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Growth and Nutritional Status of School Age Children (6-14 Years) of Tea Garden Worker of Assam

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ABSTRACT This study was conducted to assess the growth and nutritional status of school age children (6-14 years) of tea garden workers of Assam. Compared to NCHS standard and affluent Indian children, the mean height and weight of tea garden children was inferior at all ages. Assessment of nutritional status using WHO recommended anthropometric indicators revealed a high prevalence of malnutrition among tea garden school age children and malnutrition was both chronic and recent in nature. Prevalence of wasting, stunting and underweight was 21.2%, 47.4% and 51.7% respectively among the children in the age group of 6-8 years. Prevalence of stunting and thinness was 53.6% and 53.9% respectively among the children in the age group of 9-14 years age group.

INTRODUCTION

Anthropometry offers a reliable method to assess the nutritional status of the children (Bhasin et al., 1990). 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). World Health Organization (WHO) has recommended various indices based on anthropometry to evaluate the nutritional status of children (WHO, 1995). An attempt has been made to assess the nutritional status of the school age children (6-14 years) of tea garden community of Assam using WHO recommended anthropometric indices.

Tea garden workers have migrated to Assam in the latter part of nineteenth century to early part of twentieth century from central and south India viz. Madhya Pradesh, Bihar, Orissa and Andhra Pradesh (Griffiths, 1967). Main source of their livelihood is tea industry of Assam. They are socio-economically lagging behind and mostly illiterate. Poor socio-economic condition compounded by higher prevalence of communicable morbidities among children may adversely effect growth and nutritional status of tea garden children. There is paucity of anthropometric indices based information on nutritional status of tea garden children of Assam. Present study is expected to throw light on nutritional status of vulnerable population group and will provide a base line data for future research.

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MATERIAL AND METHODS

A total numbers of 606 (male-351 and female-255) from four randomly selected tea gardens of Dibrugarh district of Assam was included in the study. The ages of the children were obtained from birth record maintained in the garden and also interviewing mother with the help of local event calendar. Height and weight were measured using SECA balance and anthropometric rod. Heights were taken to the minimum of 1mm and weights were taken to the minimum of 100 gm with minimum clothing. Weighing scale was calibrated periodically against known standards and weighing scale was calibrated to the zero before taking every measurements. All the measurements were taken as per guideline of World Health Organization (WHO, 1995, 1983)

Mean and standard deviation of height and weight in each single year were calculated using EPI 6 software. Nutritional status was also assessed using different indices based on height and weight of children according to WHO technical report series-854 (WHO, 1995). WHO has recommended separate indicators for

Table 1: Anthropometric indices and cut-off-points

Indicators	*6-8 years*	
	Anthropometric variable	*Cut-off-points*
Stunting	Height-for-age	< -SD
Wasting	Height-for-weight	< -SD
Underweight	Weight-for-age	< -SD
	9-14 years	
Stunting	Height-for-age	< -SD
Thinness	BMI-for-age	< 5th percentile

children 9 years and above (adolescent ages). So, two different sets of indicators were used for 6-8 years age group and 9-14 years age group (Table 1).

Height and weight measurements of the children, taking age and sex into consideration, were expressed in terms of Z-scores relative to National Center for Health Statistics (NCHS) reference data recommended by the World Health Organization (WHO) using WHO Epianth statistical programme. Thus, those below -2 standard deviations of the NCHS median reference for weight-for-height, height-for-age, weight-for-age and are defined as wasted (as indicator of present undernutrition), stunted (as indicator of past or long term undernutrition) and underweight (convenient synthesis of both present and past undernutrition) respectively. For children 9 years and above, BMI (weight/height in meter^2) were calculated and a BMI value less than 5th percentile of reference data was considered as thinness (WHO, 1995).

RESULTS AND DISCUSSION

***Mean Height and Weight*:** The numbers of boys and girls in each single years and their mean height and weight with standard deviation is given in table 2. Results show that boys were heavier and taller than girls till the age of 10 years. However, from the age of 11 onward, the mean height and weight of girls exceeded the mean height and weight of boys.

The mean height and weight of children were found to be comparable to the ICMR pooled data and other studies from similar socio-economic conditions (ICMR, 1984; Sing, 1996). The mean height and weight of present study at all ages was also found to be more or less similar to previous report from tea garden (Chelleng et al., 1998). However, compared to NCHS standard and affluent Indian children, the mean weight and height were found to be much inferior at all ages (WHO, 1983; Agarwal, 1992). Mean height and weight of girls were equal or better than boys onwards from 10 years, which could be due to early beginning of pubertal growth spurt in girls than boys (Aneja, 1997).

Table 2: Mean and standard deviation of Height, Weight

Age in years			*Height in cm*			*Weight in Kg*		
			Mean	±	*SD*	*Mean*	±	*SD*
6 +	M 68	M	109.53	±	5.35	16.48	±	2.15
	F 40	F	108.93	±	6.37	15.90	±	2.19
7 +	M 63	M	116.27	±	8.20	18.55	±	3.15
	F 43	F	114.92	±	68.7	18.24	±	2.7
8 +	M 50	M	120.45	±	6.97	20.2	±	3.19
	F 38	F	119.90	±	5.97	19.72	±	2.90
9 +	M 60	M	125.63	±	8.40	21.98	±	4.64
	F 39	F	124.69	±	6.20	20.58	±	3.37
10 +	M 35	M	128.98	±	7.32	23.55	±	3.46
	F 31	F	128.75	±	5.1	23.37	±	3.08
11 +	M 15	M	132.06	±	3.98	25.18	±	2.07
	F 20	F	132.43	±	5.96	25.24	±	5.36
12 +	M 25	M	136.17	±	6.60	28.52	±	5.34
	F 18	F	136.36	±	5.96	28.81	±	4.91
13 +	M 14	M	142.40	±	8.49	32.6	±	5.09
	F 12	F	142.72	±	4.98	32.81	±	4.11
14 +	M 21	M	147.53	±	5.62	35.95	±	4.87
	F 14	F	147.72	±	5.15	36.00	±	3.7

Nutritional Status

6-8 Years: Prevalence of wasting, stunting and underweight was 21.2%, 47.4% and 51.7% respectively (Table 3). There was no significant differences in the prevalence wasting, stunting and underweight between boys and girls ($p>0.05$). A definite age trend was seen in the prevalence of wasting. However, no such trend was seen in case of stunting and underweight.

Prevalence of different patterns of malnu-

Table 3: Prevalence of wasting, stunting and underweight in the age group of 6-8 years

	Weight for height (wasting)			
	6 years	*7 years*	*8 years*	*Total*
Male	19(28.0%)	11(17.5%)	7(14.0%)	37(20.4%)
Female	11(27.5%)	09(20.9%)	7(18.4%)	27(22.3%)
Total	30(27.8%)	20(18.9%)	14(15.9%)	64(21.2%)
	Height-for-age			
	6 years	*7 years*	*8 years*	*Total*
Male	32(47.0%)	28(44.4%)	24(48.0%)	84(46.4%)
Female	21(52.5%)	21(48.8%)	17(44.7%)	58(48.8%)
Total	53(49.1%)	49(46.2%)	41(46.6%)	143(47.4%)
	Weight-for-age			
	6 years	*7 years*	*8 years*	*Total*
Male	36(52.9%)	33(52.4%)	26(52.0%)	95(52.5%)
Female	21(52.5%)	21(48.8%)	19(50.0%)	61(50.4%)
Total	57(52.8%)	54(50.9%)	45(51.1%)	156(51.7%)

Table 4: Prevalence of stunting and thinness in the age group of 9-14 years

	Height-for-age						
	9 years	*10 years*	*11 years*	*12 years*	*13 years*	*14 years*	*Total*
Male	28(46.7%)	20(57.1%)	7(46.7%)	14(56.0%)	8(57.1%)	11(52.4%)	88(51.8%)
Female	18(46.1%)	17(54.8%)	12(60.0%)	13(72.2%)	8(66.7%)	7(50.0%)	75(56.0%)
Total	46(46.5%)	37(56.1%)	19(54.3%)	27(62.8%)	16(61.5%)	18(51.4%)	163(53.6%)
	BMI for age						
	9 years	*10 years*	*11 years*	*12 years*	*13 years*	*14 years*	*Total*
Male	32(53.3%)	18(51.4%)	8(53.3%)	14(56.0%)	6(42.8%)	10(47.6%)	88(51.8%)
Female	23(59.0%)	17(54.8%)	13(65.0%)	10(55.5%)	5(41.7%)	8(57.1%)	76(56.7%)
Total	55(55.5%)	35(53.0%)	21(60.0%)	24(55.8%)	11(42.3%)	18(51.4%)	164(53.9%)

trition indicates that nutritional status of tea garden children was not different from those of Indian rural children. The findings of present study indicate that malnutrition of tea garden children was both due to long-term deprivation as well as recent causes. While malnutrition affects mainly preschool children, lost ground cannot be entirely made up in school age (Aneja, 1998). In India, prevalence of stunting, underweight was almost sixty percent among rural preschool children and prevalence of wasting was also high (Vijayaraghavan, 1998). Height-for-age reflects achieved linear growth, and its deficits (stunting) indicate long-term cumulative inadequacies of health and nutrition (WHO, 1995). Stunting of older children is a legacy of nutritional deprivation during early childhood. Present level of prevalence of stunting among tea garden children was not unexpected considering high prevalence nutritional assaults during early childhood among tea garden children (Medhi et al., 2004). Although, long term or chronic malnutrition was still high among older children, yet prevalence of recent malnutrition or wasting declined abruptly after the age of 6 years. This may be due to the fact that the older children can pick up food without much parental care in comparison to younger children.

9-14 Years: Prevalence of stunting was 53.6% (Table 4) in this age group. No definite age trend was observed in the prevalence of stunting. Prevalence of thinness was found to be 53.9%. A definite age trend was also not observed in the prevalence of thinness. Prevalence of both stunting and thinness was found to be higher among girls ($p>0.05$). The gender difference in the prevalence of thinness also continued during adult age group among tea garden workers of Assam (Biswas et al., 2002).

The study reveals a high prevalence of malnutrition among the school age children of tea garden workers of Assam and nature of malnutrition indicates that causes of malnutrition are not only recent but also long term deprivation. Urgent steps should be taken to improve nutritional status of children. Poor nutrition of children not only adversely affects the cognitive development of children, but also likely to reduce the work capacity in future.

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