

GROWTH AND NUTRITIONAL STATUS OF THE BAIGA ADOLESCENT GIRLS-A PRIMITIVE TRIBE OF CHHATTISGARH, INDIA

ANIKSHA VARODA, REETA VENUGOPAL, AND MOYNA CHAKRAVARTY

ABSTRACT

Nutritional problems have serious health implications impacting physical development, psychological behavioural and work performance of an individual. Healthy growth and development of a girl through adolescence helps to prepare her for healthy pregnancies during childbearing years. The present study was conducted to assess the nutritional status among the Baiga adolescent girls in three districts of Chhattisgarh. A total of 270 girls of age cohort of 10-18 years were included. The present study aimed to assess the nutritional status among Baiga girls to compare the finding with standard references, i.e. NCHS, WHO and CDC. The study reveals that the highest mean BMI was found to be 18.2 Kgm² for girls of 16 years of age; whereas the lowest mean BMI was 15.9 Kgm² for girls of 12 years of age. Present girls have low mean body weight, height and BMI than the reference populations (NCHS). It was found that 26.3% of girls were of normal category, 26.1% girls were categorized under mild thinness, 17.7 % of girls suffered from moderate thinness and 29.7% girls suffered from severe thinness category of malnutrition. The results of the present study indicate that there is a great need for the implementation of health programmes to eliminate gender inequalities and improve health of girls.

Keywords: *Nutritional Status, Baiga tribe, Adolescent girls.*

INTRODUCTION

Growth and development among humans have different and divergent phases, since birth. Adolescence is an important stage, which is characterized by various biological, cognitive, social and emotional changes. In general, the adolescence period begins around 10 to 12 years and lasts till 18-21 years of age. This stage has some predictable physical milestones. This is the period when the growth

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spurt is rapid and increase in stature and body mass are marked. A great bodily change and accelerated physical changes can be observed during this period. This is a time of growth spurt and puberty changes. Changes in physical characteristics in this period are predictable and rate of puberty may vary from individual to individual. It is also influenced by heredity and environmental factors like direct exercise, etc.

Adolescence is an important stage of growth and development in the lifespan. Unique changes that occur in an individual during this period are accompanied by progressive achievement of biological maturity (Tanner *et al.*, 1992). This period is very crucial since these are the formative years in the life of an individual when major physical, psychological and behavioural changes take place (Patil *et al.*, 2009). The adolescent may represent a window of opportunity to prepare nutritionally for a healthy adult life (Kaur *et al.*, 2007). Measurements of height and weight are important factors relating to growth and development, puberty, and nutritional status of adolescents. Healthy growth and development of a girl through adolescence helps to prepare her for healthy pregnancies during childbearing years.

Silicon India (2012) reported that nearly 50% of adolescent girls in India are unhealthy, About 47% adolescent girls in India are underweight with a body mass index (BMI) of less than the prescribed level of 18.5, said the UNICEF Global report on adolescent 2012 (UNICEF, 2012). Such undernourished adolescent girls are vulnerable to disease and early death and can have lifelong health consequence (UNICEF, 2012).

Nutritional status during adolescence is a crucial indicator of health outcome (Dey *et al.*, 2011). Nutritional deficiencies lead to giving birth to undernourished babies transferring the under nutrition to the next generation too (Singh *et al.*, 2012). This nutritional deficiency becomes more complicated to adolescents during infections and to those who are sexually active (Mlutega *et al.*, 2009), in addition leads to lower physical output and unfavourable reproductive results (Haboubi, J and Rizwana, 2009).

Nearly 20 per cent of growth in height and roughly 50 per cent of body weight are reached during adolescence. About 45 per cent of bone mass increases, bone remodelling takes place and soft tissues, organs, and even red blood cell mass also boost in size during this period (Giuseppina, 2000). The requirement for micro and macronutrients are more during the adolescent period (Lopez, M.A. and Matros, 2004).

Chhattisgarh is a tribal-dominated state. Baiga is one of the 75 identified particularly vulnerable tribal groups of India. The Baiga tribe mainly inhabits in the states of Madhya Pradesh and Chhattisgarh. Baiga tribe comes under PVTGs in both the states of Chhattisgarh and Madhya Pradesh. According to the 2011 census, the total population of Baiga is 5,52,495 in Madhya Pradesh and 89,744 in Chhattisgarh (Census of India, 2011) The major population of

the Baiga tribe is found in Kabir Dham, Bilaspur and Koriya Districts of Chhattisgarh and Shahdol, Umaria, Singrauli, Mandla, Dindori, Anuppur, Sidhi and Balaghat Districts of Madhya Pradesh. Baigas economy mainly depends on agricultural pursuits and collection of minor forest produce (Tiwari, 1984). It has also been reported that they have expertise in herbal medicine. They live in small family and but kinship structure is strong (Babu and Panda, 2016). It has been documented that the Baiga tribe like any other tribe has distinguishing characteristics .

The present study was undertaken to investigate growth patterns of Baiga girls aged 10-18 years for which a baseline survey was carried out to develop growth charts for school-going girls. The main purpose of the study was to assess the physical growth of Baiga girls in the state of Chhattisgarh and compare the findings with the WHO 2007, NCHS 2005 and NCHS/CDC (2007/2010) reference populations (WHO, 2004; NCHS, 2005; CDC, 2007).

MATERIALS AND METHODS

The subjects for the present study were selected from various government schools of Kabirdham, Bilaspur and Mugeli District of Chhattisgarh State. The subjects consisted of 270 girls aged 10-18 years. The subjects were selected at random and due care was taken to include only those subjects who were physically and mentally normal and did not suffer from any apparent illness, which may have affected their normal process of growth and development.

For the present investigation, data on anthropometric measurement (height and weight) was collected on each adolescent girls, following the standard procedure as described by Gibson (1990) and using a portable digital weighing machine and anthropometer rod. Standard techniques were used to measure weight, height, sitting height and some skinfolds, viz. biceps, triceps, subscapular, suprailiac, and calf. The analysis was done using SPSS 16.0 software. The age-wise mean of body weight, height and BMI were analyzed and the data were compared with the standard reference data of WHO 2007, NCHS 2005 and NCHS/CDC (2007/2010).

RESULTS

Table-1: Descriptive Statistics of Weight, Height and Sitting Height of Baiga Girls.

| Age group in years | N | Weight(kg) | | Height (cm) | | Sitting height (cm) | |
|--------------------|----|------------|-----|-------------|-----|---------------------|-----|
| | | Mean | SD | Mean | SD | Mean | SD |
| 10 | 30 | 34.6 | 5.7 | 144.3 | 6.5 | 55.4 | 3.4 |
| 11 | 30 | 33.0 | 4.6 | 142.4 | 6.8 | 54.6 | 4.5 |
| 12 | 30 | 32.5 | 5.0 | 142.4 | 6.5 | 53.9 | 4.4 |
| 13 | 30 | 36.0 | 5.8 | 147.1 | 4.8 | 56.6 | 2.7 |
| 14 | 30 | 36.8 | 5.8 | 150.6 | 5.7 | 55.6 | 3.6 |
| 15 | 30 | 39.9 | 4.3 | 152.2 | 5.6 | 58.1 | 3.3 |
| 16 | 30 | 42.2 | 4.5 | 154.5 | 4.7 | 58.7 | 3.0 |
| 17 | 30 | 42.3 | 3.5 | 153.5 | 5.0 | 60.7 | 2.7 |
| 18 | 30 | 42.0 | 6.1 | 153.1 | 5.0 | 60.1 | 2.8 |

Table-1 shows a steady increment in mean weight from 13 to 17 years of age. Initially the weight was observed to decrease from 10-12 years and thereafter it showed a gradual increase from 13-17 years. In the case of girls, minimum weight was recorded to be 34.6 kg at 10 years and maximum 42.3 kg at the age of 17 years. A difference of 7.7 kg was observed between 10 to 18 years. The maximum difference between two successive ages was 3.5 kg between 12 and 13 years. Mean height of girls at 10 years was 144.3 cm which increased gradually and was 153.1 cm at 18 years, and a total increase of 10.2 cm was recorded over the age range. The growth spurt was noted between 12+ to 13+ years (5.14 cm). Mean value for sitting height were 55.4 cm at 10+ years and 60.1cm at 18+ years. The maximum difference between two successive ages was 2.7 cm, among girls, between 12+ and 13+ years.

Table-2: Mean weight of present girls study in comparison with reference standards

| Age in Years | Present study | NCHS 2005 | CDC 2007-2010 |
|--------------|---------------|-----------|---------------|
| 10 | 34.6 | 40.0 | 41.1 |
| 11 | 33.0 | 47.9 | 47.5 |
| 12 | 32.5 | 52.0 | 52.3 |
| 13 | 36.0 | 57.7 | 56.8 |
| 14 | 36.8 | 59.9 | 61.6 |
| 15 | 39.9 | 61.1 | 63.3 |
| 16 | 42.2 | 63 | 62.4 |
| 17 | 42.3 | 61.7 | 63.7 |
| 18 | 42.0 | 65.2 | 66.4 |

Table-2 shows a comparison of body weight of Baiga adolescent girls of the present study with other studies, i.e., reference data of NCHS (National Centre for Health Statistics 2005) and CDC (Centers for Disease Control and Prevention 2007-2010). The table revealed that the mean weight of the girls in the present study was lower than NCHS (2005) and CDC (2007-2010) means.

Figure-1: Comparison of mean of weight of present study with other studies

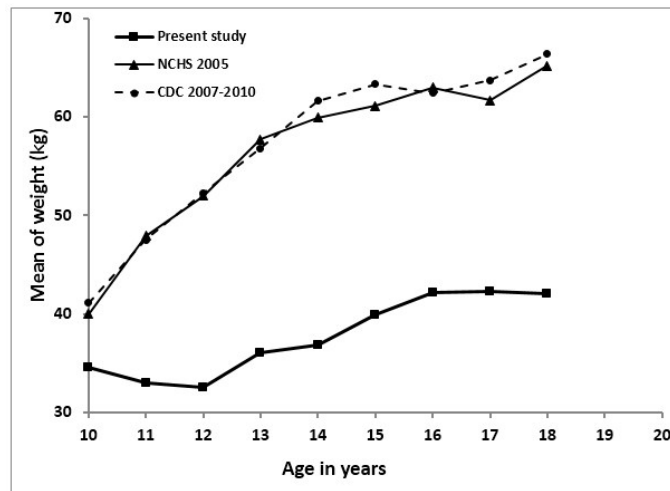


Table-3: Mean of height of present girls as compared to other studies

| Age in Years | Present study | WHO 2007 | NCHS 2005 | CDC 2007-2010 |
|--------------|---------------|----------|-----------|---------------|
| 10 | 144.3 | 138.6 | 143.3 | 144.5 |
| 11 | 142.4 | 144.9 | 151.4 | 150.4 |
| 12 | 142.4 | 151.2 | 156.0 | 156.1 |
| 13 | 147.1 | 156.3 | 159.1 | 160.0 |
| 14 | 150.6 | 159.7 | 161.8 | 161.6 |
| 15 | 152.2 | 161.6 | 161.9 | 162.9 |
| 16 | 154.5 | 162.5 | 161.9 | 162.2 |
| 17 | 153.5 | 162.8 | 163.1 | 163.1 |
| 18 | 153.1 | 163.0 | 163.1 | 163.1 |

Table-3 shows the mean height of the Baiga girls of the present study as compared with international reference data. It was revealed that means of the present study were lower than NCHS (2005), CDC (2007-2010), WHO (2007) means.

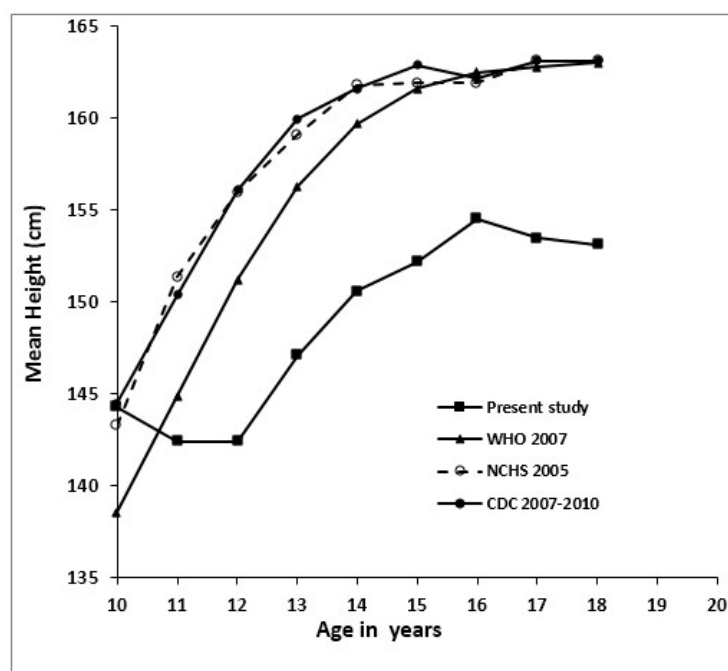
Figure- 2. Comparison of mean Height of present study with other studies

Table-4 shows the BMI (Body Mass Index) of the Baiga girls of the present study as compared with international reference data. It was revealed that means of the present study were lower than NCHS (2005), CDC (2007-2010) and WHO (World Health Organization 2007) reference data.

Table-4: Mean BMI of present study as compared to international reference data

| Age in Years | Present study | WHO 2007 | NCHS 2005 | CDC 2007-2010 |
|--------------|---------------|----------|-----------|---------------|
| 10 | 16.5 | 16.6 | 19.3 | 19.5 |
| 11 | 16.2 | 17.2 | 20.7 | 20.7 |
| 12 | 15.9 | 17.9 | 21.2 | 21.3 |
| 13 | 16.6 | 18.8 | 22.7 | 22.1 |
| 14 | 16.9 | 19.5 | 22.9 | 23.5 |
| 15 | 17.5 | 20.2 | 23.2 | 23.9 |
| 16 | 18.2 | 20.7 | 24.0 | 23.7 |
| 17 | 17.9 | 21.0 | 23.1 | 23.9 |
| 18 | 18.0 | 21.2 | 24.4 | 24.6 |

Figure 3. Comparison of mean of BMI of present study with other reference studies

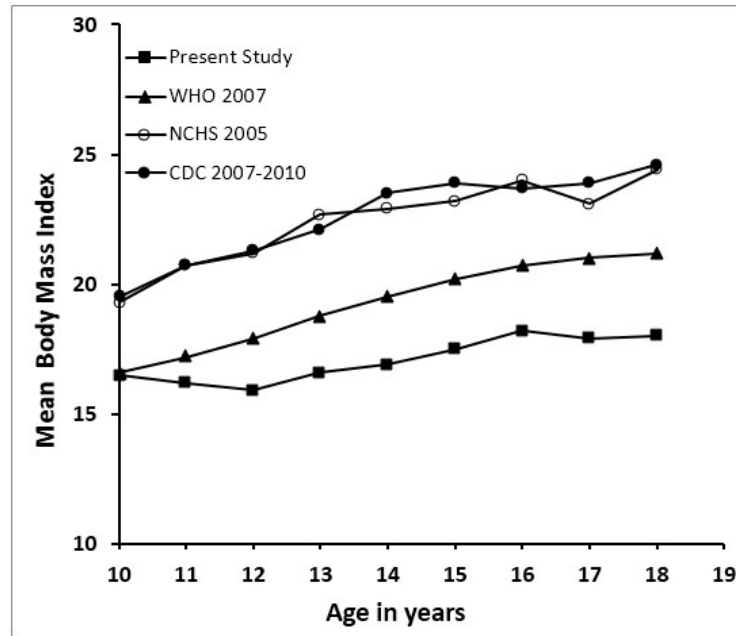


Table 5. Descriptive Statistics of Skin fold measurements of Baiga Girls.

| Age group | N | Biceps | | Triceps | | Subscapular | | Suprailiac | | Calf Skinfold | |
|-----------|----|--------|------|---------|------|-------------|------|------------|------|---------------|------|
| | | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| 10 | 30 | 4.66 | 1.79 | 7.93 | 3.48 | 8.74 | 3.66 | 9.54 | 4.41 | 12.62 | 3.75 |
| 11 | 30 | 4.89 | 1.57 | 8.21 | 3.11 | 7.99 | 2.65 | 9.65 | 3.85 | 12.84 | 3.00 |
| 12 | 30 | 4.97 | 1.87 | 7.29 | 2.70 | 8.11 | 0.04 | 7.93 | 4.29 | 12.28 | 3.03 |
| 13 | 30 | 4.66 | 1.98 | 9.32 | 3.19 | 8.44 | 2.41 | 7.39 | 2.86 | 13.17 | 4.00 |
| 14 | 30 | 5.41 | 2.23 | 8.15 | 2.90 | 8.06 | 2.26 | 7.17 | 2.44 | 13.49 | 3.98 |
| 15 | 30 | 5.26 | 2.25 | 8.60 | 1.98 | 8.39 | 1.66 | 8.12 | 2.52 | 12.77 | 3.42 |
| 16 | 30 | 4.66 | 1.64 | 10.80 | 3.47 | 8.78 | 3.15 | 7.65 | 2.64 | 13.62 | 3.51 |
| 17 | 30 | 4.33 | 1.82 | 9.41 | 2.72 | 8.75 | 2.79 | 8.24 | 2.77 | 13.53 | 4.66 |
| 18 | 30 | 4.37 | 1.74 | 9.56 | 3.42 | 8.74 | 3.88 | 7.69 | 2.76 | 13.41 | 4.58 |

Descriptive statistics of skinfold measurements are presented in Table-5. It is observed that some skinfold measurements decreased after 15 years, which shows that lean body mass increased and fat fold decreased.

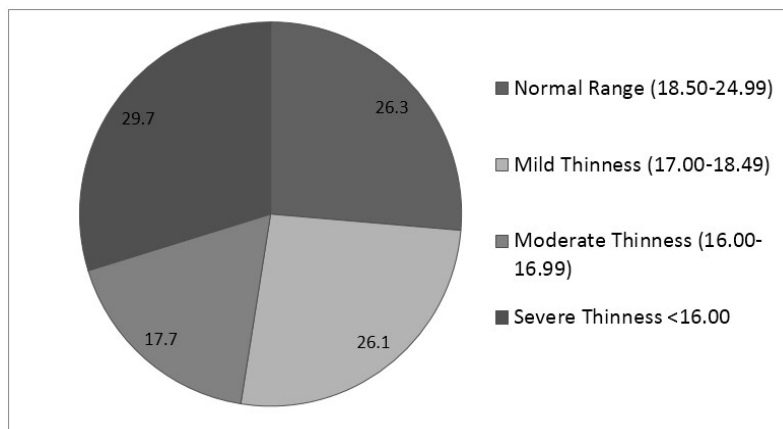
Figure 4. Body Mass Index values of Baiga girls (According to WHO 2004 Standard)

Figure -4 shows the BMI according to the WHO (2004) standard of malnutrition. BMI reveals that 26.3% of girls could be classified under the normal category. 26.1 % of girls suffered from mild thinness, 17.7 % of girls suffered from moderate thinness and 29.7% girls suffered from severe thinness category of malnutrition. Distribution of girls in various nutritional categories showed a different trend for different age groups. At age 12+ 56.6 % of girls were classified under severe malnutrition categories and with an increase in age the malnutrition status in girls improved.

DISCUSSION

The present study examined the growth and nutritional status of children from 10+ to 18+ years. In general, an increase in all anthropometric measurements under study was observed with increase in age. Weight and height of the Baiga girls were higher than some Central Indian tribal girls (Thakur and Gautam, 2015) and other primitive tribes of central India whereas it was lower as compared to CDC (2007-2010) and NCHS (2005) and WHO (2007) reference standards.

Mondal and Sen (2010) reported that weight and height of the Baiga girls were lower than the rural adolescent girls of Darjeeling District of West Bengal (Mondal and Sen, 2010). Choudhary *et al.* (2003) reported that weight and height of the Baiga girls were higher than the rural adolescent girls of Varanasi (Choudhary *et al.*, 2003).

The growth pattern of girls showed an increasing trend in almost all the variables; the rate of increase showed different pattern for different variables. Highest peak velocity corresponding to the occurrence of growth spurt was observed between 12-13 years in the present girls.

The present study shows that 26.3% of girls were be normal. Deshmukh *et al.* (2006), in their study of adolescents in rural Wardha District, reported that 44% of adolescents girls could be classified in normal category of nutritional

status (Deshmukh et al., 2006). Similarly Prashant and Shaw (2009) reported 42.6% and 22.9% prevalence of underweight in girls as per NCHS and Indian standards, respectively (Prashant and Chandan, 2009).

Shivaramakihna *et al.*(2011), in their study of adolescents girls in rural area of Kolar District, reported that 26.5% of adolescents girls were in normal category of nutritional status.

CONCLUSIONS

When compared to other tribes of Chhattisgarh, the Baiga girls showed higher mean values of height, weight, sitting height and skinfold measurements (Triceps, Biceps, Sub-Scapular, Supraspinale, Calf skinfold). The findings provide a base line data for planning awareness programmes for the adolescent girls. The result of the present study indicate that a fair number of adolescent girls are undernourished. The percentages of malnourished adolescent girls are quite alarming and steps are needed to be taken to improve their nutritional status. The finding of the present study will help to plan intervention programmes for improving nutritional status of the Baiga adolescent girls.

ACKNOWLEDGEMENTS

We are thankful to the adolescent girls of Chhattisgarh for their cooperation and participation in the study.

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