



ISSN: 0975-833X

## RESEARCH ARTICLE

### A STUDY OF MACRO NUTRIENTS STATUS AMONG ADOLESCENT SCHOOL BOYS OF DELHI

**\*Dr. Hiralal Khatri**

District Institute of Education and Training, Pitampura, Delhi, India

#### ARTICLE INFO

##### Article History:

Received 19<sup>th</sup> September, 2014  
Received in revised form  
23<sup>rd</sup> October, 2014  
Accepted 06<sup>th</sup> November, 2014  
Published online 30<sup>th</sup> December, 2014

##### Key words:

Macro nutrients status,  
Adolescent,  
Protein,  
Carbohydrates,  
Fats.

#### ABSTRACT

The physical well-being of an individual is related closely to his status of nutrition. Good nutrition is essential in childhood for optimal growth and performance in school. Under nutrition retards physical and mental growth which in turn, lowers efficiency in education and work. So, nutrition is one of the most important factors in the vital activity of man. Macro nutrients i.e. proteins, carbohydrates and fats are the most important nutrients required by the body and should be supplied in adequate amounts in the diet. The main objective of the study was to determine the macro nutrients status among government and private school boys of Delhi. The study was conducted on 700 adolescent boys of govt. and private schools. Out of which 350 children were taken from government schools and 350 from private schools. For obtaining the data on dietary intake i.e., One day recall method recommended by Norris(1949), ICMR (1951), Acheson *et al.* (1980), Chawla, (1992), was used. The researcher found that the macro nutrients status was found higher in both govt. and private schools than ICMR (Indian Council of Medical Research) recommendation. Macro nutrient status was found higher in private school boys in comparison of govt. school boys. As a preventive measure it is strongly suggested that these growing boys rationalize their fat intake.

Copyright © 2014 Dr. Hiralal Khatri. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

#### INTRODUCTION

Nutritional status is the condition of health of the individual as influenced by the utilization of nutrients. It can be determined only by the information obtained through a careful medical and dietary history and through physical examination. Malnutrition during childhood delays growth and malnutrition preceding adolescence delays the occurrence of the adolescent spurt (Tanner, 1962). Malnutrition is not a simple syndrome. The poorly nourished individual, as a rule, suffers from a complexity of deficiencies. The great diversity of body functions that may be ill-effected by inadequate nutrition complicates the process of assessing nutritional status. Good nutrition is also a determinant of healthy growth of mind and body. Several studies have been conducted on nutritional status of children in different parts of the country because malnutrition continues to be a common, social and undoubtedly the biggest public health problem in our country today. Food factors are basic to growth and development process. Inadequate diet may wrap body and mind and retard growth. All essential nutrients are to be included in the diets of children and adolescents in balanced amounts for the growth of structures and the maintenance of physiological functions of the body. Keeping in mind these facts, an assessment of nutrition status of adolescents whose growth is being investigated into, seemed imperative.

**\*Corresponding author: Dr. Hiralal Khatri,**  
District Institute of Education and Training, Pitampura, Delhi, India.

#### Rationale of the Study

Adolescence is a significant period of human growth and maturation. This period is characterized by an exceptionally rapid rate of growth which exceeds only during fetal life and early infancy. Due to rapid accretion of new tissue and other widespread development changes, nutritional needs are also more during this period of life cycle. However, inadequate diet and unfavorable environments in developing countries may adversely influence in growth and nutrition of adolescents. Poor nutrition among adolescents resulting in short stature and low body mass is associated with many concurrent and future adverse health outcomes.

#### Objectives of the study

The main objectives of the present study are :- (1) to determine the macronutrient status among the government school boys of Delhi. (2) to determine the macronutrients status among the private school boys of Delhi (3) to compare the macronutrients status among government and private school boys of Delhi.

#### Delimitations

(1) The investigation was delimited to twenty selected government and private schools (affiliated to CBSE Delhi) by random sampling. (2) The study was delimited to the age group of 11-17 year old boys.

## Procedure

The study was conducted on a cross-sectional sample of 700 adolescent boys falling in the age range of 11-17 years attending govt. and private schools of Delhi. Out of which fifty percent (i.e.350) children were taken from government schools and an equal number of children (350) from private schools. In the first stage the schools were randomly selected. Thereafter, the subjects from each school were also randomly selected. Efforts were made to choose the govt. and private schools from all regions of Delhi state. The five regions of Delhi state studied were as follows: 1) North 2) West 3) East 4) South and 5) Central Delhi.

## Criterion Measured

The age of subject was computed on the date of examination from the date of birth of the respective subject. On the basis of decimal age of the subjects, seven, one yearly age groups were made. Decimal age of the subjects was calculated by taking into account the date of their birth and the date of examination as per decimal age calculation table of Weiner and Laurie (1969). Age group 11 year contained all subjects ranging from 10.501 to 11.500, age group 12 year contained subjects from 11.501 to 12.500 and so on, and thus the last age group i.e. 17 year included boys from 16.501 to 17.500. The data were grouped in 7 age groups with an interval of one year between the successive groups as exemplified below:

**Table 1. Mean value of age of seven one yearly age groups of boys**

Age group	Age - range	Mean Age (In Decimal Years)		N (Number of Students)	
		Govt. School	Private School	Govt. School	Private School
11	10.501 to 11.500	11.01	11.12	31	37
12	11.501 to 12.500	11.95	12.04	38	46
13	12.501 to 13.500	13.05	13.03	38	49
14	13.501 to 14.500	14.03	13.83	61	48
15	14.501 to 15.500	14.88	14.89	50	50
16	15.501 to 16.500	16.08	15.95	51	53
17	16.501 to 17.500	17.05	16.97	81	67
Total subjects from govt. and private school				350	350

Dates of birth were checked from the institutional records which are maintained with the help of documentary proofs of one's date of birth while an individual enters an educational institution. For obtaining the data on dietary intake i.e., One day recall method recommended by Norris(1949), ICMR (1951), Acheson et al. (1980), Chawala, (1992), was used. The detail information obtained from the subject related to their dietary intake for three successive days was feed into the Nutriguide Software Programme standardized by Song *et al.* (1992). This software was used for the dietary analysis of food consumed by the subjects. Through this software Basal Metabolic Rate, nutrients intake and energy expenditure of the subject was calculated for the purpose of analysis of the results.

## Statistical technique use

Mean, Standard Deviation (S.D.), Standard Error of Mean (SEM), Co-efficient of Variation (C.V.), Velocity (V), Co-relation

## Analysis of Data

Analysis was also conducted on the daily dietary nutrient intake and dietary macro nutrients

(Proteins, Carbohydrates, Fats)

## Findings

The findings with regards to the major and minor nutrients are presented below:

### (i) Daily dietary intake of Protein (g)

**Table 2. Mean Values Protein intake in 11-17 Years Government and Private School Boys of Delhi (ICMR\*, 2010)**

Age	N	Mean	Velocity	S.D.	S.E.M.	C.V.	ICMR (2010)	
11	Govt.	31	58.6	-	8.94	1.61	15.3	39.9
	Private	37	61.4	-	9.40	1.55	15.3	39.9
12	Govt.	38	59.4	0.8	9.76	1.58	16.4	39.9
	Private	46	61.5	-0.1	10.03	1.48	16.3	39.9
13	Govt.	38	60.4	0.1	10.00	1.63	16.7	54.3
	Private	49	70.4	8.9	7.81	1.22	11.1	54.3
14	Govt.	61	68.3	7.9	7.50	0.96	10.9	54.3
	Private	48	77.5	7.1	6.49	0.94	8.4	54.3
15	Govt.	50	71.4	3.0	8.01	1.13	11.2	61.5
	Private	50	81.5	4.0	6.67	0.94	8.2	61.5
16	Govt.	51	78.2	6.8	6.20	0.87	7.9	61.5
	Private	53	82.2	0.7	7.34	1.01	8.9	61.5
17	Govt.	81	81.3	3.0	7.23	0.80	8.9	61.5
	Private	67	86.1	3.9	8.21	1.00	9.5	61.5

\*Indian Council of Medical Research

It is evident from the Table 2 that the protein intake is abundant in all the age groups of adolescent boys of Delhi state. At the age of 11 to 12 years, protein consumption is 58.6 g to 59.4 g in government school boys and 61.4 g to 61.5 g in private school boys which amount is to be 19.5 g to 21.6 g higher than that of its recommended allowances. Protein consumption is maximum in the age group of 17 years i.e. 81.3 g in government school boys and 86.1g in private school boys as depicted in Figure 1.

### (ii) Daily dietary intake of Carbohydrates (g)

It is observed from the Table 3 that the carbohydrates intake is abundant in all the age groups of adolescent boys of Delhi state. At the age of 11 to 12 years, carbohydrates intake is 240.9 g to 257.8 g in government school boys and 250.4 g to 251.5 g in private school boys. As the age advances, carbohydrates intake increases. Carbohydrates intake is maximum in the age group of 17 years i.e. 306.8 g in government school boys and 318.4g in private school boys as depicted in Figure 2.

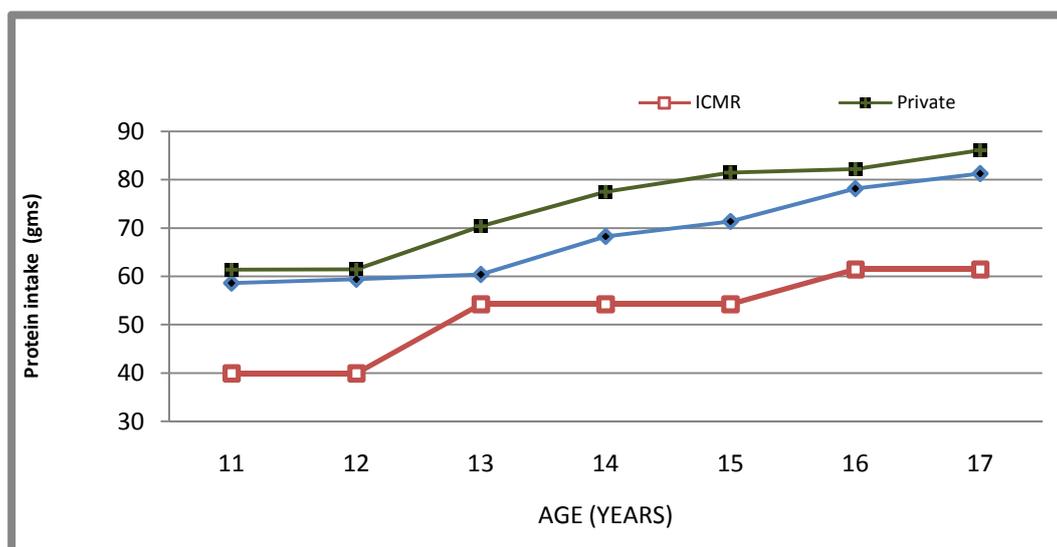


Fig. 1. Daily dietary intake of protein in govt. and private school boys from 11 to 17 years

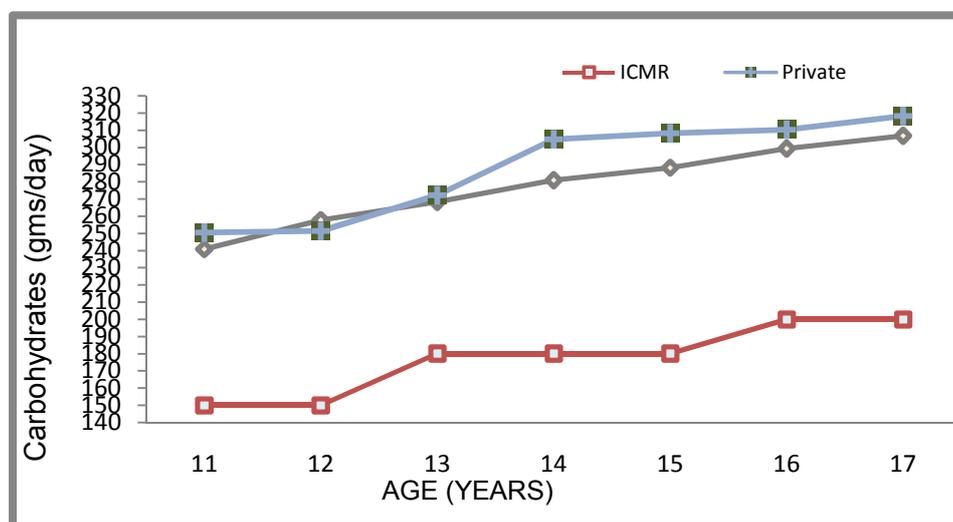


Fig. 2. Daily dietary intake of carbohydrates in govt. and private school boys from 11 to 17 years

Table 3. Mean Values of carbohydrates intake (g) 11-17 Years Government and Private School Boys

Age	School	N	Mean	Velocity	S.D.	S.E.M.	C.V.	ICMR (2010)
11	Govt.	31	240.9	-	14.34	2.58	5.9	150
	Private	37	250.4	-	2.79	0.45	1.1	150
12	Govt.	38	257.8	16.9	6.92	1.12	2.7	150
	Private	46	251.5	1.1	1.11	0.16	0.4	150
13	Govt.	38	268.3	11.0	6.33	1.03	2.4	180
	Private	49	272.3	20.8	1.66	0.23	0.6	180
14	Govt.	61	280.9	12.6	8.97	1.15	3.2	180
	Private	48	304.8	32.5	4.56	0.65	1.5	180
15	Govt.	50	288.3	12.6	8.36	1.18	2.9	180
	Private	50	308.2	3.4	5.62	0.79	1.8	180
16	Govt.	51	299.3	11.0	5.79	0.81	1.9	200
	Private	53	310.4	2.2	4.04	0.55	1.3	200
17	Govt.	81	306.8	7.5	8.99	0.99	2.9	200
	Private	67	318.4	8.0	2.80	0.43	0.9	200

(iii) Daily dietary intake Fats (g)

Table 4. Mean values of Fat intake in 11-17 years of age of Government and Private School Boys

Age	School	N	Mean	Velocity	S.D.	S.E.M.	C.V.	ICMR (2010)
11	Govt.	31	42.5	-	6.12	1.10	14.4	35
	Private	37	52.0	-	1.49	0.24	2.8	35
12	Govt.	38	43.7	1.2	4.87	0.79	11.2	35
	Private	46	54.4	2.4	2.07	0.30	3.8	35
13	Govt.	38	54.2	10.6	6.42	1.04	11.9	45
	Private	49	58.3	3.9	1.62	0.23	2.7	45
14	Govt.	61	57.5	3.3	3.34	0.43	5.8	45
	Private	48	68.4	10.1	2.75	0.39	4.0	45
15	Govt.	50	62.3	4.8	7.17	1.01	11.5	45
	Private	50	70.0	1.6	2.41	0.34	3.4	45
16	Govt.	51	69.4	7.0	5.58	0.78	8.0	50
	Private	53	71.1	1.1	1.48	0.25	2.5	50
17	Govt.	81	71.1	1.7	4.60	0.51	6.5	50
	Private	67	78.0	6.9	1.25	0.15	1.6	50

Table 4. Indicates that fats intake is sufficient in the all age group of adolescent boys. At the age of 11 to 12 years, fat intake is 42.5 g to 43.7g in government school boys and 52 g to 54.4 g in private school boys, which is 8.7 g to 19.4 g higher than that of its recommended allowances. As the age advances, fat intake increases. Fat intake is maximum in the age group of 17 years i.e. 71.1g in Government school boys and 78 g in private school boys. The Table 4 Figure 3 further depicts the intake of fat to be higher in all age groups as compared to its recommended allowances (ICMR).

### Main Findings

1. It is evident from the findings that consumption of protein is higher in all age groups as compared to its recommended allowances (ICMR). This can be due to the high consumption of proteins foods like milk and milk products etc in the daily diets of the adolescent with increase in age.
2. Higher intake of proteins during the growth period is essential when increase in body size is taking place and muscles tissue is being continuously added with the help of anabolic processes that requires a positive energy balance in children. Deficiency of proteins or inadequate consumption of this important nutrient at this stage of like may play havoc with the growth and developmental processes with far reaching consequences.
3. The Table 3 and Figure 2 further depicts the intake of carbohydrates is higher in all age groups as compared to its recommended allowances (ICMR).
4. It is found that fats intake is sufficient in the all age group of adolescent boys. The intake of fat to be higher in all age groups as compared to its recommended allowances (ICMR).

### Educational Implication

The study may bring awareness among the teachers, parents and students so they can know about their macro nutritional status and which help them to maintain ideal body weight.

### Conclusion

It is evident from the findings that consumption of protein, carbohydrates and fats is higher in all age groups as compared to its recommended allowances (ICMR).

High fat diet has been shown to be associated with a number of diseases like high blood pressure, coronary heart diseases, diabetes, and cancer etc. controlling the amount of saturated fats in the diet is the most important diet related action required to be taken to strict the levels of cholesterol under the prescribed limits. In blood, elevated levels of cholesterol are associated with increased risk of premature heart diseases. As a preventive measure it is strongly suggested that these growing boys rationalize their fat intake.

### REFERENCES

- Acheson, K.J, I.T. Campbell, O.G. Edholm, D.S. Miller and M.J. Stock 1980. The measurement of food and energy intake in man-an evaluation of some techniques. *Am. J. Clin. Nutr.*, 33: 1155-1164.
- Chawla, S. 1992. Effects of nutritional status on physical capacity of school going girls. Unpublished MSc. thesis, Punjab Agriculture University, Ludhiana, Punjab.
- ICMR, 1951. A note on the management and techniques of diet surveys in India "Special report No. 21" New Delhi.
- Mohptra, A., G. Mallick, B. Murmi, M.R. Ranjit, N.S. Moran, and K. Satyanarayan 1998. Nutritional status of school children in Orissa. A science programme and Abstr. XXXI. Annual meeting of Nutrition Society of India .P.44. National Institute of Nutrition, Hyderabad, India.
- NIN, 1991. Nutritional composition of Indian foods. National Institute of Nutrition, Hyderabad (A.P.)
- Norris. T. 1949. Dietary surveys their techniques and interpretation FAO International studies No 4, *Food and Agriculture Organization Washington*.
- Parvathi, S. 2001. Malnutrition in Indian children. *Soc. Welf.*, 2001; 48(6):27-33.
- Song, W. O., Mann, S.K., Sehgal, S., Devi, P.R., Gударус, S. and Kakarala, M. 1992. Nutriguide, Asian Indian Goods. Nutritional Analysis Computer programme. Michigan state University, USA.
- Tanner, J.M. 1962. Growth at adolescence. 2<sup>nd</sup> edition, Blackwell Scientific Publisher, Oxford.
- Weiner, J.S. and Lourie, J. A. 1969. Human Biology: A guide to field methods. IBP Hand book No. 9 Blak wll scientific Publication oxford UK.

\*\*\*\*\*