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An Analysis of Food and Nutrient Intake of Rural Preschool Children in Punjab

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KEYWORDS Agro-Climatic Regions. Recommended Dietary Allowances (RDA). Rural Preschool Children. Suggested Dietary Intake (SDI)

ABSTRACT A sample of 150 preschool children spreading over 24 villages, 12 blocks, 6 districts and 3 agro-climatic regions i.e. sub-mountain (RI), central plains (RII) and south-western (RIII) were selected. The food and nutrient intake of the subjects were compared with their respective SDI (ICMR, 1984) and RDA (ICMR, 2000). The diet of rural preschool children was found to be imbalanced with plenty intake of milk and milk products and low intake of cereals, pulses and green leafy vegetables. The data of present study revealed that the requirement of macronutrients was adequately met with the intake of milk. The intake of protein and fat of rural preschool children was one and a half to two times of RDA in all the regions. Further, intake of energy was adequate in RI (103%) and nearly adequate in RII (89%) and RIII (88%). Whereas the intake of iron, ascorbic acid and niacin was inadequate. The study highlighted that the intake of food and nutrient by rural preschool children of sub-mountain region (RI) was significantly higher than those of southwestern region (RIII).

INTRODUCTION

During early childhood, the frequent or prolonged infections and inadequate intakes of nutrients particularly energy, protein, vitamin A, zinc and iron exacerbate the effects of foetal growth retardation. Malnutrition is reported to be a result of inadequate dietary intake and disease. The data suggest that when there is an inadequate dietary intake, the intake is low in both energy and protein and some micronutrients (Vijayaraghavan and Hanumantha Rao, 1998). Therefore, the dietary intake is considered as one of the most important determinants of nutritional status. Information on this pattern is essential pre-requisite for planning food needs. Though, Punjab is one of the most prosperous states of India and production of food in proportion to area is also far better than India. Yet, on the basis of economic growth, Punjab suffers from regional imbalances. According to 1999 report of National Institute of Rural Development, the poverty percentage of 17.5 in southern districts is reported to be perceptibly higher than northern districts of 7.6 (Anonymous, 2001). Thus, agriculture resource base of Punjab also varies widely from one corner to the other. Keeping in view, all these facts, an attempt was made to study the regional variations in the dietary intake of rural preschool children in Punjab.

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MATERIALS AND METHODS

Based on agro-climatic parameters (ARPU, 1998), the state of Punjab has been sub-divided into three regions viz. the sub-mountain region (RI), the central plain region (RII) and southwestern region (RIII). Two districts from each region were selected purposively, keeping in view, the functioning of Krishi Vigyan Kendra's of Punjab Agricultural University, Ludhiana. The selected districts were Hoshiarpur and Nawanshahr representing RI, Kapurthala and Patiala from RII and Bathinda and Faridkot representing RIII. The multistage random sampling technique was adopted to select sample respondents. In the first stage, two blocks from each districts were chosen randomly. In the second stage, two villages were randomly selected from each selected block. The final stage involved the selection of 50 preschool children of 1-3 years of age from the selected villages in each region. Thus, a sample of 150 preschool children spreading over 24 villages, 12 blocks, 6 districts and 3 agro-climatic regions were selected.

Information regarding food and nutrient intake of the subjects was collected from their mothers using "24-hour recall method" for three consecutive days. The amount of each food item was tabulated and average daily intake of each

Table 1: Average daily food intake by selected rural preschool children in different regions of Punjab.

Food groups	*Region*			*Punjab*		
Intake (g)	*RI*	*RII*	*RIII*		*F-ratio*	*CD*
Cereals	81.00 ± 23.58	73.70 ± 18.24	63.10 ± 21.86	72.60 ± 22.57	8.71	8.56
Pulses	17.00 ± 9.27	13.00 ± 4.90	8.20 ± 7.60	12.73 ± 8.30	17.01	2.99
Milk and milk products	503.08 ± 199.71	462.80 ± 212.53	489.60 ± 180.67	485.40 ± 198.80	0.54	NS
Roots and tubers	49.90 ± 17.31	33.90 ± 9.61	41.70 ± 14.75	41.83 ± 15.68	15.44	5.71
Green leafy vegetables	8.90 ± 10.55	8.20 ± 11.57	2.90 ± 5.58	6.67 ± 9.96	5.73	3.85
Other vegetables	35.70 ± 15.84	30.30 ± 12.90	23.20 ± 14.10	29.73 ± 15.22	9.38	5.75
Fruits	101.20 ± 74.08	61.40 ± 42.07	48.50 ± 45.66	67.03 ± 60.82	13.81	22.38
Sugar	22.30 ± 3.49	21.20 ± 4.31	21.40 ± 4.59	21.63 ± 4.18	0.97	NS
Fats and Oils	14.66 ± 3.98	14.52 ± 4.05	11.52 ± 4.00	13.57 ± 4.20	9.60	1.61

Values represent mean±S.E.
CD at 5% level

Table 2: Percent adequacy of food intake by selected rural preschool children in different regions of Punjab.

Food groups	*Suggested Dietary intake (SDI)* g*	*Region*			*Punjab*
		RI	*RII*	*RIII*	
Cereals	175	46.28	42.11	36.06	41.48
Pulses	35	48.57	37.14	23.42	36.28
Milk and milk products	300	167.69	154.27	163.20	161.80
Roots and tubers	10	499.00	339.00	417.00	418.3
Green leafy vegetables	40	22.25	20.50	7.25	16.67
Other vegetables	20	178.50	151.50	116.00	148.65
Sugar	30	74.33	70.66	71.33	72.10
Fats and Oils	15	97.73	96.80	76.80	90.46

Percent adequacy = Amount consumed / suggested intake x 100.
* ICMR (1984)

food item was calculated. The nutrients were calculated using MSU Nutriguide Computer Programme (Song et al., 1992). The food and nutrient intakes were compared with their respective suggested dietary intake (ICMR, 1984) and recommended dietary allowances (ICMR, 2000). The percent adequacy of food and nutrient intake was also calculated. The results were statistically tested using analysis of variance techniques and correlation coefficients.

RESULTS AND DISCUSSION

General Profile: Age wise distribution revealed that in all the regions majority of preschool children were male and in the age group of 1-2 years. The region wise analysis on socio-economic characteristics of selected children brought out that 50 percent of rural preschool children belonged to high caste in RIII as against 32 and 34 per cent in RI and RII. The maximum percentage of children in RI (36%) and RIII (38%) belonged to medium income group whereas in RII (30%) belonged to low-income group.

Food Intake: The mean daily intake by selected rural preschool children and its percent adequacy has been summarized in Table 1 and 2. The intake of milk and milk products, roots and tubers and other vegetables was higher than that of SDI in all the regions. The intake of fats and oils was adequate (98 and 97%) in RI and RII while it was 77 per cent of SDI in RIII. The intake of sugar varied between 71-74 per cent, cereals and pulses below 50 per cent and green leafy vegetables below 25 per cent of SDI in all regions. The region wise analysis brought out that the intake of most of food groups by rural preschool children in RI was significantly ($P \leq 0.05$) higher, followed by RII and RIII. Similarly the results of dietary survey of Punjabi rural preschool children, conducted by Punraj (1992) reported that intake of milk and milk products was above the SDI while intake of cereals, green leafy vegetables and sugar was below SDI. On the contrary, Jose and Indira (2000) found that the intake of almost all food groups of preschool children in Kerala was below SDI (ICMR, 1984).

Nutrient intake: The average daily nutrient intake by selected rural preschool children and

Table 3: Average daily nutrient intake by selected rural preschool children in different regions of Punjab.

Nutrients	*Region*			*Punjab*		
	RI	*RII*	*RIII*		*F-ratio*	*CD*
Energy, kcal	1283.68 ± 361.12	1109.22 ± 376.40	1094.44 ± 338.94	1162.45 ± 369.29	4.21	144.02
Protein, g	38.24 ± 11.45	33.56 ± 11.15	32.52 ± 10.64	34.77 ± 11.36	3.70	4.45
Carbohydrates, g	146.24 ± 38.66	119.98 ± 30.96	114.72 ± 35.62	126.98 ± 37.72	11.33	14.08
Total fat, g	49.02 ± 15.71	46.82 ± 17.44	44.96 ± 14.62	46.93 ± 16.05	0.79	NS
Calcium, mg	1145.56 ± 445.04	1043.92 ± 467.35	1069.18 ± 415.48	1086.22 ± 445.23	0.70	NS
Iron, mg	7.58 ± 2.98	6.94 ± 2.52	5.48 ± 2.04	6.67 ± 2.69	8.78	1.02
Vit A (β-carotene), µg	1464.68 ± 480.35	1409.70 ± 469.27	1259.48 ± 424.18	1377.95 ± 466.70	2.63	NS
Thiamine, mg	0.78 ± 0.20	0.68 ± 0.17	0.63 ± 0.19	0.70 ± 0.20	8.19	0.07
Riboflavin, mg	0.77 ± 0.27	0.66 ± 0.24	0.66 ± 0.24	0.70 ± 0.26	2.98	NS
Niacin, mg	5.64 ± 1.45	4.78 ± 1.06	4.38 ± 1.35	4.93 ± 1.40	12.00	0.52
Ascorbic acid, mg	27.08 ± 14.79	20.22 ± 13.28	18.06 ± 9.36	21.79 ± 13.26	6.72	5.09

Values represent mean±S.E.
CD at 5% level

Table 4: Percent adequacy of nutrient intake by selected rural preschool children in different regions of Punjab.

Nutrients	*Recommended Dietary Allowances (RDA)**	*Region*			*Punjab*
		RI	*RII*	*RIII*	
Energy, kcal	1240	103.52	89.45	88.26	93.75
Protein, g	22	173.82	152.55	147.82	158.06
Carbohydrates, g	-	-	-	-	-
Total fat, g	25	196.08	187.28	179.84	187.73
Calcium, mg	400	286.39	260.98	267.30	271.56
Iron, mg	12	63.17	57.83	45.67	55.56
Vit A (β-carotene), µg	1600	91.54	88.11	78.72	86.12
Thiamine, mg	0.6	129.33	114.00	104.33	115.89
Riboflavin, mg	0.7	109.71	94.00	94.86	99.52
Niacin, mg	8	70.50	59.75	54.75	61.67
Ascorbic acid, mg	40	67.70	50.55	45.15	54.47

Per cent adequacy = Amount intake / RDA x 100
* ICMR (2000)

its percent adequacy has been presented in Tables 3 and 4. The data revealed that the intake of protein fat and calcium was much higher than that of RDA in all the regions. The energy intake was adequate in RI (103%) and nearly adequate in RII (89%) and RIII (88%). Further the intake of vitamin A, thiamine and riboflavin was adequate while iron, niacin and ascorbic acid intake was inadequate in all the regions. The region wise analysis showed that the intake of both macro as well as micronutrients was higher in RI followed by RII and RIII (Table 3).

The energy and protein intake by selected rural preschool children were comparable to the results reported by Goyal (1990) who has found adequate intake of energy (106% of RDA) and protein (143% of RDA) by the Punjabi preschool children. On the same lines, the dietary survey conducted by NNMB in eight states and district nutrition profile surveys in four states (Vijayaraghavan and Hanumantha Rao 1998) reported that in 9 of the 12 states, the protein intake was more than 90 per cent of RDI. About 55 per cent of the rural households were adequate both with respect to protein and energy. The survey also confirmed the earlier observation that in Indian dietaries, the primary dietary bottleneck is energy and not protein.

A number of studies in Punjab have also reported the high intake of calcium, low intake of iron by preschool children (Goyal, 1990; Punraj, 1992; Sadana et al., 1998).

Contribution of Carbohydrates, Protein and Fats to total Energy Intakes: In comparison with the ICMR (2000) recommendations, the contribution of carbohydrates to the total energy intake was observed to be on the lower limit of the range (55-70%), protein was within the recommendation (10-15%), while contribution of fat to the total energy was higher than the recommendation (20-30%) in all the regions (Fig. 1).

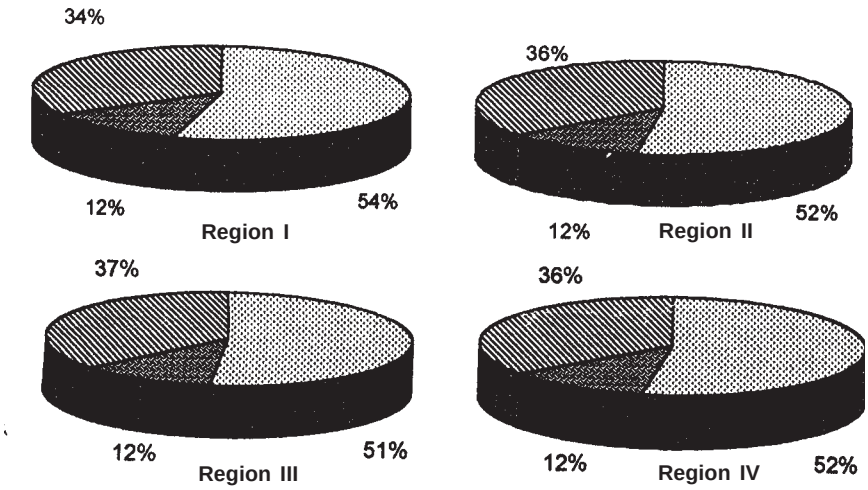

Fig. 1. Per cent contribution of carbohydrates, protein and fat to total engery intake of selected rural preschool children.

Relationship between Food and Nutrient Intake: The relationship between food and nutrient intake as tested by computing correlation coefficient (r) was the evidence of present findings regarding the nutrient intake that strong positive significant correlation of milk and milk products with energy (r = 0.88), protein (r = 0.92), fat (r = 0.91), calcium (r = 0.98), vitamin A (r = 0.86) and riboflavin (r = 0.80) indicated that milk and milk products were the chief source of these nutrients in the diet of rural preschool children. Similarly, a highly positive and significant correlation of green leafy vegetables with iron (r = 0.75) showed that poor intake of green leafy vegetables by the rural preschool children was responsible for inadequate iron intake. Further the cereal intake revealed a strong positive correlation with niacin (r = 0.85) indicating that inadequate niacin intake by rural preschool children was due to poor intake of cereals. A highly positive and significant correlation observed between intake of fruits and ascorbic acid (r = 0.72) indicates that increased consumption of fruits leads to high intake of ascorbic acid.

RECOMMENDATIONS

The study suggest that there is need to strengthen Krishi Vigyan Kendras of Punjab in generating knowledge, attitude and practice among the rural mothers related to food and nutrition for the benefits of their children.

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