International Journal of Home Science 2017; 3(1): 136-140

International Journal of Home Science

ISSN: 2395-7476
IJHS 2017; 3(1): 136-140

www.homesciencejournal.com
Received: 21-11-2016
Accepted: 22-12-2016

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Effect of nutrition education on anthropometric measurements of adolescent girls

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Abstract
Anthropometry is important for adolescent girls. During puberty wrong food habits accelerate in adolescent girls and affect their nutritional status, which have impact on their anthropometric measurements. 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 anthropometric measurements. The results show that more than 50 per cent respondents had positive change in their height, weight, BMI, body fat percentage and MUAC after exposure to nutrition education. The 't' value for height, weight, BMI and MUAC were highly significant. Change in height of respondents was correlated with change in BMI. Change in weight was correlated with change in BMI and body fat percentage. Change in BMI was correlated with change in height, weight and body fat percentage. Change in body fat percentage was correlated with change in weight, BMI and MUAC. Change in MUAC was correlated with change in body fat percentage. The findings support the importance of nutrition education to adolescent girls to improve the anthropometric measurements towards the normal range.

Keywords: Nutrition education, anthropometric measurements, body mass index, body fat percentage, mid upper arm circumference, adolescent girls

1. Introduction
Anthropometry is important during adolescence. Growth may be sensitive to nutritional deficit and surfeit, adolescent anthropometry provides indicators of nutritional status and health risk, and may be diagnostic of obesity [1]. The majority of adolescent girls have misperception of their weight and height [2]. The onset of the puberty has a marked effect on the development of health behaviour. Puberty is related to an acceleration of the development of unhealthy behaviour in adolescent girls [3]. Nutritional problems in adolescent girls are common throughout the India. Poor knowledge on nutrition among adolescent girls can lead to unhealthy eating practices leading to inappropriate anthropometric measurements and an unhealthy community [4].

Adolescent girls choose unhealthy foods on their own. They are prone to junk foods, desserts, chocolates, candies, biscuits, cakes, cookies and soft drinks since childhood, which they like and tend to consume. Wrong eating habits and choices of foods, skipping meals, eating while watching television and peer pressure have impact on adolescent girls' nutritional status, which affect their anthropometric measurements.

Adolescent girls face many health related problems due to underweight or generalized obesity; central obesity in early ages may contribute to some chronic diseases in adulthood. An intervention programme, is urgently needed to reduce overweight and obesity in adolescent stages [5] that can affect their anthropometric measurements-height, weight, body mass index (BMI), body fat percentage and mid upper arm circumference (MUAC); and can bring positive changes in undernourished adolescent girls.

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 [6]. Health education for nutrition and healthy balanced diet should be integrated in the curriculum of adolescent girls [7].

The nutrition education to the adolescent girls helps them to be decision makers about their food. Nutrition education can bring changes in their anthropometric measurements.
In light of above mentioned background and need of the study effect of nutrition education on anthropometric measurements of adolescent girls was adjudged.

2. Material and Methods

2.1 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.

2.2 Tools of the study

2.2.1. Height: The height of the respondents measured with a vertical measuring rod. The adolescent girls were instructed to stand erect, looking straight on a levelled surface with heels together and toes apart, without footwear. Height for age of the adolescent girls was compared with CDC [8], height for age percentile in terms of 'Short Stature', 'Normal Stature' and 'Tall Stature'

2.2.2. Weight: Body weight is the sensitive and simple anthropometric measurement for the evaluation of nutritional status. Weight was taken with minimum clothing and without shoes and socks on the Bio -electrical Impedance Analysis (BIA).

2.2.3. BMI: BMI is a value derived from the mass (weight) and height of the respondent. BMI of respondents was compared with BMI for age 5 to 19 years Z score [9].

2.2.4. Body: fat percentage- For the fat percentage measurement BIA was used.

2.2.5. MUAC: A fiberglass tape was used to measure MUAC of adolescent girls. MUAC of the respondents was compared with the cut-off values of MUAC recommended by Bulliyya [10].

2.2.6. Nutrition education: Educational programme on nutrition is the process to stimulate and motivate the adolescent girls to learn and act accordingly their own interest to improve or maintain their normal anthropometric measurements. 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 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).

2.2.7. Data collection: In this study the data of anthropometric measurements of respondents were collected through above mentioned standard instruments, before and after imparting the nutrition education.

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

3. Results and Discussion

3.1 Height

Table no. 1 represents the Height for age in terms of 'Short stature', 'Normal Stature' and 'Tall Stature' [8] before and after exposure to the nutrition education. Result reveal that the after exposing the respondents to the nutrition education the percentage of respondents with short stature found to be 49.31 per cent, normal stature 50.35 per cent; whereas before exposing them to the nutrition education the percentage of respondents with short stature found to be 53.80 per cent, normal stature 45.86 per cent. 00.34 per cent of the respondent found to be in tall stature category before and after nutrition education.

Table 1: Distribution of respondents according to their height (cm) for age

Categories	Respondents (n=290)			
	Before		After	
	Frequency	Percentage	Frequency	Percentage
Short Stature (Percentile<5)	156	53.80	143	49.31
Normal Stature (Percentile >5 and <95)	133	45.86	146	50.35
Tall Stature (Percentile≥95)	01	00.34	01	00.34

It, could, thus be, inferred that percentage for short stature category decreased and for normal stature increased after exposure to the nutrition education.

3.2 Weight: Table no. 2 represents respondents' weight (kg) before and after nutrition education, mean is calculated and presented.

Table 2: Distribution of respondents according to their weight

Age (years)	Respondents (n=290)			
	Before		After	
	Mean	S.D.	Mean	S.D.
13	37.02	8.47	39.14	8.27
14	39.90	6.25	41.43	6.11
15	42.87	7.50	44.65	7.70

Data reveals that before exposing the respondents to nutrition education mean weight of the respondents were 37.02 Kg, 39.90 Kg and 42.87 Kg for 13, 14 and 15 years respectively. After exposing the respondents to the nutrition education mean weight of the respondents were 39.14 Kg, 41.43 Kg and 44.65 Kg for 13, 14 and 15 years respectively.

3.3 Body Mass Index (BMI) - Table no. 3 represents respondents BMI before and after nutrition education

Table 3: Distribution of respondents according to their BMI

BMI Classification	Respondents (n=290)			
	Before		After	
	Frequency	Percentage	Frequency	Percentage
Severe under nutrition (< Median-3SD)	12	4.14	07	2.41
Moderate under nutrition (Median <-2SD to >-3SD)	37	12.76	23	7.93
Normal (≥ Median -2SD to +<1SD)	224	77.24	235	81.03
Overweight (Median≥+1SD to <3SD)	17	5.86	25	8.63

Data indicates that majority of the respondents were found to be in category of normal BMI before and after exposing them to the nutrition education. After exposing the respondents to the nutrition education the percentage of respondents for normal BMI was 81.03. Before exposing them to the nutrition education the percentage of respondents for normal BMI was 77.24. The percentage of respondents after exposing them to the nutrition education found to be 2.41 and 7.93 for severe under nutrition and moderate under nutrition respectively, whereas 4.14 and 12.76 for severe under nutrition and moderate under nutrition respectively before exposing them to the nutrition education. It, could be, noted that under overweight category after exposing the respondents to the nutrition education the percentage of the respondents were found to be 8.63. Before exposing to the nutrition education the percentage of the respondents were found to be 5.86. It is observed that none of the respondents were found to be in the category of obesity.

3.4 Body fat percentage

Table no. 4 represents the respondents' body fat percentage before and after exposure to nutrition education.

Table 4: Distribution of respondents according to their body fat percentage

Categories	Respondents (n=290)			
	Before		After	
	Frequency	Percentage	Frequency	Percentage
Under weight (5th percentile)	200	69.00	197	68.00
Normal (50th percentile)	90	31.00	92	31.70
Over weight (85th and 95th percentile)	00	00.00	1	0.30

The data presented shows the distribution of respondents as per the Smooth percentile values of body fat percentage [11]. 68.00, 31.70 and 0.30 per cent respondents found to be in under weight, normal and overweight category respectively after exposure to the nutrition education; whereas 69.00 and 31.00 per cent respondents found to be in underweight and normal category respectively before nutrition education. There was a change noticed in body fat percentage after nutrition education. The before and after mean body fat recentage are deficit than the normal value.

3.5 Mid-upper arm circumference (MUAC)

Table no. 5 represents the respondents' MUAC before and after exposure to nutrition education.

Table 5: Distribution of respondents according to their MUAC

Categories	Respondents (n=290)			
	Before		After	
	Frequency	Percentage	Frequency	Percentage
Underweight (<22)	176	60.70	127	43.80
Normal (>22-28cm)	109	37.60	154	53.10
Overweight(>28cm)	5	1.70	9	3.10

It is observed from the data that 43.80, 53.10 and 3.10 per cent respondents found to be in underweight, normal and overweight category respectively after exposing them to the nutrition education. Before nutrition education percentage of respondents for underweight, normal and overweight found to be 60.70, 37.60 and 1.70 respectively, which shows percentage increased for normal and decreased for underweight MUAC after exposure to the nutrition education.

3.6 Change in anthropometric measurements

Table no. 6 represents the change in height, weight, BMI, body fat percentage and MUAC of respondents. This change, if any

was worked out on the basis of per cent change of height, weight, BMI, body fat percentage and MUAC and the difference between after and before nutrition education for each individual. Change in height, weight, BMI, body fat percentage and MUAC of an individual was measured in terms of per cent change. Mean and standard deviation for change of height, weight, BMI, body fat percentage and MUAC was calculated and the respondents were classified into three categories by using mean ± standard deviation as below.

Table 6: Distribution of respondents according to change in height, weight, BMI, body fat percentage and MUAC

Per cent change	Respondents (n=290)									
	Height		Weight		BMI		Body Fat percentage		MUAC	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Low	82	28.27	38	13.10	43	14.83	38	13.10	23	7.93
Medium	147	50.70	205	70.70	200	68.96	218	75.18	240	82.76
High	61	21.03	47	16.20	47	16.21	34	11.72	27	9.31

A glance at table 6 revels that most of the respondents were in medium change category, followed by high and low level change category respectively. It could, therefore, be inferred that nearly two third of the respondents could have change in their height, weight, BMI, body fat percentage and MUAC

Nutrition education to respondents facilitated the understanding of the nutritional knowledge and improves the nutrients intake. Effective implementation of nutrition education, skilled researcher, favourable educational environment, involvement of respondents and their understanding about importance of nutrition education for improvement in anthropometric measurements might be various positive aspects for getting change.

3.7 Testing the significance of difference between the means of before and after towards change in anthropometric measurements

Table no. 7 represents the difference between means of anthropometric measurements (height, weight, BMI, body fat percentage and MUAC) before and after nutrition education and 't' value.

Table 7: Means of anthropometric measurements before and after nutrition education and 't' value

S.N.	Anthropometric measurements	Mean Score		Difference	't' value
		Before	After		
1.	Height (cm)	149.54	150.52	0.98	21.785**
2.	Weight (kg)	40.40	42.21	1.81	23.163**
3.	BMI ($kg/m^{2)}$	18.02	18.59	0.39	14.079**
4.	Body Fat Percentage	21.39	21.48	0.09	1.003
5.	MUAC (cm)	21.21	22.11	0.90	12.220**

**Significant at 0.01 level of probability

It is observed from the data that the means of anthropometric measurements after exposing them to the nutrition education found to be higher than the mean of before exposing them to nutrition education and difference between means after and before found.

The only quantitative superiority of the mean values of the respondents after imparting the nutrition education over the mean values of the respondents before exposure to the nutrition education is not the conclusive proof of its superiority. Hence, the data were subjected to paired 't' test to determine whether the influence of the nutrition education was statistically significant or not.

The 't' test value with respect to height, weight, BMI and MUAC are 21.785, 23.163, 14.079 and 12.220 respectively found to be highly significant at the 0.01 level of probability.

3.8 Correlation between changes in their anthropometric measurement

Table 8: Correlation matrix of change in their anthropometric measurement

Variables	Change in height	Change in weight	Change in BMI	Change in body fat percentage	Change in MUAC
Change in height	1	-0.107	-0.293**	-0.47	0.057
Change in weight	-0.107	1	0.857**	0.144*	0.048
Change in BMI	-0.293**	0.857**	1	0.140*	0.030
Change in body fat percentage	-0.47	0.144*	0.140*	1	0.298**
Change in MUAC	0.057	0.048	0.030	0.298**	1

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

Change in height found to be not correlated with change in weight, body fat percentage and MUAC; but found to be correlated with change in BMI at 0.01 level of significance. Change in weight found to be correlated with change in BMI at 0.01 level of significance and body fat percentage at 0.05 level of significance and not correlated with height and MUAC. Change in BMI found to be correlated with change in height and weight at 0.01 level of significance and body fat percentage at 0.05 level of significance; and not correlated with MUAC. Change in body fat percentage found to be correlated with change in weight and BMI at 0.05 level of significance and with MUAC at 0.01 level of significance. Change in MUAC found to be not correlated with change in height, weight, BMI but correlated with body fat percentage at 0.01 level of significance.

4. Conclusion

The present study aimed at assessing the effect of nutrition education on anthropometric measurements of adolescent girls. The results revealed that exposure to nutrition education have brought the positive changes in anthropometric measurements of adolescent girls and improve their height, weight, BMI, body fat percentage and MUAC towards normal range.

The findings of the study are positive. The similar studies may be undertaken in other areas and age groups; and can benefit to community. It is expected that the nutrition education improves nutritional knowledge, eating behaviour of adolescent girls, foster their eating habits in their daily lives and improve their nutritional status and health.

5. References

1. World Health Organization Physical status: The use and interpretation of anthropometry. Geneva, Switzerland: WHO Tech Rep Ser No. 1995; 854:1-452.
2. Peralta E, Emelin R, Salinas Q, Rosario M. Self-perception of body image and practices to correct it in adolescents from an educational institution, Lima, Peru. Annals of the Faculty of Medicine. 2016; 77(2):117-122
3. Simon AE, Wardle J, Jarvis MJ, Steggles N Cartwright M. Examining the relationship between pubertal stage, adolescent health behaviours and stress. Psychological Medicine. 2003; 33(8):1369-1379
4. Sneha A, Rupali S. Effect of Nutrition Education Program on Anthropometric Measurements of Adolescent Girls (16-19 Years). Indian Journal of Applied Research. 2015; 5(4).
5. Thakkar HK, Deopa D, Misra SK, Gupta SC. Relationship between Various Anthropometric Indicators Used for Obesity Measurement among College Going Girls of Agra. International Journal of Development Research. 2015; 5(11):6019-6024
6. Nicole IL, Jonathan MM, Allison WW, Mary TS, Dianne RN. Adolescent Snacking Behaviors are Associated with Dietary Intake and Weight Status. Journal of Nutrition. 2016; 146(7) : 1348-1355
7. Elrahman A, Hassan SI, Elbastawesy SI. Assessment of nutritional status among preparatory school girls in Talkha City. Egyptian Journal of Hospital Medicine. 2013; 52:493-505
8. http://www.cdc.gov/growthcharts/html_charts/bmiagerev.htm, 2001.
9. www.who.org
10. Bulliyya G. Hemoglobin status of non-school going adolescent girls in three districts of Orissa, India. International Journal of Adolescent Medicine and Health. 2007; 19(4):395-406.
11. CDC/ NHANES. Smoothed percentage body fat percentiles for U.S. Children and Adolescents. United States. 2011; Number 43.