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RESEARCH ARTICLE

UNDERNUTRITION AMONG THE RURAL PRESCHOOL CHILDREN (ICDS) OF ARAMBAG, HOOGHLY DISTRICT, WEST BENGAL, INDIA, USING NEW HEAD CIRCUMFERENCE CUT-OFF POINTS

Gopal Chandra Mandal[1] and Kaushik Bose[2*]

[1]Department of Anthropology, Bangabasi College, Kolkata, India.
[2]Department of Anthropology, Vidyasagar University, Midnapore, India.

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ABSTRACT

The Millenium Development Goals (MDGs) aim towards the reduction of maternal and child mortality. Low income, bad healthcare and neglect of basic education can all be influential in causing and sustaining the extraordinary level of undernutrition in India. Undernutrition among preschool children may be the result of faulty feeding practices rather than scarcity of the food. The nutritional status of the people is increasingly being recognized world over as an important indicator of development of a country. Anthropometry is widely recognized as one of the useful techniques to assess the growth and nutritional status of an individual or population. One of the basic reason is that, anthropometry is highly sensitive to undernutrition. Under the Integrated Child Development Service (ICDS) scheme, the development of women as well as children implements the food supplementation program for improving nutritional status of the mother and children. The package of services provided by the ICDS scheme includes supplementary nutrition, immunization, health check-up, referral services, nutrition and health education, and preschool education. Keeping these in mind, the present work attempted to study the nutritional status of 894 children (boys = 441; girls = 453) aged 2-5 years rural preschool children from 20 ICDS centers of Bali-Gram panchayat, Hooghly district, West Bengal, India. Here, we tried to assess the nutritional status of the studied children with the help of the head circumference (HC) by using new WHO (2007) recommended cutoff points. The overall (age combined) rate of undernutrition among girls was slightly higher (64.9%) than boys (62.8%). There is clear increasing trend of undernutrition among the boys with the increasing age. The age specific highest prevalence among boys was found at age 5 years (74.8%), whereas, among girls, the highest rate (76.5%) was noticed at age 4 years followed by children of 5 years of age and the lowest (44.3%) prevalence was found at age 3 years. The overall prevalence (age combined) of undernutrition based on head circumference cut-off points, showed significant association with the sex ($\chi^2 = 5.50$; df=1, $p < 0.025$). Our study clearly indicated that the nutritional status of these pre-school children was serious with very high rates of undernutrition in both sexes based on HC.

***Corresponding author:** *kaushikbose@cantab.net*

INTRODUCTION

The Millenium Development Goals (MDGs) aim towards the reduction of maternal and child mortality. Low income, bad healthcare and neglect of basic education can all be influential in causing and sustaining the extraordinary level of under nutrition in India. Yet, it has been shown that, even after taking note of low levels of these variables, one would have expected a much higher level of nutritional achievement (Osmani, 1992). In most of Asia where the Green Revolution boosted food supplies, hunger and under nutrition have continued to decrease since 1981. Despite the availability of surplus food grains in India and in South Asia, the region is still facing high levels of hunger (Gupta, 2004). Under nutrition among preschool children may be the result of faulty feeding practices rather than scarcity of the food. It was also assessed that the low status of woman and their lack of nutritional knowledge are important determinants of high prevalence of underweight children (Antony and Laxmaiah, 2005).

The health of the people is the wealth of a country and nutrition is one of the most important pre-requisite for good health. The nutritional status of the people is increasingly being recognized world over as an important indicator of development of a country. The strength of a nation in future will be determined by how healthy and educated its people are. Prompting optimum development of the child is the responsibility of every one (Lathia, 1997; cited in Shah and Patel, 2009). Children differ from adults because their nutritional intake must provide not only for the replacement of tissues but also for growth (Kaushik, 1997; cited in Shah and Patel, 2009). Growth assessment best defines the health and nutritional status of children, because disturbances in health and nutrition, regardless of their etiology, invariably affect child growth and hence provide an indirect measurement of the quality of life of an entire population (de Onis *et al.,* 1993). Anthropometry is widely recognized as one of the useful techniques to assess the growth and nutritional status of an individual or population (Gorstein et. al., 1994). One of the basic reason is that anthropometry is highly sensitive to under nutrition (Jellife, 1966). It is possible to use a variety of anthropometric measures to assess the growth of a child. Among the most studied are: weight, height, arm circumference, head circumference and skin fold thickness. There are many factors responsible for under nutrition of preschool children in slum area. They are poor hygienic habits, insufficient food intake, lack of food availability, illiteracy, socio-economic and cultural factors. It has now been generally accepted that nutritional anthropometry has a significant role in the direct assessment of nutritional status in preschool children. A number of anthropometric measurements have been suggested for studies on growth and nutritional status, but height, weight, mid-upper arm circumference, head circumference, chest and fat fold (skin fold) at triceps are most frequently used.

Infants and preschool children in developing countries form an important vulnerable segment and suffer the highest rate of mortality and morbidity (Gupta, 1992). Malnutrition of under-five children is one of the most serious health problems in developing countries. (Bharati *et al.,* 2008). One half of the children under the age of five years in India are moderately or severely malnourished, 30% of new born children are significantly under weight and nearly 60% of women are anemic (Economic Survey, Govt. of India, 2002-2003). Under the Integrated Child Development Service (ICDS) scheme, the development of women as well as children implements the food supplementation program for improving nutritional status of the mother and children. Moreover, Ministry of Health and Family Welfare implements programmes for taking major micronutrient deficiencies such as Vitamin-A and Iodine deficiency etc. (Economic Survey, Govt. of India, 2002-2003). The package of services provided by the ICDS scheme includes supplementary nutrition, immunization, health check-up, referral services, nutrition and health education, and preschool education (Kapil and Pradhan, 1999). The scheme services are rendered essentially through the "*Anganwadi"* worker at a village center called "*Anganwadi".* There is therefore an urgent need to evaluate the nutritional status of children at ICDS centers.

Malnutrition (under nutrition or over nutrition), is an impairment of health either from a deficiency or excess or imbalance of nutrients, and is of public health significance among the children all over the world. It creates lasting effect on the growth and development of an individual. Malnutrition is a problem at varying proportion in developing countries including India and anthropometry is a single tool to assess its magnitude in children and adolescents (WHO, 1989). A preschool child is the most vulnerable of all the members of a family, as a child without adequate nourishment is highly vulnerable to viral, bacterial and parasitic diseases (Elankumaran, 2003). Nutrition is one of the basic requirements of any living organism to grow and sustain life. However, the quality and quantity of nutrients necessary for normal growth and to keep an organism in good health during its life span vary with the age of the organism. Any major deviation in the nutrient intake either in quality or in quantity from its requirement can also affect growth and life span in a number of way particularly in the later period / growth is more influenced by nutrition (Gopalan *et al.,* 1989).

Keeping these in mind, the present work attempted to study the nutritional status of the rural preschool ICDS children of Bali-Gram Panchayat, Hooghly district, West Bengal, India, by using WHO (2007) recommended cutoff points for head circumference. Nutritional status may be assessed with the help of several parameters like – stunting, wasting, underweight, CIAF, thinness, leanness, MUAC, head circumference etc. Here, we tried to assess the nutritional status of the studied children with the help of the head circumference (HC).

MATERIAL AND METHODS

Study area

The present cross sectional study was undertaken during the period November 2005 to December 2006, at 20 Integrated Child Development Services (ICDS) centers in Bali Gram Panchayat, Arambagh, Hooghly District of West Bengal, India. The study area consists of remote villages located approximately 100 km. from Kolkata, the capital of West Bengal. All children (aged 2-5 years old) living in these areas are enrolled at these centers.

Study sample

A total of 894 children (boys = 441; girls = 453) aged 2-5 years old enrolled in these centers were studied. Information on a number of non-anthropometric variables such as age, sex, were collected using a pre-structured interview schedule. All the children were Hindu by religion. Most of the families to which the children belonged depended upon agriculture for their livelihood. From ICDS centers, all children were given a daily food supplementation, in the form of porridge, consisting of approximately 60 grams of rice and 20 grams of lentils per day. They were also fed an egg per week.

Anthropometric measurement

The measurement (head circumference in cm.) was taken following standard method (Lohman *et al.,* 1998) by first author (GCM). Nutritional status of the children was evaluated using the following scheme: Moderate undernutrition : < - 2 sd, Severe undernutrition : < - 3 sd where sd refers to the age and sex-specific WHO standard deviations of Head circumference. Table 1 presents the WHO (2007) recommended cut-off points for head circumference (cm.) by age and sex. The assessment of nutritional status of these preschool children by head circumference was done with the help of the said cut off values.

Statistical analyses

Statistical analyses were done with the help of computer package for social sciences (SPSS, version 7.5). Significant levels of sex differences in different ages were done by t – test. The $\chi 2$ – test was done to test the level of association between the nutritional status and the sex of the studied children.

RESULTS AND DISCUSSION

The sex differences in head circumferences by age. The mean head circumference among boys was 46.9 cm (1.6) and it is 46.0 cm (1.5) among girls

Table 1. WHO (2007) recommended cut-off points for head circumference (cm) by age and sex.

Age in years	*Boys*		Girls	
	- 2SD (Moderate)	- 3SD (Severe)	- 2SD (Moderate)	- 3SD (Severe)
2	45.5	44.2	44.4	43.0
3	46.6	45.2	45.7	44.3
4	47.3	45.8	46.5	45.1
5	47.7	46.3	47.1	45.7

Table 2. Sex differences in mean head circumference (in cm.) by age.

Age in years	*Boys*	Girls
2***	45.5	44.6
(N=183)	(1.9)	(2.1)
3****	46.9	46.0
(N=231)	(1.4)	(1.2)
4****	47.7	46.3
(N=241)	(1.6)	(1.4)
5***	47.6	47.0
(N=239)	(1.6)	(1.3)
Total****	46.9	46.0
(N – 894)	(1.6)	(1.5)

*** = $p < 0.001$; **** = $p < 0.0001$

Punjabi preschool children also revealed similar type significant age specific sex differences in mean HC. Moestue (2008) tried to examine the potential of anthropometry as a tool to measure gender discrimination, with particular attention to the WHO growth standard. He studied 6 – 59 months old children of Bangladesh and found conflicting patterns of the relative growth of girls and boys by age and over time. He concluded that, in Bangladesh as in other Asian countries, the problem significant gender discrimination cannot be overstated.

The assessment of nutritional status of these preschool children by head circumference is presented in Table 3. The overall (age combined) rate of under nutrition among girls was slightly higher (64.9%) than boys (62.8%). In both the cases, the rate of severe under nutrition was very low in comparison to the moderate under nutrition. There was a clear increasing trend in under nutrition among boys with increasing age. However, no such trend was noticed in case of

Table 3: Assessment of nutritional status of the children by head circumference.

Age	*Boys*			*Girls*		
(Years)	**Under nutrition**			**Under nutrition**		
	Moderate	**Severe**	**Overall**	**Moderate**	**Severe**	**Overall**
2*** (N=183)	34(37.4)	15(16.5)	49(53.8)	41(44.6)	11(11.9)	52(56.5)
3 (N=231)	61(48.8)	12(9.6)	73(58.4)	40(37.7)	7(6.6)	47(44.3)
4 (N=241)	58(52.7)	11(10.0)	69(62.7)	70(53.4)	31(23.7)	101(77.1)
5 (N=239)	60(52.2)	26(22.6)	86(74.8)	70(56.5)	24(19.3)	94(75.8)
Overall** (N=894)	213(48.3)	64(14.5)	277(62.8)	221(48.8)	73(16.1)	294(64.9)

Percentages are given in the parentheses. ** = $p < 0.025$; *** = $p < 0.01$.

(Table 2). Mean values in both sexes increased from 2 years of age to 5 years (except in age group 5 yrs among the boys). Highly significant sex differences in mean HC was observed at all ages. The study of Singh and Grover (2003) among girls. The age specific highest prevalence among the boys is found in the age of 5 years (74.8%), whereas, among the girls, the highest rate (76.5%) is noticed in the age of 4 years followed by among the children of 5 years of age and the lowest

(44.3%) prevalence is found in the age of 3 years. The overall prevalence (age combined) of under nutrition based on head circumference cut-off points, showed significant association with sex (χ^2 = 5.50; df=1, $p < 0.025$). Children aged 2 years showed highly significant association of sex with nutritional status (χ^2 = 9.47; df=1, $p < 0.01$). In a previous study conducted by Singh and Bisnoi (2005) among the female preschool children of Faizabad District, U. P., showed the similar trend of lower level of HC mean values than the ICMR (1976) standard. A study conducted at Calcutta by Chaudhury (1975) also observed similar results. The head circumference which relates mainly to brain size was significantly lower than the standards (ICMR, 1994) except in boys in age groups 2-3 and 4-6 years. However the values were significantly ($p < 0.01$) lower in girls of all ages among the urban pre school children of Punjab, India (Singh and Grover, 2003). In conclusion, our results unequivocally demonstrated that pre-school ICDS children of Arambag, Hooghly district, despite of the food supplementation, were in a poor nutritional state. Thus, it is imperative that there is an enhancement of this supplementation. This enhancement should be made mandatory at all ICDS centers.

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