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Assessment of Nutritional Status among Young Adults in Varanasi, India

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Abstract

Malnutrition is one of the most important principal public health issues during all stages of life in the world that threats the progress and achievement of a variety of global health targets [1,2]. According to WHO report (2016) in India among young adults above 18 years old 23.6% are underweight 19.7% are overweight [3] .A cross-sectional study was undertaken to determine anthropometric profile and nutritional status based on body mass index (BMI) of young adults. Anthropometric profile including height, weight, BMI as well as waist and hip circumferences and waist-hip ratio (WHR) were measured. In the present study on the basis of WHO (2008) BMI classification for adults, it was found that 16.45% of males and 17.71% of females were underweight while 10.22% and 18.86% of males and females respectively were overweight. On the account of waist-hip ratio (WHR), majority of female respondents (38.86%) were at high health risk whereas higher proportion of males (71.11%) were at low health risk. Cereals, legumes and pulses, root and tubers, cooking oil and fats are the most common food groups used by the respondents in a daily routine while only 25.8 % and 26.2% of total participants daily consumed green leafy vegetables and fruit respectively. Nutrient intake including protein, fat, carbohydrate, fibre and energy were more among males as compared to females.

***Key words**: Young adults, Underweight, Overweight, BMI, WHR*

1. Introduction

Malnutrition including underweight and overweight both are contributing factors in negative health consequences [4-7]. There are some evidences that overweight is replacing underweight as the leading type of unhealthy weight in low-resource settings in the world [8,9]. Focusing on nutrition and health of adults is particularly important because of their responsibility for the economic and social support among the rest of the society. Nutritional status of adults can be assessed by use of anthropometric measurements. The nutritional status of a person could be either good or poor. Good nutritional status refers to the intake of a balanced diet that supplies all the essential nutrients to meet the body's requirements to help achieving good health. Poor nutritional status deals with an inadequate (undernutrition) or excessive intake (overnutrition) or even poor utilization of the nutrients to meet the requirement of the body that can be can be prevented or treated through consuming a healthy and balanced diet throughout the life course [10].

Unhealthy diets and poor nutrition are among the top risk factors for these diseases globally. Dietary adjustments may not only influence present health, but may determine the development of Non-Communicable Diseases (NCDs) such as cancer, cardiovascular disease, respiratory diseases and type 2 diabetes later in life. The aim for assessment of nutritional status among young adults in this study was to determine the prevalence of malnutrition, evaluate the anthropometric measurements and assessing the food consumption pattern and nutrient intake by the respondents to discover the facts and guiding the subjects to improve their nutrition knowledge, nutritional and health status. The main aim of the study was to determine their anthropometric characteristics and nutritional status through the assessment of Body Mass Index (BMI) and Waist-Hip ratio.

2. Materials and Methods

2.1 Subject Selection

The study was carried out on young adults both males and females free from any physical and

mental problems aged 18 to 30 years and was purposively selected from different departments and hostels in Banaras Hindu University Campus, Varanasi.

2.2 Body Mass Index (BMI)

Body Mass Index is a reliable indicator for the assessment of body fatness based on an individual's weight and height. Weight and height were collected through standard techniques. BMI is defined as individual's body weight divided by the square of the height. Height and weight measurements were recorded through standard techniques and categorization of respondent was done on the basis of BMI for adults in the present study (WHO, 2008) [11].

Body Mass Index (Kg/m^2)	Classification
< 18.50	Underweight
18.5 – 24.9	Normal weight
25.0 – 29.9	Overweight
30.0 – 34.9	Obese grade I
35.0 – 39.9	Obese grade II
>40.0	Obese grade III

2.3 Measurement of WHR

Waist–hip ratio (WHR) is the dimensionless ratio of the circumference of the waist to that of the hips. This is calculated as waist measurement divided by hip measurement ($W \div H$). The WHR is used as a measurement of obesity which in turn is a possible indicator of other more serious health conditions. The waist and hip measurements have been done through standard techniques (Jelliffee1968). The classification of WHO Expert Consultation, 2008 were used in the present study as given below:

WHR for male	**WHR for female**	**Level of health risk**
<0.90	<0.80	Low risk
0.90 – 1.0	0.80 – 0.85	Moderate risk
>1.0	>0.85	High risk

2.4 Assessment of food consumption pattern

The frequency consumption pattern of different food products over a specified period of time was recorded through standard food frequency questionnaire.

2.5 Assessment of nutrient intake

Dietary nutrient variables were obtained from the participants based on values from diet diary for 24 hours. Subjects were trained about recording the data through demonstrating the use of standard cups, tumblers and spoons for serving food and drinks. The nutrients intake i.e. protein, fat, carbohydrate, total fibre and energy intake consumed by the respondents were calculated through this method.

2.6 Statistical Analysis

Results are presented as percentage and mean ± SD. Data analysis has been processed through SPSS

version 16.0 by using suitable statistical tools and techniques.

3. Results and Discussion

The population included for the study comprised of males and females from Banaras Hindu University Campus in Varanasi where they were studying. Table 1 represents the distribution of respondents into age groups. It can be perused from the table that a larger proportion of the participants among both males and females were in the age group of 18 to 21 followed by 22 to 25.

Body Mass Index (BMI) classification including underweight, normal and overweight among the respondents is shown in table 2. It can be observed from the table that the majority of total respondents among both males and females were in normal BMI group. Higher percentage of females (18.86%) were overweight, while underweight respondents (16.45%) were more among males. It is evident from the table that larger proportion of female respondents were overweight as compared to male respondents. Waist-Hip Ratio (WHR) levels of health risk including low, moderate and high are presented in table 3. According to the table majority of the male respondents (71.11%) were at low health risk whereas higher proportion of females are at high health risk on the basis of their WHR. It is also indicated that mean value of WHR among females (1.37 ± 7.19) is higher than males (0.86 ± 0.06).

Distribution of food consumption pattern among the respondents can be observed from table 4. This table shows that cereals, legumes and pulses, root and tubers, cooking oil and fats are the most common food groups used by the respondents in a daily routine while only 25.8 % and 26.2% of total participants daily consumed green leafy vegetables and fruit respectively. The data regarding nutrient intake in table 5 revealed that mean value of all nutrient intake were higher among males as compared to females. The mean ± SD nutrient intake including protein, fat, carbohydrate, fibre and energy in total respondents were 56.95 ± 23.93), 47.22 ± 24.83, 278.28 ± 107.11, 37.05 ± 25.03 and 1704 ± 56.02 respectively.

4. Conclusion

This study has been concluded that prevalence of malnutrition including undernutrition and over nutrition was higher among female respondents. The mean waist-hip ratio (WHR) was 1.37 ± 7.19 and 0.86 ± 0.06 in males and females respectively. Majority of male respondents (71.11%) were at low health risk whereas most of the females (38.86%) were at high health risk on the basis of their waist-hip ratio. Cereals, legumes and pulses, root and tubers, cooking oil and fats are the most common food groups used by all the respondents in a daily routine whereas only 25.8 % and 26.2% of the participants daily consumed green leafy vegetables and fruit respectively. It was observed that nutrient intake including protein, fat, carbohydrate, fibre and energy were higher among males as compared to females. This study may provide baseline data for further studies on young adults in India and help to plan for management and improvement of their nutritional and health status.

5. Acknowledgement

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Table legend-

Table 1: Distribution of respondents according to age group

Table 2: Distribution of respondents according to BMI

Table 3: Distribution of participants on the basis of WHR

Table 4: Distribution of respondents on the basis of food consumption pattern

Table 5: Distribution of participants according to nutrient intake

Table 1: Distribution of respondents according to age group

Age groups (Years)	Males		Females		Total	
	No.	%	No.	%	No.	%
18-21	110	27.50	88	22.00	198	49.50
22-25	100	25.00	67	16.75	167	41.75
26-30	15	3.75	20	5.00	35	8.75
Total	225	56.25	175	43.75	400	100

Table 2: Distribution of respondents according to BMI

*BMI classification	Male (n=225)		Female (n=175)		Total (n=400)		Mean ± SD
	No.	%	No.	%	No.	%	
Underweight (<18.5)	37	16.45	31	17.71	68	17.00	17.57 ± 0.82
Normal (18.5-24.9)	165	73.33	111	63.43	276	69.50	21.53 ± 1.70

***Note: classification is based on WHO, 2008

Overweight & Obese(>25)	23	10.22	33	18.86	56	13.50	27.15 ± 2.26

Table 3: Distribution of participants on the basis of WHR

*WHR level of health risk	Male		Female		Total	
	No.	%	No.	%	No.	%
Low risk	160	71.11	51	29.14	211	52.75
Moderate risk	63	28.00	56	32.00	119	29.75
High risk	2	0.89	68	38.86	70	17.50
Waist-Hip Ratio (WHR)	Mean ± SD					
	0.86 ± 0.06		1.37 ± 7.19		1.08 ± 4.75	

*Note: Classification is based on WHO Expert Consultation, 2008

Table 4: Distribution of respondents on the basis of food consumption pattern

Food groups	Food Consumption Pattern											
	Daily		Alternatively		Weekly		Monthly		Occasionally		Never	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Cereals	340	85.0	36	9.00	12	3.00	-	-	11	2.8	1	2.0
Legumes & pulses	304	76.0	52	13.0	29	7.2	3	8.0	9	2.2	3	0.8
Roots & tubers	305	76.2	50	12.5	23	5.8	5	1.2	12	3.0	5	1.2
Green leafy vegetables	103	25.8	122	30.5	107	26.8	16	4.0	41	10.2	11	2.8
Other vegetables	168	42.0	146	36.5	61	15.2	5	1.2	16	4.0	4	1.0
Fruits	105	26.2	133	33.2	103	25.8	14	3.5	42	10.5	3	8.0
Milk & milk products	193	48.2	84	21.0	67	16.8	12	3.0	34	8.5	10	2.5
Fleshy foods	12	3.0	64	16.0	88	22.0	34	8.5	46	11.5	156	39.0
Sugars	225	56.2	59	14.8	32	8.0	19	4.8	47	11.8	18	4.5
Cooking oil & fats	320	80.0	42	10.5	16	4.0	6	1.5	14	3.5	2	0.5
Nuts & oil seeds	70	17.5	49	12.2	88	22.0	39	9.8	125	31.2	29	7.2
Miscellaneous	75	18.8	86	21.5	64	16.0	30	7.5	115	28.8	30	7.5
Non-alcoholic beverages	182	45.5	81	20.2	56	14.0	11	2.8	59	14.8	11	2.8
Alcoholic beverages	4	1.0	5	1.2	7	1.8	11	2.8	69	17.2	304	76.0
Nutrient supplements	33	8.2	10	2.5	10	2.5	17	4.2	60	15.0	270	67.5

Table 5: Distribution of participants according to nutrient intake

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Nutrients	Male	Female	Total
	Mean ± SD		
Protein (g)	64.85 ± 25.26	46.78 ± 17.52	56.95 ± 23.93
Fat (g)	48.56 ± 24.94	45.89 ± 24.73	47.22 ± 24.83
Carbohydrate (g)	304.90 ± 113.43	244.05 ± 87.47	278.281 ± 107.11
Fibre (g)	40.37 ± 24.47	32.77 ± 25.16	37.05 ± 25.03
Energy (Kcal)	1840 ± 625.09	1530 ± 556.65	1704 ± 65.02