ASSESSMENT OF NUTRITIONAL STATUS BY MID-UPPER-ARM-CIRCUMFERENCE (MUAC) AMONG THE UNIVERSITY FEMALE BOARDERS OF MIDNAPORE TOWN, WEST BENGAL

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ABSTRACT

A cross sectional study has been conducted among 270 university female boarders of Vidyasagar University, Paschim Medinipur district, West Bengal. All of the participants belong to 20-26 years of age. The objective of the study is to find out the nutritional status of female boarders of Vidyasagar University and the facors influencing the nutritional status of the participants. Body Mass Index (BMI), Waist Circumference (WC), Waist Hip Ratio (WHR), Mid Upper Arm Circumference (MUAC) and Waist Height Ratio (WHTR) have been used to evaluate nutritional status of the participants. Central obesity is found more among the participants according to WC (5.6%), WHR (8.9%) and WHTR (13%). In this study, MUAC shows significant association with occupation and educational status of father of the participants. No other associated factor has been found to influence the nutritional status of the participants.

KEYWORDS

Nutritional status, University students, Female students, Boarders, MUAC

1. INTRODUCTION

Nutritional status assessment is very important to understand the standard of living of any individual in any population. Nutritional status is influenced by food consumption [3][14][19]. In the era of globalization, the changes in the socio economical factor also influence the nutritional status of individuals. This results in an increase in illnesses either by overnutrition or undernutrition [3]. Globally it seems to be a serious health risk among the 20–39 years old population [21]. Proper nutrition, adequate sleep, and physical activity help to increase immunity power, combat disease, develop physical and mental growth, and increased productivity [3][12]. World Health Organization (WHO) report said that, globally the frequency of underweight adults are 462 million while overweight or obese are 1.9 billion. In India, the prevalence of being underweight declined between 2006-2016, from 36% to 23% among women and 34% to 23% in the case of men. According to WHO, the overall prevalence of underweight, overweight and obesity in male university students were 14.2%, 11.5%, and 2.5%, respectively, in female university students were 27.5%, 2.4%, and 0.3%, respectively. In the context of globalization and industrialization, both developing and developed countries have faced the problem of malnutrition. The mushrooming of shopping malls, fast food outlets, different social and cultural pressure, peer group influences, availability of oily food in university campuses, and adequacy of funds have compelled young adults to adopt unhealthy food habits [7][17][2][10][6]. University students, usually within the age group of 17-25 years, cover a large number of populations [1]WHO 2002,. Living away from home influences the nutritional status which leads to under and over-nutrition [17][6]. Most university students did not consume recommended macronutrients/micronutrients [22][7][15][4][19][20]. A report has shown that the underweight prevalence of university students is increasing day by day, especially in females .Female

university students are more akin to losing weight than male students [9]. A women's nutritional status is very important for her child's good health [12]. A small mother will have small babies who will grow to become small mothers. There is an association between maternal and child nutrition[23][8][11]. In developing country like India women faces serious health concern related to physical growth and nutritional status which starts at an early age[12][5]. Anthropometry is affordable and easily accessible technique for evaluating nutritional status of different populations [18]. Hence, I have used different anthropometric measurements to acess the nutritional status of the university female students who used to live in the hostels affiliated with Vidyasagar University.

2. OBJECTIVE

(a) To assess the nutritional status of the female boarders of Vidyasagar University.
(b) To find the factors affecting the nutritional status of female boarders of Vidyasagar University.

3. MATERIALS AND METHOD

A cross-sectional study was conducted in the two affiliated girls' hostels of Vidyasagar University, Midnapore, West Bengal named Pritilata Chhatrinibas and Matangini Chhatrinibas among female students. Among 300 female students, only 270 students have been chosen to conduct the study based on their willingness to participate as a subject. They are pursuing postgraduate courses under Vidyasagar University and of 20-26 years of age. Purposive sampling was used to select the participants of the study. A pre-structured schedule was made to collect data. A quantitative technique was applied here. Anthropometric measurements were obtained by using Martins Anthropometer, a weighing machine, and a calibrated cloth tape. Socioeconomic variables and anthropometric variables are taken for the study. They are as follows,

Socio-economic variable: Socio-economic variables are family type, education of father, education of mother, Occupation of father, occupation of mother, family income,

Anthropometric variable: The anthropometric variables which have been used in this study are as follows, height (cm), weight (kg), Mid Upper Arm Circumference (mm), Waist Circumference (mm), Hip Circumference (mm).

The derived variables which I have found are Body Mass Index (BMI), Waist Hip ratio (WHR) and Weight Height Ratio (WTHR) accordingly.

SPSS (IBM Statistical Package for the Social Sciences, version18) software has been used for statistical analysis. To find the associated factors which influence the nutritional status of the study participants, a chi-square test has been performed.

4. RESULTS

Table 1- Anthropometric characters of the study participants

Anthropometric variable	**Mean**	**SD**	**Prevelence of BMI**		
Height	154.10	5.16	**Category**	**n**	**%**
Weight	49.44	4.50	CED grade III	12	4.4
MUAC	24.18	2.39	CED grade II	8	3.0
WC	30.0	1.89	CED grade I	38	14.1
HC	69.47	7.33	Normal	188	69.6
			Overweight	21	7.8
Derived Variable	**Mean**	**SD**	Obese	3	1.1
BMI	20.81	3.12	**Prevelence of MUAC**		
WHR	0.77	0.05	Undernutrition	62	23.0
WHTR	1.13	0.07	Normal	208	77.0
			Prevelence of WHR		
Prevelence of WHTR	**n**	**%**	Normal	246	91.10
Normal	235	87.0	Central obese	24	8.9
Central obese	35	13.0	**Prevelence of WC**		
			Normal	255	94.4
			obese	15	5.6

Table 1 shows that the mean and standard deviation of the anthropometric variables viz. height, weight, MUAC, WC, and HC are 154.10 ±5.16, 49.44 ±4.50, 24.18 ±2.39, 30.0 ±1.89, 69.47 ±7.33 respectively. The derived variables are Body Mass Index(BMI), Waist Hip Ratio(WHR), and Waist Height Ratio(WHTR). The mean and standard deviation of the BMI, WHR, and WHTR are 20.81± 3.12, 0.77 ±0.05 and 1.13± 0.07 respectively.

The BMI is an attempt to quantify the amount of tissue mass (muscle, fat, and bone) in an individual, and then categorize that person as Chronic Energy Deficiency *(CED)*, normal weight, overweight, or obese based on that value. According to the table, the prevalence of nutritional status based on BMI according to WHO (1995) it is revealed that among 270 individuals, 12 females (4.4%) are under CED III, 8 females (3%) are under CED II, 38 females (14.1%) are under CED I. while 188 females (69.6%)are normal, 21 females (7.8%) are overweight and 3 females (1.1%) are obese. Hence, 58 females (CED grade III+CED grade II+CED grade I) have BMI less than 18.5, 188 females are normal and lie in between the BMI range 18.5-24.9 and the rest 24 have BMI more than 25.

Waist Circumference (WC) is another measurement of central obesity. According to the table, the prevalence of nutritional status based on WC shows that among 270 individuals, 255 individuals (94.4) are normal and 15 individuals (5.6%) are centrally obese. Waist hip Ratio (WHR) is the measure to calculate central obesity. Table 5 reveals that among 270 individuals, 246 individuals (91.1%) are normal and 24 individuals (8.9%) are centrally obese. Waist height ratio (WHTR) is another measurement of central obesity. This table shows that among 270 individuals, 235 (87%) individuals are normal and 35 (13%) are centrally obese. MUAC has been used to detect short-term changes in the nutritional status of a population. It is revealed that among 270 individuals(females) 208 individuals (77%) are normal and 62 individuals (23%) are in the undernutrition category.

Table 2: Socio demographic and economic profile

Education (%)	**Father**	**Mother**	**Father occupation**	**%**	**Mother occupation**	**%**
Non-literate	10	18.5	Agricultural labour	37.8	Housewife	85.6
Primary	30.4	34.1	Daily labour	8.5	Dialy labour	4.4
Secondary	34.1	28.1	Business	35.2	Service	8.1
HS	11.9	11.5	Service	15.6	Non manual labour	0.4
Graduate and more	10.4	5.6	**Income category**			
Family type	**%**		**Income group**	**Income range**	**n**	**%**
Nuclear	69.3		Lower middle	1036-4045	5	1.8
Joint	11.1		Upper middle	4046-12535	122	45.2
Extended	19.6		high	>12535	143	53.0

Table 2 illustrates the socio-demographic profile and economic profile. Three types of families are found here. These are the nuclear family, joint family, and extended family. Observance of Nuclear family is found to be more (69.3%) than joint (11.1%) and extended (19.6%) family.
Father's and mother's education has been categorised into five divisions. They are Non-literate/can sign (10%, 18.5%), primary (30.4%, 34.1%), secondary (34.1%, 28.1%), higher secondary (11.9%, 11.5%), and Graduate (10.4%, 5.6%) respectively. It is seen that the prevalence of literacy among mothers is more than that of the father. Primary education among mothers is more than that of the father.

The monthly income of the participants has been categorized according to World Bank classification which shows that total family income less than 1036 rs per month belongs to the low-income category. The lower middle-class category range is from 1036 -4045 rs and the upper-middle-class category range is from 4046-12535. Monthly family Income more than 12535 rs belongs to high-income category.

The table shows that, majority of the families belong to agriculture-oriented economy. They are agriculture (37.8%), daily labor (8.5%), business (35.2%), and service (15.6) respectively. Also, the major frequency is observed among the housewife category (85.6%). Then Labour (4.4%), service (8.1%), and non-manual labor (0.4%) are the remaining three categories of mother occupation.

Table 3: Association between father's education category and MUAC				**Table 4: Association between father's occupation category and MUAC**			
Association between Father education category and MUAC category				**Association between Father occupation category and MUAC category**			
Father education	**Under nutrition**	**Normal**		**Father occupation**	**Under nutrition**	**Normal**	
Non-literate	12 (44.4%)	15 (55.6%)		Agriculture	27 (26.5%)	75 (73.5%)	
Primary	21 (25.6%)	61 (74.4%)	χ^2 = **10.024 ;df=4 ; p=0.040**	Manual labour	11 (47.8%)	12 (52.2%)	χ^2 = **17.833; df=3 ; p=0.000**
Secondary	15 (16.3%)	77 (83.7%)		Business	10 (10.5%)	85 (89.5%)	
HS	6 (18.8%)	26 (81.3%)		Service	12 (28.6%)	30 (71.4%)	
Graduate and more	6 (21.4%)	22 (78.6)					

The table 3 shows that, 44.4% participants fall under nutritional category whose fathers are non-literate followed by primary education category which shows 25.6% individuals are in undernutrition category. Hence, an association has been found between father education category and MUAC category. Father education category and MUAC category are significantly associated (χ^2 = 10.024 ;df=4 ; p=0.040). The table 4 shows that, 47.8% indivials are in undernutritional category according to MUAC whose fathers are used to do manual labour jobs and 89.5% participants are normal whose father are businessman. Hence, an association has been found between father occupation category and MUAC category. Father occupation category and MUAC category is significantly associated (χ^2 = 17.833; df=3 ; p=0.000).

5. DISCUSSION

I have found that, the mean height and weight of the participants are 154.10 cm and 49.44 kg respectively. Rasoul stated that, mean height is 154.43 cm and 48.9 kg for girlssimilar to my study [17]. In my study, I have found that, 12 females (4.4%) are under CED III, 8 females (3%) are under CED II, 38 females (14.1%) are under CED I. while 188 females (69.6%)are normal, 21 females (7.8%) are overweight and 3 females (1.1%) are obese .Another study showed that, prevalence of overweight and obesity is 17.35% and 14.33% which is high than my study [12]. In my study, The prevalence of central obeseity is among 15 individuals (5.6%) according to WC category,24 individuals (8.9%) according to WHR category and 35 (13%) according to WHTR category. Another scholars used MUAC as best indicator to detect short term changes in the case of nutritional status. It is revealed that among 270 individuals(females) 208 individuals (77%) are normal and 62 individuals (23%) are in the undernutrition category. Another study showed that, the prevalence of undernutrition is 21.9% which is less than my study [17]. In this study, MUAC shows significant association with occupation and educational status of father of the participants. But in another study the scholars had found that only father occupation is significantly associated with obesity and overweight [6].

6. CONCLUSION

This paper has tried find out the nutritional status of the female boarders of Vidyasagar University by evaluating nutritional status through BMI, HC, WC, WHR, WHTR and MUAC. Which fulfils the first objective of the study. Also socio demograpgic and economic distributuion been shown which suggests that, MUAC strongest association with father education and father occupation. Hence, among all the associated factors, only father education and father occupation can influence the nutritional status of the study participants. It can be concluded that, MUAC is the best indicator to evaluate nutritional status of the study participants. The prevalence of overweight and obesity according to BMI category and undernutriton according to MUAC category have been found high if compared to another studies. Hence, I will suggest that, Proper intervention is needed in the hostels. Also nutritional awareness is necessary among the participants for the good health and better quality of life of the individuals.

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