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Nutritional status of school going children (5- 8 years) in urban slum areas of Muzaffarpur town, Bihar, India, using WHO Z-score system

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Abstract : Nutritional status directly affects the growing up of children in term of physical and mental development. One of the greatest problems of India in under nutrition among children. The country is struggling with this problem. Malnutrition, the condition resulting from faulty nutrition, weakens the immune system and causes significant growth and cognitive delay. Growth assessment is the measurement that best defines the health and nutritional status of children, while also providing and indirect measurement of well-being for the entire population. School going children were randomly selected among all slum areas of Muzaffarpur Town. Anthropometric measurement of 120 school going children 5-8 years old were obtained, analyzed with WHO Anthro-Plus and associated with the mentioned variables by further statistical analysis. The overall prevalence of stunting, thinness and underweight were 30.83%, 80.83% and 55.83% respectively.

Keywords: Nutritional status, Anthropometric measurement, WHO Anthro-Plus.

INTRODUCTION

Children are the future pillars of the nation and the future of the nation rest on the hands of the children's health today. The future of the society depends upon the quality of the life of it's under 10 year children. Health of children is the wealth of nation. The health of children is of fundamental important in every country. The school children population approximate one fifth of the total population and forms of the future hope of the nation. The school going period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescent.

Growth and development of any country is reflected by the growth and development of its children in our country, children constitute a measure bulk of population i.e. 32.4 percent of the children are aged less than 14 years. A child's growth is the most important indicator of health, which is influenced and measured by adequate intakes of food and nutrients and a decreased susceptibility to disease. Health and weight measurements are used as determinants of normal child growth.

Anthropometrics can be sensitive indicators of health, growth and development in children. Anthropometry is the single most universally applicable, inexpensive and non-invasive method available to assess the size, proportion and composition of human body >WHO 1995?. According to WHO, the ultimate intention of nutritional assessment is to improve human health >Beghin et al, 1998? . Malnutrition which refers to an impairment of health either from a deficiency or excess or imbalance of nutrients is public health significance among children all over the world.

MATERIALAND METHODS

The present study was carried out in Muzaffarpur town. Five slum areas *Akharaghat*, *Juran Chapra Nunfar*, *Maal Godown Mestar Tola*, *Sikandarpur Ambedkarnagar*

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and *Mestar Toli*, were selected by chit-fold method. 120 children >65 boys and 55 girls in the age groups 5-8years were selected randomly for five different slum of Muzaffarpur town. 24 children were selected from each slum. Their nutritional status was determined using Anthropometric measures. Anthropometry is the measurement of the human. It is a quantitative method and is highly sensitive to nutritional status especially among children. The following parameters have been used for the assessment of nutritional status.

Height:- Height was measured by using stadiometer in centimeter placed on plain floor.

Weight:- An electronic weighing scale was used to measure the weight in kilograms.

Body Mass Index:- BMI = weight >kg /height² >m².

Nutritional status of all the selected children was assessed by measuring body height (cm), weight (kg) which was compared with the World Health Organization (WHO) 2007[1] classification, based on BMI-for age (z-score), Weight-for-age (z-score) and Height-for-age (z-score).

Malnutrition was calculated with the help of **AnthroPlus** software (*developed by WHO 2009*)[2], as Severe thinness (< -3SD), Thinness (**e" -**3SD & <-2SD), normal (> -2SD & < +1SD), Overweight (> +1SD & d" +2SD) and Obesity (> + 2SD) for **BMI-for-age**, Normal , Mild underweight (> -2SD & < -1SD), Moderate underweight (**e" -**3SD & <-2SD), and Severe underweight (< -3SD) for **weight-for-age** and Normal, Mild stunting (> -2SD & < -1SD), Moderate stunting (**e" -**3SD & <-2SD) and Severe stunting (< -3SD) for **height-for-age** according to *WHO 2007[1] classification.*

RESULTS AND DISCUSSION

A total of 120 children in the age group of 5-8 years have been included in the study. The mean weights and heights of the school going children for each age group according to gender are shown in table 1, the mean weight in the age group 5-6 years for boys and girls was 15.88 kg. and 16.30 kg. respectively. Mean weight of boys was higher 19.15 kg. and 21.70 kg. than girls 17.21 kg. and 20.22 kg. in the age groups 6-7 years and 7-8 years respectively. The mean height of boys was found to be higher than girls in all age groups.

The percentage of school going children, who were underweight, stunting and thinness according to their gender are shown table 2.

Weight-for-age:- The present study showed that 25.83 % boys were normal while 18.33 % girls were normal. Mild underweight category had 23.33 % boys and 12.5 % girls. The severe level of underweight was more girls 1.67 % than boys 0.83 %.

Height-for-age:- It was found that 69.17 % children were found to be normal as per their height-for-age, 30.83 % children were stunting with 20.83 % children showing mild degree, 8.33 % moderate degree and 1.67 % children showing severe degree of stunting.

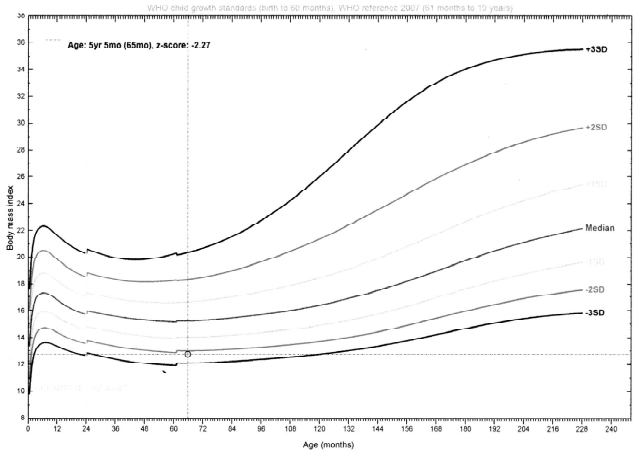
BMI-for-age:- Thinness was found in 32.50 % of children. Out of which 17.5 % were boys and 15 % were girls. Severe thinness was found in 48.33 % of children. Out of which 26.67 % were boys and 21.67 % were girls. Overweight was found in 2.5 % of children. Obesity was not found in any girl.

The mean height and mean weight of the present study at all ages were found to be much inferior when compared to WHO 2007[1] reference. Mean height and mean weight of boys in 5-8 years were better than girls of the same age. It is clear that the problem of malnutrition in India is of alarming magnitude, but also of great intricacy. The prevalence of underweight is among the highest in the world, nearly double that in Sub-Saharan Africa, and the pace of improvement lags behind what might be expected given India's economic growth. A major part of this problem is contributed by slum population.

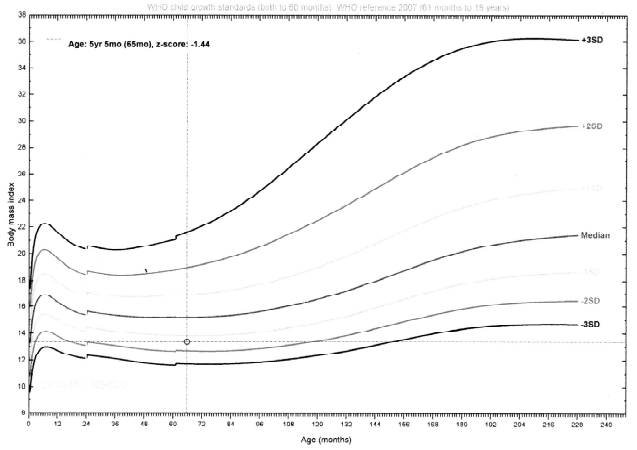
During the research realized that certain improvements by the Government of Bihar, administrators and policy makers should be made in the ongoing welfare programmes and new comprehensive programmes should be developed to improve the overall health of the children of Bihar and elevate the position of Bihar in the Human Development Index.

Table 1:- Mean of weight, height and BMI, Z-score and mean of weight-for-age, height-for-age and BMI-for-age of study participation.

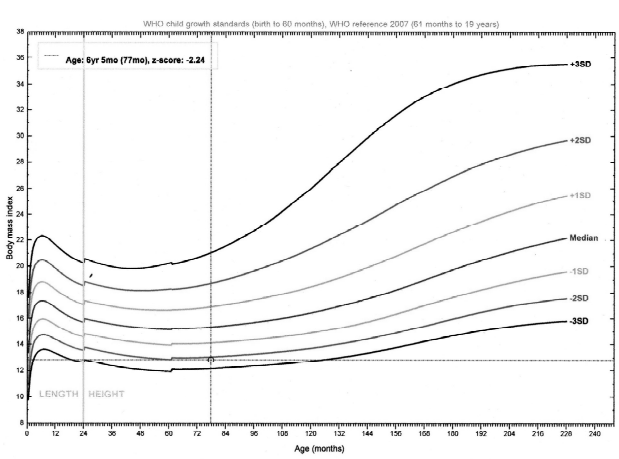
Age.	Age (mean)	Sex	No.	WEIGHT (mean) kg	HEIGHT (mean) cm	BMI (mean) kg/m²	WEIGHT FOR AGE Z- score (mean)	HEIGHT FOR AGE Z- score (mean)	BMI FOR AGE Z- score (mean)
5-6	5½	M	20	15.88	111.55	12.80	-1.53	-0.25	-2.27
		F	21	16.30	110.52	13.30	-1.12	-0.30	-1.44
6-7	6½	M	22	19.15	122.04	12.90	-0.92	+0.65	-2.24
		F	19	17.21	118.15	12.30	-1.44	+0.06	-2.36
7-8	7½	M	23	21.70	132.04	12.40	-0.76	+1.40	-2.84
		F	15	20.22	110.17	16.70	-1.01	-2.37	+0.62



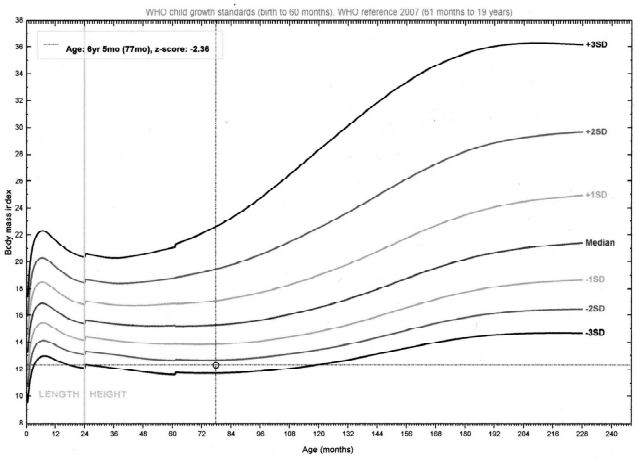
NUTRITIONAL STATUS OF 5-6 YEARS BOYS ACCORDING TO WHO Z-SCORE REFERENCE



NUTRITIONAL STATUS OF 5-6 YEARS GIRLS ACCORDING TO WHO Z-SCORE REFERENCE



NUTRITIONAL STATUS OF 6-7 YEARS BOYS ACCORDING TO WHO Z-SCORE REFERENCE



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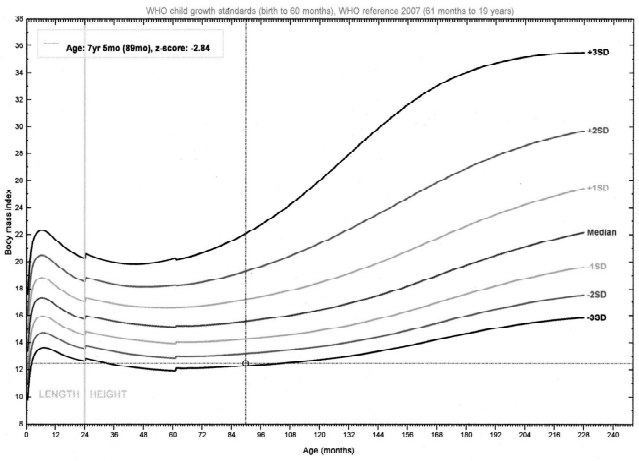
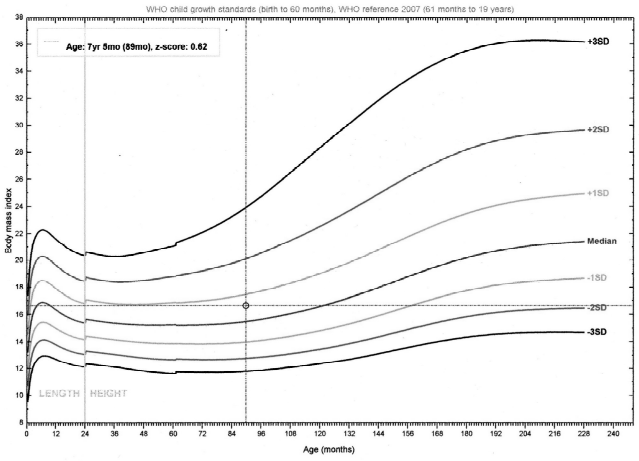


NUTRITIONAL STATUS OF 7-8 YEARS BOYS ACCORDING TO WHO Z-SCORE REFERENCE



NUTRITIONAL STATUS OF 7-8 YEARS GIRLS ACCORDING TO WHO Z-SCORE REFERENCE

Table 2:- Nutritional status of children as per weight-for-age, height-for-age and BMI-for-age

Variables	Boys (n= 65)		Girls(n=55)		Total (n= 120)	
	n	%	n	%	n	%
Weight-for-age						
• Normal	31	25.83	22	18.33	53	44.17
• Mild underweight > -2SD & < -1SD	28	23.33	15	12.50	43	35.83
• Moderate underweight = -3SD & <-2SD	05	04.16	16	13.33	21	17.50
• Severe underweight < -3SD	01	00.83	02	01.67	03	02.50
Height-for-age						
• Normal	48	40.00	35	29.17	83	69.17
• Mild stunting > -2SD & < -1SD	13	10.83	12	10.00	25	20.83
• Moderate stunting = -3SD & <-2SD	03	02.50	07	05.83	10	08.33
• Severe stunting < -3SD	01	00.83	01	00.83	02	01.67
BMI-for-age						
• Obesity > + 2SD	01	00.83	-	-	01	00.83
• Over weight > +1SD & = +2SD	02	01.67	01	00.83	03	02.50
• Normal > -2SD & < +1SD	09	07.50	10	08.33	19	15.83
• Thinness= -3SD & <-2SD	21	17.50	18	15.00	39	32.50
• Severe thinness< -3SD	32	26.67	26	21.67	58	48.33

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