

Assessment of Nutritional Status in Medicos Studying in a Medical College in Andhra PradeshSrvanathi. N¹, Revathi. A², Sreelatha. D³, Durga. T⁴, Shyam Prasad B.R.⁵¹Post Graduate Student, Department of Biochemistry, Government Medical College, Ananthapuramu, Andhra Pradesh^{2,3}Assistant Professor, Department of Biochemistry, Government Medical College, Ananthapuramu, Andhra Pradesh⁴Professor & HOD, Department of Biochemistry, Government Medical College, Ananthapuramu, Andhra Pradesh⁵Associate professor, Department of Biochemistry, Government Medical College, Ananthapuramu, Andhra Pradesh

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Abstract**Background:** According to the World Health Organization (WHO), obesity is one of the most common neglected public health problems in both developed and developing countries. Undernutrition due to poverty, dominated in the past is being rapidly replaced by obesity associated with affluence.**Aim:** To study the prevalence of undernutrition and overnutrition among young medicos.**Materials and Methods:** The study was done among young medicos who joined in I MBBS in Government Medical College, Ananthapuramu from all over India. A total of 150 students were included in the study. Out of them, 73 were females, 77 were males. Anthropometric measurements of Height and Weight of each student were taken. BMI was calculated. Subjects were categorized based on BMI, as Underweight, Normal, Overweight and Obese. Waist Hip Ratio was measured and calculated. Random blood sugar values were measured to assess the glycemic status. Hemoglobin levels were measured and assessed for the presence of anaemia.**Results:** Based on BMI, the overall prevalence of Malnutrition in the present study was 38.6 %, Under nourished was 16.6 %, and over nourished was 22 %. Based on WHR, prevalence of Obesity is more in females (47%) when compared to males (23.3%). The prevalence of Anaemia was more in males (44.2%) compared to females (41%). In this study, BMI was not significantly related with anaemia. In the present study, all 150 students RBS values were within the normal range.**Conclusion:** Overnutrition, incidence is increasing in all ages including adolescence. Hence nutritional evaluation should be done in all ages which will help in giving proper preventive measures like Lifestyle modification thereby prevention of various metabolic and cardiovascular diseases.**Keywords:** Height, Weight, Body Mass Index, Underweight, Overweight, Obese, Waist Hip Ratio, Anaemia.

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Introduction

Nutritional status is the current body status of a person or a population group related to their state of nourishment (the consumption and utilization of nutrients). The term Malnutrition refers to deficiencies, excess or imbalances in person's intake of energy or nutrients. It is categorized into three broad groups: 1. Undernutrition 2. Micronutrient related malnutrition (vitamin and mineral deficiencies) 3. Overnutrition which can lead to overweight, obesity and diet related noncommunicable diseases like Diabetes, Cardiovascular diseases etc. [1]

There are various methods to assess nutritional status of a person.

1) Anthropometric measurements like height, weight, Body Mass Index, Waist Circumference, Waist Hip Ratio etc.

2) Dietary Assessment which includes 24hr dietary recall method, food frequency questionnaires.

3) Biochemical assessment includes certain BMR measuring methods, Glycemic index, Protein efficiency evaluation methods, Lipid indexes, blood and urine tests like blood sugar values, Hemoglobin assessment, vitamin levels etc.

4) Physical assessment includes physical signs like appearance, skin condition, muscle wasting, pallor etc. [2]

In India, adolescents and young people account for nearly one quarter of the total population. Young adults between the age group of 18 to 25 years, are in a period of transition from adolescence to adulthood. This age group is the ideal age group for implementing nutritional or lifestyle modifications as part of primary prevention. Hence the lifestyle behaviors developed during adulthood will carry on throughout their life and influence their health status [3,4].

This age group face the double burden of Malnutrition which is Undernutrition and Overnutrition. The short-term complications of Undernutrition are poor performance at school or college, risk of frequent infections due to decreased immunity and deficiency disorders of nutrients. In the long-term Undernutrition is associated with poor general health [5,6]. On the other hand, Overnutrition in this age group contributes to development of non-communicable diseases like Diabetes mellitus, Cardiovascular diseases, Hypertension etc.

According to WHO - World health statistics report 2023, the prevalence of obesity in adults is 13.1% [7]. Globally the female to male ratio of age standardized prevalence of obesity was 1.4 in 2016, down from 1.6 in 2000 indicating a rapid increase in male obesity. In India the prevalence of obesity is 11.8 to 31.3% according to ICMR-INDIAB study 2015 [8]. In children and adolescents, the prevalence is 17%. India is currently experiencing rapid nutrition transition with an explosion in the prevalence of non-communicable diseases [9].

With this background, the present study has been undertaken to study and assess the nutritional status amongst the I Year medical students admitted in a Government Medical College under different quotas covering wide representation of population across the country and to find prevalence of malnutrition (Undernutrition & overnutrition) and various factors associated with them and to recommend various preventive measures to reduce the modifiable risk factors found.

Aim & Objectives: To study the nutritional status of Undernutrition, Overweight and Obesity in Medicos.

Ethics Committee Approval: The study was approved by Institutional Ethics Committee (IEC) with the reference number 4-9-23, dated 12/09/2023.

Materials and Methods:

Sample Size: A convenient sample of 150 was taken without taking into consideration the incidence and prevalence as there were no studies matching the study design.

Study Design and the Participants: A cross-sectional study was carried out in 150 students among them 73 were females and 77 were males admitted in Government medical college, Ananthapuramu, Andhra Pradesh during the academic year 2022.

Inclusion Criteria:

- 1) Age group 17 -22 years
- 2) Students willing to participate in the study
- 3) Students of first phase MBBS admitted in 2022 – 23 batch

Exclusion criteria:

- 1) Students not willing to volunteer
- 2) Other students of other phases

Study Period:

The study period was conducted from September 15th to October 15th 2023.

Methods:

After obtaining the oral informed consent from the study subjects, Anthropometric measurements of weight was measured to the nearest 0.1 kg using electronic weighing scale, and height was measured to the nearest 0.5 cm with measuring tape while the respondent stood still without shoes. Body mass index was calculated using Weight in Kg as numerator and (Height in meters)² as denominator and the subjects were divided into four categories based on their BMI according to the BMI cut-offs points as follows, underweight (BMI <18.5), normal (18.5–24.9), overweight (25–29.9), and obese class (BMI ≥30) [10]. Waist circumference (WC) was measured at the end of several consecutive natural breaths, at the level parallel to the floor, midpoint between the top of the iliac crest and the lower margin of the last palpable rib in midaxillary line. Hip circumference was measured at a level parallel to floor, at the largest circumference of the buttocks was calculated by dividing WC (in cm) by hip circumference (cm). WHR could be used as an alternative indicator for obesity. [11] The cut-offs points of WHR for Asians used are 0.95 in men and 0.80 in women [12] denote abdominal obesity.

Random blood sugar values were measured using Glucometer based on the principle of Glucose – oxidase peroxidase method. The diagnostic criteria for Diabetes mellitus as per ADA guidelines are Random blood sugar ≥ 200mg/dl along with the symptoms of Hyperglycemia [13].

Hemoglobin (Hb) levels were measured with Sahli's method. All subjects were assessed for presence of anaemia using WHO criteria. Anemia is defined as Hb levels <12g/dl in females, Hb levels <13g/dl in males as per WHO Criteria [14].

Data Management and Statistical Analysis: All the values were tabulated in excel data sheet and studied and analyzed as mean and standard deviation.

Results:

In this study, a total of 150 students were enrolled from first year MBBS students. Out of all

participants 73 (48.6%) were female and 77(51.3%) were male.

The Mean and Standard deviation of various parameters studied in the present study are given below in Table 1.

Table 1: Mean and Standard deviation of various parameters

	Mean \pm SD	Minimum	Maximum
Age (years)	19.26 \pm 0.97	17	22
Height (cm)	165.69 \pm 9.90	146	185
Weight (kg)	60.19 \pm 12.16	40	94
BMI	21.92 \pm 3.71	15.12	35.00
WHR	0.85 \pm 0.07	0.76	1.07
RBS (mg/dl)	105.29 \pm 9.38	81	127
Hb (g/dl)	13.05 \pm 1.38	10.20	16.10

The mean age of the study group in years was 19.26 \pm 0.97 with a minimum of 17 and maximum of 22 years. The mean and SD of height in centimetres was 165.69 \pm 9.90 with a minimum of 146 and a maximum of 185 cm. The mean and SD of weight in kilograms was 60.19 \pm 12.16 with a minimum of 40 and a maximum of 94 kg. The mean and SD of BMI was 21.92 \pm 3.17 with a minimum of 15.12 and a

maximum of 35.00. The mean and SD of WHR was 0.85 \pm 0.07 with a minimum of 0.76 and a maximum of 1.07. The mean and SD of RBS in milligram% was 105.29 \pm 9.38 with a minimum of 81 and a maximum of 127 mg/dl. The mean and SD of Hb in grams% was 13.05 \pm 1.38 with a minimum of 10.20 and a maximum of 16.10 g/dl.

Age:

Table 2: Gender wise Mean and SD of Age in years

	Mean \pm SD	Minimum	Maximum
Females	19.26 \pm 0.88	17	20
Males	20.00 \pm 0.99	17	22

The minimum and maximum age in females is 17 and 20 years. The minimum and maximum age in males in 17 and 22 years.

Height:

Table 3: Gender wise Mean and SD of Height in Cms.

	Mean \pm SD	Minimum	Maximum
Females	158.63 \pm 7.45	146	173
Males	172.38 \pm 6.75	151	185

The minimum and maximum height in females is 146 and 173cm. The minimum and maximum height in males in 151 and 185cm.

Weight:

Table 4: Gender wise Mean and SD of Weight in kg

	Mean \pm SD	Minimum	Maximum
Females	53.64 \pm 9.00	40	83
Males	60.40 \pm 11.52	45	94

The minimum and maximum weight in females is 40 and 83kg. The minimum and maximum weight in males in 45 and 94kg.

61.3 %were normal, 16.6% were undernourished, 14.7% were overweight and 7.3% were under obesity categories.

BMI: The prevalence of Malnutrition among 150 students is 38.6%. Of the total 150 subjects studied,

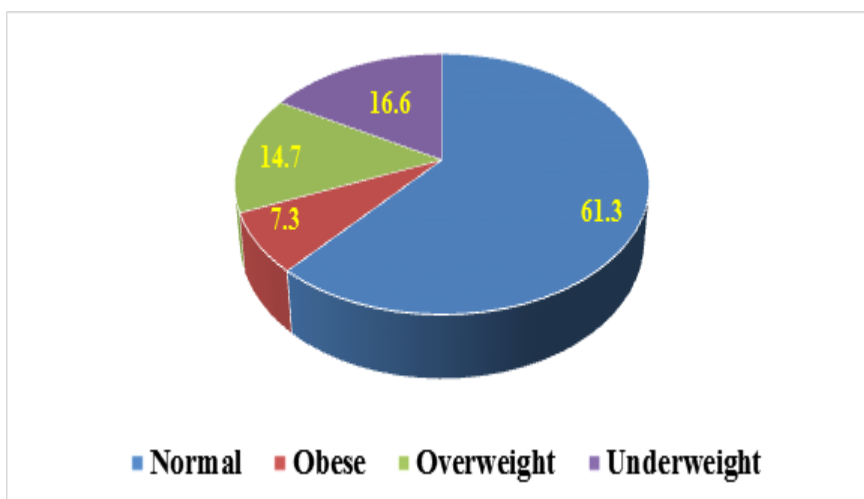


Figure 1: Pie chart showing Prevalence of Malnutrition according to BMI

Table 5: Gender wise Prevalence of Malnutrition according to BMI with number

Gender	Normal (92)	Underweight (25)	Overweight (22)	Obese (11)
Female (73)	48 (65.7%)	14 (19.2%)	7 (9.6%)	4 (5.5%)
Male (77)	44 (57.1%)	11 (14.3%)	15 (19.5%)	7 (9.1%)

In our study, the prevalence of Malnutrition in Females is 34.3%. Of the total 73 female subjects studied, 65.7 % were normal, 19.2% were undernourished, 9.6% were overweight and 5.5% were obese. The prevalence of Malnutrition in Males is 42.9%. Of the total 77 male subjects studied, 57.1 %were normal, 14.3% were undernourished, 19.5% were overweight and 9.1% were obese.

Table 6: Mean and SD of various parameters among females

	Underweight	Normal	Overweight	Obese
BMI	17.57 ± 0.88	21.09 ± 1.53	25.64 ± 0.73	30.42 ± 0.56
WHR	0.78 ± 0.01	0.79 ± 0.02	0.80 ± 0.02	1.00 ± 0.02
RBS	103.7 ± 7.31	103.4 ± 8.07	105.2 ± 11.79	106 ± 3.55
Hb	11.83 ± 0.82	12.1 ± 0.88	11.98 ± 0.98	12 ± 1.56

The above table shows Mean and SD of BMI, WHR, RBS, Hb in different BMI categories among female subjects.

Table 7: Mean and SD of various parameters among males

	Underweight	Normal	Overweight	Obese
BMI	17.31 ± 1.00	21.19 ± 1.47	25.83 ± 1.08	31.26 ± 2.04
WHR	1.00 ± 0.03	0.90 ± 0.04	0.92 ± 0.04	1.01 ± 0.05
RBS	112.18 ± 10.13	106.8 ± 11.01	105.33 ± 8.69	99.85 ± 5.11
Hb	14.10 ± 1.08	13.85 ± 1.09	14.26 ± 0.76	14.47 ± 0.62

The above table shows Mean and SD of BMI, WHR, RBS, Hb in different BMI categories among male subjects.

WHR:

Table 8: Gender wise Prevalence of Obesity based on WHR

	Normal	Obese
Total (150)	97 (64.6%)	53 (35.3%)
Female (73)	38(52.0%)	35(47%)
Male (77)	59(76.6%)	18(23.3%)

The above table shows the prevalence of obesity among the study subjects according to Waist Hip Ratio. In females it is 47% and in males it is 23.3%.

RBS:

Table 9: RBS in Females and Males

	UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESE
Females	103.7 ± 7.31	103.4 ± 8.07	105.2 ± 11.79	106 ± 3.55
Males	112.18 ± 10.13	106.8 ± 11.01	105.33 ± 8.69	99.85 ± 5.11

The above table shows the RBS values in both females and males in each category of BMI.

HB:

Table 10: Gender wise Prevalence of Anaemia

	Normal	Anaemia
Total (150)	86 (57.3%)	64 (42.7%)
Female (73)	43 (59%)	30 (41%)
Male (77)	43 (55.8%)	34 (44.2%)

The above table shows prevalence of Anaemia among the study subjects according to WHO guidelines. The total prevalence of Anaemia is 42.7%, in females it is 41%, in males it is 44.2%.

Discussion:

In the present study which was done among 150 students, females were 73 and males were 77. The Age group of the students taken was 17 years to 22years. In a study conducted by Y. Lakshmi et al [15], their participants were between age group of 18-20.

The Prevalence of Malnutrition Based on BMI in the present study was 38.6 % (Undernutrition is 16.6%, Overweight is 14.7%, Obesity is 7.3%). In a study conducted by Y. Lakshmi et al [15], similar findings were observed 20% were underweight, 59% were Normal, 10% were Overweight, and 11% were Obese. While in a study done by Tiwari R et al [16], they found the prevalence of underweight was 19% and for overweight it was 11.5%.

In the present study the prevalence of undernutrition (19.2%) in females is more compared to males (14.3%). In males the prevalence of overnutrition (28.6%) is more compared to females (15.1%). A study, looking across 22 low- and middle-income countries, was conducted among 15,746 undergraduate students from 22 universities with mean age of 20.8 years. This highlighted that overall 22% of young adults were obese, with men (24.7 %) more than women (19.3 %). [17] They also found the average age of these Overweight /obese men was younger (16–19) compared to women (22 years or more).

In the present study the prevalence of obesity based on Waist Hip Ratio is 35.3%, more in females (47%) when compared to males (23.3%) indicating that with advancing age the risk of developing Insulin resistance and its consequences are very high since WHR was suggested as better anthropometric measure for estimating the risk of Type 2 Diabetes mellitus. A study conducted by Torun B et al. Guatemala 2002 [18] in the age group of 19–29 years the prevalence of obesity based on WHR in females is 22%, in males it is 25%. A study among Indians found that the prevalence of abdominal obesity using WC were 46% in men and 64% in women and using WHR were about 12% in men and 68% in women (using the lowest cut-off points recommended for Asians). [19]

In the present study, BMI was higher in men compared to women with a trend of higher waist to hip (W:H) ratio among the females. A study conducted by Bhongir AV et al [20] India 2011 among 18–22-year-old Indian young adults (urban and rural), BMI was significantly higher in urban men and women than their rural counterparts with a trend of higher waist to hip (W: H) ratios amongst the urban young adults significant only in males.

In the present study Mean of Random Blood sugar levels is 105.29 ± 9.38 . Total 150 study students RBS values were within the normal range. So, the prevalence of Diabetes mellitus is 0% in both females and males. A study conducted by Gupta R et al. [21] in India 2009 among 15–19 years and 20–29 years age group, the prevalence of Diabetes mellitus (≥ 126 mg/dl) in 15–19 years age group in both females and males is 0% and in 20–29 years group females is 0%, in males it is 0.6 %.

The mean of haemoglobin in the present study was 13.05 ± 1.38 gm/dl. A study conducted by Mehta et al. [22] showed Mean Hb was 10.6 ± 1.2 gm/dl and Kotecha et al reported as 11.8 ± 1.4 g/dl. [23] The prevalence of anaemia in the present study is 42.7%, (females- 41 % & males- 44.2%). A study conducted by Oliver Didjun et al [24] showed the prevalence of anaemia in the age group of 15 -19 years in males is 29.3%, in females it is 53.9%, in the age group 20–24 years in males is 18.4%, in females it is 53.5%. In 2018, India launched a new large-scale initiative to tackle anaemia, called Anaemia Mukht Bharat [25]. Aiming to reach children, pregnant women, women of reproductive age (20–49 years), male and female adolescents aged 10–19 years. This initiative combines several strategies to prevent and treat anaemia like iron and folic acid supplementation, deworming, food fortification in schools, and malaria screening. [24]

In the present study BMI was not significantly related with anaemia. A study conducted by Mehta et al and Kotecha et al also reported that age is not a significant correlate of anemia. [22, 23]

Conclusion

In the present study the prevalence of Undernutrition is 16.6% and Overnutrition is 22% according to BMI indicating the double burden of Malnutrition. The risk of obesity along with other Noncommunicable diseases like cardiovascular disease, stroke, cancers may start in this age group (18-25 years). Culturally

acceptable lifestyle interventions need to be advised and developed.

Anaemia among men is an important public health issue in India that it has received little research and policy attention. Policy makers should consider extending efforts to reduce the burden of anaemia both in women and men.

Importance of This Study: The present study was conducted among the first year MBBS students who were admitted from all over India. The study subjects represent young adults from all over India, so as the Prevalence of Malnutrition.

Limitations: Our study has several limitations as our results are only representative of young adults 17 -22 years in a Government Medical College, Ananthapuramu, Andhra Pradesh. We were unable to determine the type and cause of anaemia.

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