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LETTER TO EDITOR

Nutritional and Health Status of Rural School Children in Ratnagiri District of Maharashtra.

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Sir,

The health problems of school children vary from one place to another. The common health problems are malnutrition, dental caries, infectious diseases, diseases of the skin, eye and ear diseases and infestation by intestinal parasites [1].

Undernutrition, the primary cause of illness and premature mortality among children in developing countries [2], is prevalent among children in almost all the states in India [3]. Children residing in rural areas of India, disproportionately suffer more from undernutrition when compared to their urban counterparts [4]. Although several recent studies have assessed the problem of undernutrition among rural children in different parts of India, there is scanty information regarding undernutrition among the rural school children of Ratnagiri District in Maharashtra.

Three commonly used indicators of under nutrition among children are stunting (low height for age), thinness (low body mass

index for age) and that of being underweight (low weight for age). Stunting is an indicator of chronic under nutrition, the result of prolonged food deprivation and/or disease or illness; thinness is an indicator of acute under nutrition, the result of more recent food deprivation or illness; being underweight is used as a composite indicator to reflect both acute and chronic under nutrition, although it cannot distinguish between them. Over 40% of Indian children are found to be afflicted with dental caries, a common dental disease among children, a large percentage of them residing in rural areas and most of them are in need of dental care[5]. Keeping this in mind, the present study was undertaken to assess the nutritional status and identify the common health problems of the rural school children of Ratnagiri District.

This descriptive study was carried out (during the period of June 2008 to October 2008) at two primary and secondary schools in Ratnagiri District. All 5-12 years old students enrolled at these schools were invited to participate in this study. Information on the ethnicity and age of all subjects was obtained from questionnaires and was verified from school records. The completion of questionnaires and measurement of subjects were done during school working hours. Permission for the study was obtained from the school authorities prior to commencement of the study. Ethical permission was also obtained from School authorities. The sample size of the study was 201 (96 boys and 105 girls).

The age range of the subjects was 5-12 years. The samples were classified into eight age groups by keeping one-year intervals. Anthropometric Measurements like Height and weight measurements were taken by one observer, following the standard techniques. The body mass index (BMI) was computed by following the standard formula:

$$\text{BMI (kg/m}^2\text{)} = \text{Weight (kg)} / \text{Height}^2 \text{(m}^2\text{)}.$$

Teeth showing discoloration, chalky or softened appearance of enamel or appearance of the broken surface of teeth by visual examination or on probing were designated as carious.

Evaluation of Nutritional Status

Three commonly used undernutrition indicators, i.e., underweight, stunting and thinness were used to evaluate the nutritional status of the subjects. The age and sex specific – 2 z-scores of the United States National Centre for Health Statistics (NCHS) [6], were followed to define underweight, stunting and thinness. The following scheme was utilized:

Underweight: < - 2 WAZ (Z-score for weight-for age)

Stunting : < - 2 HAZ (Z-score for height-for age)

Thinness : < - 2 BMIZ (Z-score for BMI-for-age)

Where WAZ, HAZ and BMIZ refers to Z score for Weight for age, Z score for height for age and Z score for BMI for age respectively. As per NCHS it considered to be age and sex specific z scores respectively, of NCHS [7].

The WHO [8] classification [Table/Fig 1] was followed for assessing the severity of malnutrition by the percentage prevalence ranges of these three indicators among children.

Table/Fig 1) WHO classification of severity of malnutrition.

Severity of malnutrition	Low (%)	Medium (%)	High (%)	Very High (%)
Underweight	<10	10-19	20-29	Equal or >30
Stunting	<20	20-29	30-39	Equal or >40
Thinness	<5	5-9	10-14	Equal or >15

Statistical Analyses

The distributions of height and weight were not significantly skewed, therefore not necessitating their normalization. Technical errors of measurements (TEM) were found to be within reference values and were thus not incorporated in the statistical analyses. Between the sexes, differences in the means of height and weight were tested by the student’s t-test. P values < 0.05 were considered to be statistically significant.

Results

The total number of respondents were 201 (105 were boys and 96 were girls). The age-wise means and standard deviations of weight, height and BMI in both sexes are presented in [Table/Fig 2]. There were no significant sex differences in mean height and BMI. There were significant (p < 0.05) sex differences in the mean weight at the age of 6 years (t = 5.77).

Table/Fig 2) Age and sex-specific mean weight (kg), height (cm) and BMI (kg m⁻²) of the children.

Age	Weight (kg)			Height (cm)			BMI (kg/m ²)		
	Boys	Girls	t	Boys	Girls	t	Boys	Girls	t
5	13.4 (1.7)	12.2 (2.12)	0.16	102.4 (5.2)	98.5 (7.2)	0.00	12.4 (1.6)	12.4 (1.3)	0.73
6	15 (1.73)	15.8 (1.93)	5.77	109.9 (4.9)	112.8 (5.6)	3.2	12.3 (1.0)	12.5 (0.7)	0.64
7	17.04 (1.99)	16.67 (2.65)	2.7	116.0 (3.2)	117.7 (6.6)	2.3	12.5 (0.9)	12.1 (1.3)	1.51
8	19.63 (2.75)	18.9 (3.30)	0.15	124.2 (8.0)	121.5 (5.7)	0.27	12.8 (0.91)	12.8 (1.29)	3.01
9	20.7 (2.37)	18.7 (2.57)	2.22	128.1 (3.5)	122.4 (3.2)	3.5	12.7 (1.18)	12.9 (1.05)	1.06
10	22.2 (2.37)	23.2 (2.57)	0.93	128.5 (4.5)	131.7 (5.1)	0.00	13.6 (0.6)	13.4 (1.5)	1.32
11	23.86 (3.89)	24 (2.80)	0.44	133.1 (9.5)	134.5 (6.2)	1.45	13.3 (1.3)	13.2 (1.03)	2.2
12	28.2 (3.06)	26.16 (3.81)	4.44	142.0 (5.6)	142.0 (5.9)	0.15	14.0 (0.89)	12.9 (1.00)	3.9

Standard Deviation are given in parentheses (* P < 0.05)

[Table/Fig 3] and [Table/Fig 4] reveal the prevalence of being underweight, stunting and thinness by age and sex. The overall age

and sex combined prevalence of being underweight; stunting and thinness were found to be 19 %, 30.3 % and 16.8 %, respectively. Both sexes had similar rates of underweight (boys = 19.5%; girls = 18%), stunting (boys = 30.4%; girls = 30.1%), and thinness (boys = 16.9%; girls = 16.6%). Based on the WHO classification of severity of malnutrition among children, the overall age and sex combined rates of underweight, stunting and thinness were medium (10-19%), high (30-39) and very high (15%), respectively. Overall systemic examination revealed that 146 (72.6%) children were found to be suffering from dental caries, followed by 18(9%) with respiratory problems, 13(6.5%) from parasitic infestation, 9(4.5%) with skin infections and 12(6%) of the children had problems with their vision.

(Table Fig 3) Prevalence underweight, stunting and thinness by age wise.

Age in year	Underweight	Stunting	Thinness
5 year	14.8%	12.4%	13.3%
6 year	13.8%	12.3%	8.4%
7 year	14.5%	12.3%	13.3%
8 year	13.0%	11.2%	10.6%
9 year	10.8%	7.6%	9.1%
10 year	13.0%	8.4%	9.5%
11 year	13.8%	10.0%	10.8%
12 year	13.5%	6.9%	9.6%

(Table Fig 4) Prevalence underweight, stunting and thinness by Sex wise.

Sex	Underweight	Stunting	Thinness
Boys	19.5	30.4	16.9
Girls	18	30.1	16.6
Overall	19	30.3	16.8

Discussion

Improved child health and survival are considered as universal humanitarian goals. In this respect, understanding the nutritional status of children has far-reaching implications for the better development of

future generations [9]. However, reports have stated that child malnutrition has risen in recent years in India [10]. Malnutrition continues to be a problem of considerable magnitude in most developing countries of the world [3]. Several studies [11], [12] have shown that dietary and environmental constraints are the major determinants of differences in the growth performance between children of developing and developed countries.

In the present study, it was seen that the prevalence of dental caries was very high. The prevalence of dental caries in the present study was found to be much higher as compared to other studies conducted in India [13], [14], [15]. These findings were dissimilar to the present study. Rao A *et al* found that the prevalence of caries was 76.9% [16]. These findings are similar to the present study where about 72.6% of the children of the age group of 5–12 years had dental caries.

While stunting reflects a failure to reach the linear growth potential due to suboptimal health and/or nutritional conditions, underweight reveals a low body mass relative to chronological age, which is influenced by both, a child's height and weight. Underweight thus cannot distinguish between a child that is small in weight relative to his/her height and a child that is low in height relative to his/her age, but who may be normal in weight-for-height. On the other hand, thinness is an indicator of acute undernutrition and the result of more recent food deprivation [9]. Dental caries is a multifactorial disease and the complex interaction of several aetiological factors result in the occurrence of caries.

In conclusion, this study provided evidence that these children were under acute and chronic nutritional stress. Hence, the screening for common health problems and the assessment of nutritional status should be an essential part of school health services. Early detection and appropriate treatment of malnourished children must be done prior to

school entry, to avoid complications like stunting and wasting. Children found to have a health problem, mostly dental caries, should be appropriately dealt or referred. School nutrition programmes should also be included to improve the health and nutritional status of school children.

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