Nutritional status of school going children (7-9 years) in rural area of Bhilwara district (Rajasthan)

■ GITIKA SHARMA **AND** SARLA LAKHAWAT

■**ABSTRACT :** The present study was conducted with an objective to assess nutritional status of school going children. The study was conducted in village Hurda of Hurdapanchayatsamiti of Bhilwara district of Rajasthan. Total 120 school going children (15 girls and 15 boys from each school) were selected. Nutritional status of the subjects was assessed by using anthropometric measurements (height and weight), clinical assessment and dietary recall method. All respondents were vegetarian. The height and weight of respondents was lower than reference value. Severely wasted (44.43%), Severely stunted (32.2) according to Waterlow classification. Gomez classification revealed (60%) respondent's was severely malnourished. According to BMI for age z- score severely undernourished was found 33.33 per cent. In Clinical assessment of respondent's revealed equal number of respondents was in normal and poor appearance (41.66%). Diffused pigmentation in children were (25%), lack of luster were (16.66%), Pale conjunctiva were (23.33), Cheilosis (19.16). Dietary intake of respondents was substantially inadequate (<50%) in all food groups whereas intake of sugar was marginally adequate (83%) dietary intake was lower than recommended dietary intake (RDI). The mean nutrient intake was significantly lower than recommended dietary allowances .Intake of protein of respondents was 81 per cent of RDA.

■ **KEY WORDS:** Recommended dietary allowances (RDA), Recommended dietary intake (RDI)

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Children are the backbone of a nation and development of any nation depends on the health and well being of its child population. India has the second largest child population in the world. Numbering over 2.2 billion worldwide and 263.9 million in India (Census, 2011). School age is the active growing phase of childhood it represents a dynamic period of physical growth as well as of mental development of the child. Better the nutritional status of the children more they will be able to contribute to vital human potential and impart strength to the national economy and development. Nutrition is a fundamental pillar of human life, health and development across the entire life span. Good nutrition – an adequate, well balanced diet combined with regular physical activity- is a corner stone of good health. A child's entire life is determined

in large measures by the food given to him during his early childhood years. The school age period is nutritionally significant as this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence. Thus Health and nutrition in early stages of human life determine, to a great extent, the physical and mental well being of a person. On the other hand, inadequacies in one or more of the three main preconditions for good nutrition: food, care and health leads to Malnutrition. Globally, malnutrition among school age children is becoming a major public health concern. More than 200 million school age children are stunted and underweight and if no action is taken, about one billion school children will be growing up by 2020 with impaired physical and mental development. (Mitra *et al.,* 2007). Developing countries like India, accounts for about 40 per cent of undernourished children in the world and it is largely due to result of dietary inadequacy in relation to their needs. This may be due to insufficient intake, increased loss, increased demand or a condition or disease that decrease the body's ability to digest and absorb nutrients from available food. Many factors can cause under nutrition, most of which relate to poor diet or severe and repeated infections, particularly in underprivileged populations. Nutrition status is a sensitive indicator of child's health and nutrition is an input to and foundation for health and development. Thus the assessment of nutritional status plays an important role. It is widely accepted that for practical purposes anthropometry is the most useful tool for assessing the nutritional status of children. Of the various parameters, weight for age, weight for height, arm circumference and height for age, either singly or in combination are extensively used for this purpose. The present scenario of health and nutritional status of the school-age children in India is very unsatisfactory. Also most of the research work that has been conducted on nutritional status of children is limited to infants and preschool children only. There is dearth of information on nutritional status of school going children particularly from rural areas. Therefore it is imperative that dietary patterns of school going children are thoroughly assessed which can help in imbibing simple changes in their daily diet, thus improving their nutritional status and as the nutritional status of children is also associated with the nutritional knowledge of the mothers, so keeping this parameter in mind the present study attempts to assess the nutritional status of rural primary school children (7-9 year) of government school of Bhilwara district and the knowledge of the mothers regarding various aspects of nutrition.The present study has been carried out with following objective: to ascertain the nutritional status of the rural school going children.

■ RESEARCH METHODS

The study was conducted in Bhilwara district of Rajasthan panchayatsamiti, Hurda was selected, from this PanchayatSamiti, Hurda village was selected as it the largest among the villages of HurdaPanchayatSamiti in terms of area and population, four Government schools were selected randomly. After the selection of schools, the investigator contacted the school authorities to get the list of enrolled students in the school in the age range of 7-9 years. Total of 60 girls and 60 boys in the age group of 7-9 years enrolled in government schools were selected by Systematic Random Sampling

General profile :

It consisted of particulars related to the respondents *i.e.* name, age class , address , contact number, father's name, religion, caste, father's occupation, type of family, food habits, and total earning members in the family and monthly income of family.

Anthropometric measurements :

Nutritional status of all the selected children was assessed by measuring body height (cm) and weight (kg).

Weight :

The recorded mean values for weight was compared with ICMR (2008).

Height (cm) :

These mean values for height was compared with standards of ICMR (2008).

Anthropometric measurements *viz.,* height and weight were measured as per the guidelines suggested by ICMR standards. Height was measured by using a height scale nearest to 0.1 cm. A portable personal weighing scale was used to measure the kilograms nearest to 0.1 kg, with minimal clothing and without shoes.

Assessing severity of under nutrition :

The nutritional status of the sample was ascertained

with the help of indicators such as Gomez classification (% reference weight for age), Water low classification (height for age) and WHO (2006) classification (BMI for age) and results were calculated.

Gomez classification :

The child's weight is compared to that of a normal child (50th percentile) of the same age. It is useful for population screening and public healt (Gomez *et al.*, 1955).

Waterlow classification:

Chronic malnutrition results in stunting. Malnutrition also affects the child's body proportions eventually resulting in stunting (Waterlow, 1972).

BMI for age:

Thinness has been assessed using the indicator BMI- for- age according to the z-score of WHO (2007).

Clinical assessment:

Clinical assessment was carried out with the assistance of doctors from Primary Health Centre for the examination of clinical symptoms of nutritional deficiencies and presence of infections and others illness.

Dietary assessment :

Dietary survey of the sample was conducted by using 24 hours dietary recall method for one day using standardized cup sets to assess their food and nutrient intake.

After collecting data, it is necessary to analyze it with help of statistics to arrive at proper and adequate conclusion. Following statistical measures were used to analyze the data:

Frequency and percentage use for clinical signs and symptoms, Z-test: The Z-test was used to compare food and nutrient intake with standard and anthropometric measurement.

■ RESEARCH FINDINGS AND DISCUSSION

The results revealed that majority (67.5%) of the respondents belonged to Hindu religion. About 65 per cent majority of respondents were from general caste and 21.66 per cent were from schedule caste. Regarding family type more than half of respondents (65%) were having nuclear family structure. Most of respondent's fathers (31.66%) were having high school education, 19.16 per cent were having middle school education and 33.33 per cent of respondent's fathers were in agriculture whereas per cent respondent's mothers were illiterate and majority per cent respondent's mothers were housewives. Maximum respondent's (43.33%) monthly family income was less than ten thousand.

Table Anthropometric measurement revealed that the Observed mean values for both height and weight was compared against the reference values and it was found that the observed values were significantly lower than the reference values at 0.05 per cent level of significance

Assessing severity of under nutrition :

Waterlow classification :

Height for age and weight for height are an index of stunting and can be used as a criterion which quantifies chronic malnutrition. According to weight for height were observed that in the age of 7 year, 8 year, 9 year, 15.55, 15.55, 13.55 per cent school children were severely wasted and on the bases of height for age there was 11.1 per cent, 11.1 per cent, 10 per cent of the school children were severely stunted and it was found that stunting was more prevalent among boys than girls (Table 4 and 5)

– Weight for height:
– Height for age

Gomez classification :

Weight for age is an indicator of underweight and reflects the long term malnutrition. *Gomez* classification highlighted the fact that in the age of 7 year, 8 year, 9

Table 1 : Water low's and Gomez's classification of malnutrition in children condition			
Sr. No.	Conditions	Water Low's classification		Gomez's classification
		Weight for height (wasting)	Height for age (Stunting)	% Reference weight for age
1.	Normal	>95	>95	>90
2.	Grade-I (Mild)	80-90	90-95	75-89
3.	Grade-II (Moderate)	70-80	85-90	60-74.9
4.	Grade-III (Severe)	<70	<85	<60

Table 2 : WHO classification BMI for age (z- score)	
> Median- 2SD to <1SD:	Normal
Median < -2SD to >-3SD:	Moderate under nutrition
<Median - 3SD:	Severe under nutrition
Median >+1SD to < + 3SD:	Overweight
>+3SD:	Obesity

year, 36 per cent,33 per cent, 37 per cent school children were between normal category and left were in the different category of malnutrition (Table 6). It is evident that higher number boys were underweight in comparison to girls.

Body mass index (BMI) for age :

BMI provides a good correlation to fatness and low correlation with stature. It is simple index of weight-for- height that is commonly used to classify underweight, overweight and obesity.

Data in Table 7 reveals that majority of girls respondents (95%) and boys respondents (81.66) were lying in category of underweight at base line survey.

Clinical assessment :

Clinical findings indicates that 41.66 per cent were in normal appearance at the same 41.66 per cent were in poor appearance. 16.66 per cent of respondents suffered from Lack of luster in hairs, 25 per cent suffered from Diffused pigmentation. 23.33 per cent suffered from Pale conjunctiva. 19.16 per cent suffered from Cheilosis.

Dietary adequacy :
– Food intake
– Nutrient intake

Table 3 : Mean ± SD of Anthropometric measurement of school going children							(n=120)
Anthropometric parameter		Boys(n=60)			Girls(n=60)		
		Reference value	Observed value	z-value	Reference value	Observed value	z-value
Height	7 year	124.3	109.83±8.63	12.98	123.6	115.52±7.73	8.09
	8 year	130.1	114.55±7.66	15.72	129.2	120.84±5.19	12.47
	9 year	134.6	119.56±5.8	20.08	135.0	125.14±6.95	10.98
Weight	7 year	22.7	19.16±2.76	9.93	22.3	19.14±3.73	6.56
	8 year	25.2	21.45±3.33	8.72	25.0	20.72±3.56	9.31
	9 year	28	23.06±3.71	10.30	27.6	23.42±3.857	8.39

Reference values are according to ICMR (2008)

Table 4 : Nutritional status of school children according to Waterlow classification by age and gender (weight for height)				
	Normal	Wasting		
Age (years)	(>90 % of NCHS Standard)	Mild (80-90 % of NCHS Standard)	Moderate (70-80 % of NCHS 3 Standard)	Severe (<70% of NCHS Standard)
7 years (n=45)	16 (35.55)	13 (28.88)	9 (20)	7 (15.55)
8 years (n=45)	15 (33.33)	14 (31.11)	9 (20)	7 (15.55)
9 years (n=30)	12 (40)	6 (20)	8 (26.66)	4 (13.33)

Table 5 : Nutritional status of school children according to Waterlow classification by age and gender (height for age)				
	Normal	Stunting		
Age (years)	(>95 % of NCHS Standard)	Mild (90-95 % of NCHS Standard)	Moderate (85-90 % of NCHS Standard)	Severe (<85% of NCHS Standard)
7 years (n=45)	10 (22.2)	13 (28.9)	17 (37.80)	5 (11.1)
8 years (n=45)	8 (17.8)	19 (42.2)	13 (28.9)	5 (11.1)
9 years (n=30)	3 (10.0)	13 (43.3)	11(36.7)	3 (10.0)

Table 6 : Nutritional status of school children according to Gomez classification by age and gender				
	Normal	Malnutrition		
Age (years)	(90-110% of NCHS Standard)	Grade I (75-90 % of NCHS Standard)	Grade II- Moderate (60-74.9 % of NCHS Standard)	Grade III- Severe (<60% of NCHS Standard)
7 years (n=45)	16 (35.6)	15 (33.3)	14 (31.1)	-
8 years (n=45)	15 (33.3)	20 (44.4)	8 (17.8)	2(4.4)
9 years (n=30)	11 (36.7)	11 (36.7)	7 (23.3)	1(3.3)

Findings indicate 100 per cent subjects were vegetarians. Dietary survey was conducted for one day by using 24 hours recall method. Recommended Dietary Intake (RDI) was substantially inadequate (<50%) in fruits, roots and tubers, milk and milk products, green leafy vegetables, other vegetables, pulses, cereals and fat and oils whereas intake of sugar marginally adequate (83.1%). Further 'Z' value calculated between intake of food group and RDI, showed highly significant difference among these food groups.

Dietary intake of respondents showed that mean nutrients intake of energy, carbohydrates and fat and all nutrient intake was lower than Recommended Dietary Allowances. Protein intake was marginally adequate from RDA.

Conclusion :

It is clear that the problem of malnutrition in India is of alarming magnitude. A major part of this problem is contributed by rural population. Tackling malnutrition in rural area requires a holistic approach, especially when targeting populations of school children. From the finding of the present study it can be concluded that, even after the efforts of government the knowledge about nutrition has not reached to rural school going children and mothers up to desired level. The health and

Table 7 : Anthropometric indicators (BMI for age) WHO (2006) z-score					
BMI for age		Girls(60)		Boys(60)	
		F	%	F	%
According to z- score					
Severe under nutrition	< Median- 3SD	11	18.33	20	33.33
Moderate	Median<-2SD to >-3SD	12	20	17	28.33
Normal	>Median-2SD to+<1 SD	37	61.66	23	38.33
Overweight	Median>+1SD to<+3SD	-	-	-	-
Obesity	>+3SD	-	-	-	-

Table 8 : Mean daily food intake of school children				(n=120)
Food group (g)	RDI (g)	Mean / SD	z value	Overall intake %age of RDI
Cereals	180g	121.54±49.26	13.00*	67.52
Pulses	60g	38.03±10.84	22.20*	63.38
Fats and oils	30g	14.41±3.84	44.47*	48.03
Sugars and jaggery	20g	16.62±8.15	4.54*	83.1
Green leafy vegetables	100g	34.45±10.22	70.26*	34.45
Roots and tubers	100g	54.12±6.97	72.10*	54.12
Other vegetables	100g	66.75±20.92	17.41*	66.75
Fruits	100g	45.20±23.02	26.07*	45.20
Milk and milk products	500g	129.58±15.56	260.78*	25.91

RDI- Recommended Dietary Intake (NIN, 2010).   * indicates significance of value at P=0.05

Table 9 : Mean daily nutrient intake of school children				(n=120)
Nutrients	RDA	Mean±SD	z value	Overall intake (% of RDA)
Energy (Kcal/d)	1690	863.03±114.82	78.89*	51.06
Protein (g/d)	29.5	24.02±1.28	46.89*	81.42
Fat (g/d)	30	19.429±4.15	27.92*	64.73
β- carotene (ug/d)	4800	1749.39±467.99	71.40*	36.44
Thaimine(mg/d)	0.8	0.55±0.14	19.56*	68.75
Riboflavin(mg/d)	1.0	0.46±0.07	84.50*	46
Niacin (mg/d)	13.0	7.31±1.73	36.02*	56.23
Carbohydrate (g/d)**	253.5	129.06±20.02	68.09*	50.91
Ascorbic acid (mg/d)	40	29.98±22.57	4.8*	74.95
Iron (mg/d)	16	7.93±0.97	91.13*	49.56
Calcium (mg/d)	600	365.23±73.56	34.96*	60.87

RDA- Recommended Dietary Allowances (ICMR, 2008).   * indicates significance of value at P=0.05   **CHO-60-65% of Energy (kcal/d)

nutritional standards of school going children in this study were found to be unsatisfactory. The above results show that majority of the respondents were lying in category of under nutrition. The mean intake of the food intake and nutrient intake was lower than the reference values. The study illustrates that most school going children fail to meet dietary intake recommendations in all food groups. The mean intake of all the nutrients *i.e.* energy, protein, fat, carbohydrates, β- carotene, thiamine, riboflavin, niacin, carbohydrate, ascorbic acid, iron, calcium was not adequate. This is most likely due to the fact that children were belonging to low socio-economic status, percentage of illiteracy of their mothers was higher they were skipping meals on regular basis.

Recommendations :

– A comparative study on school going children between rural and urban, also between girls and boys may be carried out with same objectives.

– This type of community based nutrition education programme is essential to train such vulnerable group regarding nutrition and health.

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