

IMPACT OF NUTRITION EDUCATION PROGRAM ON DIET QUALITY SCORE AMONGST ADOLESCENT GIRLS BETWEEN AGE GROUP OF 16 TO 17 YEARS IN MUMBAI

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Abstract :

Aim : To See The Impact Of Nutrition Education Program On Diet Quality Score Amongst Adolescent Girls Between Age Group Of 16 To 17 Years In Mumbai .

Place and duration of the study : The study was conducted at Dr B.M.N. College of Home Science (Mumbai) in India between November 2018 to February 2019 .

Methodology : 3 Day 24hour Diet record was taken where energy , carbohydrate , protein and fat were calculated and with the help of 3day diet record Healthy Eating Index Score of Adolescent was assessed and Nutrition Education Program was imparted for the duration of 2 months .

Results : The results of the study showed that consumption of Energy was 1715 Kcal , Carbohydrate 226 gm and Protein 43 gm was low in pre tests which significantly increased in post tests i.e Energy was 1959 kcal , Carbohydrate was 250gm and Protein was 49 gm , hence showed significant results ($p=0.05$) . However consumption of fat was high in pre test i.e 41.25gm which significantly reduced in post test i.e 39gm which showed no significant results ($p= 0.05$) . It was observed that the Healthy Eating Index score for pre test was 45.15 which was considered as “ Poor Diet” and Healthy Eating Index score for post test was 52.45 considered as “ Need for Improvement” and high significant difference was observed ($p= 0.05$) .

Conclusion : Thus the study concluded that after giving Nutrition Education Program to the subjects there was increase in the Healthy Eating Index Score . There was also increase in the consumption of energy , carbohydrate, protein and decrease in fat consumption and thus Nutrition Education Program had positive effect on the subjects .

Key words : Adolescent girls , Nutrition Education Program , Diet Quality Score , 3 Day Diet Record

Introduction :

Adolescence is the stage where there is transition from childhood to adulthood and is one of the most dynamic periods of human development (Singer , 1988) . Physiological and social conditions may affect adolescents' dietary patterns due to physiologically conditions energy and other nutrient requirements may rise due to increase in body size and sexual maturation, including menarche in girls and due to social conditions it will have an impact on their food selection which may tend to acquire unhealthy eating behaviors such as skipping meals, overconsumption, less consumption etc all of which decreases diet quality (Singh , 1991) . Also it was observed that television viewing , computer use , playing e-games , sitting for long hours may affected the dietary patterns of the adolescent leading to unhealthy eating patterns. (Fletcher et al ; 2018) . An increasingly urban world was also contributing to the rising incidence of non- communicable diseases and obesity in adolescent (WHO 2010). Malnutrition in adolescent had increased globally with serious public health problem due to the nutrition transition taking place where traditional diets have been replaced by western diets and mostly high consumption of sugar and fats i.e processed foods . Factors leading to Unhealthy eating behavior seen in adolescent girl are body image perception and attitudes, body weight concern, family environment, peer pressure, weight related behaviors, media exposure and physical activity. Social pressure of remaining thin played a significant role in body weight dissatisfaction among girls (Myers and Crowther, 2007)

Therefore it becomes very important to assess their diet quality rather just keep examine their dietary patterns .

Therefore number of studies used to assess the diets individuals in terms of single foods, food groups, nutrients, or other individual dietary components. An alternative approach to examine overall diet quality should be done in order to reflect the complexity of food intake patterns and dietary exposure (Miller , 2011) . The Healthy Eating Index (HEI) was first developed by the US Department of Agriculture (USDA) "to provide a single summary of diet quality based on different aspects of a healthy diet" (Pick, 2005) . The HEI 2005 (USDA)assesses dietary intakes on a per calorie basis rather than on the basis of absolute amounts of foods consumed; thus, the HEI-2005 assesses the quality of the relative proportions of foods consumed rather than the quantity of foods consumed (Guenther , 2008) . In 2016 , Sengar had developed Healthy Eating Index in Indian context by using the latest Dietary Guidelines for Indians (2010) . In recent years, epidemiological studies on a diet and chronic diseases have tended to focus on the relationship between diet quality and disease risk in different age groups, including children, adolescents, adults, and elderly people (Pontaga , 2009) . Thus Healthy Eating Index Score (HEIS) for adolescent is a useful index in assessing diet quality, therefore the aim of the study was to assess diet quality score of adolescent girls.

Materials and Methods :

The present study were done on Adolescent girls between the age group 16 to 17 years . 20 subjects were taken for the study from Dr B.M.N. College of Home Science (Mumbai) in India . Random Sampling technique was used to select the sample from the population . In this study pre and post test was done to compare Healthy Eating Index Score of Adolescent girls and Consumption of nutrient intake by imparting them Nutrition Education Program through contact sessions . The tools used to in the study used were

1. Healthy Eating Index Score (HEIS) for adolescent
2. 3 Day 24hour Diet record/recall
3. Nutrition Education Program (NEP)

1. Healthy Eating Index Score (HEIS) for adolescent

The Healthy Eating Index comprise of 10 components i.e Total grains , Total pulses/meat/fish/poultry , Total greens/yellow/orange vegetables , Total fruits , Total Milk , Total sugar , Variety and SOFAAS [solid fat and added sugars] each component was given a score of 5 or 10 and total maximum score of all the components was 100. The score above average values 80 was considered as ' Good Diet' followed by numeral average and 80 were indicator for Need of Improvement and below average indicated 'poor diet' . The above components were scored on the basis of their 3 day 24hour diet record.

Table 1 : Healthy Eating Index Score for Adolescent

Components	Maximum Score	Minimum score
Total Grains	10	0
Total pulses/Meat , Fish & Poultry	10	0
Total Vegetables	5	0
Total Green, Yellow & Orange vegetables	5	0
Total Fruits	10	0
Total Milk	10	0
Total Oil	10	0
Total Sugar	10	0
Variety	10	0
SOFAAS	20	0
Total Score	100	0

2. 3 Day 24hour Diet record/recall

3 Day 24 hour Dietary Recall was taken on 2 weekdays and 1 weekend day . During a 3day 24-hour recall, respondents i.e adolescents were asked, to recall and report foods and beverages of all meals consumed over the preceding 24 hours and 24-hour period starts with the first thing eaten by the respondent in the morning until the last food item consumed before he/she got up the next morning. Each and every detail of food must be assessed like time i.e what time it was eaten , what food was consumed either homemade food or outside food , what was the ingredient added to that meal , how much ml /l of water , milk was consumed , what was the quantity of the packaged foods consumed , how much oil was used in the whole day , how many meals were skipped , note any other beverages were consumed like alcohol , note down and specific food allergy ,how was the meal prepared and midnight cravings so that it will be easy to calculate energy and other nutrients and help in assessing the nutritional status of the respondent. The nutrient intake was compared with ICMR reference values .

3. Nutrition Education Program (NEP)

The objective of Nutrition Education Program is to help individuals to establish food habits and practices that helps to full fill the nutritional needs of the body . Nutrition Education Program is not merely a process of transferring facts or information about the nutritional content of the food but the important role of food is to prevent nutritional deficiency diseases. Nutrition Education Program also helps families to limit on budget and make healthier food choices and choose physically active lifestyle by acquiring the knowledge , skills , attitudes and behavior changes to improve health . Nutrition Education Program were initiated by government and national and International organizations which would help in improving the nutritional status of adolescents and help in combating the development of obesity and other chronic degenerative diseases in later stage of their life . NEP will help individuals in making proper food choices of them and their families . Therefore in the present study , NEP was given in the form of power point presentation by explaining ' The Importance of Nutrition in daily life' .

For statistical analysis t-test SPSS Package was used and consent letters were not given .

Results :

1. 3 day 24 hour Diet record :

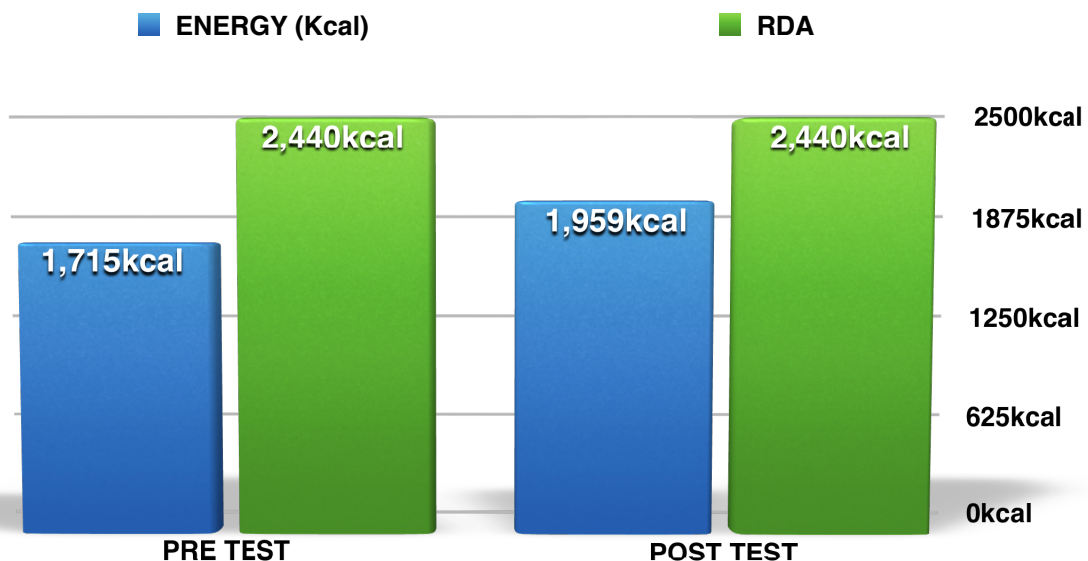
A. Energy :

Energy is required for all the biochemical and physiological functions that sustains life i.e respiration , circulation , maintenance of electrochemical gradients across the cell membranes and maintenance of body temperature as well as for growth and physical activity. Energy is provided with the diet by protein , carbohydrate , fat and it is expressed as a unit of heat ; the calorie. Energy requirements of adolescents are defined as the amount of food energy needed to balance total expenditure of desirable level of physical activity and to support optimal growth and development with longterm health . The recommended Dietary Allowances for adolescent girl is 2440 kcal (Dietary Guidelines for Indians , 2010) .

Table 2 Paired Sample Statistics for Energy consumption

		No of samples	Mean \pm Std. Deviation	Sig. (2-tailed)
Pair 1	PRE ENERGY CONSUMPTION	20	1715 \pm 207	.000
	POST ENERGY CONSUMPTION	20	1959 \pm 203	

Figure 1 Graphical representation of pre and post test by NEP on Energy consumption



Consumption of Energy

Figure 1 showed that in both the pre and post test consumption of energy did not meet Recommended Dietary Allowance for adolescent girls .It was observed the consumption of energy was less in the subjects which mostly included empty calories (HFHS Foods) . When subjects were given Nutrition Education Program (through contact session) about significance of consuming energy and its benefits there was minimal increase in consumption of energy . Further nutrient rich foods were consumed which were mainly homemade . The mean pre energy consumption was 1715 ± 207 kcal and post energy consumption was 1959 ± 203 kcal and hence highly significant difference was observed at $p=0.05$ ($p=0.000$) in the study .

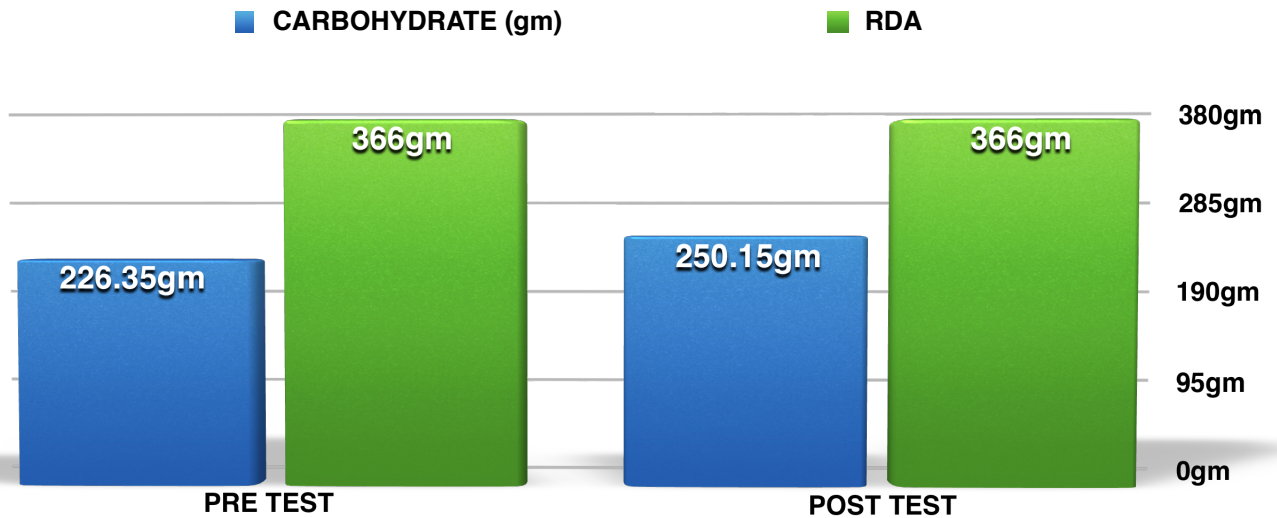
B. Carbohydrate :

Carbohydrates are the main source of energy to body . Every gram of carbohydrate , sugar or starch when oxidised yields on an average of 4 kcal /gm .Carbohydrate spares protein and fat being metabolized for calories. The principal dietary carbohydrates are sugars and starches.to provide energy. Carbohydrates have numerous other potential effects , such as lowering cholesterol, increasing calcium absorption, acting as a source of short-chain fatty acids in the colon, and increasing fecal bulk .

Table 3 Paired Sample Statistics for Carbohydrate consumption

		No of samples	Mean \pm Std. Deviation	Sig. (2-tailed)
Pair 1	PRE CARBOHYDRATE CONSUMPTION	20	226.35 ± 45.99	.002
	POST CARBOHYDARTE CONSUMPTION	20	250.15 ± 26.24	

Figure 2 Graphical representation of pre and post test by NEP on Carbohydrate consumption



Consumption Of Carbohydrate

Figure 2 showed that both the pre and post test carbohydrate consumption did not meet Recommended Dietary Allowance for adolescent girls .It was observed the consumption was lower because consumption of simple carbohydrate i.e high sugar consumption in the form of chocolates , ice-creams , bakery products . When subjects were given Nutrition Education Program through contact session about importance of consuming complex carbohydrates and its benefits there was **minimal** increase in energy consumption and nutrient rich foods were consumed . The mean pre energy consumption was 226.35 ± 45.99 gm and post energy consumption was 250.15 ± 26.24 gm . A significant difference was observed at $p=0.05$ ($p=0.002$) in the study .

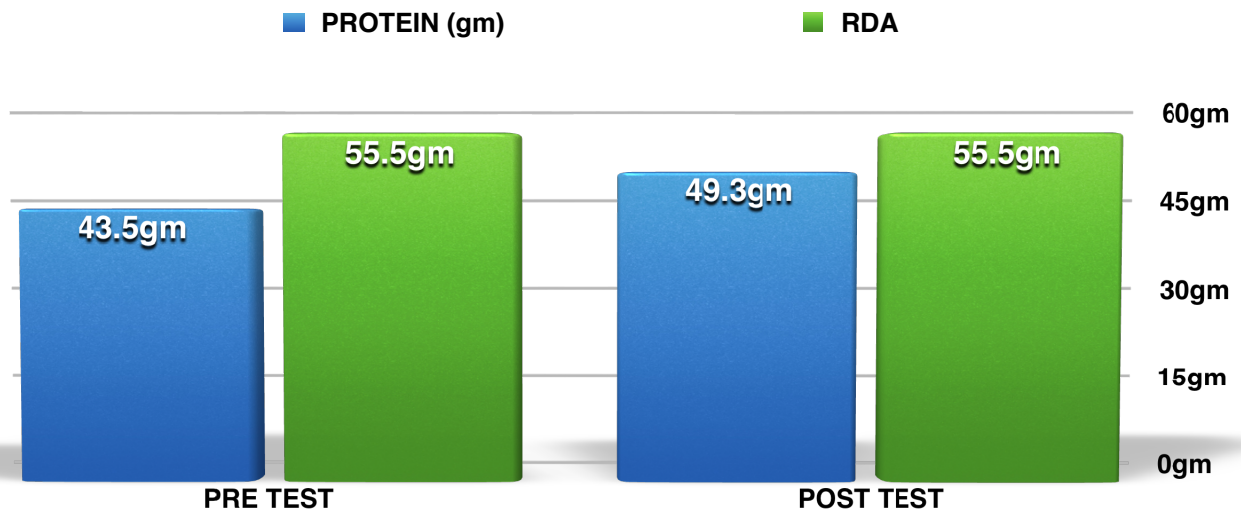
C. Protein

Proteins are the major structural and functional components of all cells in the body. Dietary protein provides the amino acids required for both the synthesis of body proteins and the production of other nitrogenous compounds . Proteins Provide 4 kcal /gm . During adolescence protein requirements vary from degree of physical maturation. Protein is required for the growth and maintenance of the tissues , and repair of the damaged tissues . Therefore Recommended Dietary Allowance for adolescent girl is 55 gm /day i.e 1gm/kg/day (Dietary Guidelines for Indians , 2010)

Table 4 Paired Sample Statistics for Protein consumption

		No of samples	Mean ± Std. Deviation	Sig. (2-tailed)
Pair 1	PRE PROTEIN CONSUMPTION	20	43.50 ± 10.05	.003
	POST PROTEIN CONSUMPTION	20	49.30 ± 5.15	

Figure 3 Graphical representation of pre and post test by NEP on Protein consumption



Protein Consumption

Figure 3 depicts the consumption of proteins in both pre and post test data which showed the consumption of proteins in the subjects were not according to RDA Dietary Guidelines for Indians (ICMR) of 2010. Thereafter Nutrition Education module was constructed and demonstrated through contact session a minimal increase in the consumption of protein was observed in the study. The protein foods which was mostly consumed were milk, egg, chicken, pulses, legumes etc. The mean pre protein consumption was 43.50 ± 10.05 gm as compared to post protein consumption was 49.30 ± 5.15 gm, and there was a significant difference observed at p=0.05 (p=0.003) between the pre and post test respectively.

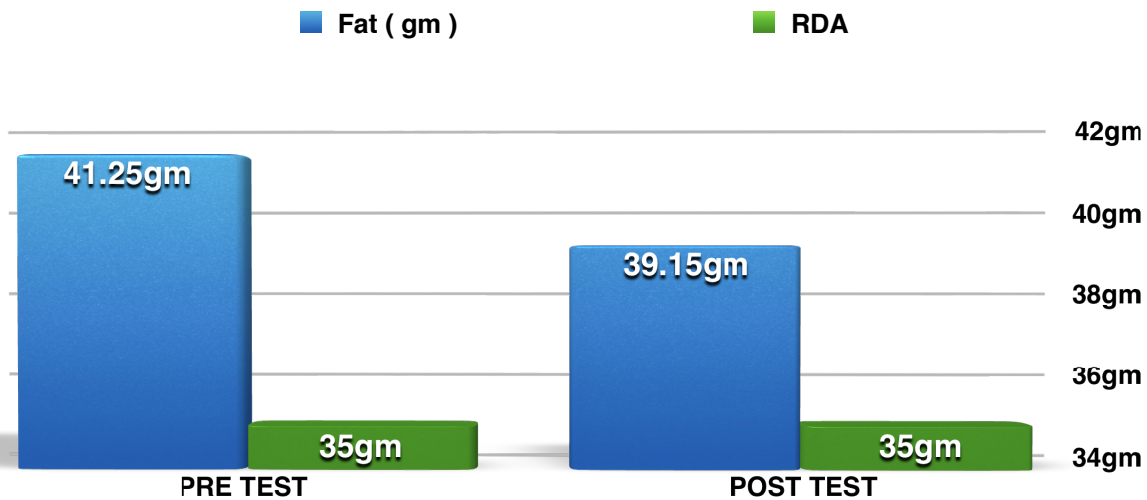
D. Fat

Fats contribute to texture, flavor and taste and increase the palatability of the diet. Fats are essential for meeting the nutritional needs like essential fatty acids (linoleic n-6 and alpha-linolenic n-3) and serve as rich sources of energy. Therefore, fats should be consumed, in moderation amounts. However, for the growth and development of young children high-caloric diets are required. This was achieved by inclusion of adequate amounts of fat (1g fat = 9 Kcals) in their diets as they cannot consume large quantities of bulky cereal - pulse- based diets. The total fat (visible + invisible) in the diet should provide between 20-30% of total calories therefore the Recommended Dietary Allowance for adolescent girls is 35 gm / day. (Dietary Guideline for Indians , 2010).

Table 5 Paired Sample Statistics for Fat consumption

		No of samples	Mean ±Std. Deviation	Sig. (2-tailed)
Pair 1	PRE FAT CONSUMPTION	20	41.25 ± 10.54	.108
	POST FAT CONSUMPTION	20	39.15 ± 6.85	

Figure 4. Graphical representation of pre and post test by NEP on Fat consumption



Fat Consumption

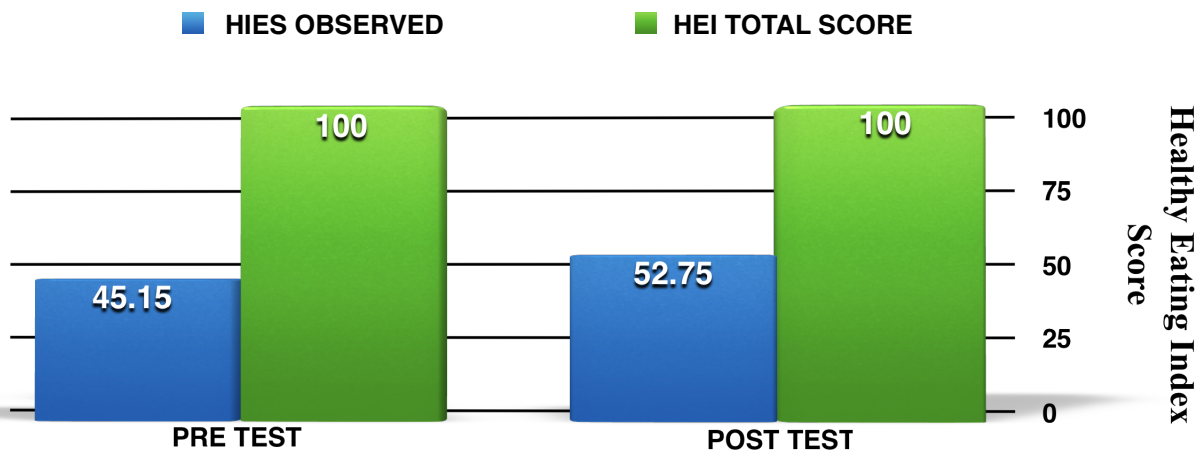
Figure 4 depicts the consumption of fat which was higher than the Recommended Dietary Allowance for adolescent girls. Nutrition education Program when conducted showed a declining trend in consumption of fat. The consumption of invisible fat was noted through Food Frequency Questionnaire in all the subjects which included vadapav, samosapav, sabudana vada, mendu vada, pani puri, processed packaged foods etc. The mean pre fat consumption was 41.25 ± 10.54 gm and post fat consumption was 39.15 ± 6.85 gm. However no significant difference was observed at $p=0.05$ ($p=0.108$) between the pre and post test.

2. Healthy Eating Index Score (HEIS)

Table 6 Paired Sample Statistics for Healthy Eating Index Score

		N	Mean \pm Std. Deviation	Sig. (2-tailed)
Pair 1	PRE HEALTHY EATING INDEX SCORE	20	45.15 \pm 6.35	.000
	POST HEALTHY EATING INDEX SCORE	20	52.75 \pm 7.92	

Figure 5. Graphical representation of pre and post test by NEP on Healthy Eating Index Score



Data analysis was obtained from 20 subjects. Dietary intakes in the form of 3Day 24 hour recall were obtained from each subject. Healthy Eating Index Adolescent scores were calculated for a period of three days, first day being Sunday and the other two were working days (Monday and Tuesday). Figure 5 denoted that both pre and post test of Healthy Eating Index Score did not match the maximum score of

100 . The mean pre Healthy Eating Index Score was 45.15 ± 6.35 which was considered as “ Poor Diet” as per the guidelines given by Sengar for Healthy Eating Index Score for Adolescent , because there was no fruit consumption daily , green , yellow and orange vegetables were not consumed , diets were high in fat and protein intake was less and when Nutrition Education Program was conducted by expelling importance of nutrition in daily life the mean post Healthy Eating Index Score was 52.75 ± 7.92 which was considered as “ Need for Improvement” because the subjects initiated the consumption of one serving of fruits daily , followed by consumption of green leafy vegetable was found to be more but intake of fat was noticed to be same .There was significant difference observed at $p=0.05$ ($p=0.000$) which was noted statistically between the pre and post test.

Conclusion :

The objective of the study was to assess their Diet Quality by calculating Healthy Eating Index score by collecting the information from nutrient intake i.e Energy , Carbohydrate , Protein and Fat and these nutrients were compared with ICMR (2010) Standards . It was observed that the HEIS score for pre test was 45.15 which was considered as “ Poor Diet” and HEIS score for post test was 52.45 considered as “ Need for Improvement” as per the guidelines given by Sengar for Healthy Eating Index Score for Adolescent and high significant difference was observed ($p= 0.05$). It was also noticed that consumption of energy was 1715 kcal , Carbohydrate 226 gm and protein 43 gm was low in pre test which significantly increased in post test i.e energy was 1959 kcal , carbohydrate was 250gm and protein was 49 gm , hence showed significant results ($p=0.05$) . However consumption of fat was high in pre test i.e 41.25gm which significantly reduced in post test i.e 39gm which showed no significant results ($p= 0.05$) .

This implies that the NEP had positive effect on the subjects however contact session sessions durations to be increased so that the knowledge imparted to the subjects can be brought into practice . Similar ways , Healthy Eating Index Score also indicates transition towards a positive correlation go NEP and healthy eating habits .

Discussion :

Nutrition health education is an effective strategy for behavioral change to improve home diets. Nutrition health education is a process of formulating and disseminating messages that make individuals and communities aware about health and other related issues, strategies and behavior that enable them to make informed choices (Nandi, 2005). Therefore in the present study Nutrition Education Program has helped the subjects to make healthy food choices , fast foods was replaced by home made foods and there was significant difference observed in the nutrition intake and Diet quality score in the adolescent . As children or adolescent do not always choose what they eat, as their parents decide and prepare the food for them. Hence, there is a need to reach out to their mothers as they are the ones who are directly involved in the preparation of meals for the family.

Ethical Approval : This study had the agreement with The Institutional Ethical Committee at Dr B.M.N College of Home science.

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