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Macronutrients intake of adolescent girls and nutrition education

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ABSTRACT

Adequate macronutrients intake is important for adolescent girls. During puberty wrong food habits accelerate in adolescent girls and affect their nutritional status, which have impact on their nutritional status. Therefore there was the need to impart nutrition education to adolescent girls. Nutrition education has been recognised as a nutritional knowledge improver and good food habit builder. The purpose of the study was to improve their nutritional status through nutrition education and observe the change in their macronutrients intake. The results show that more than 50 per cent respondents had positive change in their energy, protein and fat intake after exposure to nutrition education. The 't' value for energy, protein and fat intake were highly significant. Socio-economic status found to be correlated with change in protein intake at the level of 0.01 level of significance. The findings support the importance of nutrition education in adolescent girls and it helped them to consume macronutrients adequately.

Key Words : Nutrition education, Energy, Protein, Fat and nutrients intake

INTRODUCTION

Adolescent age group is a crucial period in life and implies multiple physiological, biological and psychological changes that affect nutritional needs and habits. Meal skipping, eating out and eating irregularly are common in adolescent girls. High fiber diets, fruits and vegetables provide bulk or more satiety and have been linked to lower body weight during adolescence.

Nutrition for adolescents is important in which there were changes found in growth, hormones, activities and food intake (Elrahman *et al.,* 2013). Changes in life style patterns associated with genetic factors are causing increasing prevalence of adolescent obesity in India (Shefali *et al.,* 2014). Adolescent girl's health is overall condition of their body at a given time, appropriate intake of nutrients, free from nutrients deficiency, normal nutritional status and the condition of optimal physical wellbeing.

Nutritional status in this mater not only affects as an individual adolescent girl but as a whole family or community in whom she lives, therefore an adolescent girl has to keep healthy herself. She cannot utilize her life to fulfill her goals and plays an important role for the community if she is not healthy. Good nutrition and dietary behavior are important during adolescence to achieve full

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growth potential and appropriate body composition, to promote health and wellbeing and to reduce the risk of chronic diseases in adulthood. The physical, developmental and social changes that occur during adolescence can markedly effect on eating behaviors and nutritional health. The period of adolescence for a girl is a period of physical and psychological preparation for safe motherhood. As the direct reproducers of future generations the health of adolescent girls influences not only their own growth, but also the health of future population (Ramya and Anooja, 2015). Intake of common energy dense snack foods, total number of snacks consumed, frequency of consuming snacks prepared away from home, and frequency of snacking while watching television in adolescents and these behaviour may be linked to diet and weight status (Nicole *et al.,* 2016). Health education for nutrition and healthy balanced diet should be integrated in the curriculum of adolescent girls (Elrahman *et al.,* 2013).

Nowadays adolescent girls are facing health problems which are directly or indirectly related to less or excess macronutrients intake. Health of adolescent girls is affected by their nutritional status and dietary habits. Adolescent girls are future responsible citizens, mothers and individuals. Therefore adolescent girls need education to develop and maintain health. Adolescent girls have many challenges in their life. The nutrition education to the adolescent girls helps them to be decision makers about their food. Nutrition education can bring changes in their nutritional status.

In light of above mentioned background and need of the study Macronutrients Intake of Adolescent girls and Nutrition Education was adjudged.

METHODOLOGY

Sampling and research design of the study :

The study was carried out on a group of 290 adolescent girls of age range 13-15 years from 10 schools of Amravati city, Maharashtra. A list of adolescent girls from the 10 schools was prepared and 290 adolescent girls sample was drawn with the help of lottery method. The study design was before after without control experimental research design.

Tools of the study :

Diet Survey (24 hours diet recall method) :

To identify nutrients intake of the respondents 24 hours diet recall method was used. This is the ideal and realistic method used for dietary intake studies. This involves a record of actual food and drink; consumed on a specific day for past 24 hours. The nutritive value of consumed food was then calculated using "Diet soft" (Hore and Gurdeep Kaur, www.dietsoft.in), the software developed, based on data of 'Nutritive value of Indian foods' (Gopalan, 2010). Energy, protein, and fat were calculated from actual food intake before and after nutrition education and compared with RDA.

Nutrients intake of the respondents was assessed by using nutrients intake ratio before and after imparting the standardized nutrition education.

Nutrient Adequacy Ratio (NAR) :

It is defined as the per cent intake of RDA. NAR for energy was divided in to four categories for energy, *viz*., <50%, 50-75%, 75-90%, and >90% and the frequency of respondents occurring in these categories were found out. Similarly, NAR for other macro nutrients were divided into three categories, *viz.,* 0-66%, 66-99% and = 100% and the frequency of respondents occurring in these categories were found out for nutrient intakes (Mittal, 2013).

$$NAR = \frac{\text{Nutrient intake}}{\text{RDA}} \times 100$$

Nutrition education :

This nutrition education programme was developed and standardized through following process:

1. Collecting and editing of nutrition education contents from available literature and material.

2. Nutritionists and nutrition educationists' responses on collected and edited nutrition education contents were taken on a three point continuum namely 'relevant', 'somewhat relevant' and 'not relevant' with the scores of 3, 2 and 1, respectively.

3. Assessing relevancy of nutrition education contents- the relevancy score for the nutrition education contents was found out by addition of scores. Rating given to each item by experts was added. From this data relevancy percentage, relevancy weightage and relevancy score were calculated. Contents scored relevancy percentage >75, relevancy weightage >0.75 and mean relevancy score >2 were considered for final selection of contents and included in the nutrition education programme.

4. By following all above procedure the standardized nutrition education programme was formulated. The nutrition education programme was planned and objectives were set.

5. Nutrition education programme was conducted for 6 months (once a month).

Data collection :

In this study the data of dietary intake (24 hours dietary recall) were collected before and after imparting the nutrition education.

Statistical analysis of data :

The statistical analysis of data was carried out by using SPSS software (version 20).

RESULTS AND DISCUSSION

Adolescence is a rapid growth and maturation period, for that adolescent girls require nutrients as per their body's requirement. An assessment of diet through 24 hours diet recall method was carried out. The nutrients intake of each individual was calculated using the nutritive values of Indian foods.

In the context of present research the respondents were assessed by nutrients intake before and after imparting the standardized nutrition education. The data related to nutrients intake of all the respondents were collected through 24 hours diet recall method. The per cent adequacy of nutrient was calculated on the basis of macronutrient scategorized on the basis of Nutrient Adequacy Ratio (NAR) (Mittal, 2013).

During adolescence period demands increase for macronutrients. Due to higher nutrient needs for growth, effect of the standardized nutrition education was examined on the basis of change in NAR for energy, protein, fat before and after nutrition education.

Energy intake :

Energy requirement is influenced by physical activity, BMR, growth and development. RDA for energy for 13-15 years adolescent girl is 2330 Kcal/day. The energy intake of respondents has been divided into four categories viz. <50%, 50 – 75%, 75-90% and >90% of RDA. The data

regarding the energy intake of respondents before and after nutrition education has been classified, distributed and presented in Table 1.

Table 1 : Distribution of respondents according to their NAR for energy before and after nutrition education

NAR for energy	Respondents (n=290)			
	Before		After	
	Frequency	Percentage	Frequency	Percentage
<50%	221	76.21	61	21.03
50-75%	60	20.69	127	43.79
75-90%	09	3.10	71	24.48
>90%	00	00.00	31	10.70
Total	290	100.00	290	100.00

The data presented in Table 1 and Fig. 1 reveals that the before exposing the respondents to the standardized nutrition education 76.21 per cent respondents, found to be in <50% NAR for energy category, 20.69 per cent found to be in 50-75% NAR for energy category, 3.10 per cent respondent found to be 75-90% NAR for energy category and none of the respondent found to be in >90% NAR for energy category, before exposing them to the standardized nutrition education.

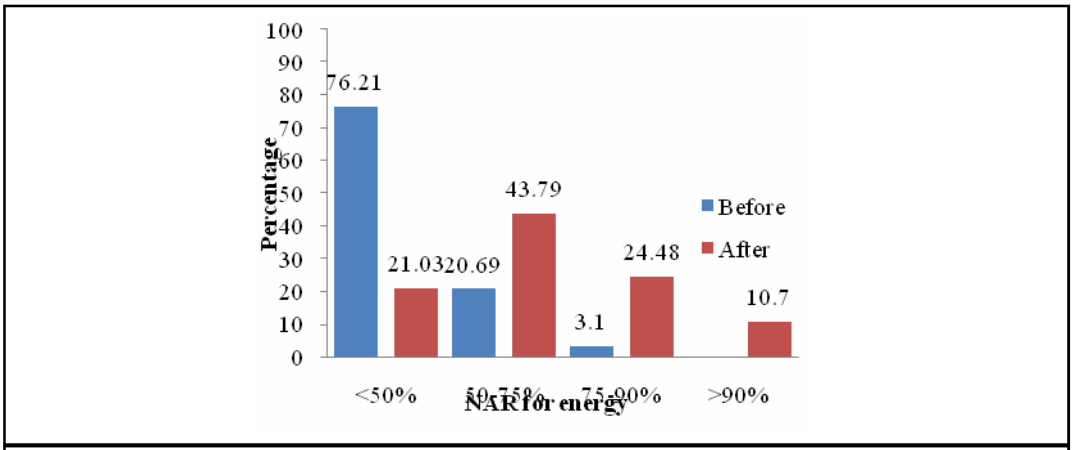

Fig. 1 : Distribution of respondents according to their NAR for energy before and after nutrition education

After exposing the respondents to the standardized nutrition education 43.79 per cent respondents found to be in 50-75% NAR for energy category, followed by 24.48 per cent respondents found to be in 75-90% NAR for energy category, 21.03% respondents in <50% NAR for energy category and 10.70% respondents found to be in >90% NAR for energy category.

It, could, therefore be, inferred from the results depicted in Table 1 and Fig. 1 that the percentage of respondents has been decreased for <50% NAR category and increased for 50-75%, 75-90% and >90% NAR category after exposure to the standardized nutrition education.

Change in energy intake :

As stated earlier it was contended that the standardized nutrition education would bring the

change in energy intake. The change was computed in terms of per cent change for each individual. Difference between after and before nutrition education was calculated. Mean ± standard deviation of difference were calculated and on the basis of that respondents were categorised into three levels of categories as below.

Table 2: Distribution of respondents according to per cent change in energy intake

Per cent change in energy intake	Respondent (n=290)	
	Frequency	Percentage
Low	27	9.31
Medium	241	83.10
High	22	7.59

The data presented in Table 2 and Fig. 2 reveal that 83.10 per cent respondents fell into medium change category, which are more than three fourth respondents, followed by 9.31 per cent respondents falling into low level change category and 7.59 per cent respondents falling into high level change.

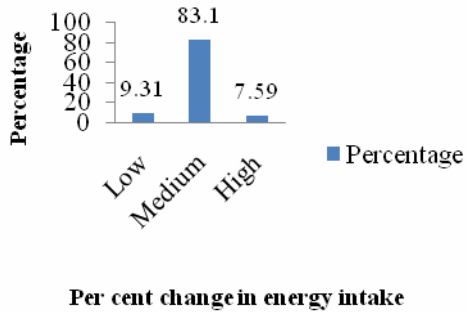

Fig. 2 : Distribution of respondents according to per cent change in energy intake

Protein intake :

Protein requirements are influenced by growth and maintenance of existing lean body mass. Protein needs are highest in adolescent girl. If protein needs are not fulfilled, it results in linear growth, delay in sexual maturation and reduced accumulation of lean body mass. RDA for 13-15 years girls is 51.9 g/day.

NAR for protein were classified in three category *viz.,* 0-66%, 66-99% and ≥100% and the frequency of respondents occurring in these categories were found out before and after imparting the standardized nutrition education and presented in Table 3.

Table 3 : Distribution of respondents according to their NAR for protein before and after nutrition education

NAR for protein	Respondents (n=290)			
	Before		After	
	Frequency	Percentage	Frequency	Percentage
0-66%	229	78.97	67	23.10
66-99%	55	18.97	119	41.04
>100%	06	2.06	104	35.86
Total	290	100.00	290	100.00

From Table 3 and Fig. 3, it was observed that majority 78.97 per cent of the respondents found to be in 0-66% NAR category, followed by 18.97 per cent found to be in 66-99% NAR for protein and 2.06 per cent respondents found to be in ≥100% NAR for protein category before imparting them to the standardized nutrition education.

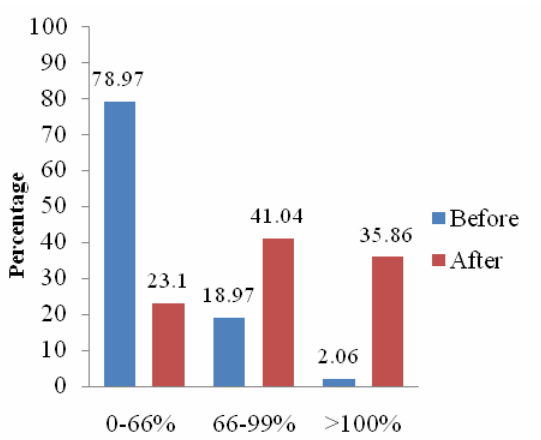

Fig. 3: Distribution of respondents according to their NAR for protein before and after nutrition education

It could be observed that from the Table 3 that after exposure to the standardized nutrition education percentage of respondents decreased in the 0-66 % NAR for protein category *i.e.* 23.10 per cent and increased in 66-99% NAR for protein and ≥100% NAR for protein category *i.e.* 41.04 per cent and 35.86 per cent respondents, respectively.

It, could, therefore be, inferred that the percentage of respondents for 0-66% NAR for protein category decreased and increased for 66-99% and ≥100% NAR for protein category after exposure to the standardized nutrition education.

Change in protein intake :

With a view to observe change in protein intake of respondents, it was postulated that standardized nutrition education would bring change in protein intake. Change in protein intake was measured in terms of per cent change of each individual. For these indices protein intake was calculated after and before nutrition education and the difference was computed. The respondents were classified on the basis of mean and standard deviation and categorised into three levels of per cent change, as below.

It is evident from Table 4 and Fig. 4 that more than three fourth of the respondents *i.e.* 83.40 per cent fell into medium change category. In equal proportion, the respondents found to be in high

Table 4: Distribution of respondents according to per cent change in protein intake

Per cent change in protein intake	Respondents (n=290)	
	Frequency	Percentage
Low	24	8.30
Medium	242	83.40
High	24	8.30

and low change category *i.e.* 8.30 per cent. The data indicate that an overwhelming majority of respondents had changed their protein intake at medium level.

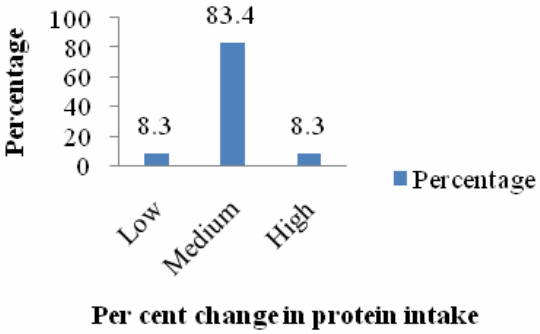

Fig. 4 : Distribution of respondents accordingto per cent change in protein intake

Fat intake :

Adolescent girls require dietary fat and essential fatty acids for normal growth and development. RDA for visible fat for 13-15 years is 40 g/day. NAR for fat intake was categorised in terms of 0-66%, 66-99% and ≥100% and the frequency of respondents occurring in these categories were worked out before and after exposure to standardized education.

Table 5 : Distribution of respondents according to their NAR for fat before and after nutrition education

NAR for fat	Respondents (n=290)			
	Before		After	
	Frequency	Percentage	Frequency	Percentage
0-66%	170	58.62	58	20.00
66-99%	88	30.35	66	22.76
≥100%	32	11.03	166	57.24
Total	290	100.00	290	100.00

The data presented in Table 5 and Fig. 5 reveal that before exposing to the standardized nutrition education 58.62 per cent of respondents were found to be in 0-66% NAR for fat category, 30.35 per cent were found to be in 66 - 99% and 11.03 per cent were found to be in ≥100% NAR for fat category.

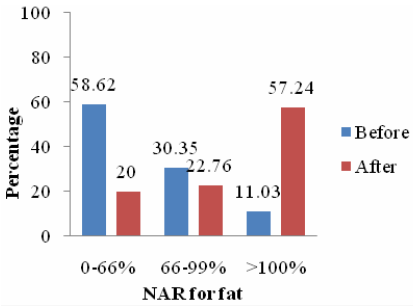

Fig. 5: Distribution of respondents according to their NAR for fat before and after nutrition education

After exposing respondents to the standardized nutrition education majority of the respondents (57.24%) found to be in ≥100% NAR fat category, followed by 22.76 per cent respondents found to be in 66-99% and 20.00 per cent found to be in 0-66% NAR fat category

It, could, therefore be, inferred that after exposure to the standardized nutrition education the percentage of respondents increased for ≥100% NAR for fat category and decreased for 0-66% and 66-99% NAR for fat category.

Change in fat intake :

Difference of fat intake between after and before nutrition education was computed, mean and standard deviation was calculated and on the basis of that respondents were categorised.

Table 6 : Distribution of respondents according to per cent change in fat intake

Per cent change in fat intake	Respondents (n=290)	
	Frequency	Percentage
Low	35	12.00
Medium	217	74.90
High	38	13.10

It may be observed from Table 6 and Fig. 6 that nearly three fourth of the respondents (74.90%) have medium level change for fat intake, followed by 13.10 per cent respondents falling into high level change category and 12.00 per cent respondents have low level change in fat intake.

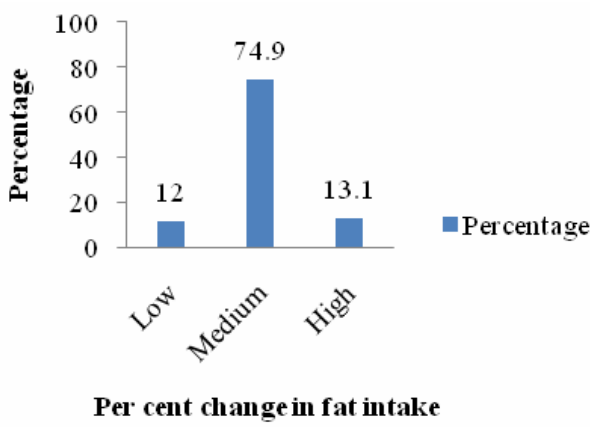

Fig. 6 : Distribution of respondents according to per cent change in fat intake

Testing the significance of difference between the means of before and after towards change in nutrients intake :

With a perception to observe the effect of the standardized nutrition education in terms of change in nutrients (energy, protein, and fat) intake, the means of nutrients intake before and after nutrition education were workout and furnished in Table 7.

It is observed from Table 7 that the means of energy (1589 Kcal), protein (45.62 g), and fat (44.23 g) intake of the respondents after exposing them to the standardized nutrition education found to be higher than the means of energy (975 Kcal), protein (27.39 g), and fat (26.45 g) intake

Table 7 : Means of nutrients intake before and after nutrition education

Sr. No.	Nutrients intake	Mean score		Difference	't' value
		Before	After		
1.	Energy (Kcal)	975	1589	614	15.838 **
2.	Protein(g)	27.39	45.62	18.23	20.795 **
4.	Fat(g)	26.45	44.23	17.78	12.583 **

* *Significant at 0.01 level of probability

of the respondents before imparting to the standardized nutrition education to them and difference found to be between after and before means of energy (614.00), protein (18.23), and fat (17.78) intake.

The data were subjected to 't' test *i.e.* testing the significant difference between the means of same group of individual *i.e.* paired.

The 't' test values presented in the Table 7 with respect to energy "15.838", protein "20.795", and fat "12.583" found to be highly significant at 0.01 level of probability. It could, therefore be, stated that the standardized nutrition education did improve the nutrients intake of the respondents who had undergone the standardized nutrition education.

Correlation between age, education and socio-economic status with their change in nutrients intake :

Adequate nutrients intake plays a vital role in building physical wellbeing and good nutritional status in the adolescent girls. Improvement in nutrient intake might have been a function of several factors. For identifying these factors influencing the macronutrients intake, the co-efficient of correlation between the independent variables age, education and socio-economic status of the adolescent girls and their macronutrients intake were work out and furnished in Table 8.

Table 8 : Correlation matrix of age, education and socio-economic status with their change in nutrients intake

Variables	Age	Education	SES	Energy(Kcal)	Protein(g)	Fat(g)
Age	1	1.000**	.064	.053	.077	.097
Education	1.000**	1	.064	.053	.077	.097
SES	.064	.064	1	.102	.197**	.095
Energy (Kcal)	.053	.053	.102	1	.693**	.705**
Protein (g)	.077	.077	.197**	.693**	1	.456**
Fat (g)	.097	.097	.095	.705**	.456**	1

* Significant at 0.05 level of probability
** Significant at 0.01 level of probability

It could be, observed from Table 8 that the independent variables namely age and education found to be not correlated with energy, protein, and fat intake.

Socio-economic status found to be correlated with protein, intake at the level of 0.01 level of significance. Socio-economic status found to be not correlated with energy, and fat. The standardized nutrition education was effective for the change in nutrients intake. Socio-economic status is the influencing factor of change in nutrients intake.

Thus, it could be inferred that socio-economic status influenced the nutrient intake of the adolescent girls.

Lopez *et al.* (2012) found no difference in total energy intake depending on respondent's father's educational level, but the energy provided by lipids is higher in adolescent whose father has high educational background. The process of nutritional transition is not uniform in the sample, but depends on the socio-economic characteristics of adolescent girls.

Seema (2008) found mean intake of energy, protein, fat, calcium, vitamin D and milk/milk products was significantly higher in upper socio-economic status than the low socio-economic status girls. Conversely carbohydrates, fibre, phytates and cereal intake were high in low socio-economic status than the upper socio-economic status girls.

Summary and conclusion :

Results of nutrients (energy, protein, fat) intake showed that there was remarkable improvement in nutrients intake after imparting the standardized nutrition education to the respondents. Majority of the respondents have change in their nutrients intake. Significant difference was observed between before and after nutrition education in nutrients intake. Socio-economic status found to be correlated with protein intake at the level of 0.01 level of probability.

REFERENCES

Elrahman, A.,; Hassan, S.I. and Elbastawesy, S.I. (2013).Assessmentof nutritional status among preparatory school girls in Talkha city. *Egyptian J. Hospital Med.*, **52**:493-505

Hore, A. and Parminder Kaur (2014). Diet Software (www.dietsoft.in).

Lopez, P.M., Anzid, K., Cherkaoui, M., Baali, A. and Lopez, S.R. (2012). Nutritional status of adolescents in the context of the moroccan nutritional transition: The role of parental education. *J. Biosocial Sci.*, **44** (04) : 481-494

Megha, M. (2013). To assess the nutritional status and morbidity patterns among non-pregnant non-lactating rural women of reproductive age group (18-40 Years). *Internat. J. Scientific & Res. Publications*, **3**(9) ISSN 2250-3153. www.ijsrp.org.

Nicole, I.L., Jonathan, M.M., Allison, W.W., Mary, S. and Dianne, R.N. (2016). Adolescent snacking behaviors are associated with dietary intake and weight status. *J. Nutri.*, **146**(7) : 1348-1355.

Ramya, R. and Thomas, A. (2015). Nutritional status and dietary pattern of adolescent girls of Kottayam Taluk. *Internat. J. Adv. Res.,* **3**(4) : 949-955.

Shefali, P., Bhaskaran, A., Agashe, S. and Vaidya, R. (2014). A cross-sectional study of childhood and adolescent obesity in affluent school children from western Suburb of Mumbai 2001-2002 and 2013-2014. *J. Obesity & Metabolic Res.,* **1**(1) : 7-13.

Seema, P., Marwaha, R.K., Agarwal, N., Tandon, N., Agarwal, R., Grewal, K., Reddy, D.H. and Singh, S. (2008). Vitamin D status of apparently healthy schoolgirls from two different socioeconomic strata in Delhi: relation to nutrition and lifestyle. *British J. Nutri.*, **99**(04):876-882.

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