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Determinants of dietary adequacy of nutrients consumption among rural school age children

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ABSTRACT

Introduction: Good nutrition during school-age is critical to cover the deficits suffered during childhood. Dietary intake with respect to adequate availability of food in terms of quantity and quality, ability to digest, absorb and utilize food and the social discrimination against girls can greatly affect the adequate nutrition of these children. The present is an attempt to determine the dietary pattern of energy and protein consumption among rural school-age children in Aligarh district and the study will also highlight the causes of inadequacy in terms of energy and protein consumption.

Material and Methods: The present cross-sectional study was undertaken in the rural field practice areas of Department of Community Medicine, Jawaharlal Nehru Medical College, A.M.U. Aligarh under Rural Health Training Centre. A sample of 350 school-age children was selected for the purpose of present study. A self prepared structured interview schedule was used as a tool for data collection. 24 hr dietary recall method was adopted to get the information about the dietary pattern of children. Statistical analysis of the data was performed using the statistical package for social sciences for windows SPSS (Version 16.0). To test the significance of association between dependent and independent variables, chi-square test was used.

Results and Discussion: In regard of energy and protein consumption pattern of school-going children, majority of them were having the inadequate energy (62%) and protein (72%) consumption pattern. Various determinants like gender of the child, social class, family type, mothers' education level and working status of mothers' were found significantly associated with energy and protein consumption pattern of rural school age children.

Conclusion: In the present study low socio-economic status of the family, illiteracy of mothers, large family size and non working status of mothers were found to be the contributory factors for inadequate consumption of energy and protein consumption pattern of rural school age children.

Keywords: School age children, 24 hr dietary recall, energy consumption, protein consumption.

INTRODUCTION

School going children are the future generation of any country and their nutritional needs are critical for the well being of society. Good nutrition during school-age is critical to cover the deficits suffered during childhood. Food is a major concern of the mankind beginning from the time of conception and extending through the entire life span of the individual. Food supplies the energy for physical activity and other metabolic needs of the body. Children need energy for deposition of tissues. Energy is also required for physical activity of daily life. Carbohydrates, fats and proteins in the food are the chief energy yielding nutrients. 1 gm of carbohydrate and 1 gm of protein provide 4 kcal while 1 gm of fat releases 9 kcal. Protein is the second most abundant substance in the body, next to water. Protein helps the child to grow, as the constituent amino-acids are necessary for the synthesis of tissue in the body [1]. Dietary intake with respect to adequate availability of food in terms of quantity and quality, ability to digest, absorb and utilize food and the social discrimination against girls can greatly affect the adequate nutrition of these children.

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According to Chandra and Salil [2], growth and nutritional status of preschool and school-going children are profoundly influenced by the diet consumed by them. Dietary intake serves as the best indicator for assessing nutritional status. For their optimal growth and development, the school-age children require adequate nutritious food to meet their daily nutritional requirements [3]. During these age-groups, deficiencies of protein/calorie in diet result in underweight, wasting, stunted growth, low immunity and also impaired cognitive and motor development and learning. According to NNMB, technical report [4], the proportion of household with energy inadequacy was about 70%, while that protein adequacy was about 27%. Mehrotra et al [5], revealed in their study that the diet of 20% rural children was deficient in protein than the recommended dietary allowances. Energy deficiency was exhibited by 54% of rural respondents. The study conducted by Sankhala et al [6], found that there was highly inadequate (73%) energy and protein intake than Recommended Dietary Allowances among the children of Udaipur district of Rajasthan. According to Kulsum et al [7], diets of children were inadequate in terms of types of food items. Only 22% of children consumed diets adequate in protein and energy, protein calorie adequacy was influenced by the age and gender of children and by literacy and economic status of mothers. The present is an attempt to determine the dietary pattern of energy and protein consumption among rural school-age children in Aligarh district and the study will also highlight the causes of inadequacy in terms of energy and protein consumption.

Objectives of the Study

1. To determine the nutritional adequacy of calories and proteins in the diet of school age children.
2. To examine the impact of associated factors on dietary adequacy of school-age children.

MATERIAL AND METHODS

Profile of the Study Area: The present cross-sectional study was undertaken in the rural field practice areas of Department of Community Medicine, Jawaharlal Nehru Medical College, A.M.U. Aligarh under Rural Health Training Centre. Four villages namely- Jawan, Chota Jawan, Tejpur and Sumere were randomly selected for the study.

Ethical Consideration: Following approvals were obtained for conducting the study-

1. Permission from the chairman, Department of Community Medicine, Jawaharlal Nehru Medical College, A.M.U. Aligarh.
2. Permission from the in-charge, Rural Health Training Centre. Jawan Block, Aligarh.

Period of the Study: April 2010 to September 2010.

Sample Size Estimation: The sample of 350 school age children was drawn with the help of following formula- **$n = 4pq/L^2$,** Where n= sample size

p = prevalence of under nutrition (65%)

q = 100-p

L = allowable error in prevalence (8% non response error was calculated)

Study Variables: Adequacy and inadequacy of nutrient intake were dependent variables. Gender of the child, social class, family type, mothers' education level and mothers' working status were the independent variables in the study.

Sampling Frame: Spin the bottle method was used to select the households. Mothers as well as their children were interviewed to get the information related to child and his/her socio-demographic profile. If any household having more than one child of the age group 6-12 years then only the eldest one was selected.

- **Inclusion Criteria- (**a) Male as well as female children (b) Children who had completed 6 years of age on the date of interview and were not more than 12 years of age.
- **Exclusion Criteria-** (a) Children having physical deformities of limbs and spine. (b) Children who were suffering from diseases and having mental defects.

Tools for the Data Collection:

- **Structured Interview Schedule:** A self-prepared structured interview schedule was used by the researcher as a tool for data collection to collect the socio- demographic information about the child- gender, social class, family type, mothers' literacy level and mothers' working status. The socio-economic status of the child's family was determined using the modified B.G. Prasad' Classification (2004).
- **24 hr Dietary Recall Method:** 24 hr dietary recall method was used to assess the dietary intake of children. The quantity of each preparation consumed by each individual child was assessed in terms of cups and also recorded the quantity of left-over food. At the end of the interview, the researcher summarized the items that were consumed by the child and got it checked by the mothers so that nothing had been omitted. The energy and protein content of the diet was calculated for individual child using food composition table. After calculating the energy and protein consumption of each child, it was compared with recommended dietary allowances (RDA) for Indians by ICMR (2010) according to the age and

gender of the child. Children were divided into two categories according to their dietary consumption pattern-

Adequate Pattern: Children, whose dietary pattern of energy and protein consumption was as per the recommended dietary allowances given by ICMR, were categorized as adequate.

Inadequate Pattern: Children, whose dietary consumption of nutrients was less than the recommended dietary allowances, were grouped as inadequate.

Statistical Analysis: Statistical analysis of the data was performed using the statistical package for social sciences for windows SPSS (Version 16.0). To test the significance of association between dependent and independent variables, chi-square test was used.

RESULTS

The findings of the present study were categorized in the following manner-

Dietary Pattern of School Age Children: The results of the present study revealed that out of 350 school age children, majority (62%) of them were having inadequate energy consumption pattern and only 38% were having adequate energy consumption pattern. In regard of protein consumption pattern, 72% of them were having the inadequate pattern of energy consumption. Only 28% children were having the adequate protein consumption pattern.

Table-1 Nutrient Consumption Pattern of School Age Children

Nutrients	Dietary Pattern of School Age Children					
	Adequate		Inadequate		Total	
	n	%	n	%	N	%
Energy (kcal)	133	38	217	62	350	100.0
Protein (gm)	98	28	252	72	350	100.0

Determinants of Nutrients Consumption Pattern

In the present study, school age children (6-12years) were grouped into different categories according to their gender, social class, family type, mothers' education level and working status of mothers. It was found in the study that out of total 350 school-age children, majority of them were boys (52.6%) and remaining 47.4% were girls. On the basis of modified Prasad's Classification (2004), children were categorized into different social class according to per capita monthly income. Majority of children belonged to lower middle class (60.3%) and only 39.7% were in the upper middle class category. It is astonishing to mention that none of the child was found in the upper high, high, poor and very poor categories of social class. Based on the distribution of children according to their family type, it was found that the highest percentage (60%) of children belonged to joint families and 40% came under in the category of nuclear family. School age children were further divided according to their mothers' education levels, it was found that maximum percentage i.e. 46% were having illiterate mothers, 35.1% were having literate mothers and very little percentage (18.9%) of children were having the mothers who were educated up to primary level. In regard of mothers' working status, it was revealed that 63.7% of children belonged to non-working mothers and only 36.3% were having working mothers. To examine the impact of various socio-demographic determinants on dietary adequacy of school-age children following association were established

Factors Associated with Energy Consumption Pattern

To find out the impact of various socio-demographic factors like gender of the child, social class, family type, mothers' education level and working status of mothers on dietary adequacy of energy consumption, chi-square test was performed. In regard of gender of the child and adequacy of energy consumption, it was found that 43.5% boys and 31.9% girls were having adequate pattern of energy consumption. Majority of girls (68.1%) were having inadequate energy consumption pattern. The findings revealed the significant association (chi-square=4.942, d.f. =1, $p<0.05$) between gender of the children and their energy consumption pattern. The findings further revealed that majority of children (57.6%) from upper middle social class were having adequate energy consumption pattern. There was significant association (chi-square=37.419, d.f.=1, $p<0.01$) between social class and energy consumption pattern of school age children. In regard of family type, it was found that maximum percentage i.e. 53.6% from nuclear families were having adequate energy consumption pattern. Mother's education level was also found significantly associated with child's energy consumption pattern (chi-square=62.356, d.f.=2,

p<0.05). The study further indicated that majority of children (71.7%) of non working mothers were having inadequate pattern of energy consumption. Significant association (chi-square=24.792, d.f.=1, p<0.05) was found between maternal working status and adequacy energy consumption.

Table-2: Determinants of Energy Consumption Pattern

Determinants	Energy Consumption Pattern					
	Inadequate		Adequate		Total	
	n	%	n	%	N	%
Gender						
Boys	104	56.5	80	43.5	184	100.0
Girls	113	68.1	53	31.9	166	100.0
Social Class						
➢ **Lower Middle (1500-2999)**	158	74.9	53	25.1	211	100.0
➢ **Upper Middle (3000-4999)**	59	42.4	80	57.6	139	100.0
Family Type						
➢ **Joint**	152	72.4	58	27.6	210	100.0
➢ **Nuclear**	65	46.4	75	53.6	140	100.0
Mothers' Education Level						
Illiterate	133	82.6	28	17.4	161	100.0
Literate	64	52.0	59	48.0	123	100.0
Primary Education	20	30.3	46	69.7	66	100.0
Mothers' Working Status						
Non-Working	160	71.7	63	28.3	223	100.0
Working	57	44.9	70	55.1	127	100.0

Factors Associated with Protein Consumption Pattern

In regard of determinants of protein consumption pattern, the results of present study showed that majority of girls (78.9%) were found in having the inadequate pattern of protein consumption and maximum percentage of boys i.e. 34.2% were having the adequate pattern of protein consumption. Findings showed the significant association (chi-square=7.491, d.f.=1, p<0.01) between gender and pattern of protein consumption. Study findings further revealed that there was significant impact of social class (chi-square=31.532, d.f.=1, p<0.01) on child's protein consumption pattern as majority of children i.e. 82.9% from lower middle class were having the inadequate protein consumption pattern.

In regard of family type, it was found that maximum percentage of children i.e. 48.6% were having adequate pattern of protein consumption who belonged to nuclear families. Significant association (chi-square=48.980, df=1, p<0.01) between family type and protein consumption pattern was observed. Findings further revealed that majority of children of illiterate mothers i.e. 87% were having inadequate pattern of protein consumption. There was significant association (chi-square=59.453, d.f.=2,p<0.05) between mothers' literacy level and protein consumption pattern. The results also highlighted that majority of children of non-working mothers (83.9%) were having the inadequate pattern of protein consumption and significant association (chi-sqaure=42.854, d.f.=1, p<0.05) was observed between maternal employment and protein consumption pattern.

Table-3 Determinants of Protein Consumption Pattern

Determinants	Protein Consumption Pattern					
	Inadequate		Adequate		Total	
	n	%	n	%	N	%
Gender						
➢ **Boys**	121	65.8	63	34.2	184	100.0
➢ **Girls**	131	78.9	35	21.1	166	100.0
Social Class						
➢ **Lower Middle (1500-2999)**	175	82.9	36	17.1	211	100.0
➢ **Upper Middle (3000-4999)**	77	55.4	62	44.6	139	100.0
Family Type						
➢ **Joint**	180	85.7	30	14.3	210	100.0
➢ **Nuclear**	72	51.4	68	48.6	140	100.0
Mothers' Education Level						
Illiterate	140	87.0	21	13.0	161	100.0
Literate	88	71.5	35	28.5	123	100.0
Primary Education	24	36.4	42	63.6	66	100.0
Mothers' Working Status						
Non-Working	187	83.9	36	16.1	223	100.0
Working	65	51.2	62	48.8	127	100.0

Discussion

In regard of energy and protein consumption pattern of school-going children, majority of them were having the inadequate energy (62%) and protein (72%) consumption pattern. Mehrotra *et al* [5], highlighted that the diet of 20% rural children were deficient in protein than the recommended dietary allowances, on the other hand energy deficiency was exhibited by 54% of rural respondents. In support of the findings of present study, Sankhla et al [6], found that there was highly inadequate energy and protein intake than RDA among the children of Udaipur district of Rajasthan. The study conducted by Sati and Dahiya [8], reported that the intake of all the nutrients including energy except protein was significantly lower than the recommended dietary allowances.

In the present study, various determinants like gender of the child, social class, family type, mothers' education level and working status of mothers' were found significantly associated with energy and protein consumption pattern of rural school age children. In support of the findings of present study, Sahoo and Pal [9] reported that dietary intake among the tribal girls was very poor in comparison to recommended dietary allowances. Kulsum *et al* [7] showed in their study that protein calorie adequacy was significantly influenced by literacy and economic status of mothers. Mitra *et al* [10] observed that both boys and girls consumed lower amount of energy and protein than the recommended dietary allowances in all age groups, whereas boys consumed marginally higher energy than girls in all age groups. In case of protein consumption, they found that girls consumed higher amount of protein compared to boys in 4-6 years of age.

Conclusion and recommendations

In the present study low socio-economic status of the family, illiteracy of mothers, large family size and non working status of mothers were found to be the contributory factors for inadequate consumption of energy and protein consumption pattern of rural school age children. Sex discrimination was also observed in regard of nutrient consumption as number of girls with

inadequate pattern of energy and protein consumption was higher than boys in the present study. There is need to encourage village women to become the part of income generating activities to raise their family income and for the alleviation of poverty. In addition to poverty alleviation, efforts should be made towards improvement in education and restricting family size through effective family planning techniques. There is an urgent to impart knowledge among mothers of school-going children regarding the balanced diet and promote the consumption of food items like cereals, pulses, green leafy vegetables, roots and tubers, sugar and jiggery etc which are affordable and locally available at the village level. In the present study, single 24 hr recall was used to get the information about the child's feeding pattern. But the limitation of this method is that single 24 hour recall does not represent the habitual intake of the respondent but it is adequate for surveying in a large group and estimating group mean intakes. In the present study, repeat 24 hr recall could be employed to assess a typical diet at an individual level (also known as multiple pass recall) instead of single 24 hr recall. The multiple pass recall is a staged approach to the dietary recall. Although the exact stages or passes may vary between protocols they all follow the pattern of a free and uninterrupted recall of intake, followed by detailed and probing questions about intake (including quantities consumed) and concluding with a review of everything that was previously recalled, allowing for the addition of any items not remembered up to this point, and often also the location of the consumption.

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