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STUDY ON NUTRITIONAL DISORDERS AMONG SCHOOL GOING CHILDREN IN A SOUTH INDIAN CITY

DR.PAVAN KUMAR KULKARNI * AND DR.MASEER KHAN

Asst. Professor, |Department of Community Medicine, Deccan College of Medical sciences, Hyderabad.

ABSTRACT

According to survey by FAO [2006] [1] on one side there is still prevalence of malnutrition and other deficiency diseases like anaemia, vitamin A and iodine deficiency, improper immunization and food insecurity, while on the other side overweight and obesity are rampant among children in India. The consequences of underweight and deficiency diseases as well as overweight and obesity are extensive among children, resulting in reduction in the rate of productivity. The study included a sample of 1575 matriculation school children aged six to fifteen years that included 20% children from each grade (one-ten) and 25% children from each area and from each socioeconomic strata (urban with high, middle and low SES and rural with low/disadvantaged SES).The selection was based on random sampling technique with the teachers allotting the students as per the roll order on a random basis.

Common deficiency diseases prevalent among the school going children were Vitamin A deficiency, anaemia and skin infections. Among the deficiency symptoms, as diagnosed through clinical examination by a physician, anaemia was predominant in 650 (70.2%) of preadolescent girls. The prevalence of obesity is more among adolescent boys (24.2%) than adolescent girls (23.3%). In the adolescent age group of 12-16 years, 12 boys from matriculation schools were found to have elevated blood pressure, both systolic and diastolic, while among girls six from matriculation schools were found to have high blood pressure.

Key words: Nutritional disorders,school going children,obesity.

DR.PAVAN KUMAR KULKARNI
Asst. Professor, |Department of Community Medicine, Deccan College of Medical sciences,
Hyderabad

Corresponding author

INTRODUCTION

According to survey by FAO [2006] [1] on one side there is still prevalence of malnutrition and other deficiency diseases like anaemia, vitamin A and iodine deficiency, improper immunization and food insecurity, while on the other side overweight and obesity are rampant among children in India. The consequences of underweight and deficiency diseases as well as overweight and obesity are extensive among children, resulting in reduction in the rate of productivity. WHO/FAO report (2003) ,[2] the consequence of malnutrition has severe long-term impact for individual educational achievement, labour productivity and economic growth, especially in developing countries like India. The World health report (2002) [3] lists overweight as the fifth most serious risk factor for both developed and developing countries. The need of the hour is to determine strategies to prevent the occurrence of both underweight as well as overweight and obesity as well as avoid nutritional deficiencies among children in order to increase their capacity in education as well as extracurricular activities to enable them to grow into complete individuals, with mental as well as physical prowess. Obesity is a global epidemic and children are the worst affected with an estimated 10% of school-aged children being overweight and one quarter of these being obese worldwide [4,5]. The study aims to explore determinants of nutritional disorders among school children . With the overall objective of creating awareness and increasing knowledge of the students, parents and teachers on diet and nutritional habits, the present study was conducted among school going children with the objectives of identifying nutritional deficiencies, underweight and overweight among school children, assess their socio economic status, determine the medical history of their family members as well as that of the children, measure their height, weight and other parameters of body dimensions as well as determine their nutritional and lifestyle habits.

MATERIALS AND METHODS

Selection of area & samples

For obtaining information about the prevalence of underweight and overweight as well as obesity, urban area of Hyderabad city were the target areas, with five of Matriculation schools were selected. The study included a sample of 1575 matriculation school children aged six to fifteen years that included 20% children from each grade (one-ten) and 25% children from each area and from each socioeconomic strata(urban with high, middle and low SES and rural with low/disadvantaged SES). This selection was based on random sampling technique with the teachers allotting the students as per the roll order on a random basis.

DATA Collection

Sampled schools were visited on pre-arranged dates in summer 2011 by a team of trained senior medical students lead by the Principal Investigator. Health education of children and teachers was also carried out after data collection in the respective school.

The nutritional status of the children was analyzed by measuring their body dimensions such as height, weight. a) Height: Height was recorded to the nearest 0.1 cm using a stadiometer, the student standing barefoot with his or her heels against the upright bar of the scale while standing erect.

b) *Weight:* Weight was recorded using a portable spring balance checking for accuracy with standard weights prior to taking the weight. Overweight and Obese children were then identified using the International obesity task force (IOTF), (2009)[6] cut-off values. BMI-for-age is the anthropometric index of relative weight recommended by the international expert committees [7]. Measurement of blood pressure: Using the standardized procedure suggested from the National high blood pressure education

program working group on high blood pressure in children and adolescents the systolic and the diastolic blood pressure of the selected children were measured (US Dept. of Health & Human Services, 2007) [8]. Study instrument was a structured questionnaire designed in English that included the following sections: a) demographic information (gender, date of birth, residential address and parental education), b) family-based characteristics (parental working status, number of siblings and number of persons in child's living room), c) nutritional and life style disorders. Study instruments and procedures were pre-tested in the field and modified accordingly Children were interviewed in presence of their class teacher (guardian) by senior medical students trained in the interviewing techniques, and the responses were based on self-recall. Informed consent statement was printed on the study forms. Verbal informed consent for the child to participate in the study was taken from class teachers and school heads. As the study involved no invasive procedure, verbal informed consent was deemed sufficient. The study was approved by the Ethical Review Board of Deccan College of Medical Sciences, Hyderabad. Permissions to conduct the study were granted by the Departments of Education and Health Hyderabad, AP and the sampled schools.

Statistical analysis

Data were entered and analyzed by manual and computerized checking using MS EXCEL. Age was calculated to the precise day by subtracting the date of birth from the date of examination. Overweight (> +1 SD) and obesity (> +2 SD) were defined using the WHO child growth reference 2007 [9,10].

Table-1
Age & Sex wise distribution of students (N=1575)

Age inYears	Boys (N=825)		Girls (N=750)	
	N	%	N	%
6- 8	275	33.3	260	34.6
9-11	200	24.2	190	25.3
12-15	350	42.4	300	40
Total	825	100	750	100

This table shows age and sex distribution of matriculation school students. Out of total 1575 students, 825(52.38%) are boys and 750 (47.61%) were girls. Majority of the students (42.4% & 40% respectively) among boys and girls are in the age group of 12-15 years,.

Table- 2
Order of birth of Subjects(N= 1575)

	Order of birth		
Sex	First order	Second order	Third order
Male(n=825)	338(40.96%)	269(32.60%)	218(26.42%)
Female(n=750)	346(46.13%)	238(31.73%)	166(22.13%)

Majority of the children of matriculation school, belong to first order of birth, 724 (45.96%) . A study done by Adlakha et al [11] captured that higher proportion of urban married women (51%)

use contraceptives than rural married women (37%) This might be a contributory factor for the lesser number of children in urban areas.

Table 3
Family Type and Socio Economic Status (N=1575)

Type of the Family	No. of students (%)
Nuclear	1134(72%)
Joint	315(20%)
Single parent	126(8%)
Socio Economic Status Scale (Urban) of the student`s family	
Upper class	300(19.05%)
Upper middle class	250(15.87%)
Middle class	280(17.78%)
Lower middle class	420(26.67%)
Lower class	325(20.64%)

Table 3 shows the pattern of nuclear and joint families among the selected urban students and the socioeconomic status of the student`s families. From Table 3 it can be deciphered that in urban areas, the prevalence of nuclear family was predominant 1134 (72%). 126 (8%) students have single parents. Single parenthood in India may be the result of many things. In most cases it is an unforeseeable tragedy as in the death of one parent, divorce, or abandonment by one parent (Dhanyasree,2007) [12].And it is also seen that 87.5% and 94.4% of boy and girl students who were having single parents have anaemia(Table-4). It is also captured in the study that 66.66% and 77.7% of male and female students respectively were suffering from Vitamin A deficiency. These values when compared with the students who have both parents were significantly high. So it can be inferred that single parenthood is a major problem in India when nutrition of a child is concerned. Policy makers should take strategies which will concentrate on the nutrition of the children who have single parent.

Table - 4
Table showing relationship of single parenthood to Malnutrition of the children

		Anaemia	Vitamin A deficiency	skin infections
Single parent	Male(n=72)	63(87.5%)	48(66.6%)	32(44.4%)
	Female(n=54)	51(94.4%)	42(77.7%)	36(66.6%)
Both parents	Male(n=753)	490(65%)	120(15.9%)	257(34.1%)
	Female(n=696)	471(67.6%)	170(24.4%)	375(53.8%)

Table5
Educational Status of the Parents in the Urban area

Educational Status	Father (N=1500)	Mother(N=1450)
	No.(%)	No.(%)
Professional degree	20(1.3%)	0
Post graduate	30(2%)	0
Graduate	50(3.3%)	30(2%)
Higher Secondary	700(46.6%)	650(44.8%)
High School	400(26.6%)	450(31%)
Middle School	100(6.6%)	150(10.3%)
Primary Education	80(5.3%)	20(1.3%)
Illiterate	120(8%)	150(10.3%)

Table 5 shows the distribution of parents of the school going children according to their educational qualification. Majority of the parents, both father and mother(46.67% & 44.82%) respectively   are having higher secondary school qualification. Parental education plays a major role in upbringing of children. Private schools insist on both parents being educated to enroll their wards in the schools. Maitra and Sharma (2009) [13] associate the educational levels of mothers with the education of their children with well-educated mothers ensuring that their children are also well educated. It is well documented in the table-6 that maternal education is having upshot effect on the malnourishment of the children as it was found that 72% of the malnourished children`s mothers were found to be illiterates and the association was found to be highly significant

Table - 6
Table showing relationship of students malnourishment with mothers literacy levels

Mothers Education	Malnourished students	Well-nourished students
Illiterate mothers(150)	108(72%)	42(28%)
Literate Mothers(1300)	580(44.6%)	720(55.4%)

$X2=40.45$ P=<0.00001 df=1 Relative Risk=1.61 at CI=95%

Table 7
Prevalence of Diseases among family members of students

Diabetes Mellitus in family	Pre adolscent (6-11yr) No.(%)	Adolscent(12-15yrs) No.(%)
Father	25 (2.7%)	60 (9.2%)
Mother	20 (2.2%)	54 (8.3%)
Uncle\Aunt	10 (1.1%)	30 (4.6%)
Grand parent	30 (3.2%)	125 (19.2%)
Cardiovascular diseases in family		
Father	20 (2.2%)	45 (6.9%)
Mother	15 (1.6%)	50 (7.7%)
Uncle\Aunt	12 (1.3%)	45 (6.9%)
Grandparent	35 (3.8%)	150 (23%)

Table 7 predicts the prevalence of two major non communicable diseases among parents of matriculation school students. Table 7 depicts the disease pattern among the parents of the preadolescent and adolescent school going children. It can be observed that when compared with pre adolescent's parents, the parents of adolescents had greater prevalence of all the 4 diseases mentioned. This might be contributed to affluence (diabetes) and ignorance (CVD). Pancholia (2009) [14] infers that life style changes in families are related with physical activity, food habits and tobacco consumption / smoking. These are mainly due to affluence, urbanization and mechanization.

Table 8
Nutritional Disorders among School Going Students

	Anaemia	Vitamin A defeciency	skin infections
Preadolscents(n=925)	650(70.2%)	270(29.2%)	350(37.8%)
Adolscents(n=650)	425(65.3%)	110(16.9%)	350(53.8%)

Common deficiency diseases prevalent among the school going children were Vitamin A deficiency, anemia and skin infections. Among the deficiency symptoms, as diagnosed through clinical examination by a physician, anemia was predominant in 650 (70.2%) pre adolescent girls of Matriculation school. The main symptoms presented were brittle nails, pale tongue and eyes, easy fatigue and hair loss. Vitamin A deficiency was presented in the form of poor adaptation to darkness, dry skin and dry hair. From the table it is evident that 270 (29.2%) pre-adolescent girls and 110 (16.9%) adolescent girls from matriculation schools had VAD. In the adolescent age group of 12-16 years, 12 boys from matriculation schools were found to have elevated blood pressure, both systolic and diastolic, while among girls six from matriculation schools were found to have high blood pressure. An association between blood pressure and body mass index (BMI) suggesting that obesity is a strong risk factor for developing childhood hypertension has been brought out by Luma and Spiotta (2006) [15].

Table 9
Distribution of students   according to their BMI values

	SEX	Obese	Overweight	Underweight	Normal
Pre Adolscent	**Boys (N=475)**	50 (10.5%)	125 (26.3%)	155 (32.6%)	145 (30.5%)
	Girls (N=450)	70 (15.5%)	130 (28.8%)	145 (32.2%)	105 (23.3%)
Adolscent	**Boys (N=350)**	85 (24.2%)	75 (21.4%)	80 (22.8%)	110 (31.4%)
	Girls (N=300)	70 (23.3%)	65 (21.6%)	110 (36.6%)	55 (18.3%)

Table 9 shows the distribution of Matriculation School students according to their BMI values. It can be inferred that the prevalence of obesity is more among adolescent boys (24.2%) than adolescent girls (23.3%). However the trend is reversed in underweight category with 36.6% of adolescent girls being underweight compared to 22.8% of adolescent boys.Whereas in pre adolescent students the prevalence of obesity is higher among girls (15.5%) than compared to boys (10.5%).   A trend of increasing overweight was seen till the age of 11 years for boys, after which the percentage of overweight reduced such that at 11 years of age 26.3% of boys were overweight while at 15 years of age it reduced to 21.4%. Among the girls, a similar trend was observed with regards to overweight, with 28.8% of girls remaining overweight at 11 years while at 15 years it reduced to 21.6%. Lazzarie et al. (2008) [16] opine that the trend in the prevalence of overweight (including obesity) among girls from 9-15 year old strongly decreased, while the prevalence of thinness increased. In boys, this decrease was less marked and the prevalence of thinness displayed an irregular trend, with an increment from 9-11 year old and a decrease from 13-15 year old.

The trend in the prevalence of normal weight increased with age, with a higher prevalence among boys than girls. Biro and Wien (2010) [17] bring out the consequences of childhood and adolescent obesity as earlier puberty and menarche in girls, type 2 diabetes and increased incidence of the metabolic syndrome in youth and adults, and obesity in adulthood. These changes are associated with cardiovascular disease as well as with several cancers in adults, likely through insulin resistance and production of inflammatory cytokines. In addition, the sex difference in overweight trends may relate to the emerging body image (preference of thinness) among adolescent females (Wang et al., 2002) [18].

CONCLUSIONS

Education of mothers, housing space, family size, religion and sex of children had significant effects on the nutritional status of children. When compared with pre adolescent's parents, the parents of adolescents had greater prevalence of all the 4 diseases mentioned. This might be contributed to affluence (diabetes) and ignorance (CVD). Life style changes in families are related with physical activity, food habits and tobacco consumption / smoking. These are mainly due to affluence, urbanization and mechanization. Common deficiency diseases prevalent among the school going children were Vitamin A deficiency, anemia and skin infections. Among the deficiency symptoms, as diagnosed through clinical examination by a physician, anemia was predominant in 650 (70.2%) pre adolescent girls. The prevalence of obesity is more among adolescent boys (24.2%) than   adolescent girls (23.3%). However the   trend is reversed   in underweight category with 36.6% of adolescent girls being underweight compared to 22.8% of adolescent boys.

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