Shodhshauryam, International Scientific Refereed Research Journal
© 2022 SHISRRJ | Volume 5 | Issue 5 | ISSN : 2581- 6306

To Assess the Nutritional Status of Rural Adolescent Girls with Residential Facilities Based on BMI Level

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Article Info
Volume 5, Issue 5
Page Number : 71-77

Publication Issue :
September-October-2022

Article History
Accepted : 01 Sep 2022
Published : 10 Sep 2022

Abstract : The present study was carried out to assess the Nutritional status of students of Kasturba Gandhi Balika Vidyalaya in Chandauli District of Uttar Pradesh. A Community based Cross-Sectional study with 277 adolescent girls selected from Schools. Nutritional status assessed by the help of Anthropometric measurement including weight, Height and BMI. It was found that 84.1% of respondents had normal BMI (≥-2 to ≤+ 1SD), whereas 10.8% underweight and remaining only 5.1% were falling in overweight BMI category. It was also observed that the mean intake of calorie, protein, fat and carbohydrate were found greater among overweight student, And also observed that mean intake of caloric (1930.80kcal), protein (47.08gm) fat (33.77gm) and carbohydrate (359.24gm) was found to be greater among overweight students in comparison to the underweight while mean intake of calcium and iron is found in decreasing order with increase of BMI. But on the basis of this study was found to be good nutritional status of girls of KGBV.

Keywords : Nutritional status, BMI, Adolescent, KGBV, Yamane's formula

INTRODUCTION : The present study was conducted to Nutritional status of students of Kasturba Gandhi Balika Vidyalaya in Chandauli, KGBV is a very Ambitious scheme of Government of India for the girls of disadvantage section of the Educationally backward areas of the country. The Objective of the Scheme to ensure access and Quality Education to the girls of disadvantage groups of society, but KGBV Schools are residential in nature and to provide meals and dietary supplement to these schools so, it's become better nutritional status of its residential student girl. There are so many studies have been done on the Educational, Psychological and other aspect but very few studies have been carried out on the nutritional status. Therefore, this study it carried out nutritional status of girls residing in KGBV.

Nutrition plays a vital role as inadequate nutrition during any stage of life may lead to malnutrition, growth retardation, reduced work capacity, poor mental and social Development. Adolescence is a period of transition between childhood and Adulthood. In this age, they gain 20% to 25% of their height and up to 50% of their ideal weight therefore, to support this rapid growth their is need to increase requirement demand of energy, protein, mineral and other nutrients.

UNICEF reported that over 80% of adolescent suffer from 'Hidden Hunger' like the deficiency of one or more micronutrient, such as, Iron, Zinc, Vitamin A, Vitamin D and Prevalence of malnutrition specially among the adolescent girls is a major public Health problem in India. The CNNS Report (2016-18) show that 22.9%, 27.8% and 5.3% are thin, short and overweight respectively at national leveland this varies across states.Prevalence of malnutrition in Uttar Pradesh 22.3%, 28.9% and 3.3% are thin, short and overweight respectively between 10-14 years age group.

Materials and Methods :

Study area : The present study was conducted on Kasturba Gandhi BalikaVidyalaya of chandauli district.

Study design and sample size :A community based cross-sectional study with 277 girls belong to 11-17 years age group are selected for this study. The data collected from July 2019 to February 2020. The sample size determine on the basis of yamane's formula, which is given below-

$$n = \frac{N}{1+N\,(e)^2}$$

where, - n = Sample size

N = Population size

e = Permissible error

Nutritional assessment of the students-

Nutritional status assessed by the help of anthropometric measurement in which include weight, height and BMI.

Body Mass Index (BMI) : Body mass index is a calculator for the measure of body fats based on an Individual's height and weight. BMI is calculatedusing the formula –

$$BMI = \frac{Weight\ (in\ Kilogram)}{Height\ (in\ meter)2}$$

Statistical Analysis : Data were entered in an excel sheet and mean, SD and percentage was calculated from SPSS version 16.0 by using suitable tools and techniques.

Results and discussion

Table no. 1. Socio-Demographic profile of the respondents (n=277)

Demographic characteristics	No.	Percentage (%)
Class of study		
6th	67	24.2
7th	99	35.7
8th	111	40.1
Religion		
Hindu	241	87.0
Muslim	36	13.0
Caste-group		
General	10	3.6
OBC	112	40.4
SC/ST	155	56.0
Family type		

Joint	115	41.5
Nuclear	162	58.5
Family Size		
1-5	64	23.1
6-10	168	60.6
>10	45	16.2
Socio-economic status		
Upper lower	06	2.2
Lower	271	97.8

The above table shows that majority 40.1% respondents were selected from 8th class followed by 35.7% from 7th class while about one fourth (24.2%) respondents were 6th class. out of total respondents more than three fourth (87.0%) were from Hindu families and remaining 13.0% were from Muslim families and more than half (56.0%) respondents belong to SC/ST families followed by 40.4% were OBC while remaining only 3.6% belong to General category family who were under below poverty line.

It is also revealed that majority of the respondents (58.5%) belong to nuclear type of family and remaining 41.5% to joint family and 60.6% of respondents had their family size in the range of 6-10 members in the family whereas 23.1% and 16.2% respondents had their family size in given range of 1-5 and more than 10 family members respectively.

It shows that out of total respondents maximum 97.8% respondents family belong to lower socio-economic status while remaining only 2.2% of respondents were in upper lower socio-economic status.

Table No. -2. Age wise Distribution of Respondents According to their weight, height & BMI

Level of Weight	Age							
	11-12		13-14		> 15		Total	
	No.	%	No.	%	No.	%	No.	%
21-30	44	44.0	22	13.7	0	0.0	66	23.8
31-40	51	51.0	107	66.5	7	43.8	165	59.6
41-50	5	5.0	32	19.8	9	56.2	46	16.6
Total	100	100.0	161	100.00	16	100.00	277	100.00
Mean ± SD	31.88 ± 4.66		37.29 ± 4.90		41.38 ± 4.70		35.57 ± 5.61	

f = 51.56, P < 0.001, Sig. Pairs = (1 Vs2, 3) , (2Vs3)

Level of Height								
121-135	22	22.0	21	13.0	1	6.2	44	15.9
136-150	71	71.0	108	67.1	13	81.3	192	69.3
151-165	7	7.0	32	19.9	02	12.5	41	14.8
Mean ± SD	140.02 ± 6.34		143.73 ± 7.51		145.88 ± 6.76		142.51 ± 7.30	

f = 10.45, P < 0.001, Sig. Pairs = (1Vs2,3), (2vs 3)

Level of BMI								
Under weight	17	17.0	12	7.5	1	6.2	30	10.8
Normal	80	80.0	140	87.0	13	81.3	233	84.1
Over Weight	03	3.0	9	5.5	02	12.5	14	5.1
Mean ± SD	16.25 ± 2.08		18.11 ± 2.45		19.52 ± 2.55		17.52 ± 2.53	

f = 25.84, P < 0.001, Sig. Pairs = (1Vs2,3), (2vs 3)

The weight, height and BMI of the respondents is categorized into three major groups and analysis is presented in the above table according to their age groups. It elaborates that more than half of the respondents (59.6%) were found to have weight between (31-40kg) among which the proportion of respondents were more to 13-14years (66.5%). The average weight of the respondents was found to be minimum 31.88kg in age group 11-12 years and maximum 41.38kg in the age group 15years and more than 15 years. The average weight is found to be in increasing order with increase of the respondents age and this increasing pattern is often to be statistically highly significance.

Out of total respondents in 69.3%the height was observed in the range of 136-150cm while among 15.9% and14.8% of respondents the height was observed to be 121-135cm and 151-165cm respectively the average height of the respondents in age group 11-12years,13-14years,and 15 &more than15 years were calculated to be 140.02cm, 143.73cm, and 145.88cm respectively. The analysis of variance test signifies the fact that there is significant increase in average height of the respondents with their age status.

The BMI index is also categorized into three major group and analyzed result explain that majority 84.1% of respondents had normal BMI whereas 10.8% were underweight and remaining only 5.1% were falling in over weight BMI category. The average BMI of respondent is found to be in increasing order with increase of their age group.

Table No.-3. Mean Intake of Calories, Protein, Fat &carbohydrate by the Respondents with reference to their level of BMI

BMI	No	Nutrients							
		Calorie(gm)		Protein(gm)		Fat(gm)		Carbohydrate(gm)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Under weight	30	1764.30	304.58	44.86	6.51	30.09	7.05	321.67	71.45
Normal	233	1854.00	320.81	43.27	6.35	30.47	7.06	344.78	76.60
Over Weight	14	1930.80	288.06	47.08	5.33	33.77	7.47	359.24	74.03
Total	**277**	**1848.10**	**318.29**	**43.64**	**6.37**	**30.59**	**7.09**	**343.01**	**76.11**
F		1.56		3.04		1.52		1.57	
P		> 0.05		< 0.05		> 0.05		> 0.05	

Sig Pairs – (2Vs 3)

The mean intake of various study nutrients is also classified according to the BMI status of the students and presented in table no. 2 The above table elucidates that the mean intake of calorie(1930.80),protein (47.08), fat (33.77) and Carbohydrate (359.24) was found to be greater among

overweight students in comparison to the underweight and normal students but the variation is not statistically significant with the exception of protein intake in which significant difference is observed.

Table No. : 4

Mean Intake of Calcium, Phosphorus, Iron& Vitamin C by the Respondents with reference to their level of BMI

BMI	No	Nutrients							
		Calcium(mg)		Phosphorous (mg)		Iron(mg)		Vitamin C (mg)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Under weight	30	438.47	156.70	903.06	184.44	15.06	3.21	35.71	19.79
Normal	233	432.07	109.44	881.57	162.15	15.01	4.32	39.13	19.55
Over weight	14	410.65	88.98	937.10	112.29	13.46	2.98	45.14	17.07
Total	**277**	**431.68**	**114.22**	**886.71**	**162.63**	**14.94**	**4.16**	**39.06**	**19.48**
F		0.29		0.94		0.93		1.13	
P		> 0.05		> 0.05		> 0.05		> 0.05	

The above table portrays that the mean intake of calcium and iron is found to be decreasing order with increase of BMI status in the range of minimum 410.65 and 13.46 among overweight students and maximum 438.47 and 15.06 among underweight students respectively but this different is not significant. It is also seen that there is no significant difference in mean consumption of phosphorous and vitamin C among student of the different BMI status.

Table No. : 5

Association of Average Percent Consumption of Calorie, Protein, Fat &carbohydrate to RDA with respondents BMI status

BMI	No	NAR of Nutrients (%)							
		Calorie (gm)		Protein (gm)		Fat (gm)		Carbohydrate (gm)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Under weight	30	83.05	17.88	101.21	22.77	81.28	19.41	101.21	27.09
Normal	233	83.87	15.66	91.58	18.37	79.92	18.64	104.05	24.51
Over weight	14	85.50	12.43	95.92	13.51	87.23	21.37	105.93	20.57

Total	**277**	**83.87**	**15.72**	**92.84**	**18.87**	**80.44**	**18.86**	**103.84**	**24.55**
F		0.12		3.74		1.03		0.23	
P		>0.05		<0.05		> 0.05		> 0.05	
Sig. Pairs		-		(1Vs 2)		-		-	

The Association of mean percent consumption of calorie, protein and Carbohydrate with respect to RDA with respondents BMI status is presented in the above table which elaborates that increasing trend of observed in mean percent intake of calorie and Carbohydrate with increase of BMI status in the range of minimum 83.05% and 101.21% among underweight respondents to maximum 85.50% and 105.93% among overweight. Similarly, the mean percent consumption of protein is found to be maximum 101.21% among underweight respondents and the mean percent consumption of fat was maximum 87.23% among overweight respondents. The statistical F-test indicates towards the fact that no significant difference exists in mean percent consumption of different study nutrients among different BMI status respondents with the exception of protein nutrients.

Table No. : 6

Association of Average Percent Consumption of Calcium, Phosphorus, Iron& Vitamin C to RDA with respondent's BMI Status

BMI	**No**	**NAR of Nutrients (%)**							
		Calcium (mg)		**Phosphorus (mg)**		**Iron (mg)**		**Vitamin C (mg)**	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Under weight	30	54.81	19.59	112.88	23.05	55.78	11.88	89.27	49.48
Normal	233	54.01	13.68	110.20	20.27	55.62	15.99	97.82	48.88
Over weight	14	51.33	11.12	117.14	14.04	49.85	11.05	112.84	42.69
Total	**277**	**53.96**	**14.28**	**110.84**	**20.33**	**55.34**	**15.40**	**94.65**	**48.70**
F		0.29		0.94		0.95		1.13	
P		> 0.05		> 0.05		> 0.05		> 0.05	

It is highlighted in the above table that the mean percent consumption of vitamin C is seen to be in increasing order with increase of respondents BMI status which vary from minimum 89.27% among underweight to maximum 112.84% among overweight. A just opposite trend is observed in mean percent consumption of calcium and iron that is maximum 54.81%and54.78% among underweight and minimum 51.33% and 49.85%respectively among overweight respondents but statistically, this increasing or decreasing pattern is not significant.

Conclusion : The present study observed that the average BMI is found to be significantly in increasing order with increase of their age status and class of study majority 84.1% of girls had normal BMI while only 10.8% were underweight and 5.1% were overweight. It is also found that the girls were consuming Iron and Calcium less than respective RDA because respondents were consumed mainly cereals and legume which is well documented to contain low contents in key nutrients such as Iron, Calcium and Zinc. The result clearly show that the good nutritional status of the study subject in this type school in study area.

Acknowledgment: I would specially like to thank the district education officer of Chandauli and warden of all the schools for providing permission and moral help during the data collection for study.

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