

## Anthropometric Study Among the Adikarnatakas of Mysore City, Karnataka

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**ABSTRACT** The present study reveals that majority of the Adikarnataka males come under short stature and females fall under upper medium stature categories. Sitting height vertex measurement shows that higher proportion of males and females belongs to lower medium and tall categories respectively. A higher proportion of both males and females belongs to very narrow type of bizygomatic breadth. The dolichocephalic element was predominantly found in males while hyperdolichocephalic element was observed in females. The predominant types of euryprosopic and leptoprosopic facial types were noticed in males and females respectively. Most of the males belongs to narrow chest category while females come under medium chest category.

### INTRODUCTION

Anthropometry was the main tool of study for the early workers. Ethnologists like Thurston in 1909, Risley in 1915, Von Eickstedt in 1934, collected a large quantity of anthropometric data from various populations of the Indian sub continent and classified the populations of India on this basis into different racial elements. Gupta and Dutta (1966) published a comprehensive bibliography with important results of various works. Rakshit (1964), Sen (1967) and Malhotra (1978) showed by their works that single characters like stature, cephalic index, nasal index of populations are more useful in understanding the compositions of different elements among the Indian population groups. It was further observed that some of these measurements vary both spatially and vertically (caste wise), thus helping us to understand the effect of migration and micro-evolutionary factors operating at the endogamous level.

The city of Mysore, where the present study has been carried out is an old city in Karnataka state of South India. It is known as a 'garden city' of India, throughout the world and for the pomp and gaiety of its traditional dasara festival. Adikarnatakas are distributed almost all parts

of the Karnataka state. Majority of them are illiterates, they occupy the lowest status in the Hindu caste hierarchy. They are economically very poor. Generally they were supposed to live outside the main village in the past, but because of modernity, they now live along with higher castes populations.

### MATERIAL AND METHODS

A sample of 480 Adikarnataka individuals of either sex (Males: 259, Females: 221) from Mysore city in the age group of 20-50 years has been included in the present study. Twenty selected somatometric measurements, of which thirteen on head and face, and seven on body, were taken on each individual of either sex. On the basis of these measurements, eleven indices were calculated. The measurements were recorded according to the methods and techniques of Martin and Saller (1957) and Singh and Bhasin (1989).

### RESULTS AND DISCUSSION

Table 1 and 2 present the range, mean, standard deviation, coefficient of variation and their respective standard errors of 20 somatometric measurements and 11 indices.

**Stature:** The Adikarnataka male stature ranges from 146 to 183 cms with a mean value of  $163.55 \pm 0.44$  cms while the female stature ranges from 141.7 to 171.6 cms with a mean value of  $154.41 \pm 0.36$  cms. The stature classification reveals that majority of the Adikarnataka males come under short stature category (27.40 per cent) and their counter parts of the females fall under upper medium stature category (27.14 per cent).

**Sitting Height:** The Adikarnataka male and female sitting height vertex ranges from 71.2 to 92.0 cms with a mean value of  $83.99 \pm 0.30$  cms

Table 1: Statistical constants of Male and Female Adikarnatakas

| Measurements                      | Male                   |                        |                   | Female                 |                        |                   |
|-----------------------------------|------------------------|------------------------|-------------------|------------------------|------------------------|-------------------|
|                                   | Minimum value (in cms) | Maximum value (in cms) | Mean $\pm$ S.E.   | Minimum value (in cms) | Maximum value (in cms) | Mean $\pm$ S.E.   |
| Height Vertex                     | 146.00                 | 183.00                 | 163.55 $\pm$ 0.44 | 141.70                 | 171.60                 | 154.41 $\pm$ 0.25 |
| Sitting Height                    | 71.20                  | 92.00                  | 83.99 $\pm$ 0.30  | 69.50                  | 87.60                  | 77.44 $\pm$ 0.23  |
| Body Weight (in kgs)              | 35.00                  | 85.00                  | 52.27 $\pm$ 0.52  | 29.00                  | 62.00                  | 49.40 $\pm$ 0.38  |
| Biacromial Breadth                | 29.20                  | 42.00                  | 37.40 $\pm$ 0.13  | 30.00                  | 37.50                  | 33.68 $\pm$ 0.10  |
| Upper Arm Circumference           | 19.00                  | 34.00                  | 24.38 $\pm$ 0.13  | 18.00                  | 29.60                  | 23.98 $\pm$ 0.11  |
| Chest Breadth                     | 20.50                  | 36.00                  | 27.04 $\pm$ 0.09  | 19.60                  | 29.50                  | 26.05 $\pm$ 0.11  |
| Chest Circumference               | 66.10                  | 106.00                 | 82.99 $\pm$ 0.38  | 64.00                  | 95.60                  | 81.53 $\pm$ 0.38  |
| Head Length                       | 15.80                  | 20.60                  | 18.64 $\pm$ 0.05  | 15.20                  | 18.20                  | 17.39 $\pm$ 0.04  |
| Head Breadth                      | 10.40                  | 16.40                  | 14.29 $\pm$ 0.05  | 7.20                   | 15.60                  | 12.43 $\pm$ 0.09  |
| Head Circumference                | 50.00                  | 58.70                  | 54.48 $\pm$ 0.09  | 48.00                  | 58.50                  | 53.15 $\pm$ 0.09  |
| Minimum Frontal Breadth           | 9.60                   | 13.30                  | 10.86 $\pm$ 0.03  | 8.90                   | 12.60                  | 10.36 $\pm$ 0.05  |
| Maximum Bizygomatic Breadth       | 10.00                  | 15.50                  | 13.02 $\pm$ 0.05  | 11.10                  | 13.50                  | 12.09 $\pm$ 0.03  |
| Physiognomic Facial Height        | 14.10                  | 18.80                  | 17.06 $\pm$ 0.05  | 14.20                  | 18.20                  | 16.25 $\pm$ 0.05  |
| Physiognomic Upper Facial Height  | 9.50                   | 15.20                  | 12.99 $\pm$ 0.05  | 11.00                  | 14.60                  | 12.70 $\pm$ 0.04  |
| Morphological Facial Height       | 8.90                   | 12.80                  | 10.72 $\pm$ 0.04  | 6.80                   | 11.60                  | 10.19 $\pm$ 0.04  |
| Morphological Upper Facial Height | 5.00                   | 8.00                   | 6.18 $\pm$ 0.03   | 5.10                   | 7.90                   | 6.49 $\pm$ 0.04   |
| Nasal Height                      | 3.30                   | 5.80                   | 4.56 $\pm$ 0.02   | 3.20                   | 5.90                   | 4.49 $\pm$ 0.03   |
| Nasal Length                      | 3.00                   | 5.20                   | 3.98 $\pm$ 0.02   | 3.10                   | 5.60                   | 4.07 $\pm$ 0.04   |
| Nasal Breadth                     | 2.60                   | 4.20                   | 3.69 $\pm$ 0.08   | 2.40                   | 4.20                   | 3.38 $\pm$ 0.03   |
| Nasal Depth                       | 1.00                   | 2.40                   | 1.85 $\pm$ 0.01   | 1.10                   | 2.00                   | 1.60 $\pm$ 0.01   |

Table 2: Anthropometric Indices of Male and Female Adikarnatakas

| Indices                          | Male                   |                        |                   | Female                 |                        |                   |
|----------------------------------|------------------------|------------------------|-------------------|------------------------|------------------------|-------------------|
|                                  | Minimum value (in cms) | Maximum value (in cms) | Mean $\pm$ S.E.   | Minimum value (in cms) | Maximum value (in cms) | Mean $\pm$ S.E.   |
| Cephalic Index                   | 60.46                  | 88.24                  | 77.26 $\pm$ 0.06  | 47.36                  | 82.36                  | 72.19 $\pm$ 0.12  |
| Morphological Facial Index       | 61.61                  | 107.00                 | 86.26 $\pm$ 0.08  | 56.66                  | 100.90                 | 83.10 $\pm$ 0.08  |
| Morphological Upper Facial Index | 35.00                  | 66.66                  | 51.59 $\pm$ 0.07  | 37.50                  | 67.24                  | 52.87 $\pm$ 0.07  |
| Physiognomic Facial Index        | 108.57                 | 167.82                 | 139.19 $\pm$ 0.06 | 106.66                 | 155.55                 | 133.19 $\pm$ 0.12 |
| Physiognomic Upper Facial Index  | 55.88                  | 88.37                  | 73.27 $\pm$ 0.06  | 71.17                  | 88.19                  | 79.66 $\pm$ 0.07  |
| Nasal Index                      | 48.14                  | 124.24                 | 9.89 $\pm$ 0.07   | 45.28                  | 115.62                 | 88.47 $\pm$ 0.07  |
| Sagittal Naso-Facial Index       | 32.28                  | 55.88                  | 45.17 $\pm$ 0.05  | 33.06                  | 63.23                  | 48.27 $\pm$ 0.06  |
| Sitting Height Vertex            | 44.37                  | 54.60                  | 50.60 $\pm$ 0.05  | 44.54                  | 53.75                  | 50.17 $\pm$ 0.05  |
| Stature Index                    |                        |                        |                   |                        |                        |                   |
| Biacromial Breadth               | 17.73                  | 26.87                  | 22.43 $\pm$ 0.04  | 15.78                  | 24.48                  | 20.81 $\pm$ 0.04  |
| Stature Index                    |                        |                        |                   |                        |                        |                   |
| Chest Girth-stature Index        | 41.31                  | 62.72                  | 53.12 $\pm$ 0.05  | 40.59                  | 62.42                  | 53.57 $\pm$ 0.07  |
| Robusticity Index                | 1.00                   | 59.00                  | 25.35 $\pm$ 0.06  | 1.00                   | 58.50                  | 24.90 $\pm$ 0.07  |

and from 69.5 to 87.6 cms with a mean value of 77.44 $\pm$ 0.23 cms respectively. Majority of the males come under lower medium (40.54 per cent) category, and the female individuals fall under tall category (29.86 per cent).

**Body Weight:** The Adikarnataka male body weight ranges from 35.0 to 85.0 kgs with a mean

value of 52.27 $\pm$ 0.52 kgs, whereas, the female population ranges from 29.0 to 62.0 kgs with an average value of 49.40 $\pm$ 0.38 kgs. Majority of the male (46.34 per cent) and female (42.08 per cent) individuals fall under the range of 43.0 to 50.9 kgs and 47.0 to 51.9 kgs respectively, showing their under weight.

**Biacromial Breadth:** The biacromial breadth values of males range from 29.2 to 42.0 cms with a mean value of  $37.40 \pm 0.13$  cms and its values of females range from 30.0 to 37.5 cms with a mean value of  $33.68 \pm 0.10$  cms. Majority of the Adikarnataka males (52.13 per cent) come under the range of 35.0 to 37.9 cms and the females (41.18 per cent) fall under the range of 34.0 to 35.9 cms.

**Upper Arm Circumference:** The Adikarnataka males upper arm circumference ranges from 19.0 to 34.0 cms with a mean value of  $24.38 \pm 0.13$  cms and its value among the females range from 18.0 to 29.6 cms with a mean value of  $23.98 \pm 0.11$  cms. The highest proportions of males (53.28 per cent) and females (42.08 per cent) come under the ranges of 22.0 to 24.9 cms and 22.0 to 23.9 cms respectively.

**Chest Breadth:** The chest breadth among the males and females of Adikarnatakas varies from 25.5 to 36.0 cms with a mean value of  $27.04 \pm 0.09$  cms and from 19.6 to 29.5 cms with an average value of  $26.05 \pm 0.11$  cms respectively. Majority of the males (72.22 per cent) come under the range of 26.0 to 28.9 cms whereas more number of females (72.39 per cent) fall under the range of 25.0 to 27.9 cms.

**Chest Circumference:** The Adikarnataka male chest circumference ranges from 66.1 to 106.0 cms with a mean value of  $82.99 \pm 0.38$  cms while of its females chest circumference ranges from 64.0 to 95.6 cms with a mean value of  $81.53 \pm 0.38$  cms. Majority of the males (22.00 per cent) fall under the range of 80.02 to 82.04 cms whereas the highest proportion of females (36.19 per cent) comes under the range of 79.0 to 83.9 cms.

**Head Length:** The Adikarnataka males head length ranges from 15.8 to 20.6 cms with a mean value of  $18.64 \pm 0.05$  cms and the females head length ranges from 15.2 to 18.2 cms with an average value of  $17.39 \pm 0.04$  cms. A higher proportion of the Adikarnataka males (36.68 per cent) and females (58.82 per cent) fall under long head length and medium head length categories respectively.

**Head Breadth:** The head breadth values of males range from 10.4 to 16.4 cms with a mean value of  $14.29 \pm 0.05$  cms and those females range from 7.2 to 15.6 cms with an average value of

$12.43 \pm 0.09$  cms. Majority of male and female individuals fall under narrow type (36.67 per cent) and very narrow type (79.18 per cent) respectively.

**Head Circumference:** The head circumference values range from 50.0 to 58.7 cms with a mean value of  $54.48 \pm 0.09$  cms among the males whereas these range from 48.0 to 58.5 cms with a mean value of  $53.15 \pm 0.09$  cms among the females. Majority of the male individuals (51.35 per cent) comes under the range of 54.0 to 55.9 cms, while most of female individuals (61.99 per cent) fall under the range of 52.0 to 53.9 cms.

**Minimum Frontal Breadth:** The Adikarnataka males minimum frontal breadth ranges from 9.6 to 13.3 cms with an average value of  $10.86 \pm 0.03$  cms and its female minimum frontal breadth ranges from 8.9 to 12.6 cms with an average value of  $10.36 \pm 0.05$  cms. Majority of the male individuals come under broad type (37.45 per cent) whereas female individuals come under above medium type (59.27 per cent).

**Maximum Bizygomatic Breadth:** The Adikarnataka male bizygomatic breadth ranges from 10.90 to 15.50 cms with a mean value of  $13.02 \pm 0.05$  cms and the female bizygomatic breadth ranges from 11.1 to 13.5 cms with a mean value of  $12.09 \pm 0.03$  cms. More number of both male (40.15 per cent) and female (61.09 per cent) populations of Adikarnataka belong to very narrow type.

**Physiognomic Facial Height:** The male Adikarnatakas physiognomic facial height ranges from 14.1 to 18.8 cms with a mean value of  $17.06 \pm 0.05$  cms and females physiognomic facial height ranges from 14.2 to 18.2 cms with a mean value of  $16.25 \pm 0.05$  cms. Majority of the males (31.66 per cent) and females (38.46 per cent) fall under the range of 17.0 to 17.9 cms and 16.1 to 17.0 cms respectively.

**Physiognomic Upper Facial Height:** The physiognomic upper facial height in the male series ranges from 9.5 to 15.2 cms with an average value of  $12.99 \pm 0.05$  cms and in the female series it ranges from 11.0 to 14.6 cms with a mean value of  $12.70 \pm 0.04$  cms. Majority of the males (44.79 per cent) come under the range of 13.0 to 13.9 cms whereas more number of females (23.08 per cent) fall under the range of

12.6 to 13.0 cms.

*Morphological Facial Height:* The morphological facial height among the males and females of Adikarnataka varies from 8.9 to 12.8 cms with a mean value of  $10.72 \pm 0.04$  cms and 6.8 to 11.6 cms with an average value of  $10.29 \pm 0.04$  cms respectively. Majority of the male and female Adikarnatakas morphological facial height falls under very low type (male: 72.58 per cent, female: 61.09 per cent).

*Morphological Upper Facial Height:* The morphological upper facial height of Adikarnataka males ranges from 5.0 to 8.0 cms with a mean value of  $6.18 \pm 0.03$  cms and that of females ranges from 5.1 to 7.9 cms with a mean value of  $6.49 \pm 0.04$  cms. Majority of the males (40.45 per cent) and females (27.60 per cent) fall under the range of 5.5 to 8.9 cms and 6.1 to 6.5 cms respectively.

*Nasal Height:* The nasal height of Adikarnataka males and females varies from 3.3 to 5.8 cms with a mean value of  $4.56 \pm 0.02$  cms and 3.2 to 5.9 cms with a mean value of  $4.49 \pm 0.03$  cms respectively. The higher proportion of males (39.38 per cent) and females (51.58 per cent) fall under below medium category.

*Nasal Length:* The nasal length of Adikarnataka males vary from 3.0 to 5.2 cms with a mean value of  $3.98 \pm 0.02$  cms and of its females vary from 3.1 to 5.6 cms with an average value of  $4.07 \pm 0.04$  cms. Majority of the male (54.05 per cent) fall under the range of 3.5 to 3.9 cms and of females (36.19 per cent) come under the range of 3.6 to 4.0 cms.

*Nasal Breadth:* The nasal breadth among male Adikarnatakas ranges from 2.6 to 4.5 cms with a mean value of  $3.69 \pm 0.08$  cms, and among females ranges from 2.4 to 4.2 cms with an average value of  $3.38 \pm 0.03$  cms. Majority of males (52.14 per cent) and females (55.20 per cent) fall under above medium type and medium type respectively.

*Nasal Depth:* The Adikarnataka males nasal depth ranges from 1.0 to 2.4 cms with a mean value of  $1.85 \pm 0.01$  cms, while its females nasal depth ranges from 1.0 to 2.1 cms with a mean value of  $1.60 \pm 0.01$  cms. A higher proportion of males (52.89 per cent) fall under the range of 1.5 to 1.9 cms and females (60.18 per cent) come under the range of 1.3 to 1.5 cms.

*Cephalic Index:* The cephalic index ranges from 60.4 to 88.2 units with a mean value of  $77.26 \pm 0.06$  among the males of Adikarnatakas, revealing majority of the males belong to dolichocephalic category (37.06 per cent). The value of the female ranges from 47.3 to 82.3 units with an average value of  $72.19 \pm 0.12$  showing higher proportion of the females (62.89 per cent) comes under hyperdolichocephalic category.

*Morphological Facial Index:* The morphological facial index varies from 61.6 to 107.0 units with a mean value of  $86.26 \pm 0.08$  units among the males and from 56.6 to 100.9 units with an average value of  $83.10 \pm 0.18$  units among the females. Majority of males (35.52 per cent) falls under hyper euryprosopic category whereas a higher proportion of females (36.19 per cent) comes under leptoprosopic category.

*Morphological Upper Facial Index:* The morphological upper facial index values range from 35.0 to 66.6 units with an average value of  $51.59 \pm 0.07$  among the males and from 37.5 to 67.2 units with an average value of  $52.87 \pm 0.07$  among the females. Majority of the males (38.22 per cent) falls under Euryen type while higher proportion of females (29.96 per cent) comes under mesen type.

*Physiognomic Facial Index:* The physiognomic facial index ranges from 108.5 to 167.8 units with an average value of  $139.19 \pm 0.06$  units among the males and from 106.6 to 155.5 units with a mean value of  $133.19 \pm 0.12$  among the females. Majority of the males (43.63 per cent) come under the range of 125.0 to 134.5 whereas females (24.89 per cent) falls under the range of 130.0 to 134.9.

*Physiognomic Upper Facial Index:* The physiognomic upper facial index ranges from 55.8 to 88.3 units with a mean value of  $73.27 \pm 0.06$  in the male series and from 71.1 to 88.1 with an average value of  $79.66 \pm 0.07$  units in the female series. The highest proportion of males (45.95 per cent) falls under the range of 75.0 to 79.9 and that of females (40.27 per cent) comes under the range of 76.0 to 78.9.

*Nasal Index:* The nasal index values among the males range from 48.1 to 124.2 units with an average value of  $91.89 \pm 0.07$  units and among the females they range from 45.2 to 115.6 units

with a mean value of  $88.47 \pm 0.07$  units. Majority of the males and females nasal index falls under mesorhinae type (males: 39.00 per cent females: 55.20 per cent).

**Sagittal Naso-Facial Index:** The sagittal naso-facial index ranges from 32.2 to 55.8 units with a mean value of  $45.17 \pm 0.05$  units among the males while it ranges from 33.6 to 63.2 with an average value of  $48.27 \pm 0.06$  units among the females. The males (46.33 per cent) are highly concentrated in the range 40.0 to 44.9 and females (47.98 per cent) show the highest frequency in the range 42.0 to 46.9.

**Sitting Height Vertex - Stature Index:** The sitting height vertex - stature ranges from 44.3 to 54.6 units with an average value of  $50.60 \pm 0.05$  units among the males, while it ranges from 44.5 to 53.7 units with a mean value of  $50.17 \pm 0.05$  units among the females. Majority of the males (57.92 per cent) comes under the range of 48.0 to 50.9 whereas majority of females (51.39 per cent) falls under the range of 50.0 to 51.9.

**Biacromial Breadth Stature Index:** The biacromial breadth stature index ranges from 17.7 to 26.8 units with a mean value of  $22.43 \pm 0.04$  units among the males and from 15.7 to 24.8 units with a mean value of  $20.81 \pm 0.04$  units among the females. Majority of the males (42.08 per cent) comes under broad shoulder category whereas the highest proportion of females (42.99 per cent) falls under narrow shoulder category.

**Chest Girth-Stature Index:** The chest girth

stature index of males ranges from 41.3 to 62.7 units with a mean value of  $53.12 \pm 0.05$  units and that of females varies from 40.5 to 62.4 units with an average value of  $53.57 \pm 0.07$  units among the Adikarnatakas. The above values reveals that majority of the males (57.53 per cent) and females (41.18 per cent) fall under narrow chest and medium chest categories respectively.

**Robusticity Index:** The robusticity index ranges from 1.0 to 59.0 units with a mean value of  $25.35 \pm 0.06$  units among the males and from 1.0 to 58.5 units with an average value of  $24.90 \pm 0.07$  units among the females. Majority of the males (26.65 per cent) fall under bad category whereas the highest proportion of females (22.17 per cent) fall under good category.

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