu* males and females were taller with larger head length, longer nasal length and nasal height. Similarly nasal breadths of *Limbu* females were broader where as in males, *Rai* had broader nose than that of the *Limbu*. Therefore it was concluded that anthropometric measurements can play significant role in determining the sex and ethnicity of characteristic pure races of national importance.

Keywords: Anthropometry, head length, nasal length, nasal breadth, nasal height and total stature.

INTRODUCTION

Anthropometry is the hallmark technique¹ that deals with the study of body proportion and absolute dimensions that vary widely with age and sex within and between racial groups.² Over the centuries, there have been remarkable changes in Anthropometric measurements due to geographical, cultural, genetic and environmental factors³ as well as world wide 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.⁴

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, the present study was designed in order to provide database of certain Anthropometric measurements for *Rai* and *Limbu* 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 grand parent (both maternal and paternal) did not have inter-cast marriage were considered as pure race.

Rai and *Limbu* communities are placed in Mongoloid

groups who have migrated from Tibet as well as from Northern Burma, Assam, Bhutan and Sikkim during 200 B.C. These people are scattered in eastern and central hill districts of Nepal.⁵ 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 444 healthy people (210 males and 234 females) aged between 25-50 years belonging to pure race of *Rai* and *Limbu* communities of Sunsari district of Eastern Nepal were selected with door to door visit using multistage sampling 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 tumors, 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.

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

Table-1: Distribution of subjects sex and community wise:

Community	Frequency	
	Male	Female
Rai	111	116
Limbu	99	118
Total	210	234

i.e. maximum head length, nasal length, nasal breadth, nasal height 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 version and their significance was tested by student 't' test.

RESULTS

The statistical analysis was done firstly between male and female of same race and later on the analysis was performed between Rai and Limbu community persons of same sex by using student 't' test. All the parameters were taken in millimeters.

When different parameters were compared among males and females of same race (Table-2), it was observed that all the values were higher in male. Table-2 also showed statistically significant difference ($P < 0.001$) in all parameters except nasal breadth between male and female of *Limbu* community which was not statistically significant.

Table-3 showed that except nasal breadth of male, the male and female from *Limbu* community had larger head length, longer nasal length, nasal breadth, nasal height and total height compared to that of *Rai* community, where as *Rai* males had broader nasal breadth than *Limbu* males. Further comparison from Table-3 showed significant difference in nasal length ($P < 0.05$), nasal breadth, nasal height and total height ($P < 0.001$) of females between *Rai* and *Limbu* but when comparison were done between the males of two communities, significant difference was found only in total height ($P < 0.01$).

DISCUSSION

The result of this study showed significant difference ($P < 0.001$) in head length between males and females with males having higher values compared to the females of same community where as comparison were done between the sexes of two communities no significant difference was noted between *Rai* and *Limbu*. For pure ethnic races or *Rai* and *Limbu*, no such scientific somatometric data was available which indicate the head length, nasal ergonomics and total stature to mark the difference.⁶ However critical survey suggested that race as well as sex can be determined accurately with head

measurements, which varied between major races and even smaller ethnic groups.^{4,7} Besides this, several studies revealed marked differences exist in cranial shape between males and females,^{8,9} head length of males being larger than the females.¹⁰

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 investigation¹¹. The size, shape and proportion of the nose is very valuable for cosmetic and plastic surgeons, undertaking repair and reconstruction of the nose.¹²

Present study demonstrated that there were racial as well as sexual differences in nasal ergonomics. Several studies showed sexual differences in NL, NB and NH.¹³⁻¹⁵ The study conducted by Milgrim (1996)¹⁶ also showed that there were racial differences in nasal breadth. They found the mean nasal breadth of white females was 31 mm and South American females 34.4mm. We also found differences in nasal breath between females of two communities. Nasal breadth of females of *Rai* was (36.01) and *Limbu's* (37.73) 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 12.93 mm among *Rais* and 13.91 mm among *Limbus*. However, nasal length of *Rai* females (42.02 mm) and *Limbu* females (42.67 mm) as observed in this study, presented similar values like Caribbeans (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

Table-2: Comparison of different parameters between male and female of same race.

Parameters	Race	Mean±SD	
		Male	Female
Head length (HL)	Rai	179.96±4.78	171.32±5.87***
	Limbu	180.01±5.05	171.94±4.54***
Nasal length (NL)	Rai	46.81±3.04	42.02±2.74***
	Limbu	47.07±3.88	42.67±2.90***
Nasal breadth (NB)	Rai	38.36±2.58	36.01±2.10***
	Limbu	38.05±4.28	37.73±3.70
Nasal height (NH)	Rai	14.78±1.94	12.93±1.83***
	Limbu	14.82±1.78	13.91±2.26**
Total height (TH)	Rai	1577.32±55.70	1486.55±40.37***
	Limbu	1601.06±64.96	1510.34±48.87***

** $P < 0.01$, *** $P < 0.001$

Table-3: Comparison of different parameters between Rai and Limbu of same sex

Parameters	Gender	Rai	Limbu
Head length (HL)	Male	179.96±4.78	180.01±5.05
	Female	171.32±5.87	173.13±5.40
Nasal length (NL)	Male	46.81±3.04	47.07±3.88
	Female	42.02±2.74	42.67±2.90*
Nasal breadth (NB)	Male	38.36±2.58	38.05±4.28
	Female	36.01±2.10	37.73±3.70***
Nasal height (NH)	Male	14.78±1.94	14.82±1.78
	Female	12.93±1.83	13.91±2.66***
Total height (TH)	Male	1577.32±55.70	1601.06±64.96**
	Female	1486.55±40.37	1510.34±48.47***

*P<0.05, **P<0.01, ***P<0.001

Standing height is an ideal technique for estimating the stature of individuals¹⁷, which helps in determining the levels of nutritional support and monitoring the effect of nutritional intervention. Both genetic and environmental influences on stature had a significant carry over effect from birth to late adolescence.¹⁸

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.¹⁹ 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.²¹

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 same race (mongoloid) showed significant variation possibly due to multifactorial etiological factors *i.e.* environment, genetic, geography, nutrition and other related factors which played significant roles. 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.

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Table-4: The rates of infection of patients with and without fusidic acid

Age (years)	Infection		No infection		Total n=70
	n.	(%)	n.	(%)	n.
With fusidic acid	1	(2.8)	34	(97.1)	35
Without fusidic acid	6	(17.1)	29	(82.8)	35
Total	7	(10.0)	63	(90.0)	70

$\chi^2 = 3.967$, $df = 2$, $P = 0.0460$ (significant)

therapy for impetigo, providing rapid clinical and bacteriologic resolution.⁷ Topical fusidic acid may be more effective than oral antibiotics for limited non bullous impetigo and staphylococcal infections.⁸⁻¹⁰

Fusidic acid is an antibiotic that belongs to a group of its own the fusidanes. The molecule has a steroid-like structure but does not possess any steroid like activity. The antimicrobial activity of fusidic acid is specially aimed at the most common skin pathogens including staphylococcus aureus towards which it is one of the most potent antibiotics. Fusidic acid is effective in the treatment of mild to moderate skin and soft tissue infections.¹¹

Fusidic acid and mupirocin have been recommended for the treatment of acute staphylococcal skin lesions¹² but long term use of more than 10 days may develop resistance.¹³ Another study shows that mupirocin and fusidic acid gave good results in treating primary and secondary skin infections.¹⁴

Our study showed that with the use of topical fusidic acid over the wound in absorbable stitches, the infection rate was almost 6 times lower as compared to standard povidone-iodine dressing. The majority of wound infection occurred with growing age and in repeated caesarean sections. Therefore the use of topical fusidic acid can be safely recommended for the prevention of wound infection.(surgical site infection)

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