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Prevalence of thinness among rural pre-school children of east Midnapur, West Bengal, India.

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Abstract

Nutrition during the first five years has not only an impact on growth and morbidity during childhood, but also acts as a determinant of nutritional status in adolescent and adult life. India has the highest occurrence of childhood malnutrition in the world. Body mass index (BMI) has been used for assessing thinness more recently in children aged 0-5 years.The aim of the present study was to evaluate the different grades of thinness among the Bengalee preschool Integrated Child Development Services Scheme (ICDS) children. This cross sectional study was conducted in nine villages of Argoal Gram Panchayat at 10 (ten) ICDS centers of Purba Medinipore, West Bengal. The total sample was 225 between the age group 3 and 6 years. Thinness was evaluated by using age and sex specific internationally accepted cut off points. The overall prevalence of thinness was 59.1%. The boys were comparatively (61.8%) more malnourished than girls (56.8%). This difference was statistically significant ($\chi^2 = 7.18$, d.f. 1; $p < 0.025$).From the present study it can be concluded that, the rural preschool children were found to be highly malnourished, but this situation was comparatively better than the rural children from the ICDS centers of Hooghly and Purulia Districts. These results indicate that the present food supplementation programme of the ICDS centers is inadequate.

INTRODUCTION

Malnutrition, one of the most important global health problems, large numbers of children in developing countries [1]. A study by UNICEF shows that about 2.2 million children under age of 5 were died for the Malnutrition in 2005. If you eliminate malnutrition, you would prevent 35% of child deaths globally [2]. Nutrition during the first five years has not only an impact on growth and morbidity during childhood, but also acts as a determinant of nutritional status in adolescent and adult life. Global comparative data indicate that contrary to common perception, prevalence of undernutrition (a deficiency of calories or of one or more essential nutrients) is highest in South Asian children [3].

Infants and preschool children in developing countries form an important vulnerable segment and suffer the highest rate of mortality and morbidity [4]. There is a growing consensus that poor nutritional status during childhood (or even in uterus) can have long-lasting scarring consequences into adulthood, both in terms of health and mortality, and in terms of other measures of human capital such as schooling and productivity [5]. Malnutrition of children aged under five is one of the most serious health problems in developing countries [6]. India has the highest occurrence of childhood malnutrition in the world [7]. One half of the children under age of five years in India are moderately or severely malnourished [8].

The assessment of nutritional status of population has attracted the attention of not only the nutritionists and other biological scientists, but also the economists and other social scientists with a view to understanding the health and socioeconomic status of the population [9]. Due to its simplicity and low cost, anthropometric evaluation give, further, a simple and a reliable estimation of under nutrition prevalence [10]. A healthy child will become a healthy adult. A healthy adult will be the backbone of the society as well as the country. Poor nutrition as evidenced by poor growth and small stature could affect development, intellectual performance and intellectual achievement [11]. Poor nutrition of children do not only affects the cognitive development of children but also likely to reduce the work capacity in future [12]. Body mass index (BMI) has been widely used for assessing nutritional status of adults and thinness in adolescents and more recently in children aged 0-5 years [13].

Integrated Child Development Services (ICDS) was launched on 2 October, 1975 the 106th birth anniversary of Mahatma Gandhithe Father of the Nation. The ICDS is the symbol of India's commitment to her children. The main objective was to improve the nutritional status as well as health status of the preschool children.

The following services are sponsored under ICDS to achieve its objectives [14] (http://wcd.nic.in/icds. Htm).

1. Immunization, 2. Supplementary nutrition, 3. Health checkup, 4. Referral services, 5. Pre-school non formal education, 6. Nutrition and Health information.

The aim of the present study was to evaluate the different grades of thinness among the Bengalee preschool children of aged 3-6 years using age and sex specific international cut off values based on Body Mass Index (BMI).

MATERIAL AND METHODS

Study Area:

This study was conducted in various Integrated Child Development Service (ICDS) centres, which is commonly known as “Anganwadi”, of the villages of Argoal Gram Panchayat at Patashpur- II block in East Midnapur district, West Bengal, India. The study area was a rural and the villages were remotely located, approximately 110 km away from Kolkata, the capital of the state.

Table 1. Age and sex wise distribution of the preschool children.

Age (Years)	Total Number		
	Boys	Girls	Total
3	31	26	57
4	42	42	84
5	26	38	64
6	11	9	20
Total	110	115	225

Table 2. International cut off points of BMI (kg/m^2) for thinness grade, I, II and III for the ages of 3-6 years.

Age	Boy's Thinness			Girl's Thinness		
(years)	Grade-III	Grade-II	Grade-I	Grade-III	Grade-II	Grade-I
3	13.09	13.79	14.74	12.98	13.60	14.47
4	12.86	13.52	14.43	12.73	13.34	14.19
5	12.66	13.31	14.21	12.50	13.09	13.94
6	12.50	13.15	14.07	12.32	12.93	13.82

The majority of inhabitants were Hindus (84.4%). The anthropometric data presented in this paper was collected in March-April, 2008 by one of the authors (AA).

Participants:

This is a cross sectional survey which was conducted in nine villages of Argoal Gram Panchayat at ten ICDS centers. The subjects were taken randomly from each of these centers. The total sample was 225 (110 boys and 115 girls) between the age group 3 and 6 years. The details of distribution of the children are represented in Table 1. All of the preschool children of the study belonged to Bengalee ethnicity. The ICDS centers provided food supplementation to these children, in the form of porridge, consisting of approximately 40 grams of rice and 17 grams of lentils per day and an egg per week [15].

Measurements:

Anthropometry offers a reliable method to access the nutritional status of the children. Anthropometry is the single most universally applicable, inexpensive and non-invasive method available to assess the size, proportion and composition of human body [16]. Weight (kg.) and Height (cm.) of each subject were taken with the help of Martin's Anthropometer and Standard Weighing Machine respectively following the standard methods [17].

Assessment of Thinness:

Body Mass Index (BMI) was computed following the internationally accepted standards formula, which is - BMI = Weight (in kgs.) / [Height (in m)]^2 and the unit is kg/m^2.

The nutritional status (thinness) was evaluated using age and sex specific international cut off values [18] based on Body Mass Index (BMI) which is shown in Table 2.

RESULTS

An improved child health and survival are considered universal humanitarian goal. In this respect, understanding the

Table 3. Prevalence of thinness among the studied children.

Age in Years	Height (cm)			Weight (kg)			BMI (kg/m^2)		
	Boys	Girls	Sex Combined	Boys	Girls	Sex Combined	Boys	Girls	Sex Combined
3	90.1 (3.5)	90.7 (5.5)	90.4 (4.5)	12.0 (1.5)	11.9 (1.8)	11.9 (1.6)	14.74 (1.28)	14.35 (1.14)	14.56 (1.22)
4	95.6 (7.3)	97.6 (5.1)	96.6 (6.4)	13.3 (1.7)	13.4 (1.7)	13.3 (1.7)	14.78 (3.06)	14.01 (0.92)	14.40 (2.27)
5	104.1 (4.6)	101.2 (4.5)	102.4 (4.7)	15.2 (1.5)	14.0 (1.9)	14.5 (1.8)	13.93 (0.67)	13.64 (1.09)	13.75 (0.96)
6	106.2 (5.3)	106.4 (5.8)	106.3 (5.4)	15.8 (2.3)	15.8 (2.2)	15.5 (2.2)	13.97 (1.03)	13.43 (0.88)	13.74 (0.98)
Total	**97.1 (8.1)**	**97.9 (6.8)**	**97.56 (7.5)**	**13.6 (2.1)**	**13.4 (2.0)**	**13.51 (2.1)**	**14.49 (2.08)**	**13.91 (1.06)**	**14.19 (1.66)**

Standard Deviations are shown in the parentheses.

Table 4. Prevalence of thinness.

Age in years	Thinness - Boys				Thinness – Girls				Thinness Sex-combined
	Grade I	Grade II	Grade III	Overall	Grade I	Grade II	Grade III	Overall	
3	9 (29.03)	6 (19.35)	2 (6.45)	17 (54.84)	7 (28.00)	6 (24.00)	1 (4.00)	14 56.00)	31 (55.36)
4	18 (42.86)	4 (9.52)	5 (11.90)	27 (64.29)	13 (30.95)	8 (19.05)	3 (7.14)	24 (57.14)	51 (60.71)
5	12 (48.00)	2 (8.00)	2 (8.00)	16 (64.00)	9 (23.08)	7 (17.95)	6 15.38)	22 56.41)	38 (59.37)
6	6 (50.00)	1 (8.33)	1 (8.33)	8 (66.67)	2 (22.22)	2 (22.22)	1 (11.11)	5 (55.55)	13 (61.90)
Total*	45 (40.91)	13 (11.82)	10 (9.09)	**68 (61.82)**	31 (26.96)	23 (20.00)	11 (9.56)	**65 (56.52)**	**133 (59.11)**

Percentages are shown in the parentheses. * $p < 0.025$

Table 5. Prevalence of thinness among preschool children : A comparison with other recent studies.

Studied population	Prevalence of Thinness			Study
	Boys (%)	Girls (%)	Overall (%)	
ICDS children of Chapra, Nadia, West Bengal.	49.68	51.57	50.7	Biswas et al., 2009
ICDS Children of Vadodara,Gujrat,	58.0	68.2	63.0	Bhalani & Kotecha, 2002
ICDS children of Bali-Gram panchayat, Hooghly, Arambag, West Bengal.	84.8	85.6	85.2	Mandal et al., 2009
Barui scheduled caste children of Purulia, West Bengal.	-	-	65.3	Das et al., 2009
Santal children from Purulia, West Bengal	59.5	53.3	56.4	Das et al., 2011
ICDS children from Patashpur, East Midnapur, West Bengal, India.	***61.8***	***56.5***	***59.1***	***Present study***

nutritional status of children has far-reaching implications for the better development of future generations [19]. Nutritional assessment is an evaluation of the nutritional status of individuals or populations through anthropometry and/or measurements of food and nutrient intake. Apart from these, there are some other ways like observing nutrient deficiency symptoms and blood analysis by which nutritional assessment is done. According to the World Health Organization, the ultimate intention of nutritional assessment is to improve human health.

Table 3 shows the mean height, weight and BMI at each age-sex group. The mean Height of the boys, girls and sex combined were 97.1 cm, 97.9 cm and 97. 6 cm, respectively. The Height of the both boys and girls are increasing as the age group increase. There is a significant sex difference (at 0.015 levels) at the ages of 5 years. Except in the 5-year age group the mean height of girls was greater than the boys.

In case of boys, highest and lowest mean BMI were found at the ages of 4 (14.8 kg/m^2) and 5 (13.9 kg/m^2) respectively where as in case of girls it is at the ages of 3 (14.3 kg/m^2) and 6 (13.4 kg/m^2) respectively. The BMI decreases with the age in case of Girls. Also, sex combined result shows the same. The mean BMI of boys, girls and sex-combined were 14.5 kg/m^2, 13.9 kg/m^2 and 14.2 kg/m^2, respectively.

Table 4 represents the prevalence of thinness among the boys. Among boys, 61.8% suffered from thinness reaching a maximum at age 6 years (66.7%). Minimum prevalence was found at age 3 years (54.8). Overall, 56.5% girls suffered from thinness. This difference was statistically significant ($\chi^2 = 7.2$, d.f. 1; $p < 0.025$). Maximum and minimum prevalence were found at ages 4 and 6 years (57.1% and 55.6% respectively). Sex combined results showed that overall 59.1% children, irrespective of sex, suffered from thinness. The highest rate (61.9%) was found at 6 year while the lowest (55.4%) was observed at 3 years.

DISCUSSION

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 ways, particularly in the later period / growth [20]. The underfed still outnumbered in the developing world among Asian, African and Latin American populations. In spite of the economic development in the region, under nutrition remains an important public problem in many Asian countries [21]. Among the preschool children, estimation of the level of under nutrition based on BMI was not suitably possible due to the lack of appropriate cut-off points. Cole and others [18] developed suitable thinness cut-off points for the children aged 2-18 years. Based on this cut-off point, the present study showed that the prevalence of thinness among the ICDS children was nearly 60% (59.1%) and it was slightly higher than among the ICDS children (50.7%) of Nadia, West Bengal [22] as well as among the Santal children (56.4%) from Purulia, W.B [23]. But it was slightly lower than thinness among the ICDS children (63.0%) of Vadodara, Gujrat [24]. Barui scheduled caste preschool children (65.3%) also from Purulia, W.B. [25]. In comparison to these studies, the ICDS children from Arambagh, Hooghly District, West Bengal represented the worst (85.2%) situation [26]. All the discussed (Table 5) studies were conducted in agricultural based rural areas. The situation is not worst like these children among the preschool children of Gaza Strip [27]. The prevalence of thinness, among them was only 4.2%.

CONCLUSION

From the present study, it can be concluded that the nutritional situation as measured by thinness of the ICDS children was not

good as expected. Not only the present study but also other studies from West Bengal as well as other parts of India showed that despite implementation programmes being initiated nearly 35 years back, the nutritional profile remains grim.

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REFERENCES

1. Victora CG, Vaughan JP, Kirkwood BR, Martines JC, Barcelos LB. Risk factors for malnutrition in Brazilian children : the role of social and environmental variables. Bull World Health Organ. 1986 : 64 : 299-309.

2. Black RE, Allen LH, Bhutta ZA, Caulfield L E, de Onis M, Ezzati M, Colin M, Rivera J. For the Maternal and Child Undernutrition Study Group. The Lancet, 2008. Published Online January 17, DOI:10.1016/S0140-6736 (07) 61690-0. (Http://www.who.int/nutrition/topics/Lancetseries_Undernutrition1.pdf ; Accessed on 25.03.2011).

3. SCN (United Nation Standing Committee on Nutrition), Fifth Report on the World Nutrition Situation: Nutrition for Improved Development Outcomes, 2004 : SCN, Geneva, Switzerland.

4. Gupta VM, Shukla KK. Epidemiology correlates of protein energy malnutrition in preschool children. Indian J. Prev. Soc. Med. 1992 : 23 : 26-32.

5. Behrman JR, Hoddinott J, Maluccio JA, Soler-Hampejsek E, Behrman EL, Martorell R, Ramirez-Zea M and Stein AD. What determines adult cognitive skills? Impacts of pre-schooling, schooling and post-schooling experiences in Guatemala. 2008. Discussion Paper 00826. (Article.sapub.org/10.5923.j.ijpbs. 20120202.07.html; accessed on 12.11.2011)

6. Bharati S, Pal M and Bharati P. Determinants of Nutritional Status of Pre-school Children in India. J. Biosoc. Sci. 2008 : Nov; 40 (6) : 801-14.

7. Bamji MS. Early nutrition and health Indian perspective. Current Science, 2003 : vol-85 : 1137-1142.

8. Economic Survey, Govt. of India. A report of the economic survey. 2002-2003.

9. Osmani SR. Nutrition and Poverty. Clarendon Press, Oxford. 1992.

10. Marins VMR and Almeida RMVR. Under-nutrition Prevalence and Social Determinants in Children Aged 0-59 Months. Niterol, Brazil. Ann. Hum. Biol. 2002 : 29 : 609-618.

11. Francis A, Okolo S and Okolo A. Nutritional Status of Newly Enrolled Primary School Children in Jos-Plateau, Nigeria. Pakistan Journal of Nutrition, 2010 : 9: 1166-1170.

12. Elizabeth Une A, Houmsou and Soumay R. Assessment of Nutritional Status of School Children in Makurdi, Benue State. Pakistan Journal of Nutrition, 2009 : 8 : 691-694.

13. World Health Organization. Child growth standards based on length / height, weight and age. Acta Paediatrica. 2006 : Vol.450 : 76-85.

14. Integrated Child Development Services (ICDS) Scheme" (http://wcd.nic.in/icds.htm). Ministry of Women & Child Development, Government of India. (Http://wcd.nic.in/ icds.htm. Retrieved 21 March 2011).

15. Mandal GC, Bose K and Acharya A. Stunting Among Rural Bengalee Children from ICDS Centers of Patashpur II Block, East Midnapur, West Bengal, India. Ind. J. Phys. Anthrop. & Hum. Genet. 2010 : Vol. 29. Nos. 1-2,: 99-107.

16. WHO. Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. Technical Report Series No. 854. World Health Organization, 1995 : Geneva, Switzerland, pp 1-3.

17. Lohman TG, Roche AF and Martorell R. Anthropometric Standardization Reference Manual. 1988, Chicago: Human Kinetics Books, pp 3-80.

18. Cole TJ, Flegal KM, Nicholls D and Jackson AA. Body mass index cut offs to define thinness in children and adolescents: International survey. BMJ, 2007 : 335 : 194.

19. World Health Organization. Use and Interpretation of Anthropometric Indications of Nutritional Status. Bull. WHO. 1986 : 64: 921-941.

20. Mishra BK and Mishra S. Nutritional anthropometry and preschool child feeding practices of working mother in central Orissa. Stud. Home Comm. Sci., 2007 : 1(2): 139-144.

21. Wickramasinghe VP, Lamabadusuriya SP, Atapattu N, Sathyadas G, kuruparanantha S and Karunarathne P. Nutritional status of school children in an urban area of Sri Lanka. Ceylon Med J, 2004 : Vol. 49 : 114-118.

22. Biswas S, Bose K, Bisai S and Chakraborty R. "Prevalence of thinness among rural Bengalee pre-school children in Chapra, Nadia District, West Bengal, India," Malaysian Journal of Nutrition, 2009 : vol. 15, no. 2, pp. 155164.

23. Das S, Bose K. Prevalence of Thinness among Santal Preschool Children using New Body Mass Index Cut-off Points. Journal of Anthropology, 2011; (http://www.hindawi.com/journals/janth/2011/602782; accessed on 22.09.2011).

24. Bhalani KD and Kotecha PV. Nutritional status and gender difference in the children of less than 5 years of age attending ICDS anganwadis in Vadodra city, Indian Journal of Community Medicine, 2002 : vol. 27, pp. 124129.

25. Das S and Bose K. Anthropometric characteristics and nutritional status of Barui pre-school children of Nituria Block, Purulia, West Bengal, Intern J Biol Anthropol, 2009 : Vol. 3, No. 2.

26. Mandal GC, Bose K and Bisai S. Thinness among the rural children of Bengal. Indian J Pediatr, 2009 : Vol. 76 : 817-819.

27. Kanoa BJ, Baker M. Zabut and Hamed AT. Nutritional Status Compared with Nutritional History of Preschool Aged Children in Gaza Strip: Cross Sectional Study. Pakistan Journal of Nutrition, 2011: 10 : 282-290.