Anthropometric Characteristics among the Pengu Porja of Visakhapatnam

SURIBABU CHINTALA†

Sujatha Nagar, MIG-B,C2-376, Visakhapatnam 530051
Andhra Pradesh
E-mail: suribabu.chintala@gmail.com

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ABSTRACT: The present anthropometric study comprises 185 males and 184 females of the Pengu Porja tribe. 13 body measurements have been taken, and accordingly, 13 indices have been calculated to supplement information regarding somatic characters. The study shows that the mean body weight among the Pengu Porja males and females is statistically significant.

INTRODUCTION

Visakhapatnam district in Andhra Pradesh is the home of about 19 tribal groups of Andhra Pradesh living in the agency division. According to the 2011 Census, the total population of Visakhapatnam district is 42,88,113. The Scheduled Tribes, with a population of 6,18,500, account for 14.4% of the district's total population, the second-largest tribal concentration in Andhra Pradesh after Khammam district. The significant tribes inhabiting the Eastern Ghats of Andhra Pradesh are Jatapu, Savara, Gadaba, Konda Reddy, Porja, Bagata, Khond,Konda Dora, Valmiki, Konda Kammara, and Koya. Pengu Porja is one of the primitive tribal groups inhabiting the Visakhapatnam district. 'Anthropometry' the science of measurement of man, a term coined by the naturalist Cuvier (1769–1832) is derived from the Greek roots for 'man' and 'measuring and taking observations on the human body and its different parts.'

As it is possible to ascertain the racial origin of the people based on their morphological characters, in the present study, an attempt has been made to ascertain the racial origin of the Pengu Porja to the extent possible. They are a homogeneous population, isolated from the neighboring tribes maintaining their own identity, traditions, customs, rules, and regulations of their group to a significant extent. From the discussion on different morphological characteristics, it seems that the Pengu Porja has features like short stature, dolichocephalic heads, dark brown skin colour, wavy hair, and the skin more like the proto-australoid racial stock as suggested by Guha (1935) in his racial classification of the people of India. Further, Malhotra ('78), in his recent paper examining the morphological variation in India, expressed the view that the tribal populations of south and central India mostly come under Australoid or proto-Australoid racial stocks. Also, still more recently, Sanghvi *et al*., ('81), studying the biology of the people of Tamil Nadu, opined that the proto-australoid element is strongly represented in most of the tribal populations living in Tamil Nadu, Kerala, Mysore, Andhra Pradesh, Maharashtra, Madhya Pradesh and even further up to Orissa and Bihar. However, there is abundant literature available on anthropometric and its relations with tribal communities to assess their biological variations (Majumdar *et al*., 1990; Basu *et al*., 1994; Watkins *et al*., 2005; Beck and Mishra 2011; Rao *et al*., 2015).

The system of somatic measurements encompasses anatomical features whose genetics has been little studied and far from understood. However, there is little doubt that each of the characters studied by anthropometrics results from actions of a considerable number of genes. The traits such as

† Independent Researcher

stature and some somatological characters like skin color and hair form are essential for evaluating the relative roles of heredity and environment. Because size and form affect the biological function, physical anthropologists are also concerned with anthropometry measurement of dimensions and proportions of the head, face, and limbs, taken by standard procedures. The genetics of anthropometric traits is complex, and various dimensions are interrelated and subject to various modifying influences. Whatever their cause may be, variations in the human physique challenge the physical Anthropologist for a description and an explanation.

MATERIALS & METHODS

The objective of the present investigation is to study the morphological characters of the Pengu Porja tribe of Vishakapatnam. Anthroposcopic observations were also made to unveil the complete morphological description of the population under study. The purpose is purely taxonomical, and an attempt is made to see the extent of variation in the measurements among other available tribal populations of Andhra Pradesh. The present anthropometric study of Pengu Porja comprises 185 males and 184 females aged 19 to 70 years. The distribution and the range of different body measurements among the two sexes have been worked out. The range distribution has been followed after Singh and Bhasin (1968, 2004).

RESULTS & DISCUSSION

ANTHROPOMETRIC CHARACTERS

Body Weight

Most Pengu Porja males (64.86 %) belong to 45.0-51.0 kg. the range is followed by 51.0-57.0 kg, class (15.68%), while most females (33.70%) belong to 45.0-50.0 kg, and the range followed by 40.0-45.0 kg. class (32.07 %). The mean body weight of males is 49.76 + 0.39 kg, the maximum, and minimum being 66 kg and 35 kg, respectively, while that of females is 43.32 + 0.39 maximum and minimum being 60 kg and 33 kg respectively. The inter- sexual mean difference is statistically significant at a 0.01% probability level (t = 11.80).

Height Vertex (Stature)

It is noticed that the stature of Pengu Porja males mostly is in a short category, while that of females is in short. The frequency of this group among males is 51.89 and among females is 40.76 respectively. The following frequent group falls in the lower medium class among males (24.32%) and the lower medium (31.52%) among females. Few individuals are recorded in very short and tall categories in both the sexes.

Range Distribution of Different Measurements among the Pengu Porja

Regarding the mean or average stature of the males, it is 157.49$\pm$ 0.79 cm. with a range varying between 173.9 and 64.0 cm. while that of females is 147.05$\pm$ 1.20 cm. with a range varying between 168 and 0.00 cm. the mean difference in body stature in the two sexes appear to be statistically significant at 0.01 level of probability as is evident from the value of 't' (7.29).

Head Length

The tendency to medium heads is most pronounced in Pengu Porja males (51.35%), while among females short heads are predominant (46.74%). The mean for maximum head length in males is 18.25+ 0.06 cm. with a range varying between 20.00 and 13.2 cm, while that of females is 17.47+ 0.13 cm. with a maximum and minimum being 19.2 and 0.00 cm respectively. Thus there is a statistically significant sex difference between males and females at a 0.01% probability level (t= 5.54).

Head Breadth

The Pengu Porja males and females show a marked tendency to have a very narrow head with the frequencies of 48.11% and 72.28%, respectively. The next predominant type is the narrow head, occurring both in males (26.49%) and females (20.11%). Broadheads are completely absent among females. The average for maximum head breadth in males is 13.71+ 0.05 cm. with a range varying between 18.5 and 12.8 cm., while that of females it is 13.34 + 0.08 cm., with the minimum of 0.00 cm. and the maximum of 15.0 cm, the mean sex difference is statistically significant which is evident from 't' value (0.10) at 0.05% level of probability.

Head Circumference

A majority of the males and females exhibit medium values for this measurement. More number of males fall under the category of 49.0-53.0 cm. and 54.0-x cm., with the frequencies of 76.22% and 23.24% respectively, while a more significant number of females are in categories of 49.0-53.0 cm. and X-48.0 cm. with the respective frequencies of 86.41% and 7.61%. The mean for the horizontal circumference of the head in males is 52.45+ 0.11 cm. with the maximum value of 56 cm. and the minimum of 45 cm. while that of females is 50.53+ 0.49 cm., with a range varying between 86.00 and 0.00 cm. the mean of intersexual difference is statistically significant at 0.01% level of probability (t=3.83).

Chest Circumference

More than seventy-five percent of the Pengu Porja males fall into two categories. The highest frequency (54.59%) is found in the 80.0-84.9 cm category and is followed by 75.0-79.9 cm. category (29.35%); while in the case of females, nearly forty (29.35%) belong to 78.6-82.5 cm. category. The next frequent type is 74.6-78.5 cm, (24.46%) category. The average chest circumference among males is 81.83+ 0.28 cm. with a range varying between 95 and 69 cm, while among females, the mean is 78.47+ 0.57 cm. with a range between 94 to 0.00 cm, the sex difference is statistically significant at 0.01% level of probability as is evident from 't' value (5.30).

Abdomen Circumference

Most of the males exhibit medium values for this measurement. The highest frequency (82.70%) falls into the 65.5-70.0 cm category and is followed by X-65.0cm. and 70.0-75.0 cm. classes with equal frequency (8.65%). In the case of females, all the classes are almost equally distributed except 80.0-X classes with only 1.09 present. The average abdomen circumference of males is 69.42+ 0.27, with a range varying between 84 to 59 cm., while among females, the mean is 66.52 + 0.67 cm. with the maximum and minimum values being 83 to 0.00 cm, the mean difference is statistically significant at 0.01 % level of probability (t=4.01).

Upper Arm Circumference (Relaxed)

More than fifty percent of males fall into the categories 24.0-X cm. and 23.0-24.0 cm. with the frequencies 32.97% and 25.41% respectively, while among females mainly two categories 23.0-Xcm. (32.07%) and 22.05-23.0 cm. (27.17%). The mean upper arm circumference of males is 22.80+ 0.11 cm., with the maximum being 26 cm. and the minimum being 19 cm. while in females, the average is 21.91+ 0.18 cm. with a range varying between 30 and 0.00 cm. thus, there is a difference of 0.89 cm. which is statistically significant at 0.01% level of probability (t=4.12).

Calf Circumference

This measurement was taken only for males because of the non-cooperation of females. The highest frequency (57.84%) is concentrated in the 25.1-33.0 cm. class, while the lowest frequency (1.08%) is seen in X-25.0 class. The next frequent type is 25.1-29.0 cm. class with 38.38 present. The mean calf circumference of Pengu Porja males is 30.02+ 0.14 cm. with a range varying between 35 and 23cm.

Triceps Skin Fold

The triceps skinfold records as the most of the pengu porja males (90.27%) belong to 2.00 – 3.5 mm. range, and it is followed by 3.6-5.0 mm class (7.03%) with the next frequencies is 2.70%, while that of the females is 74.46%, and it belongs to 2.00 – 3.5 mm range followed by 3.6 – 5.0 mm medium-class (19.57%). The next high frequency is 5.98%. The mean triceps skinfold of males is 2.92 ± 0.05 mm, the maximum and minimum being 6.2mm and 2mm, respectively. Females are 3.26 ± 0.08 mm, the maximum and minimum are 8.1 mm 0.00 mm, respectively. The intrasexual mean difference is statistically significant at a 0.1 percent probability level (t=3.67).

Biceps Skin Fold

The biceps skin-fold observed among the males (72.97%) belong to the category below 3 - 4.5 mm; the subsequent highest frequency (21.08%) is seen in the 4.6 – 6.0 mm class. In the case of females, there is one category into which the majority of them are distributed, and they are above 6.08 mm (63.13%). The next highest frequency is (21.11%) is seen in the range of 4.6 – 6.0 mm. The next frequency is (15.76%), seen in the 3.0 – 4.5 mm class. The average biceps skin fold of males is 4.32 ± 0.08 mm with a range varying between 10 and 2 mm, while in the case of

females, the mean is 3.26 ± 0.08 mm with a range varying between 18.2 and 0.00 mm. The sex difference is statistically significant at a 0.1 percent probability level (t=13.71).

Sub-scapular Skin Fold

The majority of the females are concentrated in two categories 8.1 - x mm (62.50%) and 2.2 – 5.0 mm. (3.80). Males recorded the highest frequency (51.35 %), belonging to the category 5.1 – 8.0 mm. The average sub-scapular skin fold in males is 7.80 ± 0.17 mm, with a range varying between 26.3 and 2.1 mm. while in the case of females, the mean is in 9.15 ± 0.23 mm; the minimum and the maximum being 22.3 and 0.00 mm at 0.1 percent level of probability which is evident from "+" value (4.73%).

Suprailiac Skin Fold

Majority of the females for this measurement. The highest frequency (100-0 mm). Fall into the below category of 4.1-8.0 mm—the male highest frequency (88.65%). Fall into the below category of 4.1-8.0 mm—the next highest frequency (10.27%). The medium category (8.1-12.0 mm) and is followed by frequency (1.08%). The average supra iliac skin fold of males is 6.01± 0.14 mm, with a range varying between 19.0 – 2.0 mm, while among females, the mean is 6.54 mm. The maximum and minimum values are 16.0 to 0.0. The inter-sexual mean difference is statistically significant at a 0.1 percent probability level (t=9.20).

The Test of Significance of Sex Difference of Mean ('t' test)

The sex difference i.e. 't' test of significance for all the body measurements and indices. Significant sex differences are found in all the body measurements except anterior-posterior chest depth, which is statistically significant. Out of 13 indices, twelve of them so significant differences they are relative body weight, Stature, Head length, Head Circumference, Chest Circumference, Abdominal Circumference, Upper arm Circumference, Calf Circumference, Triceps Skin folds, Biceps Skin Fold, Subscapular skin fold, and Suprailiac skin fold.

TABLE 1

Sex difference in means; the t-test of significance

Body Character	Male	Female	Mean diff	SE	t-value
Body Weight	49.76	43.32	6.45	0.55	11.80**
Stature	157.49	147.05	10.45	1.43	7.29**
Head Length	18.25	17.47	0.78	0.14	5.54**
Head Breadth	13.71	13.75	-0.03	0.3	0.10^{NS}
Head Circumference	52.45	50.53	1.93	0.5	3.83**
Chest Circumference	81.83	78.47	3.36	0.63	5.30**
Abdominal Circumference	69.42	66.52	2.9	0.72	4.01**
Upper arm Circumference	22.8	21.91	0.89	0.22	4.12**
Calf Circumference	30.02	27.78	2.24	0.32	7.07**
Triceps Skin Fold	2.92	3.26	-0.34	0.09	3.67**
Biceps Skin Fold	4.32	7.05	-2.72	0.2	13.71**
Sub scapular skin fold	7.8	9.15	-1.36	0.28	4.76**
Suprailiac skin fold	6.01	0	6.01	0.53	9.20**

NOTE: **Significant at 0.01 level and NS: Not Significant

ANTHROPOSCOPIC CHARACTERS

The different methods followed for studying the various anthroposcopic characters among Pengu Porja have been discussed in detail in the earlier chapter. The distribution of various anthroposcopic characters in different categories in 188 adult males and 186 adult females is given below.

Skin Colour

Skin color is studied on two body regions – the inner side of the forearm and forehead. The majority of the males and females possess light brown skin colour in the two regions. The frequencies of males and females showing dark brown color at the inner side of the forearm are 90.43% and 91.40%, respectively, while 4.79% of males and 5.38% of females show dark brown colur fore-head. The next

frequent type of skin color is dark brown (males 4.79% and females 5.38%) in the inner side of the forearm, while it is medium brown (males 4.79% and females 3.23%) in the case of the forehead.

Head Hair Colour

Most of the Pengu Porja have black coloured head hair. The frequencies of black hair are 84.57% in males and 80.65% in females. Dark brown and grayish brown type of hair colour is meager in both the sexes.

Somatoscopic Characters among Pengu Porja

Hair from: Hair form is predominately wavy in both sexes. The male frequency of straight is 53.19%, and in females, it is 46.77% in males, the frequency of low waves is 9.57%, and in females, it is 2.15%. The next frequent type of hair from exhibited by both males (0.53%) and females (0.54%) is deep waves. Curly type of hair form is exhibited in more cases of females (36.70%) than males (50.54%). Deep curly type of hair form is completely absent in both the sexes.

Hair texture: Hair texture is predominately medium in both the sexes, with frequencies of 99.47% in males and 100 % in females. The next frequent type of hair texture is coarse both in males (0.53%) and females (0.00%).

Beard and Moustache: The Pengu Porja males have sparse (4.26%) beard and moustache followed by medium type (68.09%). Thick (27.66%) beard and moustache is less frequent among Pengu Porja males. The Pengu Porja females have sparse (19.35%) beard and moustache followed by medium type 66.67% thick, 13.98% beard and moustache is less frequent among Pengu Porja females.

Body hair: The total incidence of body hair among Pengu Porja males is 100%. of this, 149 individuals (79.26%) are absent, thirty-five medium (18.62%), and only four individual (2.13%) has a heavy amount of body hair.

Eye colour: Regarding the colour of the iris, most of them are light brown both in males (66.49%) and females (66.67%). The next highest type in males (28.19%) and females (29.03%) is medium brown. The frequency of dark brown females (4.03%) is more than the males (5.32%).

Eye slit: The most predominant type of eye slit is straight both in males (82.98%) and females (77.*96%).

Supra orbital ridges: Supraorbital ridges are mostly traced or moderate in males (25.53% and 1.06%, respectively), while moderate or imperceptible in females (30.65% and 2.15%, respectively). Males (3.72%) have less number of pronounced supraorbital ridges than females (3.23%). Both males (69.68%) and females (63.98%) have representation in continuous supraorbital ridges.

Nasal depression: Nasal depression is predominantly medium in males (92.55%) and females (97.85%). The next frequent type is medium, both in males (7.45%) and females (1.61%).

Nasal bridge: The nasal bridge or nasal profile is straight in males (85.64%), while in females (80.11%). The next highest frequency of nasal profile is concave in males (14.36%), while in females, 17.74% convex in females (2.15%).

Nasal septum: The most predominant type of nasal septum is horizontal in both males (83.51%) and females (51.61%). The next frequent type is upwards with 15.96% in males and 43.55% in females.

Slope of the forehead: The forehead slope is medium in males (88.30%) and females (92.47%). The next highest frequency is straight in males (10.64%) and females (6.45%).

Height of the forehead: The predominant type of height of the forehead is medium both in males (90.96%) and females (90.09%). The next frequent type is low, with 4.79% in males and 3.23% in females.

Width of the forehead: The width of the fore head is medium in males (95.21%) and females (97.85%) followed by broad type in males (2.13%) and females 2.15% and narrow type in females (2.66%).

Nature of the chin: The predominant type of chin is medium both in males (96.28%) and females (97.85%). The next frequent type is receding in males (3.16%) and females (2.15%).

Shape of the chin: The chin shape is oval mainly in males (73.94%) and females (40.86%). The next highest frequent type is pointed with 15.43% in males and 17.74% in females. The next frequent type is round with 7.98% in males and 27.47% in females. The square shape of the chin are slightly more in males with 2.66%, while that of females is 13.98%.

Body type: The body is generally characterized by medium type in males (87.77%) and females (91.94%). The next frequent type is lean in males, while in the case of females, athletic (12.23%) and obese (8.06%) types of bodies are found with equal frequencies.

CONCLUSION

Pengu Porja males come under the short category for stature, while females are in the lower medium group category. Regarding hand length and handbreadth also the bi-sexual difference is significant. The above account throws light on the physical type of the Pengu Porja. Their physical characters are the resultant of both nature and nurture. The study of anthropometry gives a general picture of the environment of the population and its effect on the physical makeup of the population. The physical type reflects the dietary status of the population. Here the dietary conditions of these people are not adequate. This situation naturally leads to a poor or moderate biotype.

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REFERENCES CITED

Basu, A., D. Mukherjee, P. Dutta, D. Bose, M. Basu, G. Ghosh, G. Kumar, and F. Huq, F. 1994. *All India Anthropometric Survey: North Zone Basic Anthropometric Data*. Vol. I. Anthropological Survey of India: Calcutta.

Beck, P. and B. K. Mishra 2011. Anthropometric profile and nutritional status of selected Oraon tribals in and around Sambalpur town, Orissa. *Studies of Tribes and Tribals*, 9(1): 1-9.

Guha, B. S. 1935. Racial affinities of the people of India. In: *Census of India*, Vol. I, India, Part3. Govt. of India Press: Simla.

Majumder, P. P., B. U. Shankar, A. Basu, K. C. Malhotra, R. Gupta, B. Mukhopadhyay, M. Vijayakumar, and S. K. Roy 1990. Anthropometric variation in India: A statistical appraisal. *Current Anthropology*, 31(1): 94-103.

Malhotra, K.C. 1978. Morphological composition of the people of India. *Journal of Human Evolution*, *7*(1): 45-53.

Rao, K. M., R. H. Kumar, K. S. Krishna, V. Bhaskar and A. Laxmaiah 2015. Diet and nutrition profile of Chenchu population–a vulnerable tribe in Telangana & Andhra Pradesh, India. *The Indian Journal of Medical Research*, 141(5): 688.

Sanghvi, L. D., V. Balakrishnan, and I. K. Karve 1981. *Biology of the People of Tamil Nadu*. Indian Society of Human Genetics: Mumbai.

Singh, I. P. and M. K. Bhasin 1968. *Anthropometry*. Bharati Bhvan: Delhi.

— 2004. *A Laborartory Manual on Biological Anthropology*. Kamla-Raj Enterprises: Delhi.

Watkins, W. S., B.V.R. Prasad, J.M. Naidu, B. B. Rao, B.A. Bhanu, B. Ramachandran, P. K. Das, P. B. Gai, P.C. Reddy, P.G. Reddy and M. Sethuraman 2005. Diversity and divergence among the tribal populations of India. *Annals of Human Genetics*, 69(6): 680-692.