

Nutritional Profile of Urban Preschool Children of Punjab

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Growth retardation and malnutrition are the major public health problems in the developing countries. Recent research has convincingly demonstrated that upto two-third of child mortality is associated with malnutrition (Pelleties, 1994). The prevalence of protein energy malnutrition is much higher in South Asia (50 per cent) than in Sub-Saharan Africa (30 percent). UNICEF report reveals that 53 per cent of Indian children are malnourished. Malnutrition and impaired growth are closely related. A majority of malnourished children fail to achieve their full genetic potential in bodily dimensions and may develop stunting and wasting, besides other deficiency disorders. As a consequence, the quality of human resource of a country is adversely affected. The status of growth of children is considered as an index of the health and well being of community. Therefore, regular monitoring of child growth and nutritional profile is now one of the major concerns for the public health policy makers and planner of country. Punjab is one of the most prosperous states of India with one of the highest per capita income. The present investigation is an attempt to provide information on the nutritional status of urban Punjabi preschool children

MATERIAL AND METHODS

Five hundred and twenty four preschool children in the age group of 1-6 years belonging to middle socio-economic groups were selected from the various urban areas of Ludhiana district, Punjab. Information regarding the food and nutrient intake of the subjects were collected using the "24-hour Recall Method" for three consecutive days. The amount of each food item was tabulated and average daily intake of each food item was calculated. The nutrients were calculated using MSU Nutriguide Computer Programme (Song et al., 1992). The nutrient and food intake were compared with their respective Recommended Dietary Allowances and Suggested Intake (ICMR, 1984, 1989), respectively and per cent adequacy was also calculated. Height, weight, mid-upper arm circumference, chest circumference and head circumference of the

children were measured (Jelliffe, 1966). To find out the level of significance, the results were statistically tested using t-test.

RESULTS AND DISCUSSION

Food and Nutrient Intake

The quantitative consumption of food items from all the food groups by the preschool children has been summarized in Table 1. The per cent adequacy of cereals, pulses and green leafy vegetables consumption by both groups (1-3 and 4-6 year) was 73 and 56 per cent, 72 and 78 per cent and 14 and 24 per cent, respectively (Fig. 1). However, the intake of income elastic foods like milk and milk products, fats and oils and sugar and jaggery was higher than the suggested intake (ICMR, 1984). Vijayaraghavan and Hanumantha Rao (1998) also reported the high consumption of these foods in the household with occupation such as business and service while low in schedule caste communities.

The mean daily intake of nutrients by the children is presented in Table 2. The data indicated that intake of energy by both groups (1-3 and 4-6 years) was about 99 and 91 per cent of RDA, respectively. The source of energy in the diet of children was fats and oils, sugar and jaggery and cereals. Khosla et al. (2000) reported the inadequate intake of energy by the preschool children (1-4 years) belonging to low income families of Ludhiana, Punjab. FAO/WHO (1980) report confirmed the findings that as the household income rise and on moving from poor to affluent society, the percentage of calories obtained from carbohydrates tend to decrease. The intake of protein (36 and 39 g) was more than RDA in both the groups (1-3 and 4-6 years), respectively. Yadav and Singh (1999) reported the intake of protein in line with the recommended dietary allowances (RDA) in tribal preschool children (1-6 years) of Bihar. Awasthi et al. (2000) also inferred the adequate supply of protein in the diet of preschool children of Uttar Pradesh.

The intake of calcium was more than RDA in

Table 1: Mean daily intake of food by preschool children (1-6 years)

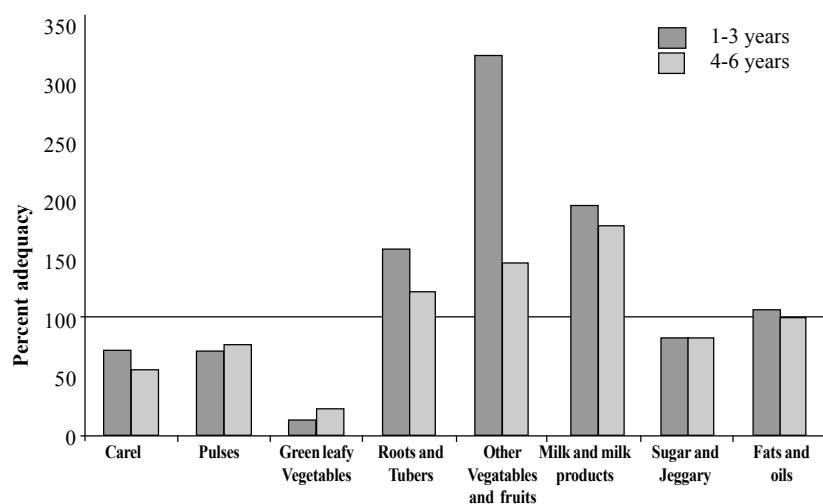
Food (g)	1-3 years (N=166)			4-6 years (N=358)		
	Mean $\pm$ S.E.	Suggested* intake	Percent adequacy	Mean $\pm$ S.E.	Suggested* intake	Percent adequacy
Cereals	127.68 $\pm$ 2.19	175	73	150.76 $\pm$ 2.21	270	56
Pulses	25.05 $\pm$ 0.57	35	72	27.18 $\pm$ 0.63	35	78
Green leafy vegetables	5.48 $\pm$ 0.43	40	14	11.95 $\pm$ 0.76	50	24
Roots and Tubers	15.92 $\pm$ 0.55	10	159	36.63 $\pm$ 0.70	30	122
Other vegetables and fruits	64.54 $\pm$ 1.71	20	323	73.28 $\pm$ 2.29	50	147
Milk and milk products	538.45 $\pm$ 8.25	300	180	400.91 $\pm$ 7.92	250	160
Sugar and jaggery	24.73 $\pm$ 0.34	30	82	32.59 $\pm$ 0.36	40	82
Fats and Oils	15.99 $\pm$ 0.51	15	107	24.59 $\pm$ 0.45	25	100
Meat and Fish	1.38 $\pm$ 0.10	-	-	1.07 $\pm$ 0.15	-	-
Eggs	9.78 $\pm$ 1.17	-	-	5.18 $\pm$ 0.59	-	-

* ICMR 1984

Table 2: Mean daily intake of nutrients by preschool children (1-6 years)

Nutrients	1-3 years (N=166)			4-6 years (N=358)		
	Mean $\pm$ S.E.	RDA*	Percent adequacy	Mean $\pm$ S.E.	RDA*	Percent adequacy
Energy, Kcal	1222.19 $\pm$ 11.52	1240	99	1541.28 $\pm$ 17.83	1690	91
Protein, g	35.73 $\pm$ 0.50	22	162	38.97 $\pm$ 0.48	30	130
Calcium, g	1.20 $\pm$ 0.02	0.40	300	0.89 $\pm$ 0.02	0.4	222
Iron, mg	10.73 $\pm$ 0.38	12	89	14.54 $\pm$ 0.42	18	81
Vitamin A, μ g	304.39 $\pm$ 3.44	400	76	479.10 $\pm$ 21.02	400	142
Thiamine, mg	0.73 $\pm$ 0.01	0.60	122	0.71 $\pm$ 0.02	0.9	79
Riboflavin, mg	0.78 $\pm$ 0.11	0.70	111	0.81 $\pm$ 0.01	1.0	81
Niacin, mg	7.50 $\pm$ 0.15	8	94	4.99 $\pm$ 0.10	11	45

* ICMR, 1990.

**Fig. 1. Percent adequacy of food intake by preschool children (1-6 years)**

both the groups and may be attributed to the nearly two times high consumption of milk and milk products. The inadequate intake of iron might be due to poor intake of green leafy vegetables and other iron rich foods. The consumption of vitamin A (479 µg) was adequate by the children of 1-3 years, whereas inadequate (304 µg) by the children of 4-6 years. The diets of the children (1-3 years) supply adequate amount of vitamin B complex. However, the diets of children (4-6 years) were deficit in thiamine, riboflavin and niacin by 21, 19 and 55 per cent,

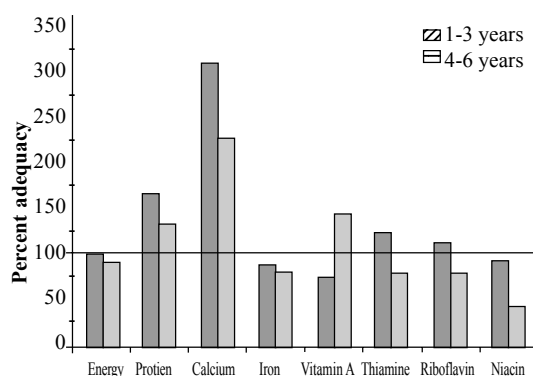


Fig. 2. Per cent adequacy of nutrient intake by preschool children (1-6 years)

respectively (Fig. 2) Khosla et al. (2000) also reported the inadequate intake of iron and all vitamins by the preschool children.

Anthropometric Measurements

Growth pattern of 524 preschool children in different age groups is presented in Table 3 and 4. The body weights and heights of preschool children were compared with those of American (NCSH standards) to assess the nutritional status. The data (Table 3) revealed that mean body weights and heights of both boys and girls in all the age groups (1-6 years) were significantly ($P<0.01$) lower than the standard. Similarly, the mid-upper arm circumference (index of body energy stores and protein mass) of both the sex was significantly ($P<0.01$) lower than the standard (Wolanski, 1964). The values of chest circumference (Table 4) of boys in the age group of 2-3, 3-4 and 4-5 years compared well with standards (ICMR, 1984). The head circumference which relates mainly to brain size was significantly lower than the standards except in the boys of age group (2-3 and 4-5 years). However, the values were significantly ($P<0.01$) lower in the girls of all age groups. Jose and Indira (2000) reported the significantly lower mean weight, height and mid-upper arm circumference of preschool children belonging to casual labourers, housewives and employed mothers.

Table 3: Mean weight and height of preschool children (1-6 years)

Age (years)		Weight (kg)		Heights (cm)	
		Boys	Girls	Boys	Girls
1-2 (N = 18, 19) [#]	Mean ±S.E.	10.11 ± 0.3	9.7 ± 0.5	80.2 ± 0.9	79.3 ± 2.4
	Standard	12.6	11.9	87.6	86.5
	t-value	8.3 **	6.5 **	16.4 **	9.6 **
2-3 (N = 67, 57)	Mean ±S.E.	12.8 ± 0.2	11.9 ± 0.2	88.7 ± 6.1	86.9 ± 6.7
	Standard	14.4	13.9	94.2	93.2
	t-value	9.4 **	10.0 **	18.2 **	18.0 **
3-4 (N = 13, 18)	Mean ±S.E.	12.9 ± 0.5	11.6 ± 0.5	99.4 ± 2.0	92.6 ± 1.4
	Standard	16.5	15.8	102.3	101.0
	t-value	9.7 **	11.7 **	3.8 **	14.8 **
4-5 (N = 68, 190)	Mean ±S.E.	15.3 ± 0.4	15.2 ± 0.2	104.3 ± 0.7	102.5 ± 0.5
	Standard	18.5	17.5	109.4	107.8
	t-value	15.2 **	20.9 **	17.8 **	26.5 **
5-6 (N = 40, 34)	Mean ±S.E.	18.9 ± 0.8	15.9 ± 0.4	109.1 ± 1.3	107.4 ± 1.5
	Standard	20.5	19.4	115.6	114.1
	t-value	4.3 **	13.5 **	14.1 **	12.9 **

Standard – NCHS, 1987

** Significant, $P<0.01$

[#]Number of children given first are of boys.

Table 4: Mean arm, chest and head circumference of preschool children (1-6 years)

Age (years)		Mid upper arm circumference (cm)		Chest circumference (cm)		Head circumference (cm)	
		Boys	Girls	Boys	Girls	Boys	Girls
1-2 (N=18, 19) [#]	Mean $\pm$ S.E.	14.9 $\pm$ 0.3	14.5 $\pm$ 0.3	45.6 $\pm$ 0.8	44.5 $\pm$ 0.8	45.1 $\pm$ 0.6	43.7 $\pm$ 0.6
	Standard	16.3 **	15.62	46.7	42.5	47.1	45.8
	t-value	4.5	2.5 **	2.6*	4.5**	5.0**	5.5 **
2-3 (N=67, 57)	Mean $\pm$ S.E.	14.6 $\pm$ 0.1	14.8 $\pm$ 0.5	46.5 $\pm$ 0.9	46.5 $\pm$ 0.5	48.5 $\pm$ 0.3	48.2 $\pm$ 0.2
	Standard	16.2	15.9	49	47.4	48.2	46.7
	t-value	14.5 **	4.2 **	2.8*	1.9	1.6	8.5**
3-4 (N= 13, 18)	Mean $\pm$ S.E.	15.6 $\pm$ 0.3	15.8 $\pm$ 0.2	49.1 $\pm$ 1.4	47.9 $\pm$ 0.9	47.0 $\pm$ 1.2	46.6 $\pm$ 0.4
	Standard	16.9	16.9	50	48.6	49.0	47.5
	t-value	4.3 **	4.7 **	1.4	1.4	3.3**	2.8*
4-5 (N= 68,190)	Mean $\pm$ S.E.	15.7 $\pm$ 0.1	15.4 $\pm$ 0.1	55.1 $\pm$ 0.7	50.7 $\pm$ 0.7	49.3 $\pm$ 0.3	50.9 $\pm$ 0.2
	Standard	17.1	16.9	51.3	50.9	49.2	48.6**
	t-value	13.0 **	20.4 **	5.3**	0.6	0.5	16.4
5-6 (N= 40, 34)	Mean $\pm$ S.E.	16.5 $\pm$ 0.4	15.9 $\pm$ 0.7	54.0 $\pm$ 0.6	53.6 $\pm$ 1.1	51.1 $\pm$ 0.4	50.1 $\pm$ 0.3
	Standard	17.3	17.3	53.5	52.7	50	49.1
	t-value	3.2 **	3.9 **	1.6	2.1 *	4.6**	4.1**

Standard: Arm circumference—Wolanski standard 1964; Chest circumference and head circumference ICMR, 1994.

* Significant, $P < 0.05$

**Significant, $P < 0.01$

[#]Number of children given first are of boys.

CONCLUSION

Thus, it may be concluded that the diets of urban Punjabi preschool children belonging to middle socio-economic group were adequate in macro-nutrients energy and protein but grossly deficient in micro-nutrients iron, vitamin A (1-3 years) and vitamin B complex (4-6 years). In spite of the adequate intake of energy and protein, the preschool children exhibit poor growth pattern. Therefore, their diets need to be supplemented with locally available cheap micro-nutrient rich foods and further study demands the development of educational modules as weaning and feeding practices, diarrhoea and its management, nutritional deficiency disorders and health and environmental sanitation for Punjabi mothers to bring health and nutritional improvement of their preschool children.

KEYWORDS Preschool Children. Dietary Survey. Anthropometric Measurements

ABSTRACT The nutritional status of 524 preschool children (1-6 years) from middle socio-economic background was evaluated with the help of dietary survey and anthropometric measurements. The consumption of cereals, pulses and green leafy vegetables was grossly inadequate, whereas the intake of income elastic foods like milk and milk products, fats and oils and sugar and jaggery was higher than suggested intake. The intake of energy by both the groups (1-3 and 4-6 years) was 99 and 91 per cent,

respectively. The diets of preschool children supply adequate amount of protein and calcium. The intake of vitamin A was inadequate only in the age group of 1-3 years, whereas the intake of vitamin B complex was inadequate in the age group of 4-6 years. Adequacy of iron intake was 89 and 81 per cent, respectively. The mean weight, height and mid-upper arm circumference of both the boys and girls in all the age groups were significantly ($P < 0.01$) lower than the standard. However, the chest circumference of boys (3-4 and 5-6 years) and girls (2-3, 3-4 and 5-6 years) and head circumference of boys (2-3 and 4-5 years) compared well with the standard.

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