

Assessment of dietary intake of pre-school children (4-6 years) belonging to slum areas of Ludhiana

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Micronutrient deficiencies in the early part of life may lead to severe health hazards in the later life. Unawareness regarding nutrition, poverty, ignorance and illiteracy in the slum areas leads to less intake of nutrients than recommended and aggravates the health problems to great extent. A study group belonging to low socio economic status residing in slum areas aged (4-6 years) was selected for their daily food and nutrient intake. General information, family history, dietary habits, food and nutrient intake was obtained using a questionnaire. Macronutrient intake of the subjects portrayed a surplus intake of protein and fat in comparison to RDA but micronutrient deficient intakes of the study group was seen. Intake of energy, β -carotene, thiamine, riboflavin, niacin, folic acid, ascorbic acid, iron, calcium and zinc was less than recommended intake. Less intake of nutrients were observed to be due to the less average food intake of all the food groups among the subjects.

Key Words : Food intake, Nutrient intake, Pre-school children, Slum areas

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INTRODUCTION

Pre-school children are our future citizens. The period of pre-school begins after infancy and continues upto the age of six years. Physical growth is important as it meant the progressive development of various parts of the body their capacity to function. The rate of physical growth may be determined by some external and internal factors like nutrition, fatigue, rest, exercise, work, heredity, illness and secretion of the ductless and endocrine glands. So, if the required balanced diet is not given to a child, his health will deteriorate (Singh and

Sandhu, 2014). It is a dynamic period of growth and development as the children undergo physical, mental and emotional development during this stage. Therefore, adequate food is the most important requisite for their rapid growth and development. Although, it is important throughout childhood but it is more crucial during the first five years of life when rapid growth is occurring (Kaur *et al.*, 2007).

Good nutrition is the fundamental basic requirement for the maintenance of positive health. A proper diet is essential from the very early stages of life for growth, development and active health. A child's nutrition begins from conception itself *i.e.* right from intrauterine life of the child (Singh and Sandhu, 2014). Inadequate consumption of nutrients will result in adverse metabolic disturbances leading to sickness, poor health, impaired development in children and large economic costs to society. Micronutrient deficiencies are typically due to inadequate food intake, poor dietary quality, poor

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bioavailability and the presence of infection (Amrutha and Kowsalya, 2012). Therefore, the present study was planned to assess the food and nutrient intake of pre-school children belonging to slum areas of Ludhiana.

METHODOLOGY

The present study was conducted on 75 pre-school children (4 to 6 years) belonging to slum areas. Subjects were randomly selected from Ludhiana. The general information regarding age, gender, income of family, type and size of family, occupation of parents, dietary habits and family history of children were collected by an interview schedule. Information regarding food intake of the subjects was collected by using 24-hour recall method for three consecutive days. The average daily nutrient intake of diet was calculated by using 'Diet cal software' (Kaur, 2014). The food and nutrient intake was compared with suggested dietary intakes and recommended dietary allowances (ICMR 2010 a and b). The data were tabulated and analysed statistically using frequencies, percentages and mean.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

General information:

The general profile of selected slum pre-school children has been given in Table 1. Fifty two per cent of the subjects in the present study were males and 48 per cent were females. The findings on the type of family indicated that majority *i.e.* 93.3 per cent were from nuclear families and the rest (6.7 %) were from joint families. On the basis of size of the family the subjects were divided into three categories. Maximum number (58.7%) belonged to category of 4-5 members, while 30.6 per cent belonged to ≤ 3 members and 10.7 per cent belonged to ≥ 6 members. Occupation of fathers of 100 per cent children was labourers. As depicted in the Table 1, the monthly income of the subjects ranged from Rs. 2,000-Rs. 9,000 per month. It was observed that maximum number of families (78.7%) had family income between Rs. 2,000-Rs. 5,000 per month. It was reported that monthly income of 14.7 per cent ranged between Rs.5,000-Rs. 10,000 and the rest 6.7 per cent had family income $>$ Rs. 10,000, respectively. Earlier studies

conducted by Rani *et al.* (2011) also reported that 52 and 48 per cent were male and female which was exact similar to the present study. Bathla (2012) reported that only 3 per cent were in the income category of less than Rs. 10,000 per month. Similar results related to type of family and occupation of fathers was observed by Premakumari and Deepa (2008). Pradhan and Sharma (2011) reported that about 67 per cent of the families were nuclear, while 33 per cent were joint families.

In the present study, it was observed that majority

Table 1 : General information of pre-school children (4-6 years)

Parameters	Frequency (n=75)	Percentage
Gender		
Male	39	52.0
Female	36	48.0
Type of family		
Nuclear	70	93.3
Joint	5	6.7
Size of family		
≤ 3	23	30.6
4-5	44	58.7
≥ 6	8	10.7
Occupation		
Labour class	75	100
Monthly income		
2000-5,000	59	78.7
5,000-10,000	11	14.7
$>10,000$	5	6.6
Dietary habits		
Vegetarian	34	45.3
Non-vegetarian	36	48.0
Ova vegetarian	5	6.7
No. of meals in a day		
3	30	40.0
4	5	6.7
5	40	53.3
Intake of fast foods		
Weekly	6	8.0
Fortnightly	33	44.0
Monthly	36	48.0
Fluid intake		
Soft drinks*	11	14.6
Juice *	11	14.6
Shakes*	3	4.0
Tea *	60	80.0
Milk *	15	20.0

*Multiple responses

of the subjects *i.e.* 48.0 per cent were non-vegetarian and 45.3 per cent were vegetarian, while only 6.7 per cent were ova- vegetarian. The data of the present study reported that 53.3 and 40.0 per cent of the subjects were in the habit of taking meals three and four times a day, whereas only 6.7 per cent of the subjects' preferred to eat five times a day, respectively. It was noticed that 48.0 and 44.0 per cent of pre-school children consumed fast foods fortnightly and monthly, respectively. It was further seen that only 8.0 per cent of children consumed fast foods weekly. Various beverages consumed by the pre-school children were tea, milk, milk shakes, juice and soft drinks. Table 1 depicts in the present study that majority of the subjects took milk in the form of tea. It was observed that daily consumption of milk and tea was most common among 20.0 and 80.0 per cent of subjects, respectively. Further, 14.6, 14.6 and 4.0 per cent of subjects preferred soft drinks, fruit juice and shakes, respectively. On the contrary, Bathla (2012) reported that 83 and 19 per cent were vegetarian and non-vegetarian, respectively in Ludhiana city. Taveras *et al.* (2006) reported that 22 per cent of pre-school children (4-6 year) ate fast food at least once per week.

Table 2 depicted in the present study reported that 10.6, 20.0, 14.6 and 2.6 per cent of subjects had family history of diseases like diabetes, high blood pressure, asthma and heart problems, respectively. It was also observed that 10.6 per cent of subjects had allergy from dust or suffered from medical problems such as asthma. Singh *et al.* (2002) reported that 45.8 per cent of children had family history of asthma.

Table 2 : Family history of pre-school children (4-6 years)

Parameters	Frequency (n=75)	Percentage
Diabetes *	8	10.6
High blood pressure *	15	20.0
Heart problem *	2	2.6
Asthma *	11	14.6
Allergy/medical problem of child*	8	10.6

*Multiple responses

Food intake:

The average daily intake of food and its per cent adequacy has been presented in Table 3. The data revealed that the mean consumption of cereals among the pre-school children was 92.8 ± 5.5 g. The daily intake was found to be less than the suggested dietary intake of

ICMR (2010a). It was also found that the per cent adequacy of cereal intake was 77.3 per cent. The mean daily intake of pulses by pre-school children was 23.1 ± 1.7 g. The data further showed that the consumption of pulses was 77.0 per cent of the suggested dietary intake of 30 g. The average daily intake of green leafy vegetables was 4.4 ± 1.4 g. It was found to be only 8.8 per cent of the suggested dietary intake of 50 g. Intake of green leafy vegetables was observed to be very less. The lower intake of green leafy vegetables might be due to their less availability during study period. Moreover, it was observed that pre-school children do not like green leafy vegetables. The most common roots and tubers consumed by the subjects were potatoes and onions in the form of vegetables. The average daily consumption of roots and tubers by pre-school children was 25.5 ± 2.5 g. However, the results showed inadequate consumption of roots and tubers when compared with the suggested dietary intake of ICMR (2010a). The per cent adequacy of roots and tubers intake by pre-school children was 25.5 per cent. The average daily intake of other vegetables by the pre-school children was found to be 5.5 ± 1.1 g. It was further observed that the mean daily intake among pre-school children was lower than the recommendations of 100 g as suggested by ICMR (2010a). The per cent adequacy of other vegetables intake by pre-school children was 5.5 per cent. The data on average daily food intake further depicted that the average intake of fruits was 40.2 ± 4.5 g and was less than the suggested intake of 100 g as suggested by ICMR (2010a). The corresponding value for per cent adequacy of fruits was 40.2 per cent among pre-school children. The mean daily intake of milk and milk products revealed that pre-school children consumed 342.3 ± 24.5 g with per cent adequacy of 68.5 per cent. From the data, it was found that the consumption of milk and milk products was lower than the recommended intake of 500 g (ICMR, 2010a). It was observed that average intake of fats and oils were 8.2 ± 0.5 g. The intake of fats and oils was less when compared to recommendations of 25 g. The adequacy of fats and oils was 32.8 per cent. The average daily intake of sugar and jaggery by pre-school children was 10.7 ± 0.6 g. The per cent adequacy of sugar and jaggery being 53.5 per cent. Further, it was also observed that the mean daily intake of meat and poultry was only 7.8 ± 2.0 g. Reddy *et al.* (2006) reported that the average intake of pulses, green leafy vegetables, milk and milk products, fats and oils,

sugar and jaggery was lower than the recommendations among pre-school children (1-6 year). Narkhede *et al.* (2011) reported that the intake of cereal (58.8%), pulses (82.6%), leafy vegetables (14.8%), other vegetable (26.7%), milk and milk products (32.0%), oil and fats (88.0%) and sugar and jaggery (80%) among pre-school children (3-5 year).

Nutrient intake:

The average daily nutrient intake by selected pre-school children and its per cent adequacy has been presented in Table 4. The average daily energy intake among pre-school children was 796.8 ± 40.1 Kcal. The nutrient adequacy of energy calculated against RDA of ICMR (2010b) was 59 per cent. The data revealed in the present study that the mean daily intake of protein was 28.3 ± 1.5 g. The results revealed that the mean intake of protein was much higher than RDA of 20.1 g as per ICMR

recommendations (2010b) and per cent adequacy was 140.7 per cent (Table 4). The results of the present study revealed that the mean daily intake of fat and carbohydrate was 27.2 ± 1.4 g and 104.5 ± 6.0 g, respectively. It was observed that the intake of fat was much higher than recommendations of 25 g by ICMR (2010b). Narkhede *et al.* (2011) reported that the mean intake of energy was 1096.24 Kcal which was comparable to present study. Kulsum *et al.* (2008) reported that only 22 per cent of children enjoyed a diet adequate in protein and calories. On the contrary to present study, Hari (2008) reported that total fat intake was inadequate among preschool children.

Table 4 depicted that the mean daily intake of β -carotene was 292.1 ± 60.4 μ g among pre-school children, the corresponding value for adequacy was 9.1 per cent. The intake was severally inadequate as ICMR recommendations (2010b) of 3200 μ g. The subjects used

Table 3 : Average food intake (g/day) of pre-school children (4-6 years)

Food groups	Observed value (g)	Per cent adequacy	Suggested intake (g)
Cereals	92.8 \pm 5.5	77.3	120
Pulses	23.1 \pm 1.7	77.0	30
Green leafy vegetables	4.4 \pm 1.4	8.8	50
Roots and tubers	25.5 \pm 2.5	25.5	100
Other vegetables	5.5 \pm 1.1	5.5	100
Fruits	40.2 \pm 4.5	40.2	100
Milk and milk products	342.3 \pm 24.5	68.5	500
Fats and oils	8.2 \pm 0.5	32.8	25
Sugar and jaggery	10.7 \pm 0.6	53.5	20
Meat and poultry	7.8 \pm 2.0	-	-

Table 4 : Average nutrient intake (g/day) of pre-school children (4-6 years)

Food groups	Observed value	Per cent adequacy	RDA
Energy (Kcal)	796.8 \pm 40.1	59	1350
Protein (g)	28.3 \pm 1.5	140.7	20.1
Carbohydrates (g)	104.5 \pm 6.0	-	-
Total fat (g)	27.2 \pm 1.4	108.8	25
-carotene (μ g)	292.1 \pm 60.4	9.1	3200
Thiamine (mg)	0.6 \pm 0.03	85.7	0.7
Riboflavin (mg)	0.7 \pm 0.1	87.5	0.8
Niacin (mg)	4.4 \pm 0.3	40	11
Folic acid (μ g)	74.1 \pm 5.3	74.1	100
Vitamin B ₁₂ (μ g)	0.6 \pm 0.06	60	0.2-1
Ascorbic acid (mg)	23.0 \pm 3.0	57.5	40
Iron (mg)	6.4 \pm 0.4	49.2	13
Calcium (mg)	585.5 \pm 34.9	97.6	600
Zinc (mg)	2.4 \pm 0.1	34.3	7.0

to take less green leafy vegetables which resulted in decreased intake of β -carotene. The data revealed in the present study that the mean daily intake of thiamine and riboflavin among pre-school children was 0.6 ± 0.03 mg and 0.7 ± 0.1 mg, respectively. It was observed that the mean daily intake of thiamine and riboflavin was marginally inadequate as compared to the recommendations of 0.7 mg and 0.8 mg (ICMR, 2010b) among pre-school children. The adequacy of intake of thiamine and riboflavin was 85.7 and 87.5 per cent, respectively (Table 4). Table 4 depicted that the mean daily intake of niacin and vitamin B₁₂ was 4.4 ± 0.3 mg and 0.6 ± 0.06 μ g among pre-school children, respectively. It was observed that the average daily intake of niacin and vitamin B₁₂ was below the RDA's of 11 mg and 0.2-1.0 μ g (ICMR, 2010b). This might be due to inadequate intake of pulses, legumes and non-vegetarian foods by the subjects in their daily diet. The per cent adequacy of intake of niacin and vitamin B₁₂ was 40.0 and 60.0 per cent, respectively. The data revealed that the mean daily intake of folic acid was 74.1 ± 5.3 μ g. It was observed that the intake of folic acid was less than the recommendations of 100 μ g (ICMR, 2010b). This might be due to the inadequate intake of whole grain cereals, pulses, green leafy vegetables and roots and tubers. The per cent adequacy of intake of folic acid was 74.1 per cent. Table 4 depicted that the mean daily intake of ascorbic acid was 23.0 ± 3.0 mg. When compared to RDA's (40 mg), the intake was found to be inadequate. The per cent adequacy among pre-school children was observed as 57.5 per cent. On the contrary, Bathla (2012) reported that the intake of beta-carotene was marginally inadequate among pre-school children. Higher intake of riboflavin was reported by Saxena and Stanley (2003) as compared to ICMR recommendations. Rani *et al.* (2011) reported that the mean daily intake of ascorbic acid was 20.3 ± 1.2 mg among children (5-8 year) which was less than recommendations.

The present study revealed that the mean intake of iron, calcium and zinc was 6.4 ± 0.4 mg, 585.5 ± 34.9 mg and 2.4 ± 0.1 mg among pre-school children, respectively. The per cent adequacy of these minerals was 49.2, 97.6 and 34.3 per cent, respectively (Table 4). It was further observed that the average daily intake of iron and zinc was inadequate as compared to RDA's of 13.0 mg and 7.0 mg (ICMR, 2010b). The present study also observed that the intake of calcium was marginally

inadequate as compared to recommended intake of 600 mg (ICMR, 2010b). Lakshmi and Padma (2004) reported that the intake of all the nutrients was found to be less than ICMR recommendations among pre-school children (1-6 years). The mean iron intake was 8.2 mg which was inadequate (Rana and Hussain, 2001). Grover (2002) also reported less intake of iron among subjects in their findings.

Conclusion :

Less intake of nutrients such as energy, β -carotene, thiamine, riboflavin, niacin, folic acid, ascorbic acid, iron, calcium and zinc was observed among the pre-school children due to inadequate intake of whole grain cereals, pulses, green leafy vegetables, roots and tubers, fruits and milk and milk products as per recommendations given by ICMR. More stress should be laid on the intake of nutrients in early life which may prove useful in later years of life for overall physical and mental development.

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