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Assessment of Nutrient Intake of Rural School Going Children (7-9 Years) of Hisar District, Haryana

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Abstract: ***Nutrient intake of 100 school going children (7-9 years) in two villages i.e. Kaimri and Mangali of Hisar I block was studied. Dietary assessment was done by 24 hour dietary recall method for three consecutive days of 100 children. Amount of nutrients obtained per day from food consumed was calculated and compared with RDA for Indian children (ICMR, 2009). Nutrients like energy, fat, β-carotene, B-complex vitamins, Vitamin C, Iron and Calcium were found limiting in the diets of school children. It was also observed that the nutrient intake was higher in boys as compared to girls. Nutritional inadequacies, poverty, lack of infrastructure and poor education of mother lead to severe malnutrition in school going children. This condition needs careful consideration. There is an urgent need to promote the importance of balanced diet and preparation of nutrient-rich recipes based on locally available food stuffs to improve their nutrient intake. Awareness programs regarding affordable but nutritious foods should be introduced by the government through community participation, involvement of non-governmental organisations and other sectors.***

Keywords: Nutrient Intake, dietary assessment, nutritional inadequacy, school-children, malnutrition

1. Introduction

Developing countries like India, account for about 40 percent undernourished children in the World which is mainly due to the dietary inadequacy in relation to their needs (Mitra *et al*., 2007). School going children form an important vulnerable segment of the nation's population. They constitute 20 to 25 per cent of the total population in India. School age is a dynamic period of physical growth and development, when the child undergoes rapid mental, emotional and social changes. It is the period of utmost significance and presents a general health status of a community and nation as a whole.

Nutrition plays a vital role in growth and development of children. Inadequate nutrition may lead to malnutrition, growth retardation, reduced work capacity and poor mental and social development (Awasthi and Kumar, 2000; Manna *et al*., 2011). These conditions if encountered during childhood can lead to a life of poor productivity and endless sufferings. Among all age groups, the school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence.

Good nutrition is important throughout childhood because under nutrition during the first few years of life decreases adult body size and physical output when the growth rate is high. The high level of nutritional deprivation combined with heavy burden of disease at young age has negative consequences which will be expressed during adult life. Hence the school age period is nutritionally significant and children are considered to be the special risk group.

Several studies have been conducted on physical growth and nutritional status of children in different parts of the country as malnutrition continues to be a common, social and undoubtedly the biggest public health problem in our country today. Studies have shown that more than 50 percent of school children suffer from sub-clinical under nutrition because of poverty, ignorance, disturbed emotional status or inadequate diet.

Malnutrition reduces memory, hearing ability and impairs intellectual functioning. The prevalence of under nutrition tended to increase from about 63% among children in 6-9 year age group to 78% in 10-13 years and then declined to 66% in 14-17 year age group (NNMB Technical Report, 2002). The consequences of malnutrition among school age children includes stunted growth, underweight, anaemia, iodine deficiency and other health related problems such as malaria, diarrhoea, worm and respiratory infection. The most common types of morbidities reported among children in India during present days consist of fever (14%) diarrhoea (4%) and respiratory infections up to 4 per cent. Among these problems, stunting occurs due to exposure to poor nutrition in early childhood period. Nearly 12 million children, who die each year in developing countries mainly from preventable causes, the deaths of over 6 million or 55 per cent, are either directly or indirectly attributed to malnutrition.

Therefore, the problem of malnutrition and under nutrition pose a serious threat to growth and development along with poor academic performance, adverse effect on gross motor activities, skilled motor activities, perception, cognition, memory, attention span, language development and inter social relationship, in turn the personality of the children. Micronutrient deficiencies also cause reduced productivity in later life (Micronutrient Initiative, 2007). There are innumerable studies on the growth and nutrition monitoring of Under Five children but the studies on the children of school going age group are scarce in literature.

Therefore, it becomes very important to know the nutritional status of school going children, the building blocks of state and country. Therefore the present study was conducted with the objective to study the nutrient intake of rural school going children of Hisar.

2. Materials and Methods

Nutrient intake was calculated from 24 hour dietary recall data for three consecutive days using Food Composition Tables of ICMR (Gopalan *et al.,* 1999). Protein, fat, energy, iron, calcium, thiamine, riboflavin, niacin, Vitamin B_{12}, folic acid, Vitamin C and β-carotene intake was calculated. The mean nutrient intake was compared with the Recommended Dietary Allowances (RDA) given by ICMR (Gopalan *et al*., 2010). The percent of RDA was calculated using the following formula:

$$\text{RDA\%} = \frac{\text{Intake of nutrient}}{\text{RDA}} \times 100$$

z value was used to find out the difference between actual intake and RDA.

3. Results and Discussion

Findings of the present study revealed that energy intake of school children significantly ($P \leq 0.01$) lower than its RDA (56.66 % of RDA). The present findings corroborate with those of Hakeem *et al.* (2002) and Mitra *et al.* (2007) who observed that energy intake of school children was low when compared with RDA. Similarly, children of Varanasi district received inadequate energy (73% of RDA) as investigated by Mishra and Tiwari (2007).

The data revealed that protein intake of the school children was significantly low than the RDA i.e. 20.15g (49.14%). Handa *et al*. (2008) studied that the protein intake of school going children of Allahabad district (30.17g/day). Similarly, Khasi girls (7-9Y) of Meghalya were shown to have lower protein intake (33.48g) than RDA (Agrahar-Murugkar, 2005).

Iron intake of school children was significantly ($P \leq 0.01$) lower than its respective recommended level. Kumari and Singh (2001) and Aranctal *et al*. (2003) reported similar pattern of low consumption of green leafy vegetables which resulted in less iron of children.

Unlike the observation for other nutrients, calcium intake by the study group was higher (72.78%). These findings were consistent with those of various workers (Handa *et al*., 2008) who observed that calcium intake was more than RDA among school children living in Ludhiana, Hisar and Allahabad, respectively.

The average intake of β- carotene, B- complex vitamins, folic acid and Vitamin C in study population was less as per recommendations. Lower content of Folic acid and Vitamin C in diet of affluent Indian school children was observed by Srihari *et al*. (2007) too. Hakeem *et al*. (2002) assessed and reported that the diet of Pakistani school children was lacking in Vitamin A and Vitamin C.

Mean intake of iron (28.6%), β- carotene (34.9%) was significantly lower than RDA. Similar findings have been supported by other workers (Glynn *et al.,* 2005; Mitra *et al.,* 2007) who reported that mean intake of most of nutrients was lower than the RDA. Iron intake was 16.09 mg and vitamin A intake was 334.69 mg per day in children.

It was found that the nutrient intake of the school-going girls was significantly lower than the boys.

4. Conclusion

Hence it may be concluded that the nutrients were found to be limiting nutrients in the diets of school children. There is an urgent need to promote the importance of balanced diet and preparation of nutrient-rich recipes based on locally available food stuffs to improve their nutrient intake. Awareness programs regarding affordable but nutritious foods should be introduced by the government through community participation, involvement of non-governmental organisations and other sectors.

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Table 1: Mean daily nutrient intake of school children (7-9 years) **(n=100)**

Nutrients	RDA	Mean daily nutrient intake	z value	Overall intake (% of RDA)
Energy (KCal)	1690	957.12±219.53	-33.38**	56.66
Protein (gm)	41	38.52±10.07	-2.46**	93.95
Fat (gm)	25	13.12±3.68	-32.28**	52.48
β- carotene (ug)	4800	1678.4±1486.96	-20.99**	34.9
Vit. B_1 (mg)	0.8	0.49±0.15	-20.66**	61.25
Vit. B_2 (mg)	1.0	0.36±0.15	-42.66**	36.0
Vit. B_3 (mg)	13.0	3.75±1.57	-61.66**	28.84
Vit. B_{12} (ug)	1.0	0.07±0.05	-186**	7.0
Folic Acid (ug)	120	83.88±63.21	-5.71*	69.9
Vit. C (mg)	40	26.43±22.33	-6.08*	66.07
Iron (mg)	25	7.15±5.47	-33.05**	28.6
Calcium (mg)	400	289.12±134.26	-8.26**	72.28

Values are mean ± SD ** Significant at 1% level
RDA- Recommended Dietary Allowances (ICMR 2010). * Significant at 5% level
z-value shows comparison of nutrients intake with RDA. n= number of school children

Table 2: Comparison between mean daily nutrient intake of boys and girls, (n=100)

Nutrients	Mean Daily Nutrient Intake			z- value		Boys vs. girls z value
	RDA	Boys (n= 50)	Girls (n= 50)	Boys	Girls	
Energy (KCal)	1690	978.62 ± 202.45 (57.90)	935.61± 235.47 (55.36)	-24.84**	-22.65**	2.19
Protein (gm)	41	39.08 ± 10.32 (95.31)	37.96 ± 9.75 (92.58)	-1.3**	-2.2**	0.9
Fat (gm)	25	13.18 ± 3.87 (52.72)	13.06 ± 3.53 (52.24)	-21.88**	-24.36**	2.48
β- carotene (ug)	4800	1628± 1255.44 (33.91)	1713.6 ± 1635.76 (35.7)	-25.26**	-18.86**	-6.4
Vit. B_1 (mg)	0.8	0.51 ± 0.15 (63.75)	0.48 ± 0.16 (60)	-13.67**	-13.70**	0.03
Vit. B_2 (mg)	1.0	0.39 ± 0.15 (39)	0.33 ± 0.13 (33)	-26.51**	-33.33**	6.82
Vit. B_3 (mg)	13.0	3.78 ± 1.79 (29.07)	3.71 ± 1.33 (28.53)	-36.42**	-49.33**	12.91
Vit. B_{12} (ug)	1.0	0.08 ± 0.06 (8)	0.07 ± 0.03 (7)	-108.42**	-164.40**	55.98
Folic Acid (ug)	120	93.16 ± 67.45 (77.63)	74.61 ± 57.86 (62.17)	-2.81**	-5.54**	2.73
Vit. C (mg)	40	30.98 ± 23.22 (77.45)	21.88 ± 20.63 (54.70)	-2.74**	-6.20**	3.46
Iron (mg)	25	7.90 ± 7.46 (31.60)	6.40 ± 1.95 (25.60)	-16.20**	-67.41**	51.21
Calcium (mg)	400	310.39 ± 142.86 (77.59)	267.85 ± 122.84 (66.96)	-4.43**	-7.60**	3.17

Values are Mean ± SD Figures in parentheses indicate percentage.
RDA- Recommended Dietary Allowances (ICMR 2010) **Significant at 1% level
z value shows comparison of nutrients intake with RDA. *Significant at 5% level
n= number of school children