A Study on Nutritional Status of School Children (5-10 years) of Bali Sahi Puri (Odisha)

Debashrebad Satapathy

M.Sc. Department of Anthropology, Central University of Odisha, Koraput, Odisha, India
Corresponding Author E-mail: *debashrebad.gugu6[at]gmail.com*

Abstract: <u>*Objective*</u>: *A study on Nutritional Status of School Children (5-10 years) of Bali Sahi Puri (Odisha) Using WHO Z-Score System* <u>*Methods*</u>: *242 number of School children of Bharat Sevashrama Sangha UG UP School were surveyed. Height and weight and arm circumference was measured following standard procedures. MS Excel and WHO anthro plus Version 1.0.4 statistical software were used for analysis of data.* <u>*Results*</u> *The mean weight, height and mid upper arm circumference were almost equal in both male and female. The overall prevalence of stunting was 1.66% and the overall prevalence of stunting of male children is 1.55% and 1.77% was among female children. The overall prevalence of thinned was 32.65% from which 32.54% of male and 32.74% of female children comes under this. According to the WHO 2007 standards for MUAC classification it represents that 1.24% of children were in severe condition.* <u>*Conclusion*</u>: *The nutritional status of school age children in this school are comparatively better even though a large number of children still fall below the cut-off for various nutritional indicators.*

Keywords: School-age children, Stunting, Wasting, Thinness, Mid-upper arm circumference

1. Introduction

Nutrition is the basic human need and a prerequisite for healthy life. A proper diet is essential from the very early stages of life for growth, development and active life [6] Children are the future of the society, Hence to ensure sound foundation and secure future of any society, health and nutrition of their children needs protection [9].Growth in children is a sensitive indicator of the general state of health as well as nutritional status of the community. The monitoring of the growth and development, to detect deviations from normal provides one of the simplest but important methods of assessing the health of a child. The school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence [2]. Good nutrition of the school going children is of utmost importance. This is the time when their brains are ready to be used in the academic fronts; also the school going age is a dynamic period of growth and development as children undergo physical, mental and emotional development during this stage. Under nutrition is considered to be the underlying cause of more than 50% of all childhood deaths in the world and in India, about 50% of childhood deaths are due to malnutrition. Malnutrition, not only kills, but also exacerbates the burden of infectious diseases. Therefore, it becomes very important to know the nutritional status of school going children, the building blocks of state and country.

To overcome this problem World Health Organization has recently recommended the use of Z-score system for classifying malnutrition in children.

In the present study an attempt has been made to assess the nutritional status of school children using the Z-score system.

The area in which the present study was conducted in Bali Sahi of Puri Odisha. No reliable estimates of nutritional status are available from the mentioned area. The present work describes the findings of the study conducted.

2. Materials and Methods

The present study was conducted in Bharata Sevashrama Sangha UG UP School of Bali Sahi Puri Odisha

The age of the children was determined using school records.

In the schools nutritional status of children was assessed as follows:

Weight: Measured using a floor type weighing scale with due respect to the standardization of the equipment and procedure.

Height: This measurement is straight distance from surface to vertex. This is measured by using anthropometric rod.

Mid-upper arm circumference: MUAC is suitable to use on children from the age of 12 months up to the age of 59. However, it can also be used for children over six months with length above 65cm [5].
- The mid-point between the elbow and the shoulder (acromion and ocleranon) was found.
- Place the tape measure around the left arm (the arm is relaxed and hang down the side of the body).
- MUAC is measured while ensuring that the tape neither pitches the arm nor is left loose.
- The measurement of MUAC is recorded to the nearest 0.1cm.

WHO z- score system was used to classify the nutritional status of children.

Table 1: Anthropometric indices and cut-off points

Anthropometric indicators	Classification	Z-scores
Height-for-age	Normal	-2SD to +2SD
	Stunted	<-2SD
	Severely stunted	<-3SD
BMI-for-age	Severely undernourished	>-3SD
	Moderately undernourished	Between -3SD and -2SD
	Normal	Between -2SD and +2SD
	Over-nourished	Above +2SD
Mid-upper arm circumference (MUAC)	Severe	< 13.5 cm
	Moderate	13.5-14.5 cm
	Normal	> 14.5 cm

The World health organization recommends the use of z-scores for evaluating anthropometric data from low income countries [8] [3]. Z-scores can be calculated accurately beyond the limits of the original reference data. This is an advantage in low income countries because individuals with indices below the extreme percentiles of the reference data can be classified accurately [6]. The method measures the deviation of the anthropometric measurement from the reference mean or median in terms of standard deviations or z-scores. The score is measure of an individual's value with respect to the distribution of the reference population [8]. This allows nutritional status of the entire populations to be described [3]. Of the three systems 27 commonly used for expressing anthropometric, z-score system is to be preferred [8]. The cut-offs for identifying nutritional status of children is given above.

Based on MUAC, earlier a fixed cut- off point (MUAC, 12.5cm) was used to distinguish normal and malnourished children. Such an approach was relatively independent of age for younger children [8]. The assumptions of age independence may not reflect the true pattern of mid upper arm growth and the use of fixed cut-off may result in wasting being over diagnosed among younger children and under diagnosed among the older ones.

Table 2: Mean and Standard deviation of Height, Weight and mid upper arm circumference of study participants

Variables	Male (N=129)		Female (N=113)	
	Mean	Standard deviation	Mean	Standard deviation
Age (in months)	103.5	18.8	103.6	18.8
Height (cm)	132.8	10.5	132.8	10.6
Weight (kg)	26.6	8.0	26.7	8.0
MUAC (cm)	18.4	3.1	18.4	3.1

This table shows the average value and the standard deviation of the demographic as well as the anthropometric measurements. The average age of male is 103.5 months while the SD score is 18.8 of 119 males, while the average age of female is also 103.6 and SD score is 18.8.The mean height of male and female is 132.8 and the SD score of male is 10.5 while the SD score of female is 10.6. Average weight of male is 26.6 and female is 26.7, both have the same SD of 8.0. Average MUAC (which was calculated in cm) of male and female is 18.4 and haves the same SD score of 3.1.

Table 3: Association between Gender and Nutritional Status (HAZ) of School-Going Children

HAZ	Z-score	Frequency		Proportion	
		Male	Female	Male	Female
Normal	-2SD to +2SD	119	110	92.24	97.35
Stunted	<-2SD	2	2	1.55	1.77
Severely stunted	<-3SD	0	0	0.00	0.00
Over-nourished	Above +2SD	8	1	6.21	0.88
Total		129	113	100.0	

On comparing between gender and nutritional status (Height for Age) of children, the findings of present study revealed that majority (1.77%) of female children and (1.55%) male children were stunted. There is no such case of severe stunting among male and female respectively. The overall prevalence of stunting (Stunted + Severely Stunted) among male children is (1.55%) and (1.77%) was among female children. Majority of male children (92.24%) were found in the normal category for height for age and (97.35%) of female children were found normal in the category of height-for-age.

Table 4: Association between Gender and Nutritional Status (BAZ) of School -Going Children (WHO, 2007 Standards)

BAZ	Z-score	Frequency		Proportion	
		Male	Female	Male	Female
Normal	-2SD to 1SD	63	68	48.84	60.18
Thin	<-2SD	21	23	16.27	20.36
Severely thin	<-3SD	21	14	16.27	12.38
Over-nourished	>1SD	24	8	18.62	7.08
Total		129	113	100	

The above table highlights that out of 129 male children, 16.27% were thin and 16.27% were severely thin. On the other hand, 20.36% and 12.38% female children were found in the categories of thinness and severe thinness respectively The overall prevalence of thinness (Thin + Severely Thin) among male and female children were 32.54% and 32.74% respectively. 63 (48.84%) of male and 68 (60.18%) of female were found normal. Also there are 24(18.62%) of male and 8 (7.08%) of female are over-nourished.

Table 5: Association between Gender and Mid upper arm Standards) circumference (MUAC) of School -Going Children

MUAC	Z-score	Frequency		Proportion	
		Male	Female	Male	Female
Severe	<13.5 cm	2	1	1.56	0.89
Moderate	13.5-14.5 cm	7	6	5.42	5.30
Normal	>14.5cm	120	106	93.02	93.81
TOTAL		129	113	100	100

The above table represents that 2 male (1.56%) and 1 female (0.89%) of children are in severe condition according to their mid-upper arm circumference (MUAC), and 7 male (5.42%) and 6 female (5.30%) are in moderate condition while the rest 120 male (93.02%) and 106 female (93.81%) are in normal condition.

3. Discussion

Among various problems encountered in school age children, malnutrition accounts for the majority. Since it is wisely said that only a healthy body can harbour a healthy

mind. It is imperative that these disorders in children are efficiently and timely assessed and corrective measures employed accordingly. Assessment of nutritional status in school children is one such endeavour.

In the present study, nutritional status of school-going children was determined on the basis of two anthropometric indices-heights for age and BMI for age, using WHO Z score system. Height for age Z score (HAZ) and BMI for age z-score (BAZ) were calculated with the help of WHO anthro-plus software.

In the present study we observe that Stunting(low height for age) is associated with long term consequences, such as impaired intellectual achievement and school performance and also leads to reduction in adult body size and, subsequently, reduced work capacity and obstetric complications. Regarding the classification of height for age (WHO, 2007 standards) 1.66% of school going children were found stunted and there were no sign of severely stunted in the present study. The overall prevalence of stunting (stunted + severely stunted) among children was1.66%. The prevalence of stunting among male is 1.55% (129) and 1.77% (113). The prevalence of stunting is more in girls than boys is because due to improper dietary habits, lack of knowledge of balanced diet in boys and their parents. The prevalence of stunting was found to be lower than the study conducted by Izharul Hassan (2011) which reported that prevalence of stunting was 40.4% and the prevalence of stunting in boys was 41.47%(124) while in girls it was 38.81%(78).

As mentioned in WHO tech rep ser 854 (1995)[7], thinness (low body mass index [BMI] for age in school aged children can result in delayed maturation, deficiencies in muscular strength and work capacity and reduced bone density later in life. The classification of BMI for age (WHO, 2007 standards) of school going children showed that 44 (18.19%) and 35 (14.46%) were found in the category of thinness and severe thinness respectively. The overall prevalence of thinness (thin + severely thin) was 32.65% among the school going children. 16.27% of male children were thin and severely thin respectively On the other hand, 20.36% and 12.38% female children were found in the categories of thinness and severe thinness respectively this may be due to improper dietary habits, lack of knowledge of balanced diet in boys and their parents.

The findings of the present study showed the lower prevalence of thinness than the study conduct by Izharul Hassan (2011) on nutritional status of the children of government Urdu higher primary schools of Azad Nagar and its surrounding areas of Bangalore the overall prevalence of thinness is 58.20% (291) while in our study it is of 32.65% which is much lower than their study.

WHO recommends that in older children (>10 years) BMI for age should be used instead of weight for height to avoid errors in assessment due to changes of puberty. [4]

4. Conclusion

The average age of male is 103.5 months while the SD score is 18.8 of 119 males, while the average age of female is also 103.6 and SD score is 18.8.The mean height of male and female is 132.8 and the SD score of male is 10.5 while the SD score of female is 10.6. Average weight of male is 26.6 and female is 26.7, both have the same SD of 8.0. Average MUAC (which was calculated in cm) of male and female is 18.4 and haves the same SD score of 3.1.

On comparing between gender and nutritional status (Height for Age) of children, the findings of present study revealed that majority (1.77%) of female children and (1.55%) male children were stunted. There is no such case of severe stunting among male and female respectively. The overall prevalence of stunting (Stunted + Severely Stunted) among male children is (1.55%) and (1.77%) was among female children. Majority of male children (92.24%) were found in the normal category for height for age and (97.35%) of female children were found normal in the category of height-for-age according to WHO 2007 standards.

On comparing between gender and nutritional status (BMI for Age) that out of 129 male children, 16.27% were thin and 16.27% were severely thin. On the other hand, 20.36% and 12.38% female children were found in the categories of thinness and severe thinness respectively The overall prevalence of thinness (Thin + Severely Thin) among male and female children were 32.54% and 32.74% respectively. 63 (48.84%) of male and 68 (60.18%) of female were found normal. Also there are 24(18.62%) of male and 8 (7.08%) of female are over-nourished according to WHO 2007 standards.

As per comparing between gender and nutritional status (MUAC) that 2 male (1.56%) and 1 female (0.89%) of children are in severe condition according to their mid-upper arm circumference (MUAC), and 7 male (5.42%) and 6 female (5.30%) are in moderate condition while the rest 120 male (93.02%) and 106 female (93.81%) are in normal condition.

These observations seem to be due chance only since similar results have not been reported from anywhere. This could be either due to a smaller number of children included or the age of the some of the children could not have been ascertained accurately in spite the best efforts. Our observations reveal that even though the situation in our setup is comparatively better, still a large number of children are malnourished in spite of the positive indicators like lower proportion of BPL, implementation of nutrition programs in schools etc.

During our survey we found that the MDMP scheme is being implemented whole heartedly on long term basis implementing nutritional monitoring of school children as part of school health program, improvement in school environment improving the purchasing power of people, making foods available at affordable prices especially for weaker sections can be instrumental in bringing a much needed improvement.

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