Prevalence of low obesity and high under nutrition in socio economic status of school childrens

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Changing trends in body weights in children is important for public health policy. It can be said that children in developing countries presently suffer from double jeopardy of malnutrition. Urban children are afflicted with problems of over-nutrition while rural and slum children suffer from effects of undernutrition. To determine changing trends in nutritional status, body-mass index and obesity in school children aged 11-17 years are considered. All children being admitted in a government school in Warangal, Andhra Pradesh were evaluated in the year 2007 and 2008. Height was measured using a standard tape and weight was measured using a well-calibrated sprig balance. 442 school children were examined in the year 2007 and 374 in the year 2008 in classes 6th to 12th. There is an increasing trend in height, weight and BMI with increasing age in both the 2007 and 2008 years. In the year 2007, 11% were overweight and 5% were obese while in the year 2008, 10% were overweight and 6% were obese. Overweight corresponding to adult BMI of 25 to 29.9 kg/m^2 was present in 2% school children in both the examinations while the prevalence of obesity corresponding to adult BMI of >30 kg/m^2 was present in very small number (0.2% and 0.3%). At all the age groups there was a high prevalence of wasting in both examination, in 2007 wasting was present in 36.4% school children and in the year 2008 in 26.2% school children. There was a significant decline in prevalence of wasting from the year 2007 (36.4%) to the year 2008 (26.2%).The above results stated the need of urgent dietary intervention programme. Further studies are required to investigate into problem and to supplement the key nutrient which is required to ensure a good nutritional status in children.

Key words : Prevalence, Body mass index, Obesity, Under nutrition and malnutrition.

INTRODUCTION

Childhood obesity is a new epidemic worldwide. In recent years due to burgeoning fast-food industry in developed countries the problem of obesity in children has emerged as a major problem and it has been estimated that more than 50% of children in USA and many Western European countries are overweight of obese (WHO, 2000). In the US, prevalence of overweight doubled among children 6 to 11 years of age between the second National Health and Nutrition Examination Surveys (NHANES) between 1976 and 1980 and the third NHANES conducted in 1999 and 2000 (Dietz, 2004). A similar trend has been observed in Japan and the frequency of obese school children (>120% standard body weight) aged 6-14 years increased from 5% to 10% between 1974 and 1993 (WHO, 2000).

In developing countries such as India, especially in urban populations, childhood obesity is emerging a major health problem. Studies from metropolitan cities in India have reported a high prevalence of obesity among affluent school children (Sundaram *et al.,* 1988; Subramanyam *et al.*, 2002). On the other hand some studies reported a high prevalence of undernutrition among rural school children and children in urban slums (WHO, 2000;

Sachdeva, 2003) It can be said that children in developing countries presently suffer from double jeopardy of malnutrition. Urban children are afflicted with problems of over-nutrition while rural and slum children suffer from effects of under nutrition (Chatterjee, 2002). Changing trends in body weights in children are important for public health policy. This can be either evaluated using a prospective-study design or by sequential multiple cross sectional studies. In accordance with this, the present study was planned to determine the prevalence of low obesity, high undernutrition and to evaluate the changing trends in body-mass index, obesity in school girls aged 11-17 years in classes 6th to 12th.

MATERIALS AND METHODS

All children being admitted to a semi government school in Warangal were evaluated in the years 2007 and 2008. All the parents consented to medical examination of their children. History of medical illnesses, accidents and operations was recorded in a specific proforma. Height was measured to the nearest centimeter using a stadiometer and weight to the nearest half-kilo was measured using a well-calibrated spring balance. Children who agreed to a recent major illness (involving absence

from school for more than 7 days in the past 6 months) were excluded from the present analysis.

The data was analyzed using computer software SPSS version 13. Body-mass index (BMI) was calculated by dividing weight in kg by squared height in meters. Numerical variables are reported as mean ± 1 SD. Prevalence of obesity was determined for each class and age-group using criteria as suggested by WHO (2004). Obesity was also determined using criteria suggested by an international study group (Cole *et al.*, 2000) wherein overweight in children corresponds to adult BMI of 25-29.9 kg/m² and obesity corresponds to BMI > 30 kg/ m². Prevalence of wasting (low weight-for-age), stunting (low height-for-age), or both were determined using criteria of Indian Council of Medical Research (Sachdev, 1994).

RESULTS AND DISCUSSION

442 school children were examined in the year 2007 and 374 in the year 2008 in classes 6th to 12th. The age distribution and number of school children in each class is shown in Table 1. There was an increasing trend in height, weight and BMI with increasing age in both the years. There was a small increase in mean height and weight in the year 2008 as compared to the earlier year in various age groups but this was not significant. The mean BMI did not change significantly in any age-group between the two examinations. The prevalence of obesity determined using the percentile cut-offs is reported in Table 2. In the year 2007, 51 school children (11.5%) were overweight and 23 school children (5.2%) were obese while in the year 2008, 38 children (10.1%) were overweight and 24 children (6.4%) were obese. The present study showed the prevalence of obesity in different age-groups was also not significantly different in the two examinations.

The prevalence of obese children varied from less than 1% in Bangladesh and Philippines, about 2% in India, Brazil, and Indonesia to more than 5% in Iran, Jamaica and Chile (Verma *et al.*, 1994). Present study was confined to children aged 11-17 years and reports a higher prevalence of obesity. The prevalence of overweight and obesity has not changed over a period of 6 years in contrast to studies from Thailand (Kapil *et al.*, 2002). In recent years many studies have reported on prevalence of obesity in school children in various parts of India. Sundaram *et al.* (1988) reported a low prevalence of obesity among rural school children. Gupta and Ahmad (1990) diagnosed obesity using the standard criteria of BMI > 85th percentile for overweight and > 95th percentile for obesity and reported obesity in 7.8% of

Table 1: Anthropometric Indices in different age-groups in 2007 and 2008								
Age-group (yr)	2007				2008			
	No.	Height (cm)	Weight (kg)	BMI (kg/m²)	No.	Height (cm)	Weight (kg)	BMI (kg/m²)
11	68	139.2±8.1	28.9±5.9	14.8±1.9	54	143.9±7.2	32.6±2.2	15.0±2.2
12	51	143.9±7.4	32.6±6.6	15.7±2.4	52	144.0±8.2	32.8±7.0	15.7±2.7
13	62	148.1±7.4	35.9±6.5	16.3±2.3	44	151.8±6.1	37.4±7.4	16.2±2.7
14	72	152.0±5.9	39.1±6.5	16.9±2.6	49	154.2±6.0	41.1±7.4	17.3±2.8
15	65	153.8±6.3	40.6±6.1	17.2±2.3	58	156.6±6.0	42.9±7.0	17.5±2.8
16	66	154.5±6.3	43.7±7.0	18.3±2.9	51	157.1±5.7	44.9±7.6	18.2±2.7
17	58	156.6±6.1	45.9±8.2	18.8±3.3	56	156.5±5.4	44.0±5.7	18.0±2.5
Total	442	149.7±6.3	38.1±6.0	16.9±1.4	374	52.0±5.8	39.4±5.2	16.8±1.2

Table 2: Prevalence of overweight (BMI > 85th to 95th percentile) and obesity (BMI >95th percentile)						
Age-ground (yr)	2007			2008		
	No.	Over weight No. (%)	Obese No. (%)	No.	Over weight No. (%)	Obese No. (%)
11	68	10 (14.8)	2 (3.0)	54	6 (11.1)	3 (5.5)
12	51	5 (9.8)	3 (5.8)	52	3 (5.7)	2 (3.8)
13	62	3 (4.8)	6 (9.6)	44	4 (9.0)	2 (4.5)
14	72	12 (16.6)	4 (3.8)	49	6 (12.2)	4 (8.1)
15	65	7 (10.4)	3 (4.6)	58	7 (12.0)	3 (5.1)
16	66	8 (10.1)	3 (4.5)	51	6 (11.7)	4 (7.8)
17	58	6 (10.3)	3 (4.5)	56	6 (10.7)	6 (10.7)
Total	442	51 (11.5)	23 (5.2)	374	38 (10.1)	24 (6.4)

school children (n = 3861) in north India.

Prevalence of obesity reported in Table 3. Overweight corresponding to adult BMI of 25-29.9 kg/m² was present in 2.3% girls in both the examinations while the prevalence of obesity corresponding to adult BMI of >30 kg/m² was present in very small numbers (0.2% and 0.3%). The prevalence of undernutrition was also determined (Fig. 1) using the Indian Council of

Table 3: Prevalence of overweight and obesity						
Age-ground (yr)	2007			2008		
	Over weight	Obese	No.	Over weight	Obese	No.
11	68	4	0	54	1	1
12	51	3	0	52	3	2
13	62	3	0	44	4	0
14	72	5	0	49	7	0
15	65	2	0	58	3	0
16	66	4	1	51	2	0
17	58	7	1	56	1	0
Total	442	28 (6.3)	2 (0.4)	374	21 (5.6)	3 (0.8)

Medical Research criteria (Sachdev, 2003). These criteria classify wasting when height-for-age is > 90% and weight-for-age is < 80% of standard; stunting when height is < 90% and weight > 80% and combined wasting and stunting when height is < 90% and weight is < 80%. At all the age-groups there was a high prevalence of wasting in both the examinations, in 2007 wasting was present in 161 children (36.4%) and in the year 2008 in 98 children (26.2%). Prevalence of stunting alone as well as combined wasting and stunting was low (Fig. 1). There was a significant decline in prevalence of wasting from the year 2007 (36.4%) to the year 2008 (26.2%). Prevalence of
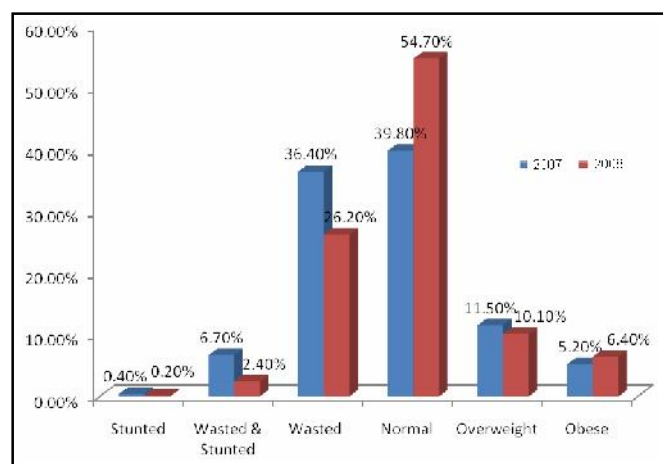

Fig. 1. Prevalence of underweight, normal weight and over-weight children in years 2007 and 2008

stunting (0.4% vs. 0.2%) and combined wasting and stunting (4.3% vs. 2.7%) did not show any significant change (Fig. 1).

Present study in a low socioeconomic status school also shows that mean BMI at 12 years of age is 15.7± 2.4 and 15.7 ± 2.7 and is similar to the low socioeconomic subjects in Delhi (Gupta and Ahmad, 2004). There was also unchanged trends in prevalence of overweight (11.5% in 2007, 10.1% in 2008) and obesity (5.2% in 2007, 6.4% in 2008) in children aged 11-17 years. The criteria for diagnosis of obesity in children have been criticized recently (Bailey and Ferro-Luzzy, 1995; Cole *et al.*, 2000). Cole *et al.* (2000) combined data from several European and Asian countries to determine childhood BMI that correspond to adult BMI of 25 kg/m² and 30 kg/m². Detailed age-specific algorithms were developed and it was recommended that these criteria should be used for diagnosis of obesity (Bhargava *et al.*, 2004). Using these criteria in the present study shows that obesity is present in only a small number of Indian school children. This indicates that either the previous criteria were more liberal in diagnosis of obesity or the Cole's criteria are not applicable to Indian and South Asian children. Significantly, there were no data from India or other developing countries in the Cole's metaanalysis and it is suggested that revised norms using data from many developing countries should be developed.

The above results stated the need of urgent dietary intervention programme. Further studies are required to investigate into problem and to supplement the key nutrient which is required to ensure a good nutritional status in children. More studies targeting the child and adolescent populations in different parts of the country are needed to accurately assess the burden of obesity and under nutrition and to devise suitable population health policy. On the other hand reducing the obesity producing environment in urban areas of developing countries may be more challenging. Government and nongovernmental organizations must play an active role in promoting and protecting an environment that supports the growth and development of infants and children, monitoring the food markets, and facilitating community-based initiatives that aim to promote healthy eating and physical activity. The other major challenge that encompasses the root cause of the problem is to reduce socioeconomic and health disparities in urban areas of developing countries such as India. Macroeconomic and public health initiatives are urgently needed in the country to achieve a balance.

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