P: ISSN No. 0976 - 8602 RNI No.UPENG/2012/42622 VOL.-IV, ISSUE-III, July-2015
E: ISSN No. 2349 - 9443
Asian Resonance

Nutritional Status of Primary School Children in Fatehpur District

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Abstract

School age is the active growing phase of childhood. Primary school age is a dynamic period of physical growth as well as of mental development of the child. Research indicates that health problems due to poor nutritional status in primary school age children are among the most common causes of low school enrolment, high absenteeism, early dropout and unsatisfactory classroom performance. Nutritional needs change throughout life, depending on genetics, rate of growth, activity and many other factors. Nutritional status is the condition of health of the individual as influenced by the utilization of nutrients. The present study was conducted in Fatehpur District to assess the nutritional status of 120 primary school children (7-9 years). Nutritional status of children was assessed in terms of dietary assessment, anthropometric measurement and clinical assessment of signs and symptoms of various nutrient deficiency diseases. The study revealed that consumption of all the nutrients by majority of the students was comparatively less than the recommended dietary allowances. Nutrient intake was higher in boys as compared to girls. The food intake qualitatively and quantitatively was observed insufficient. Data belong to anthropometry revealed that out of total children screened mean height and weight in all age groups was less than those empowered by National Center for Health Statistics Standards (2008). The Nutritional deficiency signs were observed more in girls students. It is concluded that poor anthropometric indices and presence of nutritional deficiency signs may be due to lower intake of food and nutrients.

Keywords: Nutrition, Anthropometrics Measurements, Clinical Assessment, Recommended Dietary Allowance.

Introduction

India has made substantial progress in human development still the manifestations of malnutrition are at unacceptable levels. Malnutrition is major public health problem in our country. Freedom from hunger and malnutrition is a basic human right and their alleviation is fundamental prerequisite for human and national development. India is a home to more than one billion people, of which 42 percent are children, contributing to the vital human potential. Better nutrition means stronger immune system less illness, better health and productive community.

Nutritional status is the condition of health of an individual as influenced by nutrient intake and utilization in the body. Undernutrition in childhood was and is one of the reasons of high child mortality. Chronic undernutrition in childhood is linked to slower cognitive development and serious health impairments later in life. Nutritional status is an important index of this quality. In developing countries like India various forms of malnutrition affect a large segment of population and both macro and micronutrient deficiencies are of major concerns (Srivastav et al, 2012). The World Bank estimates that India is one of the highest ranking countries in the world for the number of children suffering from malnutrition (World Bank Report 2009) and over 90 percent Indian women, adolescent girls and children are anemic. More broadly, malnutrition in India is in a state of silent emergency and thereby demands greater priority than ever before. Thatcher (1998), Aamerithaveni (2002) and suggested that the health of children is dependent upon food intake and provides sufficient energy and nutrients to promote optimal physical, social, cognitive growth and development. Inadequate energy and nutrients have a variety of poor outcomes including growth retardation, iron deficiency anemia, poor academic performance and development of psychosocial difficulties. India stands 25th on the Global hunger Index with 46 percent of underweight children below 5 years of age (State of world children, 2008).

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Nutritional assessment is an index of the impact of nutrition on the survival and health. Anthropometric measurements and functional tests useful in nutritional assessment indicate that each measurement depends on adequate nutrition. Labadarios et. al (2008) analyzed the prevalence of stunting, wasting and underweight as markers of undernutrition in children. Thus the differences in the degree of growth failure in weight and height have implications for assessing prevalence of chronic malnutrition. Most of the research work that has been conducted on nutritional status of children is limited to infants and preschool children only. School going children being the building blocks of state and country therefore it becomes very important to know the nutritional status of school going children and hence the present study was carried out in Fatehpur District with following objectives:

1. To assess the dietary pattern of 7-9 years school going children.
2. To study the anthropometic measurement of 7-9 years school going children.
3. To examine clinical signs and symptoms of 7-9 yrs.
4. To assess the nutritional status of Primary School children.

Materials and Methods

Assessment of nutritional status is the first step in the formulation of any public health strategy to combat malnutrition. The present study was conducted on school going children in the age group 7-9 years. Total 120 school going children i.e. 60 boys and 60 girls were selected proportionately for the study from four different schools of Fatehpur district. Four tools were used in the study to assess the nutritional health status- Anthropometric measurements, clinical Nutrition survey chart, 24-hr recall method, Food frequency questionnaire.

24-hr. recall method is generally used by dietician to obtain a general picture of person's food intake. It is used to elicit an accurate picture of the diet history. In 24-hr. recall method, the actual food and drink consumed in the immediate past 24 hours is recorded. Sometimes, a longer period may be used. The record food consumed in the last 24 hours is then converted to the nutrients available in each food item used in preparing it. The average daily nutrient intake was calculated with help of the food composition tables of Gopalan et al. (2002) and then compared with the Recommended Dietary Allowances (ICMR, 2010)

Food Frequency Questionnaire is either interviewer administered or self-completed. The collected information of the food consumed is then checked with the recommended dietary allowances (RDA) by ICMR, 2010. It gives an estimate of the amount and frequency of the various nutrients consumed by the individual.

Results and Discussion

Data recorded was analyzed with respect to the objectives of the present study which were to assess the nutritional status of primary school children (7-9 years). In all 120 children were surveyed out of which 70.83 percent belonged to Hindu family, followed by Muslims (25%), Christians (2.50%) and others (1.66%).

Diet and Nutrient Intakes (DNI)

Vegetarians predominated with 51.64 percent followed by non-vegetarians (32 percent) and ovo-vegetarians (16.36 percent). 46.6 percent boys and 50 percent girls skip breakfast on daily basis out of which 15 percent boys and 16.66 percent girls skip breakfast 3-4 times/week, Table 1 and 2. Similar results were obtained from National Institute of Nutrition (NIN, 2003-2004), where in 11-13 year children skipped breakfast 2-3 times/week and 3.9 percent were observed as breakfast skippers.

Table 1
Breakfast Consumption Pattern of Children (Boys, 7-9 years)

Skip Breakfast										
Age (Years)	**1-2t/wk**		**2-3t/wk**		**3-4t/wk**		**Pooled**		**Don't Skip Break Fast**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
7-<8 (n=20)	3	15	2	10	4	20	9	45	11	55
8-<9 (n=20)	5	25	2	10	3	15	10	50	10	50
9-<10 (n=20)	4	20	3	15	2	10	9	45	11	55
Pooled (n=60)	12	20	7	11.66	9	15	28	46.66	32	53.33

Table 2
Breakfast Consumption Pattern of Children (Girls, 7-9 years)

Skip Breakfast										
Age (Years)	**1-2t/wk**		**2-3t/wk**		**3-4t/wk**		**Pooled**		**Don't Skip Break Fast**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
7-<8 (n=20)	5	25	2	10	2	10	9	45	11	55
8-<9 (n=20)	3	15	3	15	4	20	10	50	10	50
9-<10 (n=20)	5	25	2	10	4	20	11	55	9	45
Pooled (n=60)	13	21.66	7	11.66	10	16.66	30	50	30	50

Note: 1-2 t/wk=1-2 times per week 2-3 t/wk= 2-3 times per week 3-4 t/week=3-4 times per week

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The 24-hr recall method was used to find out the amount of essential nutrients intake by the respondents. The percentage of the boys and girls deficient in the seven major nutrients is given in Table- 3

Table- 3
Percentage Distribution of Children According to Deficient Nutrient Intake with in Last 24 Hours

S. No.	Nutrient	*RDA	Boys		Girls	
			Average Intake	% Deficient	Average Intake	% Deficient
1	Protein (g/day)	29.5	28	11%	24	20%
2	Fat (g/day)	30	19	15%	12	18%
3	Energy (Kcal/day)	1690	1189	40%	957.12	51%
4	Calcium (mg/day)	600	370	41%	349	65%
5	Iron (mg/day)	16	10	38%	8	43%
6	Vitamin C (mg/day)	40	28	18%	25	23%
7	β-carotene (ug/day)	4800	1800	23%	1620	25%

***Recommended Dietary Allowances (ICMR 2010)**

The table illustrates that 11% boys and 20% girls were deficient in ***Protein*** intake than the recommended amount (29.5g/day). The average intake by the deficient respondents were 28 g/day and 24 g/day. This may be due to low dietary intake of food. 15% boys and 18% girls did not consume the recommended amount of ***Fat (30g/day).*** The average consumption of fat by these respondents were 19g/day and 18g/day respectively. ***Energy*** deficiency was exhibited by 40% boys and 51% of girls respondents. This may be due to inadequate intake of energy rich food i.e. protein, fats and carbohydrates as they together make up for the daily requirement of energy. ***Calcium*** is an important nutrient for the children of this age, they need relatively more calcium than adults to meet the requirements of growing bones. However 41% boys and 65% girls exhibited calcium deficiency. The average intake of calcium was about 350mg/day, in spite the recommended amount of 600 mg/day. The calcium deficiency may be due to low consumption of milk a rich source of calcium. Major part of the mineral is derived from cereals which contain insoluble calcium which is unavailable to the body. 42% girls and 30% boys were not consuming the daily recommended amount of ***Iron*** (16 mg/day). The consumption was limited to 10mg/day and 8 mg/day iron for boys and girls respectively. Dietary iron deficiency has been reported as major cause of anemia among children. Green leafy vegetables, yellow fruits and vegetables which are the precursors of vitamin A are considered as the main source of vitamin A in the diet of Indians. Although non-vegetarian foods are rich source of vitamin A. 23% boys and 28% girls exhibited β ***carotene*** deficiency in their diet. The intake of β carotene in boys and girls was 1800 ug/day and 1620 ug/day respectively. Average intake of vitamin C was approximately 25mg/day which is comparatively less than the recommended amount (40mg.day). Citrus fruits are rich source of ***Vitamin C,*** thus indicating insufficient intake of citrus fruits in the diet of children. The present findings corroborate with those of and Handa et al (2008), who reported that the intake of the nutrients viz energy, fat, β-carotene, B-complex vitamins, vitamin C, iron and calcium was found to be lower than the recommended dietary allowances, the lowest being iron and vitamin B_{12}. Similar were the findings in the present study where the intake of iron was found lowest (36%) among children besides intake of nutrients was higher in boys as compared to girls. (Vandana and Saroj, 2012)

Table 4
Percentage Distribution of Primary School Children (Boys 7-9 Years) Based on Frequency of Food Groups Intake

S. No.	Food Groups	Daily	Weekly	Twice a month
1	Pulses and legumes	88%	11%	1%
2	Cereals	100%		
3	Milk & Milk Products	96%	4%	
4	Green leafy Vegetables	58%	37%	5%
5	Fats & Oils	100%		
6	Meat, Fish & Poultry	16.36%	28%	4%
7	Sugar & Jaggery	100%		
8	Fruits	47%	51%	2%

Table 4 details the frequency at which respondents consume various food groups constituents. The foods consumed daily by all the boys included cereals, fats & oils and sugar and jaggery. Regarding the consumption of pulses it was found that a good proportion (88%) of the boys consumed daily and 11% of the respondents consume it weekly and 1% consume it twice a month. Arhar dal, peas, rajma and gram constituted major portion of pulses. Consumption of milk and milk products by the boys was also found to be frequent, 96% of them consumed milk daily and the balance 4% of them consumed the milk once in week. However the intake quantity was not satisfying. Though all the children consume cereals on a daily basis, wheat and rice constitute staple food. Similar were the findings of Sachdeva et al (1997) and Adeladza (2009) who reported that the diets were cereal based and very low frequency of consumption of protective foods including fruits and vegetables in the diet of school children. More than 50% of the boys consume green leafy vegetables daily, this may be due to easy availability of green leafy vegetables at economical prices than other vegetables. All the boys recalled consuming foods containing fats and oils like samosas, puri or any other fried food in their daily diet. Majority of the non-vegetarians and ovo-vegetarians consumed meat and poultry weekly and only 16.36% consumed it daily. Only 47% of boys consumed fruits daily.

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Table 5
Percentage Distribution of Primary School Children (Girls 7-9 yrs) Based on Frequency of Food Groups Intake

S. No.	Food Groups	Daily	Weekly	Twice a month
1	Pulses & legumes	82%	18%	
2	Cereals	100%		
3	Milk & Milk Products	92%	8%	
4	Green leafy vegetables	60%	38%	2%
5	Fats & oils	100%		
6	Meat, Fish & Poultry	11%	32.36%	5%
7	Sugar & Jaggery	100%		
8	Fruits	38%	60%	2%

Girls food consumption pattern revealed that (Table 5) pulses and legumes were consumed by 82% of them on daily basis while the rest consumed it weekly. Cereals were consumed by all the respondents on a daily basis, possibly in the form of chapatti, rice and bread. Consumption trend of other food groups i.e. Milk and Milk products, Green leafy vegetables, fats and oils, meat, fish, poultry, sugar, jaggery and fruits were almost similar to the consumption pattern of boys, though some variation was observed in terms of quantity intake between boys and girls.

Table 6
Clinical Examination Chart of Primary School Children (7-9 yrs)

S. No.	Clinical Signs	Category	Boys		Girls	
			No.	Percentage	No.	Percentage
1	General Appearance	Good	38	63.33	42	70
		Fair	17	28.33	15	25
		Poor	5	8.33	3	5
		Very Poor	-	-	-	-
2	Hair	Normal	18	30	23	38.33
		Loss of luster	25	41.66	18	30
		Dry	9	15	13	21.66
		Sparseness	8	13.33	6	10
3	Teeth	Caries	18	30	19	31.66
		Chalky Teeth	14	23.33	18	30
		Normal	28	46.66	23	38.33
4	Gums	Swollen red	2	3.33	5	8.33
		Bleeding	2	3.33	2	3.33
		Normal	56	93.33	53	88.33
5	Tongue	Pale	18	30	20	33.33
		Red	2	3.33	5	8.33
		Swollen	3	5	-	-
		Normal	37	61.66	35	58.33
6	Face	Pale	10	16.66	15	25
		Dry	12	20	15	25
		Moon Face	-	-	-	-
		Normal	38	63.33	30	50
7	Skin	Dry & rough	4	6.66	3	5
		Hyperk eratosis	-	-	-	-
		Loss of Uester	10	16.66	12	20
		Normal	46	76.66	45	76
8	Eye	Itching	9	15	12	20
		Water Discharge	12	20	11	18.33
		Night Blindness	-	-	-	-
		Normal colour	39	65	37	61.66
9	Lips	Mild cheilosis	3	5	2	3.33
		Severe cheilosis	-	-	-	-
		Angular stomatitis	04	6.66	2	3.33
		Swollen Puffy	01	1.66	-	-
		Normal	52	86.66	56	93.33
10	Bones	Normal	60	100	60	100
		Bow legs	-	-	-	-
		Knock knees	-	-	-	-

Source: FAO/WHO Expert Committee on Medical Assessment of Nutritional Status, WHO Tech. Rep. Ser. 258.

Table 6 shows the distribution of the nutritional deficiency signs amongst boys and girls respondents.

General Appearance

Majority of the boys and girls respondents (92% and 95%) were classified as good and fair.

Hair

56% boys and 5.166% girls had dry hair with no luster where as 6-8% had sparse and brittle hair. A poor hair condition of the respondents may be attributed to protein deficiency among them.

Teeth

30% boys and 31% girls suffered from caries. 23% boys and 30% girls had chalky teeth whereas 46% boys and 38% percent girls had normal teeth. Chalky teeth indicates the deficiency of calcium.

Gums

were observed normal in most of the children only 6% boys and 11% girls had swollen and bleeding gums thus indicating vitamin-C deficiency. ***Tongue:*** 30% of the respondents had pale tongue wheres 5% of them had red and swollen tongue thus indicating niacin deficiency where as 60% of the respondents had normal tongue.

Face

16% boys and 25% girls had pale face where as 20% boys and 25% girls had dry face. Remaining 63% boys and 50% girls had normal face.

Skin

Dry and rough skin was observed among 6% respondents where as 18% respondents skin was dull in luster 75% of the respondents skin was normal in appearance Hyper Keratosis was not observed in any respondent.

Eyes

65% boys and 61% girls had healthy eyes. 15% boys and 20% girls have itching eyes and about 20% of them have watery eyes. None of them suffered from night blindness.

Lips

6.66% boys and 3.33% girls had mild angular stomatitis and close to 5% had mild cheilosis which indicates riboflavin deficiency in them.

Bones

None of the children had Rickets or any other visible orthopedic problem. Bones of all the children were found normal.

Table 7
Age and Sexwise Distribution Based on the Anthropometric Parameters

Age	7-<8 years		8-<9 years		9-<10 years	
Anthropometric Measurements	Boys (n=20)	Girls (n=20)	Boys (n=20)	Girls (n=20)	Boys (n=20)	Girls (n=20)
Mean Height (cm)	118.06±5.35	116.77±7.42	121.08±5.87	123.28±4.79	127.54±10.99	129.32±6.58
NCHS Standard	121.70	120.60	127.0	126.40	132.20	132.20
Mean Weight (Kg)	18.06±3.19	17.67±3.23	19.90±2.45	19.68±3.05	21.97±2.80	20.61±2.17
NCHS Standard	19.08	18.21	21.08	20.08	23.81	23.03

Values are mean ±SD
NCHS- National centre for health statistics (2008)

Anthropometric Measurements of Children

Mean height in all age groups was lesser than the NCHS standards. The mean height in the age group 7-<8 years for boys and girls was 118.06 cm and 116.77 cm respectively. Mean height of girls was higher (123.28 cm and 129.32 cm) than boys (121.08 cm and 127.54 cm) in the age groups 8-<9 years and 9-<10 years respectively.

The mean weight in all the age groups was lesser than the NCHS standards. The difference in weight was more in the age group 9-<10 years for both boys (1.84kg) and girls (2.42kg) as compared to 7-9 years group. The mean weight increased from 18.06kg and 17.67kg for boys and girls respectively in the 7 yr age to 21.97 kg and 20.61 kg respectively in the 9 yr age group. This result is supported by a study vandana and Saroj (2012) conducted on school children of Hisar district.

Thus nutritional analysis revealed a nutritional gap among the children. So there is an urgent need to educate mothers of school going children about the importance of balance diet and promote the consumption of foods like cereals, pulses, green leafy vegetables, roots and tubers, sugar and jaggery, fats and oil, milk and milk products, fruits etc in the children's diet to improve their nutritional status so that children contribute in the well-being of the nation. Regular weight and height measurements should be taken in the schools so that a regular check can be kept on the development of the children. The need of the day is to keep children free from all diseases and provide them a healthy and hygienic environment as children are the future of the nation's prosperity.

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