

# Racial Characterization of Gond Tribes and Non-Tribe Boys of Mungeli District, Chhattisgarh Using Facial Anthropometry

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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.

**Aim** -To determine racial characteristic of Gond tribe boys by facial anthropometry.

**Material & methods**-In the present study, data were collected from Patharia block, Mungeli district, Chhattisgarh. Easy approachability and average density of Gond tribe and non-tribe population were the major criteria for selection of this place. Assessment of differences in facial structures, such as, bizygomatic diameter, morphological face height, and nose height, nose width by their direct measurements from the subjects of two groups was done to see if there are any racial characteristics.

**Result** - It was observed that GT boys had wider nose, as nose width was significantly ( $p$  value  $<0.05$ ) more than NT boys at most age groups. No major difference was observed for bizygomatic diameter, morphological face height & nose height.

**Conclusion**- It was concluded that anthropometric measurements can play significant role in determining the ethnicity of characteristic pure races of national importance. Broad nose seems to be a racial feature characteristic of Gond tribe.

**Keywords:** Anthropometry, Nasal Breadth, Nasal Height

## INTRODUCTION

The word Anthropometry is derived from the Greek word anthropos meaning man, and metron meaning to measure. There are a variety of theoretical and practical definitions of anthropometry, but in its simplest form anthropometry is the physical measurement of the human body and its parts. <sup>[1]</sup>

Anthropometry is also defined as “a science of measuring the human body, including craniometry, osteometry, skin fold evaluation for subcutaneous fat estimation, and height and weight measurements.” <sup>[2]</sup>

Chhattisgarh is a comparatively young state in the history of India that came into independent existence only in the new millennium. It was previously a part of Madhya Pradesh, which factually meant 'Central region'. Total Population of Chhattisgarh is 2, 55, 40,196. (2.55 Cr) as of 2011 census. It is ranked 16th in India in order of population. <sup>[3]</sup>

Mungeli is one of the districts of Chhattisgarh. Headquarter of Mungeli is at Mungeli city. Mungeli is newly formed District Functional from 1st January 2012 in the Indian state of Chhattisgarh. Mungeli is located at 22.07°N 81.68°E. It has an

average elevation of 288 meters (944 feet) and Patharia is one of the blocks of Mungeli district. The population of Chhattisgarh is notable for the high proportion of Scheduled Tribes and for some specific sects. Of the total population of Chhattisgarh, tribals constitute at least 32.5 percent, which is a significantly high percentage. Among the tribes of Chhattisgarh Gond tribe is considered as the most prominent one. The Gonds are one of the most famous and important tribes in India, known for their unique customs and traditions. They are mainly a nomadic tribe and call themselves as Koytoria. The term 'Gond' is derived from the Telugu word 'Konda' which means hill. Gond Tribes are primarily located in Madhya Pradesh, Chhattisgarh, eastern Maharashtra, northern Andhra Pradesh and western Orissa. With a population of over 4 millions, Gonds also form the largest tribal group in central India. [3]

Anthropometric variations in races and ethnic groups- It was traditionally believed that different ethnic groups show different anthropometric measurements and different patterns of growth; on average African-Caribbean groups are taller and heavier, and Asian and Chinese groups are shorter and lighter when compared with Caucasians. Lin et al. studied four East Asian populations viz. Chinese, Japanese, Korean and Taiwanese and showed anthropometric differences. [4]

Koirala et al. conducted a comparative anthropometric study of Mongoloid and Tharu Ethnic races in eastern Nepal and found a clear ethnic as well as sex variations in physical parameters. The sex and ethnicity had considerable effect on cranial, facial and height related anthropometric measurements. Though the two communities studied though belonged to different races (mongoloid) and Tharu showed significant variation possibly due to environment, genetic, geographical and nutritional factors. But extreme shortness may be due to a combination of genetic and non-genetic factors. It is normal that five

percent of all children will grow below the 5th centile on height for age charts and be healthy. Human growth is a dynamic changing process and is being influenced by heredity and environment. Genetic component and environment both contribute to attain final body structure. [5]

## **MATERIALS & METHODS**

The present study consisted of acquisition of anthropometric data for Gond tribe and non-tribe boys from the same area. In the present study, data were collected from Patharia block, Mungeli district, Chhattisgarh. A total number of 279 Gond tribe boys and 282 non-tribe boys were selected as subjects for the study. The data were collected on students of school. They were grouped into two groups- Non-tribe (NT) and Gond tribe (GT). Cases taken in this study were registered cases in government school of Patharia block. Total 561 number of boys age range was 5 to 18 yrs. and apparently healthy were included & females apparently ill child Boys belonging to other scheduled tribes were excluded in the study. Individuals were examined for the Bizygomatic Diameter, Morphological Face Height, Nose Height & Nose Breadth according to standard methods (NHANES/ISAK/ Singh IP and Bhasin MK. [6-8])

1. Bizygomatic Diameter -The maximum diameter between the zygomatic arch was measured. Pressure was exerted to compress the tissue. Instrument used: Spreading Calliper.

2. Morphological Face Height: With one arm of the calliper held horizontally at the marked nasion, the other arm of the calliper is hooked under tip of the chin (gnathion). Instrument used: Sliding Calliper.

3. Nose Height: One arm of the calliper is held at the marked nasion while other arm of the calliper was brought down to reach the union of upper lip with the nasal septum. Instrument used: Sliding Calliper

4. Nose Breadth: The calliper was held horizontally and its arm brought into the contact with the outside of nares but without

pressure. Instrument used: Spreading Calliper.

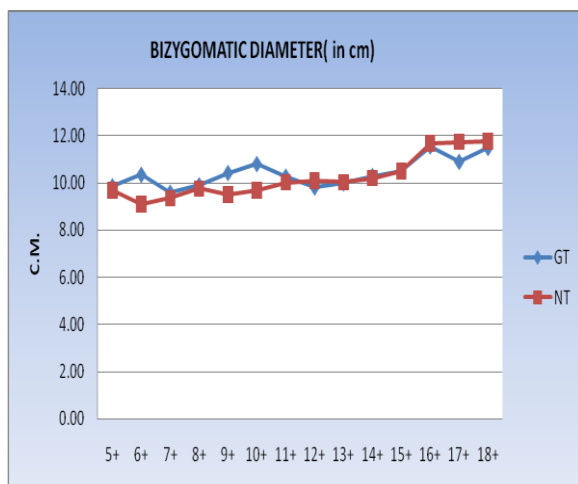
**OBSERVATIONS -**

**Bizygomatic Diameter** (Table No.1; Figure No.1) - Bizygomatic diameter of GT boys was equal to or more than NT boys at most

of the age groups. The difference was statistically significant at 6+, 7+, 9+ and 10+ years. The S.D. varies from a minimum of .51 and .46 at 11+ and 11+ to a maximum of 1.98 and 3.84 at 12+ and 5+, indicating the extent of variation in the total sample of GT and NT respectively.

**Table No -1 - Bizygomatic Diameter**

BIZYGOMATIC DIAMETER( in cm)										
Age	GOND TRIBE(GT)				NON TRIBE(NT)				t-test	P value
	No.	Mean	S.D.	S.E	No.	Mean	S.D.	S.E		
5+	19	9.86	0.62	0.62	18	9.68	3.84	3.84	0.20	0.85
6+	17	10.34	0.95	0.23	22	9.07	0.76	0.16	5.86	<0.01
7+	18	9.60	1.04	0.25	20	9.33	1.23	0.28	4.28	<0.01
8+	17	9.91	0.75	0.18	18	9.74	0.86	0.20	0.59	0.56
9+	23	10.41	0.96	0.20	19	9.49	0.70	0.16	3.46	<0.01
10+	18	10.79	0.82	0.19	25	9.68	0.93	0.19	4.05	0.00
11+	18	10.27	0.51	0.12	19	10.01	0.46	0.11	1.63	0.11
12+	24	9.81	1.98	0.40	22	10.07	0.78	0.17	-0.57	0.57
13+	18	9.98	0.63	0.15	22	10.02	0.55	0.12	-0.18	0.85
14+	17	10.29	0.55	0.13	19	10.18	0.74	0.17	0.47	0.64
15+	23	10.50	0.84	0.17	21	10.49	0.99	0.22	0.47	0.64
16+	23	11.52	1.25	0.26	18	11.68	1.16	0.27	0.07	0.95
17+	25	10.88	0.99	0.20	19	11.73	1.08	0.25	-2.71	0.01
18+	19	11.46	0.75	0.17	20	11.77	1.20	0.27	-0.97	0.34
Total	279				282					



**Figure No. 1 Bizygomatic Diameter**

**MORPHOLOGICAL FACE HEIGHT**

(Table No.2; Figure No.2) The distance curve of morphological face height reveals that curve for GT ran below the distance curve for control only up to age 9+ after that it is not uniform, and insignificant difference in MFH in most age periods except for 5+ , 8+ 18+age group. (P value <0.05).The S.D. varies from a minimum of 0.48 and 0.12 at 5+ and 18+ to a maximum of 1.33 and 0.46 at 12+ and 9+, amongst GT & NT respectively indicating the extent of variation in the total sample of GT and NT respectively.

**Table No -2 Morphological Face Heights**

MORPHOLOGICAL FACE HEIGHT ( in cm)										
Age	GOND TRIBE(GT)				NON TRIBE(NT)				t-test	P value
	No.	Mean	S.D.	S.E	No.	Mean	S.D.	S.E		
5+	19	8.14	0.48	0.48	18	8.50	0.57	0.57	-2.06	0.05
6+	17	8.04	0.58	0.14	22	8.72	0.94	0.20	-1.12	0.27
7+	18	8.58	0.70	0.16	20	8.99	0.70	0.16	1.39	0.27
8+	17	8.55	0.94	0.23	18	9.09	0.62	0.15	-1.98	0.05
9+	23	8.84	0.69	0.14	19	8.89	1.99	0.46	-0.12	0.91
10+	18	9.59	0.58	0.14	25	9.12	1.86	0.37	1.04	0.30
11+	18	9.59	0.58	0.14	19	9.66	0.73	0.17	-0.32	0.75
12+	24	9.33	1.33	0.27	22	9.59	0.71	0.15	-0.83	0.41
13+	18	9.62	0.76	0.18	22	9.70	0.62	0.13	-0.35	0.72
14+	17	10.17	0.82	0.20	19	10.24	0.96	0.22	-0.24	0.81
15+	23	10.20	0.90	0.19	21	10.14	0.75	0.16	-0.24	0.81
16+	23	10.48	0.59	0.12	18	10.68	0.67	0.16	0.26	0.79
17+	25	10.70	0.72	0.14	19	10.53	0.66	0.15	0.84	0.41
18+	19	10.51	0.66	0.15	20	10.91	0.55	0.12	-2.09	0.04
Total	279				282					

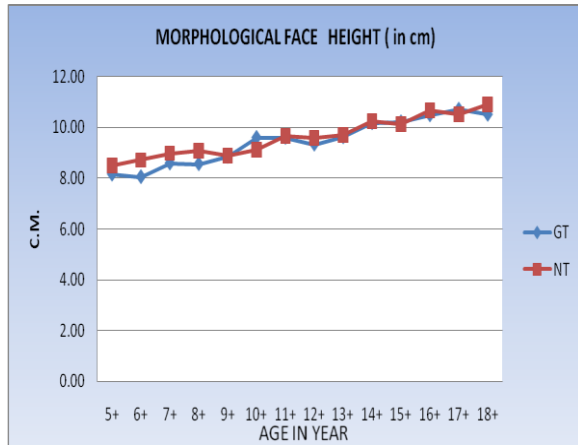


Figure No. 2 Morphological Face Heights

**NOSE HEIGHT** (Table No.3; Figure 3) The distance curve of nose height reveals that curve for NT ran above the distance curve for GT only up to age 9+ after that it is not uniform, and no significant difference in NH except for 17+ age group. The S.D. varies from a minimum of 0.08 and 0.08 at 13+ and 13+ to a maximum of 0.64 and 0.44 at 19+ and 20+, amongst GT & NT respectively indicating the extent of variation in the total sample of GT and NT respectively.

Table No -3 Nose Height

Age	GOND TRIBE(GT)				NON TRIBE(NT)				t-test	P value
	No.	Mean	S.D.	S.E	No.	Mean	S.D.	S.E		
5+	19	3.61	0.51	0.51	18	3.58	0.38	0.38	0.19	0.85
6+	17	3.91	0.30	0.07	22	3.81	0.29	0.06	0.63	0.53
7+	18	4.06	0.45	0.11	20	3.95	0.35	0.08	2.78	0.53
8+	17	4.00	0.40	0.10	18	4.02	0.36	0.08	-0.13	0.90
9+	23	4.08	0.33	0.07	19	4.13	0.25	0.06	-0.55	0.59
10+	18	3.94	0.59	0.14	25	4.10	0.28	0.06	-1.16	0.25
11+	18	4.21	0.33	0.08	19	4.09	0.34	0.08	1.00	0.32
12+	24	4.16	0.55	0.11	22	4.15	0.41	0.09	0.12	0.91
13+	18	4.38	0.49	0.11	22	4.19	0.31	0.07	1.41	0.15
14+	17	4.34	0.45	0.11	19	4.62	1.61	0.37	-0.68	0.50
15+	23	4.48	0.31	0.06	21	4.31	0.41	0.09	-0.68	0.50
16+	23	4.72	0.31	0.06	18	4.39	0.43	0.10	1.56	0.13
17+	25	4.60	0.42	0.08	19	4.17	0.41	0.09	3.43	0.001
18+	19	4.51	0.37	0.08	20	4.40	0.44	0.10	0.85	0.40
<b>Total</b>	<b>279</b>				<b>282</b>					

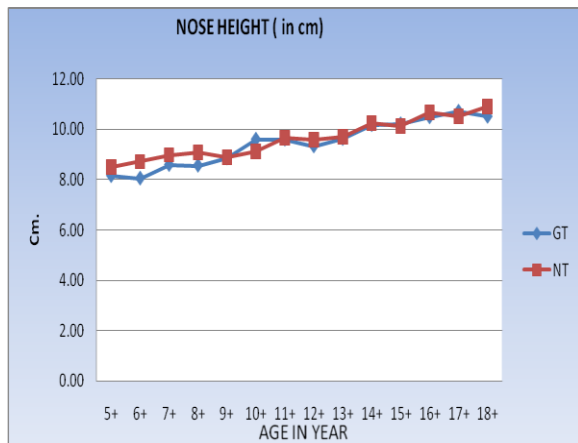


Figure No. 3 Nose Height

9+ 11+ 16+ (p value <0.01) The S.D. varies from a minimum of 0.29+ and 0.28 at 10+ and 9+, +18 to a maximum of 0.59 and 0.51 at 7+ and 14+, amongst GT & NT respectively indicating the extent of variation in the total sample of GT and NT respectively.

**NOSE BREADTH** (Table No.4; Figure No.4) The distance curve for nose breadth reveals that curve for GT ran above the distance curve for NT except at the age period of 12+ where it coincide and 13+, where it is slightly below, but the difference is significant at age periods 10+ 18 + (p value <0.05) & highly significant at 6+ ,7+.

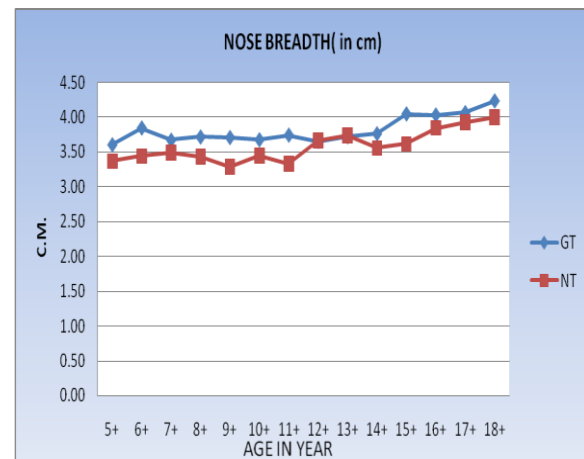


Figure No. 4 Nose Breadth

Table No -4 Nose Breadth

NOSE BREADTH( in cm)										
Age	GOND TRIBE (GT)				NON TRIBE (NT)				t-test	P value
	No.	Mean	S.D.	S.E	No.	Mean	S.D.	S.E		
5+	19	3.61	0.51	0.51	18	3.36	0.37	0.37	1.67	0.10
6+	17	3.85	0.37	0.09	22	3.44	0.36	0.08	4.37	0.001
7+	18	3.67	0.59	0.14	20	3.49	0.40	0.09	1.88	<0.001
8+	17	3.72	0.52	0.13	18	3.43	0.34	0.08	1.95	0.06
9+	23	3.71	0.56	0.12	19	3.28	0.28	0.06	3.04	<0.001
10+	18	3.68	0.29	0.07	25	3.44	0.42	0.08	2.07	0.04
11+	18	3.74	0.40	0.10	19	3.33	0.43	0.10	3.03	0.001
12+	24	3.65	0.43	0.09	22	3.65	0.37	0.08	0.00	1.00
13+	18	3.72	0.38	0.09	22	3.73	0.38	0.08	-0.04	0.97
14+	17	3.76	0.40	0.10	19	3.55	0.51	0.12	1.38	0.18
15+	23	4.05	0.44	0.09	21	3.61	0.50	0.11	1.38	0.18
16+	23	4.03	0.45	0.09	18	3.84	0.37	0.09	3.13	0.001
17+	25	4.07	0.37	0.07	19	3.92	0.43	0.10	1.27	0.21
18+	19	4.24	0.35	0.08	20	4.00	0.28	0.06	2.40	0.02
<b>Total</b>	<b>279</b>				<b>282</b>					

## RESULT & DISCUSSION

This study was conducted on boys studying in government schools of Patharia block, Dist. Mungeli, Chhattisgarh. This area was chosen as it showed average density of Gond tribe and Non-tribe population as per data from block office, Patharia.

Assessment of differences in facial structures, such as, bizygomatic diameter, morphological face height, nose height & nose width by their direct measurements from the subjects of two groups was done to see if there are any racial characteristics.

It was observed that GT boys had wider nose, as nose width was significantly (p value < 0.05) more than NT boys at most age groups. No major difference was observed for bizygomatic diameter, morphological face height & nose height.

Farkas et al. compared the facial measurements of ethnic groups with the established norms of the North American Whites. The study group consisted of 1470 healthy subjects from Europe, Asia, Africa and Middle east. The orbital regions exhibited the greatest variations in identical and contrasting measurements in comparison to NAW. Nose heights and widths contrasted sharply. In relation to NAW the nose was very or extremely significantly wide in both sexes of Asian and Black ethnic groups. [9]

Gupta R. based on her study of facial anthropometry observed that tribals of

Kanker district were significantly different from the tribals of Gariyaband block of Chhattisgarh and other part. [10]

## SUMMARY & CONCLUSION

It was concluded that anthropometric measurements can play significant role in determining the ethnicity of characteristic pure races of national importance.

It was observed that GT boys had wider nose, as nose width was significantly (p value < 0.05) more than NT boys at most age groups. Broad nose seems to be a racial feature characteristic of Gond tribe. No major difference was observed for bizygomatic diameter, morphological face height & nose height.

**Abbreviations** - BZD - Bizygomatic Diameter, MFH- Morphological Face Height , NH- Nose height , GT - Gond Tribe boys ,NT – Non Tribe boys CM - Centimeters

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