Ind. J. Phys. Anthrop & Hum. Genet. Vol. 42, No. 1, (2023) : 11-17

NUTRITIONAL STATUS OF CHILDREN AND ADOLESCENTS IN NAGADA AND GUHIASALA VILLAGE OF JAJPUR DISTRICT, ODISHA

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ABSTRACT

India carries the largest burden of malnutrition in tribal regions of Odisha. Nagada and its adjoining Guhiasala villages were selected for the present study as several sources reported a high child mortality rate among the Juang tribal individuals. The present study aims to assess the nutritional status (BMI, anemia) among the primary school children and adolescents of Nagada and Guhiasala tribal villages of Jajpur District of Odisha. A total of 77 primary school tribal children of either sex in the age group of 5-13 years were recruited for this study. Participants were screened for anemia status by using Haemocube, along with somatometric measurements (BMI), and sociodemographic data were taken. The results revealed that 62.5% of the participants were anemic. More interestingly, boys were found to be more anemic (66.7%) as compared to girls (55.2%). Almost 53% of the children were found to be underweight. Height-for-age, weight-for-age, and BMI curves revealed that the nutritional status of the studied subjects was affected. The socio-economic condition, health accessibility, and awareness were found to be very asymmetric.

KEYWORDS: *Anemia, BMI, Nagada, Guhiasala, Nutrition*

INTRODUCTION

Anemia and malnutrition have been recently recognized as the biggest public health risk affecting children in both developed and developing countries (Benoist *et al.,* 2008; WHO, 2015; Ezzati *et al*., 2002). The global prevalence of anemia among children younger than 5 years is estimated to be 47% (Benoist *et al.,*2008). It has adverse health complications and affects social and economic development as well. Anemia can result from several causes including iron deficiency, micronutrient deficiencies, acute and chronic infections, and inherited or acquired

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disorders that affect hemoglobin synthesis, and red blood cell production. Malnutrition is a diet-related non-communicable disease that includes undernutrition (wasting, stunting, underweight), inadequate vitamins or minerals, overweight and obesity, environmental, and socioeconomic factors (Benoist *et al.,*2008; WHO, 2015). Young children and childbearing women can be particularly vulnerable to anemia and malnutrition (United Nations Children's Fund, 1991). According to the World Health Organization (WHO), globally about 43% of children under five years of age were affected by anemia in 2011 (Benoist *et al.,*2008; WHO, 2015). When anemia and malnutrition occur in children, it could affect their cognitive performance and physical growth (Chalashika *et al.,*2017; Fernandes *et al.,*2017 and Sulaiman *et al.,*2018). The prevalence of anemia among adolescents in developing countries is reported to be 27% in adolescent females in impoverished countries and 6% in adolescent females in affluent nations (Sedlander, 2020). Despite several efforts, child malnutrition and anemia have continued to be a major public health issue in India. In 2017, India recorded 68·2% (95% UI 65·8–70·7) of the total under-5 deaths to be malnutrition as a risk factor for death (Swaminathan *et al.,*2019). The NNMB (ICMR) survey, which was conducted in eight states revealed anemia rates ranging from 67 to 78 percent among preschool children, adolescent girls, and pregnant and lactating women living in rural areas (NNNB Technical Report, 2018).

Undernutrition is most pronounced in tribal regions of Odisha. Nagada and its adjoining Guhiasala villages, which are situated on the hilltop in a dense forest under the mineral-rich Sukinda block in Jajpur District of Odisha, were purposefully selected for the present study as it is reported at least 19 children of the Juang tribe have died of malnutrition in 2016. Most importantly, to the best of our knowledge, no previous study has been carried out in these villages. Therefore, the present study aims to assess the nutritional status (BMI, anemia) among the primary school children and adolescents of Nagada and Guhiasala tribal villages of Jajpur district of Odisha.

MATERIALS AND METHODS

The present descriptive cross-sectional study was conducted among the primary school children and adolescents of Nagada and Guhiasala tribal villages of Jajpur district of Odisha. A total of 77 children, aged between 5 and 13 years, were recruited among which 48 boys and 29 girls. Demographic data were collected using schedules. Further somatometric data (height and weight) and biochemical data (hemoglobin status) were obtained by using proper protocol and techniques.

Body mass index (BMI) categorization Z-score value was utilized. Anthro-Plus tool was utilized to calculate BMI and to compare with growth status of the study population with WHO standards. Measures of malnutrition were calculated using reference medians recommended by the World Health Organization (WHO) and classified according to standard deviation units (Z-scores) based on the

WHO criteria. BMI for age Z-Score >+1≤2 is denoted as overweight and Z-score > +2 is denoted as obesity. The hemoglobin status was categorized as per the WHO guidelines for children and adolescents.

RESULTS

Figure-1 represents the weight-for-age among the children in the studied population. The x-curve represents the growth pattern of the studied population and the y-curve represents the standard growth pattern of WHO. By comparing the weight-for-age growth curve of the present study with WHO standards, the weight-for-age growth curve obtained by the present study was more inclined towards the negative axis. This indicates that the weight-for-age status of the present study was comparatively lower and sporadic than the WHO standards.

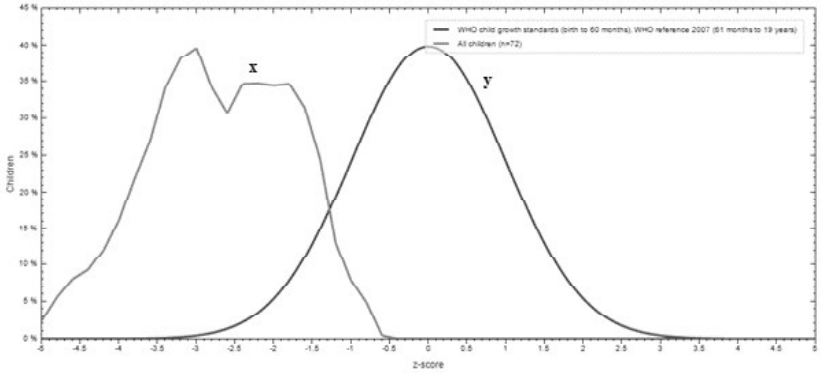

Figure-1: Weight-for-age

Similarly, the height-for-age growth curve obtained in the present study (x) has been compared with a WHO height-for-age growth standard (y) in Figure-2. This depicts that the height-for-age growth curve of the present study is also inclined towards the negative axis and the height-for-age growth curve was not uniformly distributed among the studied population.

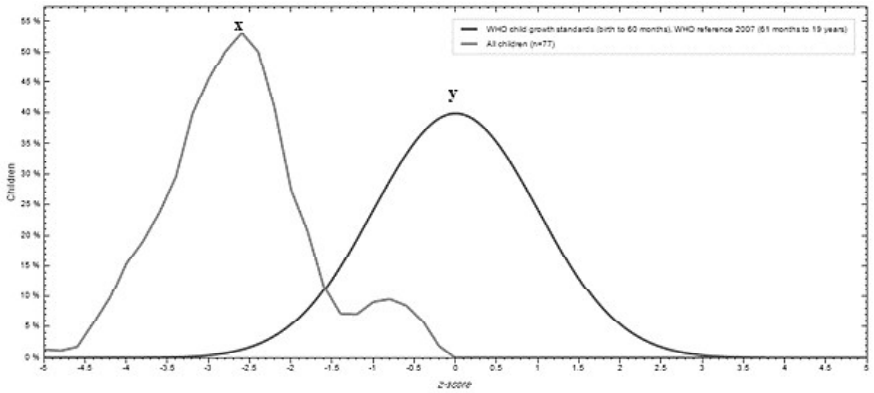

Figure-2: Height-for-age

Figure-3 shows the graphical representation of BMI with respect to the age of the children. In this graph, if the point (x) lies above the median line, then the population is considered as overweight or/and obese if the point lies on the median line then the population is considered as with normal BMI. Similarly, if the intersection point lies below the median line then the population is considered as underweight. By analyzing the graph, the Z-score was found to be -0.88. This implies the growth standard of the children fell almost on the -1SD line, which was lying under the median line [the intersection point (x) has been shown in Figure-3]. In other words, the growth standard among the children in the studied population was found to be lowered (unnourished) as compared to the WHO normal growth standards.

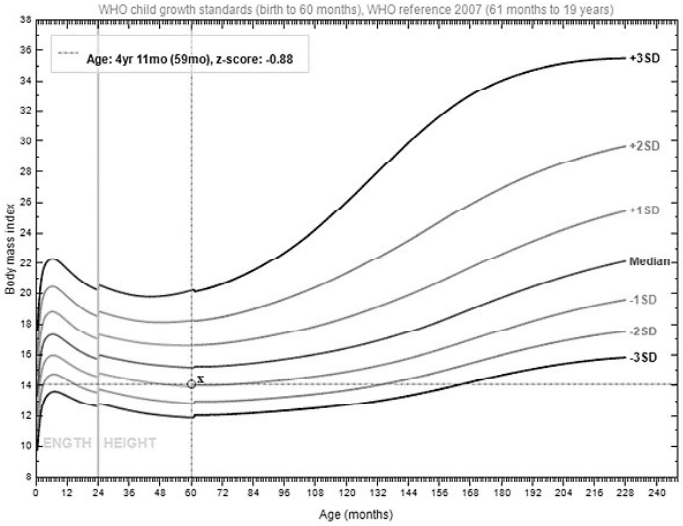

Figure-3: BMI percentile and Z-scores of children and adolescents

Further, the growth curve of BMI-for-age is displayed in Figure-4. This graph also indicated that the BMI-for-age growth curve of the studied population was inclined towards the negative axis and was non-uniform as compared to the WHO growth standards.

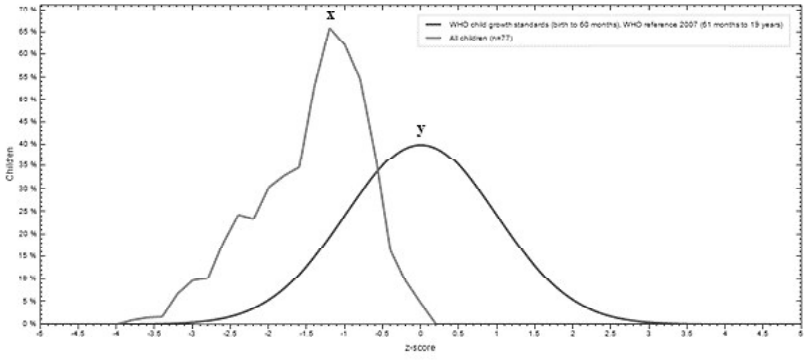

Figure-4: BMI for age

Table 1 depicts that the prevalence of anemia was high (62.7%) among the study population. More interestingly, boys were found to be more anemic (66.7%) as compared to girls (55.2%).

Table-1. Anemia status of children and adolescents

Hb status	Total		Female		Male		p-value
	N	%	N	%	N	%	
Non- Anemia	29	37.6	13	44.8	16	33.3	0.74
Mild	26	33.8	8	27.6	18	37.5	
Moderate	17	22.1	6	20.7	11	22.9	
Severe	5	6.5	2	6.9	3	6.3	

Abbreviations: Hb=hemoglobin; N=number of participants
*Significance at p-value d" 0.05

DISCUSSION

To assess the BMI and anemia status, a total of 89 primary school children and adolescents were selected in Nagada and Guhiasala tribal villages of Jajpur District of Odisha. By comparing the weight-for-age growth curve of the present study with WHO standards, the weight-for-age growth curve obtained by the present study was more inclined towards the negative axis (Figure-1). Kiarie et al. (2021) reported a similar finding; the overall prevalence of underweight based on weight-for-age z-scores (< – 2 z-score) in Yambio county was 4.8% (3.1–7.5, 95% CI), moderate underweight (< – 2 z-score and ≥ – 3 z-score) of 3.7% (2.4–5.7, 95% CI) and severe underweight (< – 3 z-score) of 1.1% (0.5–2.4, 95% CI) (Kiarie *et al.,*2021). In Nghean Vietnam, 31.8% were underweight, 44.3% were stunted and 11.9% were suffering from wasting. Region of residence, the mother's level of education and occupation, household size, number of children in the family, weight at birth, and duration of exclusive breastfeeding was found to be significantly related to malnutrition (Hien *et al.,*2008). The weight-for-age measurement revealed the protective importance of maternal education, urban residence, low episodes of diarrheal and respiratory diseases, normal birth weight and birth order up to two, and better breastfeeding status (Bhandari *et al.,*2013).

Based on the height-for-age growth curve the present study inclined towards the negative axis and the growth curve was not uniformly distributed among the studied population (Figure-2). Kiarie *et al.,*2021 also identified similar finding. The overall prevalence of stunting based on height-for-age z-scores (< – 2 z-score) was 23.8% (19.1–29.2, 95% CI) while severe stunting (< – 3 z-score) was 7.8% (5.5–10.8, 95% CI). Prevalence of moderate stunting (< – 2 z-score and > = – 3 z-score) was 16.0% (13.0–19.6, 95% C.I.) The distribution of height-for-age z-scores was compared to 2006 WHO standards among children below 5 years of age (Kiarie *et al.,* 2021). 29% of Zimbabwean children aged 3-60 months were short in relation to their age when compared with an international reference population. Analysis of the height-for-age measurement showed a positive correlation between malnutrition and rural residence, birth status (infants in

multiple births are more likely to be malnourished), lower birth weight, shorter birth interval, and suffering from diarrhea (Madzingira *et al.,*1995).

In the present study, the Z-score was found to be -0.88. This implies that the growth standard of the children fell almost on the -1SD line, which was lying under the median line. BMI-for-age growth curve of the studied population was inclined towards the negative axis and was non-uniform as compared to the WHO growth standards (Figure-3 and Figure-4). A similar type of finding in the western district of Kanchapur Nepal was found, 21.8% of under-five year children were severely stunted, 25% moderately stunted, 9.1 % were moderately and 1.4% were severely wasted, 28% were moderately underweight and 9.7% were severely underweight [Onta *et al.,*2003]. Another similar finding in Kapilvastu District, Nepal, BMI-for-age, 19.5% of children were below -1SD, 14.5% of children were below -2SD and 5% of children were below -3SD (Bhandari *et al.,*2013).

The present study showed that the prevalence of anemia was found to be high among children and adolescents (62.7%). In a similar study conducted to estimate the prevalence of anemia among school children and adolescents, the prevalence of anemia was 16.2% (Achouri *et al.,*2015). The prevalence of anemia in boys was higher (66.7%) as compared to girls (55.2%) among the study population. Related findings have also revealed that the prevalence of anemia increased in boys (37.3%) as compared to girls (24.8%) among school children and adolescents in Kenitra, Northwest Morocco (Achouri *et al.,*2015).

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