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Research Article

Association of Obesity and Anemia with the Dietary Pattern among the Nursing Students

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ABSTRACT

Aim: The aim of the study was to assess the association of obesity and anemia with the dietary pattern among the nursing students. **Methodology:** A descriptive study was conducted on 87 students of BSc Nursing final year of National Institute of Nursing Education, PGIMER, Chandigarh. Total enumeration sampling technique was used. An interview schedule consisting of socio-demographic profile, dietary pattern questionnaire, food frequency questionnaire, and 2-day recall was used for collecting data. In addition, BMI and hemoglobin levels were measured. **Result:** Among study subjects, nine (10.3%) were obese/overweight, 18 (20.6%) were anemic, and 63 (72.5%) had normal hemoglobin level and BMI. Out of nine obese/overweight subjects, four (44.4%) belonged to high socio-economic class, and six (66.7%) were non vegetarian. Habit of skipping meals was seen both in obese group six (66.7%) and in anemic group 11 (61.1%). The frequency of skipping meals among obese/overweight and anemic subjects was 2–3 meals. Daily consumption of snacks and fast food was also high both in obese/overweight 4 (44.4%) and anemic group 10(55.6%). Only three (33.3%) of obese/overweight group subjects and three (16.6%) of anemic subjects were consuming fruits daily. Calorie intake was high in eight (88.9%) of obesity/overweight group. **Conclusion:** Only the relation of BMI with the calorie intake was seen. People with greater BMI show calorie intake more than the recommended. The association was not assessed due to insufficient sample size. However, only percentages were calculated. Seventy-four (85.1%) subjects were hostellers and 63(72.5%) were still found to have normal BMI and hemoglobin values, thus concluding that they were consuming appropriate diet from the mess.

Keywords: Anemia, Dietary pattern, Obesity

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Introduction

Obesity is a public health problem and has major health concern worldwide. Overweight is associated with several non-communicable diseases such as diabetes, hypertension, and cardiovascular diseases. It is considered as the 5th leading risk of death worldwide.[1]

Nutritional anemia has highest prevalence in the developing countries. Iron deficiency anemia is the most widespread micro deficiency in India which affects all the age groups.

Obesity and anemia are the disease caused mainly due to imbalance nutrition. There are multiple factors responsible for obesity and anemia, but change in lifestyle and eating pattern are the main contributing factors for obesity and anemia. Advancement in the technology has replaced human physical efforts. Nowadays, most of the work is carried out by the machines. BMI is the most widely used criteria which is an optimal marker to assess overall obesity.

Anemia has its strong relation with gender. There are more cases of anemia seen in women with men.[2] Regular menstrual cycle frequent pregnancies, lack of nutritional iron is the causes of anemia in women while other factors are loss of RBCs from any major source such as GI tract, uterus or wound, decrease production of RBCs, and other diseases such as Thalassemia, Sickle cell anemia, and enzyme G6PD deficiency. Due to iron deficiency, cellular responses and immune function of a person may get impaired leading to increased susceptibility to infection. Low hemoglobin level leads to reduced work performance and thereby productivity. This is of great importance for the economy of country.

In the past few years researchers are continuously trying to find out the relation of anemia and obesity, but there is no clear conclusion from the past researches. Some studies show positive relation between anemia and obesity while some suggest no relation.[3-5] The present study was carried out to assess the association of obesity and anemia with the dietary pattern among the nursing students.

Methods

This was a descriptive study. The study was conducted on students of BSc Nursing 4th year of NINE, PGIMER, Chandigarh. Total enumeration technique was used to select the nursing students. Permission to conduct the study was taken from Institute Ethics committee. Informed written consent was taken from the individual participants. Data were collected from the subjects who were willing to participate.

Tools for data collection

Data were collected using following tools:

1. Socio-demographic pro forma: It contained socio-demographic profile of the subjects
2. Dietary Pattern Questionnaire: It consisted of questions prepared to assess dietary pattern of the subjects and food items taken in the past 2 days
3. Hemoglobin estimation sheet: It consisted of the tested hemoglobin value of the subjects
4. Examination record pro forma: It included measurement of height and weight to calculate BMI.

Method of data collection

The subjects under study were given dietary pattern questionnaire to fill their dietary intake. Their height and weight were measured, BMI was calculated and recorded. Their hemoglobin was checked using clinical method (cyanmethemoglobin method).

Data related to hemoglobin level and BMI were entered in hemoglobin estimation sheet and examination record pro forma.

Statistics

The collected data were analyzed using descriptive statistics (percentage, mean, and standard deviation). Calculation was carried out with the help of SPSS. The findings were interpreted and presented in the form of tables.

Results

Table 1 shows socio-demographic profile of all the study subjects. Out of total 87 study subjects, nearly half of the subjects 41 (47.1%) were aged 22 years. More than half of the subjects, 48 (55.2%) belonged to Hindu religion. Out of total 87 subjects, 75 (86.2%) belonged to nuclear families and 12 (13.8%) belonged to joint families. Nearly half of the subjects, 41 (47.1%) had per capita income ranging from 5000 to 10,000 with only a marginal subjects six (6.9%) having per capita income more than 15,000 and mean ± SD was found to be Rs. 8506.64 ± 895.

Table 1: Socio-demographic profile of study subjects. N=87

Socio demographic profile	*n* (%)
Age (years)	
20	1 (1.1)
21	39 (44.8)
22	41 (47.1)
23	6 (6.9)
Religion	
Hindu	48 (55.2)
Sikh	37 (42.5)
Muslim	1 (1.1)
Christian	1 (1.1)
Family	
Nuclear	75 (86.2)
Joint	12 (13.8)
Family income	
<10,000	1 (1.1)
10,000–30,000	35 (40.2)
30,000–50,000	35 (40.2)
>50.000	16 (18.4)
Per capita income**	
<5000	18 (20.7)
5000–10,000	41 (47.1)
10,000–15,000	22 (25.3)
>15,000	6 (6.9)

*Mean±SD and range of subjects=21.6±0.637, (20–23). **Mean±SD and range of Per capita income=8506.64±895, (3000–18000)

Table 2 depicts socio-demographic profile of anemic and overweight/obese subjects. Out of total nine obese/overweight subjects, nearly half 5 (55.5%) were aged 21 years and out of total 19 anemic subjects, 11 (61.1%) were aged 21 years. Among the total nine obese overweight subjects, eight (88.9%) belonged to nuclear families as compared to 15 (83.3%) anemic subjects. More than half of the total 18 anemic subjects, 13 (72.2%) had per capita income in the range of 5000–10,000. Similarly, five (55.6%) of total nine obese/overweight subjects had per capita income from 5,000–10,000.

Table 3 depicts menstrual history of study subjects. Out of total 87 study subjects, 73 (83.9%) had history of moderate menstrual flow. Out of 18 anemic subjects, 13 (72.2%) had moderate menstrual flow and three (16.7%) had heavy menstrual flow. Out of 87 total subjects, 60 (69%) had duration of menstrual flow between 3 and 5 days. Out of total nine anemic subjects, eight (44.4%) had duration of menstrual cycle between 3 and 5 days and five (27.7%) had more than 5 days.

Table 4 depicts family history of obesity and blood donation by study subjects in the past 3 months. Out of total 87 subjects, 21 (24.1%) showed positive family history for obesity/overweight and when compared with obese/overweight subjects, four (44.4%) showed positive family history of obesity. Out of total 87 subjects, 13 (14.9%) donated blood in the past 3 months and out of these subjects, three (16.6%) were anemic and three (33.3%) were obese/overweight.

Table 5 depicts dietary pattern of study subjects. Out of total 87 subjects, 42 (48.35%) were vegetarian. The distribution of obese/overweight subjects for non-vegetarian and vegetarian was six (66.6%) and one (1.1%), respectively. Anemia was also seen more in hostellers, that is, 15 (83.3%) and three (16.7%) in day scholars. Three-fourth subjects preferred taking meal 3 times a day. While in obese/overweight group, only five (55.5%) of the subjects ate meal thrice a day. Skipping meals were seen more among half of the subjects Habit of skipping meal in obese/overweight group was six (66.6%) and 11 (61.1%) in anemic group. Out of total 87 subjects, 32 (36.8%) ate fast food as substitute for skipped meal. Among the obese/overweight subjects, three (33.3%) opt for fast food as substitute while same percentage that is three (33.3%) do not take anything. Out of total 87 subjects, 82 (94.3%) were not taking nutritional supplements. Habit of taking milk products along with green leafy vegetables was found among 43(49.4%) of total 87 subjects. Out of total 18 anemic subjects, nine (50%) took milk/milk products along with green leafy vegetables.

Table 6 depicts daily food consumption pattern of study subjects. Out of total 87 study subjects, most of the subjects 82 (94.8%) took grains daily while 70 (80.5%) and 15 (17.2%) of study subject used to take vegetables and fruits daily, respectively. Daily consumption of pulses, milk and milk product was 65 (74.7%) and 34 (39.1%), respectively. Fifty subjects (58%) used to take beverages daily while 28 (32.2%) were eating snacks daily. Among obese/overweight, 100% subjects consumed grains daily while eight (88.8%) and three (33.3%) consumed vegetables and fruits, respectively. Nearly half, that is, four (44.4%) of

Table 2: Socio-demographic profile of anemic and obese/overweight subjects

Socio-demographic profile	*n* (%)	Anemic *n*=18 *n* (%)	Obese/ Overweight *n*=18 *n* (%)
Age (year)			
20	1 (1.1)	-	-
21	39 (44.8)	11 (61.1)	5 (55.5)
22	41 (47.1)	4 (22.2)	3 (33.3)
23	6 (6.6)	3 (16.6)	1 (11.1)
Religion			
Hindu	48 (55.2)	10 (55.2)	4 (44.4)
Sikh	37 (42.5)	8 (42.5)	5 (55.5)
Muslim	1 (1.1)	-	-
Christian	1 (1.1)	-	-
Family			
Nuclear	75 (86.2)	15 (83.3)	8 (88.9)
Joint	12 (13.8)	3 (16.7)	1 (11.1)
Per capita income**			
<5000	18 (20.7)	1 (5.6)	1 (11.1)
5000–10,000	41 (47.1)	13 (72.2)	5 (55.6)
10,000–15,000	22 (25.3)	3 (16.6)	3 (33.3)
>15,000	6 (6.9)	1 (5.6)	-

**Mean±SD and range of Per capita income=8506.64±895, (3000–18000)

Table 3: Menstrual history of study subjects. N=87

Menstrual history	*n* (%)	Anemic *n*=18 *n* (%)	Obese/ Overweight *n*=9 *n* (%)
Menstrual flow			
Heavy	10 (11.4)	3 (16.7)	1 (11.1)
Moderate	73 (83.9)	13 (72.2)	8 (88.9)
Scanty	4 (4.6)	2 (11.1)	-
Duration of menstrual cycle			
Less than 3 days	12 (13.8)	5 (27.8)	2 (22.2)
3–5 days	60 (69)	8 (44.4)	5 (55.6)
More than 5 days	15 (17.3)	5 (27.8)	2 (22.2)

Table 4: History of obesity/overweight in family and blood donation in subjects. N=87

History of	*n* (%)	Anemic *n*=18 *n* (%)	Obese/Overweight *n*=9 *n* (%)
Obesity/overweight in family			
Yes	21 (24.1)	3 (14.9)	4 (44.4)
No	66 (75.9)	15 (85.1)	5 (55.5)
Blood donation by subjects past 3 months			
Yes	13 (14.9)	3 (16.6)	3 (33.3)
No	74 (85.1)	15 (83.3)	6 (66.6)

total nine obese/overweight subjects had habit of taking snacks and seven (77.7%) had habit of taking beverages daily. Among the total 18 anemic subjects, 17 (94.4%) used to take pulses, grains, and vegetables daily. About half, that is, ten subjects took snacks in their daily routine and only three (16.6%) of anemic subjects were in the habit of taking fruits and fruit juices daily.

Table 5: Dietary pattern of study subject. N=87

Dietary pattern	*n* (%)	Anemic *n*=18 *n* (%)	Obese/ Overweight *n*=9 *n* (%)
Dietary habits			
Vegetarian	42 (48.3)	8 (44.4)	1 (11.1)
Non-Vegetarian	28 (32.2)	6 (33.3)	6 (66.7)
Eggetarian	17 (19.5)	4 (22.2)	2 (22.2)
Residence			
Hosteller	74 (85.1)	15 (83.3)	7 (77.8)
Day-scholar	13 (14.9)	3 (16.6)	2 (22.2)
Meal taking frequency			
Twice a day	7 (8)	1 (5.5)	2 (22.2)
Thrice a day	66 (75.9)	13 (72.2)	5 (55.6)
4 times a day	6 (6.9)	1 (5.5)	-
5 times a day	8 (9.2)	3 (16.6)	2 (22.2)
Skip meals			
Yes	50 (57.5)	11 (61.1)	6 (66.7)
No	37 (42.5)	7 (38.8)	3 (33.3)
Frequency of skipping meals			
1 Meal/day	23 (46.0)	6 (54.5)	4 (66.7)
1 Meal/week	13 (26.0)	2 (18.1)	2 (33.3)
2 Meal/week	13 (26.0)	2 (18.1)	-
More	1 (2.0)	1 (9)	-
Preferred substitute for skipped meal			
Fast food	32 (36.8)	7 (63.6)	3 (50)
Fruit and fruit juices	6 (6.9)	1 (9.0)	-
Soft drinks	3 (3.4)	3 (27.2)	-
Nothing	9 (10.4)	-	3 (50)
Any nutritional supplements			
Yes	5 (5.7)	1 (5.5)	-
No	82 (94.3)	17 (94.4)	9 (100)
Habit of taking milk products along with green leafy vegetables			
Yes	43 (49.4	9 (50.0)	4 (44.4)
No	44 (50.6)	9 (50.0)	5 (55.5)

Table 6: Daily food consumption pattern of study subjects

Food item	*n* (%) (*n*=87)	*n* (%) (*n*=9)	*n* (%) (*n*=18)
Grains	82 (94.8)	9 (100)	17 (94.4)
Fruits	15 (17.2)	3 (33.3)	3 (16.6)
Vegetables	70 (80.5)	8 (88.8)	17 (94.4)
Pulses	65 (74.7)	8 (88.8)	17 (94.4)
Milk and Milk products	34 (39.1)	5 (55.5)	9 (50)
Spreads	8 (9.2)	-	-
Snacks	28 (32.2)	4 (44.4)	10 (55.5)
Beverages	50 (57.4)	7 (77.7)	11 (61.1)
Non-vegetarian	1 (1.1)	-	-

Table 7 depicts frequency and percentage of calories intake of subjects. Out of total 87 study subjects, 21 (24.1%) had daily calorie intake less than recommended, 47 (54%) were in category of recommended intake, and 19 (21.8%) were above the RDA. Of total nine obese/overweight subjects, eight (88.8%) were falling in category of having calorie intake more than recommended. Out of total 18 anemic subjects, five (27.7%) had low intake and six (33.3%) had above calorie intake than recommended.

Table 8 depicts subject distribution according to anemia and hemoglobin levels. Out of total nine overweight/obese study subjects, eight (9.2%) and one (1.1%) were falling in category of overweight and Class I obese, respectively, while ten (11.5%) subjects were underweight. Anemia was found in 18 (20.7%) of total 87 study subjects of which 11 (12.6%) were mildly, six (6.9%) were moderately, (1.1%) were severely anemic. Both obesity/overweight and anemia were found only in three (12.5%) of total 24 subjects.

Discussion

Obesity is major and most common health problems seen in adults and young population. It is major growing problem of developed and developing country. This disease further increases the likelihood of major multiple problem such as hypertension, cardiovascular disease, endocrine disorders, certain type of cancers, and psychiatric disorders. The causes mainly are busy lifestyle, more consumption of fast

Table 7: Frequency and percentage of calorie intake. N=87

Calorie intake	*n* (%)	*n* (%) (*n*=8)	*n* (%) (*n*=18)
Below (1900 kcal/day)	21 (24.1)	-	5 (27.7)
In between (1900 and 2230 kcal/day)	47 (54.0%)	1 (1.11)	7 (38.8)
Above (2230 kcal/day)	19 (21.8)	8 (88.8)	6 (33.3)

Table 8: Distribution of subject on the basis of BMI and hemoglobin level. N=87

Parameters	*n* (%)
BMI (kg/m^2)	
Underweight (<18.5)	10 (11.5)
Normal weight (18.50–24.99)	68 (78.2)
Over weight (25–29.99)	8 (9.2)
Class I obese (30.00–34.99)	1 (1.1)
Anemia	
No anemia (12 g/dl)	69 (79.3)
Mild anemic (11–11.9 g/dl)	11 (12.6)
Moderate anemia (9 g/dl–10.9 g/dl)	6 (6.9)
Severe anemia (<8 g/dl)	1 (1.1)
Both anemia and obesity	*n* (%) *n*=24
Yes	3 (12.5)
No	21 (87.5)

food, sedentary lifestyle, and easy availability of packed food in working area.

Anemia is a global public health problem which has major consequences for human health along with social and economic development. The most frequent cause of nutritional anemia is iron deficiency. It is mostly seen in adolescent girls and in pregnant women. The present study was conducted with the objective to assess the association of obesity and anemia with the dietary pattern among B.Sc. Nursing students. It was found in the present study that out of total 87 subjects, 18 (20.7%) of subjects were anemic and nine (10.3%) subjects were having BMI more than 25 kg/m^2. Study revealed that half the study subjects were aged 23 years. More than half of the subjects belonged to Hindu religion (55.2%).

Majority of the subjects hailed from nuclear families (86.2%) with 41 (47.1%) subjects having per capita income ranging from Rs.5000–10,000.

Nearly half of the obese subjects (44.5%) had positive family history of obesity and 66.6% of those subjects had monthly family income in the range of Rs.30,000–50,000. Another study conducted in urban school of children in Vishakhapatnam concluded that the percentage of obesity and overweight was highest in the children with high social (24.4 %) and high economic status (28.9%).[6] Another study supporting findings of the present study concluded that the likelihood of obesity is particularly prevalent in those families whose monthly income is more than Rs.40,000 which suggested that the susceptibility to become overweight is more in middle class than the poor.[5]

Majority of obese subjects (66.6%) were non-vegetarians with meal skipping frequency of 66.6%. Furthermore, a majority of obese subjects (88.9%) had a daily calorie intake of more than RDA, that is, 2230 kcal/day. Obese subjects also showed higher percentage, that is, 77.7% of daily consumption of beverages as compared to 57.4% of total study subjects. A similar study was conducted by Sharma *et al*. in DMCH Ludhiana which showed that 43.5% of subjects were skipping their meals which was substituted by junk food in 33% of study subjects.[7]

Out of total anemic subjects, approximately 50% complained of heavy menstrual bleeding and around 61.1% skipped meals daily of which majority (63.6%) preferred fast food as the substitute. Of all the anemic subjects, only 38.8% of the subjects consumed food in accordance with daily RDA and a total of 55.5% of anemic subjects were non-vegetarians/eggetarians. A similar study conducted in Gujarat for screening of anemia among adolescents girls showed that heavy bleeding was reported in 61% of anemic girls and skipping meals were reported in 48% of subjects which supports findings of the present study. Furthermore, 43.3% of subjects were vegetarians while 46.2% were non-vegetarians.[6]

It was also found in the present study that out of total 18 anemic subjects, three (16.6%) donated blood in the past 3 months which might be the reason that they were anemic. However, the present study could not find the association between obesity and anemia due to insufficient sample size.

Conclusion

In the present study, only the relation of BMI with the calorie intake is seen. It is concluded that people with greater value of BMI shows increasing calorie intake more than the recommended dietary allowances. The association between obesity and anemia with dietary pattern was not assessed due to insufficient sample size. However, only percentages were calculated. Seventy-four (85.1%) subjects were hostellers and 63 (72.5%) subjects were still found to have normal BMI and hemoglobin values, thus concluding they were consuming appropriate diet from the mess.

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