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ASSESSMENT OF NUTRITIONAL STATUS AMONG SCHOOL CHILDREN BY COMPARING IT WITH TWO TYPES OF STANDARDS FOLLOWED IN INDIA IN A RURAL AREA IN TAMIL NADU

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ABSTRACT

Background: High prevalence of low birth weight, high morbidity and mortality in children and poor maternal nutrition of the mother continue to be major nutritional concerns in India. Although nationwide intervention programmes are in operation over two decades, the situation has not changed much. The 11-18 years old children if they have to reach adulthood in a healthy state it becomes necessary to provide services with political commitment so their nutritional status is improved **Objective**: To assess the nutritional status of the adolescent school children of Sri Vidya Mandir Matriculation and Higher Secondary School near Attaiyampatti in Salem district of Tamilnadu, by comparing it with two types of standards followed in India. **Materials and methods**: It is a cross sectional study, with a total of 957 students (617 boys and 340 girls)aged between 11-18 years studying in the Sri Vidya Mandir Matriculation and Higher Secondary School. **Results** : Anthropometric measurements from the participating children were collected. The height and weight of the children were compared with ICMR guidelines. Among the 617 boys, 70 boys (11%) satisfied the ICMR guideline values and 62 boys (9%) were overweight compared to the ICMR guidelines. Remaining 485 boys (80%) were below the ICMR guidelines. Similarly out of the 340 girls, 51 (15%) satisfied the ICMR guideline, 56 (16%) girls were overweight and 233 girls (69%) were below ICMR guidelines. Regarding height 30% of the boys and 39% of the girls satisfied the ICMR guideline values.

Key words: Nutritional status, rural area, school children, Tamil Nadu

INTRODUCTION

Among children the nutritional requirements increases because of the increased growth rate. The monitoring of children's nutritional status is a fundamental tool for the evaluation of their health condition. If offers a unique opportunity to objectively assess the health of the adolescent population. Anthropometry has been used during childhood and adolescence in many contexts related to nutritional status (WHO, 1995).

One of the major health problems in many developing countries including India is widespread prevalence of under nutrition among school children. The scourge of under nutrition is even more acute among rural children[1]. The probable reason for under nutrition may be because about 20 – 35% of the people are below poverty line in the different states of India and have low purchasing power. Ignorance of balanced

diet for school children and faulty dietary habits are also likely reasons for undernutrition.

Agricultural progress in the last decade has made India self sufficient in major food grains[1]. Yet under nutrition continues to be major nutritional problem especially in rural population .because of the probable reasons mentioned in the above paragraph.

Adolescence, a period of transition between childhood and adulthood, occupies a crucial position in the life of human beings. This period is characterized by exceptionally rapid rate of growth.

The UN sub committee on Nutrition meeting held in Oslo in 1998 concluded that more data on health and nutrition of school age children are needed to assess the magnitude of the problem. It is also believed that the scale of nutritional problems may have been previously under estimated. Traditionally the main health indicator used by health planners has been mortality rate. Adolescence has the lowest mortality among the different age groups and has therefore received low priority. However, recent studies have shown that the prevalence of malnutrition and anemia is high in these age groups[2].

MATERIALS AND METHODS

A total of 965 students (625 boys and 340 girls) studying in Sri Vidya Mandir Matriculation and Higher secondary School , Attaiyampatti, Salem, were included in the study. About 90% of the students are day scholars and only 10% are hostlers. The average income of the parents of the students was roughly about Rs.7500 per month. The study has been conducted as a part of routine school health examination. The study period was from August 2009 to November 2009. Physical examination of all children was carried out, and their height (nearest to 0.5cm) and weight in kg. (Nearest to 100gms) were recorded. The mean weight and height of the children according to age and sex were compared with mean weight and height for age as per the ICMR standards[3], the classification of malnutrition as per IAP standards[4] and the BMI was compared with WHO standards[5].

RESULTS

The age wise and sex wise distribution of the 957 students are given in **Table 1**. The total number of boys were 617 and total number of girls were 340.

The distribution of the students according to their age and weight in comparison with the ICMR guideline values are given in table 2. It is seen from **Table 2,** that the mean weight in both males and females are less than ICMR guideline value in almost all the age groups, and the 90^{th} percentile value is almost equal to the ICMR guideline value. The difference in weight between males and females are not statistically significant except in the age group of 13 where the females weigh more than the males and it is statistically significant ($P < 0.005$)

Among the 617 boys, 70 boys (11%) satisfied the ICMR guideline values and 62 boys (9%) were overweight in relation to the ICMR guidelines. Remaining 485 boys (80%) were below the ICMR guidelines. Respective numbers among the total of 340 girls were 51 (15%), 56 (16%) and 233 (69%) Overall girls are better compared to boys in body weight because only 69% of the girls were below ICMR guidelines compared to 80% among the boys. This is to be noted because generally there is gender discrimination against girl children. With a low total fertility rate of 1.7 in Tamilnadu, girl children are also well looked after including nutrition. This is a possible inference.

Distribution of the students according age, sex and mean height are given in **Table 3**. 30% of the boys and 39% of the girls satisfied the ICMR guidelines. The mean height in males is slightly less than the

ICMR guideline values in all age groups whereas among girls the mean height is almost equal to the ICMR guideline values for the age groups 12, 13 and 14.

Distribution of the students according to weight for age as per IAP (Indian Academy of Pediatricians) classification is given in **Table 4**.From the above table 5, according to IAP classification it is seen that of the total of 957 students only about 6 were in grade 4 malnutrition (<50%).Among males 52.2% were normal (>80%) and in females it was 66.17% (>80%). Among malnourishment most of them i.e., about 26% belong to **grade I** malnourishment.

Distribution of study population with reference to age and BMI are given in **Table 5.**Since the ICMR had not developed any standards for BMI in children, we have used WHO standards to compare the mean BMI. The mean BMI among males and females is lower in all age groups when compared to WHO guideline value. The difference in BMI between males and females is not statistically significant except in the age group of 13+,14+ and 17+ where the females BMI is more than the males and it is statistically significant($p<0.005$).

DISCUSSION

P.Panda et al[6] in his health status of School Children in Ludhiana City found that girls of all ages except the 14 years old had lower mean weight for age as compared to expected weight for age as per ICMR standards. The expected height for age as per ICMR standards was also less in both boys and girls of all ages except the 15 and 16 year old. The prevalence of wasting and stunting in these children was high (52.2% wasted and 26.3% stunted), with boys and girls suffering almost equally.Similarly in our study about 70% of boys and 60% of girls were below the ICMR standards for their height for age.In our study about 80% of boys and 69% of girls were undernourished according to the ICMR guideline value. Higher percentage in our study might be due to the fact that generally Punjabis are well built, may be due to better agricultural production and nutritional status.

J Semwal et al[7] conducted a study to assess the Nutritional status of school children in rural areas of Dehradun district. The results of this study showed that the expected height for age as per the ICMR standards was less in both boys and girls in all age groups and the prevalence of wasting and stunting in these children was high (52.6% wasted and 26.3% stunted). The 10 – 14 years age group was the most affected. In our study the prevalence of under nutrition is almost equal in all age groups with slight increase in age group 15 – 17 years.

K. Anand et al[2] in his study on nutritional Status of Adolescent School Children in Rural North India it is shown that the prevalence of stunting in the 12 – 18 years age group was 37.2% among girls and 41.0% among boys with an overall prevalence of 38.5% and the prevalence of thinness is 43.8% among boys and 30.1% among girls. But in our study when the study subjects were compared with IAP standards majority of males and females were nutritionally normal whereas when compared with ICMR/WHO guideline values majority of them were undernourished.

V.K. Chadha et al[8] done a study to assess the prevalence of under nutrition among peri-urban children in south India. Comparing with the ICMR standards he found that about 30% were undernourished and in that about 2.6% were severely undernourished. Similarly in our study 80% boys and 69% girls were undernourished according to ICMR guideline value.

Shanthi Ananthakrishnan et al[9] in their study titled ‘A Comprehensive study of

morbidity in school age children in a village in Tamil Nadu reported 57.6% under nutrition among 5 – 12 years children.

S. Kumar et al[10] conducted a study to assess the prevalence of obesity and its influencing factors among affluent school children of Davangere city and found that about 8.82% of girls are obese and 4.10% of boys were obese. In our study 9% boys and 16% girls were found to be overweight when compared with the ICMR guideline values.

CONCLUSION

Nutritional status of the children in our study seems to be better when we compared it with IAP guideline values where as it becomes poor when it is compared with ICMR standards. So, to avoid these sort of discrepancies still more studies have to be done to formulate one universal standardized values which may be followed throughout India. Parents of school children also may be confused when Pediatricians say the school going child is of normal weight but by ICMR guidelines the same child is under weight

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Table: 1 Age and Sex wise distribution of study population

Age	Sex		Total
	Boys	Girls	
10+	48 (58.5%)	34 (41.5%)	82 (100.0%)
11+	96 (75.6%)	31 (24.4%)	127 (100.0%)
12+	98 (67.6%)	47 (32.4%)	145 (100.0%)
13+	85 (62.0%)	52 (38.0%)	137 (100.0%)
14+	78 (60.0%)	52 (40.0%)	130 (100.0%)
15+	82 (64.1%)	46 (35.9%)	128 (100.0%)
16+	76 (55.9%)	60 (44.1%)	136 (100.0%)
17+	47 (72.3%)	18 (27.7%)	65 (100.0%)

Figures in parenthesis indicates column percentage

Table : 2 Distribution of students according to their age and mean weight

Age	Male		S.D.	Percentile			Female		S.D	Percentile			ANOVA (P value)
	ICMR Guide Line Value	Mean wt					ICMR Guide line value	Mean wt					
				10	50	90				10	50	90	
10+	32+/-2	28.12	5.08	22	26.5	36	33+/-2	27.9	7.6	20.5	26	44	0.862
11+	37+/-2	29.12	5.9	23.7	28	38.6	37.5+/-2	31.9	9.1	21	30	44	0.046
12+	40+/-2	35.4	8.87	27	32	50	43+/-2	36	8.3	27.6	33	47.6	0.667
13+	**46+/-2**	**38**	**9.27**	**28.6**	**35**	**50.8**	**46+/-2**	**42.8**	**9.6**	**32.6**	**39.5**	**57**	**.005**
14+	52+/-2	42.2	10.9	28	42	60	50+/-2	45.4	9.6	32.3	45	60.7	.086
15+	57+/-2	48.2	11.09	36	46.5	61.1	52+/-2	45.9	8.7	35	45.5	60.3	0.233
16+	62+/-2	50.7	10.45	40.7	48	66.6	53+/-2	48.3	8.1	38	46	57.9	0.147
17+	64+/-2	51.8	10.32	41.6	50	64.2	54+/-2	50.5	9.5	40.8	48	65.7	0.621

Table : 3 Distribution of students according to their age and mean height

Age	Male		S.D.	Percentile			Female		S.D	Percentile			ANOVA (P value)
	ICMR Guide Line Value	Mean ht					ICMR Guide line value	Mean ht					
				10	50	90				10	50	90	
10+	140+/-2	135	6.8	127	135	143	140+/-2	134.2	6.2	125.5	135	141.5	0.429
11+	145+/-2	137	6	130	139	145	145+/-2	140	8	130	140	153	0.130
12+	150+/-2	145	6.6	136	145	153	147+/-2	146.5	6.6	137	146	156	0.238
13+	155+/-2	150	8.6	140	150	161.8	152+/-2	152	7	143	151	162	0.306
14+	161+/-2	155	9.8	142	155	167	157+/-2	155	6	147.3	155	164	0.940
15+	**166+/-2**	**161.5**	**7.8**	**151**	**163**	**170**	**160+/-2**	**155**	**6.3**	**146.4**	**155**	**165.3**	**0.001**
16+	**170+/-2**	**166**	**7.4**	**156**	**166.5**	**175**	**161+/-2**	**155**	**6.7**	**145**	**154.5**	**164**	**0.001**
17+	**173+/-2**	**167.7**	**5.3**	**159.8**	**168**	**175**	**162+/-2**	**155.3**	**7.9**	**145**	**154**	**167.2**	**0.001**

TABLE :4 Distribution of study population by wt for age according to IAP classification

Age	Male wt		Age	Female wt	
10+ N=48	<50	0	**10+ N=34**	<50	0
	50-60	0		50-60	1(2%)
	60-70	0		60-70	6(17%)
	70-80	8 (16%)		70-80	8(23%)
	>80	40(83%)		>80	19(55%)
11+ N=96	<50	1(1%)	**11+ N=31**	<50	0
	50-60	4(4%)		50-60	3(9%)
	60-70	9(9%)		60-70	3(9%)
	70-80	38(39%)		70-80	6(19%)
	>80	44(45%)		>80	19(61%)
12+ N=98	<50	0	**12+ N=47**	<50	0
	50-60	0		50-60	2(4%)
	60-70	9(9%)		60-70	5(10%)
	70-80	31(31%)		70-80	18(38%)
	>80	58(59%)		>80	22(46%)
13+ N=85	<50	2(2%)	**13+ N=52**	<50	0
	50-60	0		50-60	0
	60-70	19(22%)		60-70	3(5%)

	70-80	23(27%)		70-80	11(21%)
	>80	41(48%)		>80	38(73%)
14+ N=78	<50	2(2%)	**14+ N=52**	<50	0
	50-60	9(11%)		50-60	2(3%)
	60-70	16(20%)		60-70	6(11%)
	70-80	9(11%)		70-80	5(9%)
	>80	42(53%)		>80	39(75%)
15+ N=82	<50	1(1%)	**15+ N=46**	<50	0
	50-60	3(3%)		50-60	0
	60-70	13(15%)		60-70	6(13%)
	70-80	16(19%)		70-80	10(21%)
	>80	49(59%)		>80	30(65%)
16+ N=76	<50	1(1%)	**16+ N=60**	<50	0
	50-60	4(5%)		50-60	0
	60-70	6(7%)		60-70	5(8%)
	70-80	30(39%)		70-80	10(16%)
	>80	25(32%)		>80	45(75%)
17+ N=54	<50	0	**17+ N=18**	<50	0
	50-60	2(3%)		50-60	0
	60-70	8(14%)		60-70	0
	70-80	20(37%)		70-80	5(27%)
	>80	24(44%)		>80	13(72%)

Table : 5 Distribution of study population based on the age and BMI

Age	Males			Females			ANOVA (p value)
	WHO guideline value	Mean BMI	SD	WHO guideline value	Mean BMI	SD	
10+	16.5+/-0.5	14.8	2.1	16.5+/-0.5	14.8	3.1	0.94
11+	17+/-0.5	14.7	2.5	17.5+/-0.5	15.5	3.1	0.13
12+	17.5+/-0.5	16	3.5	18.3+/-0.5	16.2	3.2	0.75
13+	**18.5+/-0.5**	**16.1**	**3**	**19+/-0.5**	**17.9**	**3.4**	**0.002**
14+	**19+/-0.5**	**16.7**	**3**	**19.5+/-0.5**	**18.4**	**3.5**	**0.005**
15+	19.5+/-0.5	17.9	3.9	20+/-0.5	18.5	3	0.39
16+	20+/-0.5	17.8	3.3	20.5+/-0.5	19.5	3.1	0.003
17+	**20.5+/-0.5**	**17.7**	**3.3**	**21+/-0.5**	**20.2**	**2.7**	**0.007**