Assessment of Nutritional Status of Boys and Girls in Government and Corporate School Children in Nambur Mandal, Guntur (Dt.) Andhra Pradesh, India.

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ABSTRACT

According to WHO, nutrition is the intake of food taken in relation to the body's dietary Needs. Good nutrition is an acceptable and well balanced diet with regular physical activities. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, damage the physical and mental development and reduced productivity. The purpose of study is to find the nutritional status of school going boys and girls in Government and Corporate school children in Nambur mandal, Guntur (Dt.) A.P. Anthropometry method, family income and dietary intakes were used in the present study. Basic variables like Hip circumference, WHR, BMI were taken for anthropometry measurements using standard techniques. 24 hour recall method was taken for dietary intake. The prevalence of over nutrition was significantly high in boys than girls. The data collected from two schools of boys and girls. According to the data it was clear that 37.7%, 24.2, 32.8 and 10.4 % of boys were belong to the Grade-1, Grade-2, normal, and overweight. Girls belong to 31% grade-1, Grade-2 30%, normal 32% and overweight 10% respectively. Hence comparatively boys BMI was higher than the girls.
Keywords: Dietary Needs, good nutrition, well balanced nutritional status, government and corporate schools, anthropometry, dietary intake, obesity etc.

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INTRODUCTION

The burden of obesity has increased exponentially, affecting all socio-economical groups of both developed and developing countries, irrespective of age, sex and ethnicity in recent decades. This prompted WHO to describe obesity as an escalating global epidemic [1].

Among the Indian, children in the age group of 6–18 years possess the existence of double burden of underweight and overweight. Parallel to persistent under nutrition, obesity rates are increasing globally, including those of many low and middle-income countries that had a very low prevalence [2].

In the past, obesity was considered as a problem of affluence, but now it is growing very fast in many developing countries. An estimated 42 million of school children aged less than 5years are overweight, and close to 35 million of these are living in developing countries. Further more in both developed and developing countries girls are proportionately more overweight than boys [3].

Worldwide, disease profiles are transforming at a rapid pace catching the attention of medical professionals and policy makers alike. This is particularly true in low and middle-income countries that form the major chunk of global population. The emerging epidemics of obesity, cardiovascular disease (CVD) and diabetes form the crux of this phenomenal change. Among these entities, obesity has become a colossal epidemic causing serious public health   concerns and contributes 2.6 million deaths worldwide every year. Obesity is an independent risk factor for CVD and is associated with an increased risk of morbidity and mortality as well as reduced life expectancy. The last two decades of the previous century have witnessed dramatic increase in health care costs due to obesity and related issues among children and adolescents [4].

Childhood overweight and obesity are the global problems that are in the rise. Obesity in children appears to increase the risk of subsequent morbidity, whether or not obesity persists into adulthood. Outcomes related to childhood obesity include hypertension, type 2 diabetes mellitus, dyslipidaemia, left ventricular hypertrophy, non-alcoholic stereo hepatitis, and obstructive sleep apnoea, orthopaedic and psychosocial problems. Studies on urban Indian school children selected from regions, report a high prevalence of obese and overweight in children. In addition, studies on Indian school children have also demonstrated that the prevalence of hypertension in overweight children is significantly higher than that of normal children.

According to WHO, 22 million children (under 5 years of age) are over weight. Obesity is evolving as a major nutritional problem in developing countries, affecting a substantial number of adults and resulting in an increased burden of chronic disease. National surveys conducted in the USA from the 1960s to the1990s, the prevalence of overweight in children increased from 5% to 11% [5].

The risk reducing prevalence of obesity has become the focus of great research work. The present study was divided into different sections for better understanding the problem.

1. Prevalence of obesity
2. Epidemiology of obesity
3. Risk factors in obesity
4. Other factors in obesity

Prevalence of Obesity

According to the age and sex wise the distribution of total number of children was screened. A total of 1098 children between 6-17 years of age were screened from a rural school of which 537 were boys and 561 were girl. The distribution of the sex in the present study includes 95th percentile of BMI of boys and girls. Healthy children have a BMI percentile ranging between 5th percentiles to 85th percentile. The children whose weight was more than 85th less than the 95th percentile were considered as overweight and obese who were equal to or greater than the 95[th]percentile[6].

The prevalence of overweight among the adolescents has nearly tripled. Prevalence estimated during 2003-2004 by NHANES, 2002 (7) indicated that 17% of adolescents were overweight which in turn implicates

the personal behaviour and socio environmental factors rather than genetic factors, as the primary factors responsible for this increase [8].

Accordingly, significant difference was noted in height, weight and BMI between LSES and USES. The prevalence of overweight and obesity in USES children was 16.75% and 5.59% in boys and 19.01% and 5.03% in girls respectively [9].

Epidemiology of Obesity

Childhood obesity affects both developed and developing countries of all socio-economic groups, irrespective of age, sex or ethnicity. It has been estimated worldwide, that over 22 million children under the age of 5 are obese, and one in 10 children is overweight. A wide range of prevalence levels exist, with the prevalence of overweight in Africa and Asia averaging well below 10% and in the Americas and Europe above 20%. The proportion of school-age children affected will almost double by 2010 when compared with the most recently available surveys from the late 1990s up to 2003. Obesity has become a serious public health concern affecting a significant portion of the population in countries like US. Overall, among the adults aged at least 20 yr in 1999-2002, 65.1% were overweight and 30.4% were obese. Among the children aged 6-19yr in 1999-2002, 31.0% were overweight and 16.0% were obese. Asian countries are not immune to this phenomenon. For example, in China, the prevalence of overweight and obesity among children aged 7-9yr increased from 1-2% in 1985 to 17% among girls and 25% among boys in 2006. In addition, the obesity prevalence varies across socio-economic strata. In developed countries, children of low socio-economic status are more affected than their affluent counterparts [10]. The opposite is observed in developing countries: children of the upper socio-economic strata are more likely than poor children to be obese. Indian data regarding current trends in childhood obesity are emerging. A recent study conducted among 24,000 school children in south India showed that the proportion of overweight children increased from 4.94% of the total students in 2003 to 6.57% in 2005 demonstrated the time trend of this rapidly growing epidemic. Socio-economic trends in childhood obesity in India are also emerging. A study from northern India reported a Childhood obesity prevalence of 5.59% in the higher socio-Economic strata when compared to 0.42% in the lower Socio-economic strata [4].

Environmental risk factors for obesity

Environmental risk factors for overweight and obesity are very strong and inter-related. Sub-optimal cognitive stimulation at home and poor socio-economic status predict development of obesity. Parental food choices significantly modify child food preferences, and degree of parental adiposity is a surrogate for children's fat preferences. Children and adolescents of poor socio-economic status tend to consume less quantities of fruits and vegetables and to have a higher intake of total and saturated fat 26-28%. Early rebound of BMI is linked to glucose intolerance and diabetes in adults about 29**.** Short sleep duration in children is also associated with an increase in the odds of becoming obese as well as an increase in body fat of 30% [4].

Risk Factors in Obesity

Obesity poses serious health risks such as diabetes heart disease, cancer and high blood pressure. The high price of obesity includes: Type 2 diabetes, Heart disease, Certain cancers (uterine, breast, colorectal, kidney and gallbladder), stroke, back and joint pain, osteoarthritis (degeneration of cartilage and bone of joints), infertility, sleep apnea and other breathing problems, depression, snoring and difficulty in sleeping, hypertension, gallbladder disease, high blood cholesterol, complications of pregnancy, menstrual irregularities, hirsute (presence of excess facial hair), stress in continence (urine leakage caused by weak pelvic-floor muscles), psychological disorders, increased surgical risk [11]

Other Factors in Obesity Socioeconomic Status:

Socio-economic status in childhood as defined by parental occupation (using the register general classification) if available, if not available, it was by maternal occupation when the child was 10 yrs old. The age at which the father left fulltime education was ascertained when the cohort member was 7 and 11 yrs of age. Data at age of 7 years were used if data at age 7 yr were missing. The age at which the mother left fulltime education was also ascertained when the cohort member was 11 years.

Modernization and increasing urbanization

A price, humankind has had to pay for increasing modernization and urbanization is so called disease of civilization and obesity is considered as the first among them, as it seen as the first among them, as it seen as the first wave usually followed by the other non communicable diseases. The factor implicated include changing lifestyle, sedentary activates and eating habits discussed earlier and the current rend indicators that the study increases in rated of obesity are greater in urban areas.

Hereditary factors

Studies have suggested that there are people who are more prone to put-on weight than others and in these, the condition result from a life style which factors a positive energy balance to which they have an inherited susceptibility. It has been shown that obesity tends to run in families and obese parents tend to have obese children [12], 2006 showed that the relative risk for overweight is increasing up to 4 folds for higher levels of obesity among siblings of obese parents.

Miscellaneous factors

Other miscellaneous factors linked to development of obesity include cessation of smoking, excessive alcohol consumption drugs such as corticosteroids, cyproheptadine, tricycle anti depressants and disease status such as hypothyroidism, crushing's disease etc. Further, countries under going nutritional transition have high levels of stunning which is believed to be a risk factor for obesity (Barkers hypothesis). Evidence from animal, human studies suggests that malnutrition in utero or in hormonal alteration and a predisposition to metabolic disorders and obesity.

The objectives of the study are

- ➢ To find out the prevalence and factors associated with obesity among school going children
- ➢ To study the dietary and Nutrient intake of school going children
- ➢ To study the anthropometric data analysis for WHR and BMI.

METHODOLOGY

The present work is on prevalence of obesity in school going children. The main focus of the present study were to find out the prevalence and factors associated with obesity among school going and adolescents boys and girls 11-15 years of age. To achieve the objectives the following parameters were selected.

Sample selection

For present study, samples were selected from two schools i.e. corporate and government school situated in and around Acharya Nagarjuna University, Guntur dt., A.P. These subjects were taken to study obesity in School going children.

General information

Age, sex, parent education, occupation, type of family, income level, family size, physical activity and life style characteristics were collected by using prepared questionnaire.

Anthropometric parameters

- Hip circumference
- WHR
- BMI

Dietary and nutrient intakes

Recall method and weighment method of 24hrs time period were used to collect the 3 days diet i.e. two week days and one week end. Dietary pattern, dietary intakes, nutrition composition were calculated by using NIN nutrient composition tables (ICMR, 2010).

- **Hip circumference**: A measurement of the largest distance around your hips and butt, typically recorded in inches or centimeters. This measurement can be used to track changes in size during weight loss efforts and can also be used with our waist circumference to calculate our waist to hip ratio.
- **Waist and Hip ratio:** The abdominal girth was measured in cms using a tailors tape following the method described by Ian, J et al., [14]. The subject was made to stand erect with abdomen relaxed. The tape was held behind the subject with an edge in horizontal plain throughout the centre of the umbilicus. The tape was then wrapped carefully around the subject using tar sousing it.

Body mass index

The body mass index (BMI), or Quetelet index, is a measure of relative size based on the mass and height of an individual. The index was devised by Adolphe Quetelet and the formula given by him was using this formula we calculate the BMI as,

$$BMI = \frac{\text{Weight (Kg)}}{\text{Height (m}^2)}$$

Table 1: 95th centile values of weight (kg), height (cm) and BMI by age and gender rural India (16 states) Source: ICMR, 2010

	Males			Females			
S.NO	Weight (Kg)	Height (cm)	BMI	Age (years)	Weight (kg)	Height (cm)	BMI (kg)
1	34.1	144.8	16.3	11+	34.8	145.3	16.5
2	38.0	151.1	16.6	12+	39.0	150.2	17.3
3	43.3	157.0	17.6	13+	43.4	153.8	18.3
4	48.0	163.0	18.1	14+	47.1	157.0	19.1
5	51.2	166.3	18.6	15+	49.4	158.8	19.6

RESULTS AND DISCUSSION

The present study is under taken on the "comparative study of obese children in government and corporate schools children of age groups 11-15yrs. Obesity is the current burning public health problem in the world in all age groups. The children from two schools near the Nagarjuna University of Guntur Dt. A.P. were selected for the present study. 100 school going boys and girls were selected and their diet, nutritional status and other aspects were recorded. The results obtained were discussed in this chapter under the following sections.

1. The first section consists of general information of the subjects
2. The second section deals with the anthropometric status of school going children
3. The third section related to food and nutrient intake of school going children.

General Information of the Subjects

The general information of the obese school going children in two schools was taken and shown. Previously, age, family size, literacy, type of family, income level and diet history have been taken into consideration for the study and results are given.

Anthropometric Assessment of Obese Boys and Girls

Taking anthropometric measurements is an important aspect to know individual body composition.

Waist Hip Ratio

Waist hip ratio is the widely accepted from of fat pertaining measurement. The mean waist hip ratios of obese school going boys from two schools were 0.89 and 0. 90. For girls the mean values were 0.89 and 0.91 respectively.

TABLE 2: Mean values of Waist /Hip Ratio

Boys	MEAN±SD	Reference standard	% adequacy
Govt	0.89±0.04	0.89	100
Corporate	0.90±0.06		101.1
Girls			
Govt	0.89±0.07	0.90	98.9
Corporate	0.91±0.04		101.1

Body Mass Index

Body mass index is help full in determining whether an individual is obese (or) normal. The individual's body mass index is compared with usually with a reference standard and categorized accordingly. The data collected from two schools of boys and girls. According to the data it was clear that 37.7%, 24.2, 32.8 and 10.4 % of boys were belong to the Grade-1, Grade-2, normal, and overweight. Girls belong to 31% grade-1, Grade-2 30%, normal 32% and overweight 10% respectively. Hence comparatively boys BMI was higher than the girls.

TABLE 3: Body mass index of the subjects

BMI Grade	Boys%	Girls%
Grade-1	37.7	31
Grade-2	24.2	30
Normal	32.8	32
Over weight	10.4	10

The third section related to food and nutrient intake of school going children

Dietary history can be an essential component to understand a person's dietary habit, choice of food and eating pattern. At times this can be use full in assessing an individual's care of obesity to an event.

Dietary and Nutritional intakes

Data on dietary consumption of subjects were collected using 24hrs recall and weightment method for 3 days. Standard big and small stainless katories or set of tea and table spoons used in nutritional laboratory were distributed to the subjects to collect quantitative food intakes. The subjects were requested to report about their dietary intakes for the 3 days.

Table 4: Nutrients intakes of obese school going children boys and girls.

Nutrients	Boys		RDA	% Deficit	% Adequacy	Girls		RDA	% Deficit	% Adequacy
	Mean± SD					Mean+ SD				
	Govt	Corporate				Govt	Corporate			
CHO	106.9±37.7	149.10±57.9	200	28.31	71.69	134.4±23.08	152.3±57.5	200	11.76	88.24
Calcium	290.9±103.8	484.2±120.6	600	39.3	60.07	305.98±99.7	486.5±122.9	600	37.11	62.89
Vit-A	734.9±447.9	1276.3±619.2	2400	42.42	57.58	701.2±545.1	1248.8±255.7	2400	43.86	56.14
Vit-C	35.28±22.8	30.5±7.02	40	15.6%	115.6	27.5±13.9	30.18±7.16	40	8.89	91.11

CHO Intake

The mean CHO intake of boys was 106.9 and 149.1, RDA was 200. Girls mean CHO intake was 134.4, and 152.3, RDA was 200.
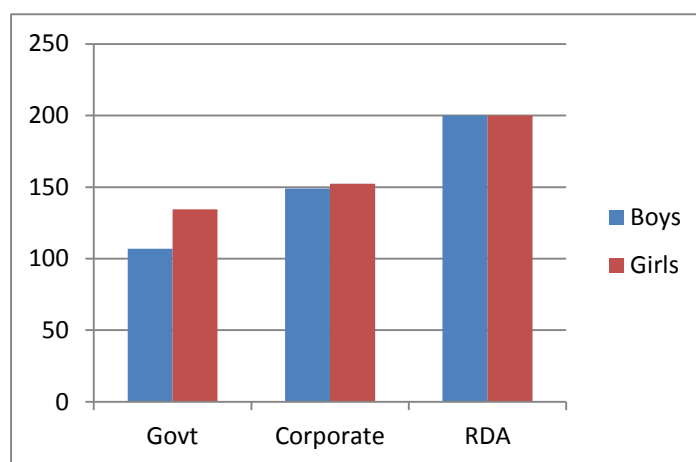

Figure 1: Mean intake of CHO

Calcium Intake

The boys mean take of calcium was 290.9, and 484.2. RDA was 600. The girls mean intake of calcium was 305.9, 486.5. RDA was 600.
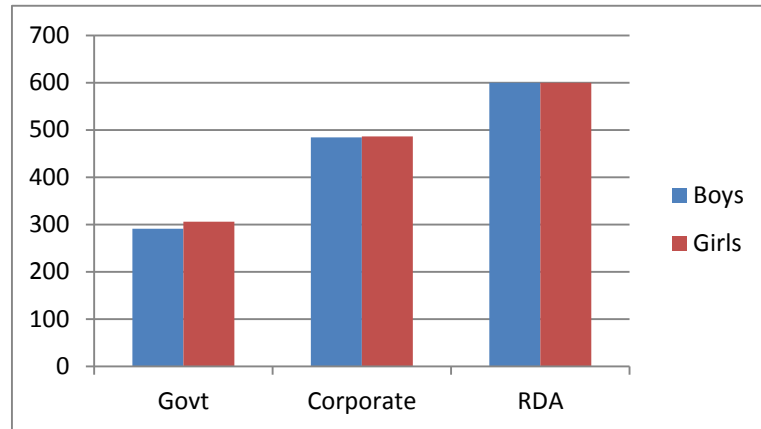
Figure 2: Mean intake of calcium

Vitamin A Intake

The boys mean take of vitamin-A value for boys 734.9 and 1276.3, RDA was 2400. For girls mean in take vitamin-A 701.2 and 1248.8, RDA was 2400.
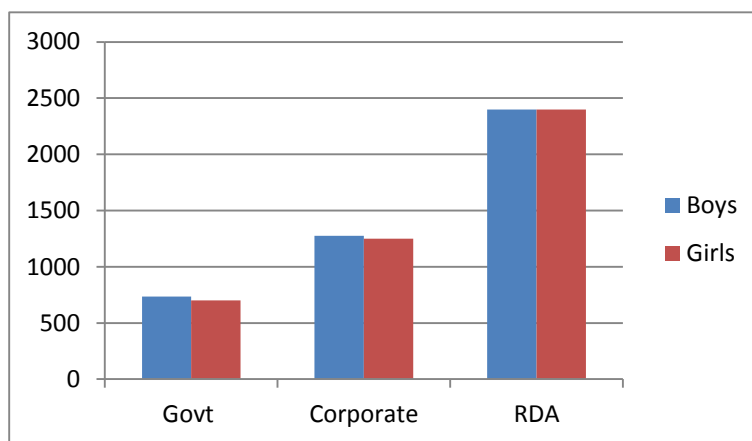

Figure 3: Mean intake of vitamin-A
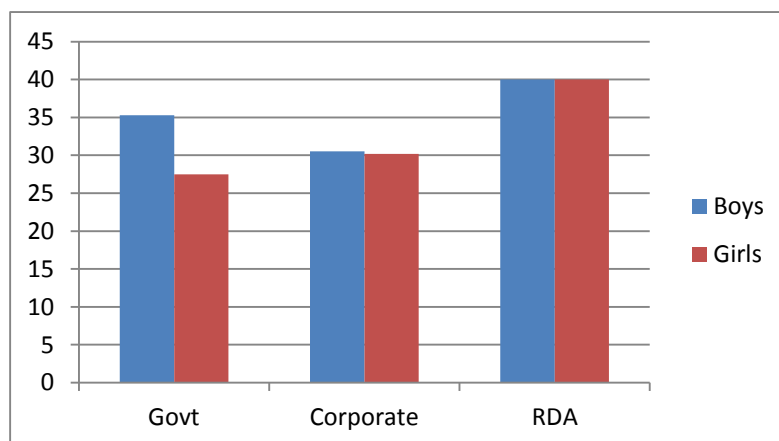
Vitamin C Intake

Figure 4: Mean intake of vitamin-C

The boys mean intake of vitamin-c values were 35.28 and 30.5, RDA was 40. For girls mean intake vitamin-c were 27.5 and 30.18, RDA was 40 respectively.

Finally, the nutrient intake of boys and girls were studied. The CHO, calcium and vitamins intake was less both in boys and girls of govt schools when compared to the corporate schools. Overall both the subjects of two schools showed more variation than RDA. The present results on agreement with Minati Singh, 2014 [15] reported that the habit of eating fast food items between meals is common among teenagers.

SUMMARY AND CONCLUSION

Adolescents generally undergo a period of great storm and stress as well as immense physical, mental and emotional potential. 10–18 years of age group is very dynamic period of human life which requires more nutrition in terms of body cell mass. Life styles of the adolescents influence their intake of nutrients and affect their food habits as well as their physiological requirements for nutrients.

Nowadays, Obesity is becoming a worldwide problem that is affecting all levels of the age groups in the society which is being described as a global epidemic. The epidemic of school going children showed obesity which is well documented and presented a major health issue that gave a new path in the medical field to find a new solution to overcome the present burning problem. It is important to understand the nutrient intake patterns to overcome the increased risk of overweight which in turn leads to obesity in youth.

Suggestions for Further Study

- Many schools and large samples could be taken
- The same study on the biochemical aspect (blood sugar levels and HB levels) can be included as it helps in enthusiastic participation of the subjects

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