Original Article

Impact of Lifestyle Choices on Body Mass Index (BMI) and Body Fat Percentage (BFP) Among Undergraduate Students of a Medical College of North Bihar

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ABSTRACT

Introduction: The present study was designed to assess the impact of lifestyle choices on body mass index (BMI) and body fat percentage (BFP) among medical students of a tertiary care teaching hospital of north Bihar.

Materials and Methods: An observational and cross-sectional study conducted among 100 first-year medical students. BMI and BFP was estimated by body fat analyser machine. Validated lifestyle questionnaire was asked to each student. Data were analysed using using Graph Pad Instat software.

Results: Out of 100 students, 32% had good lifestyle and 68% had a poor lifestyle. 40% lacked physical activity, 52% lacked enough sleep, 44% had anxiety, 65% had stress, 68% had competitive behaviour, 72% had anger issues and 15% were struggling with staying positive. Out of 68 students with poor lifestyles, 22 were overweight and 21 had high BFP. On analysis, lifestyle influence on BMI and BFP was found to be statistically insignificant but BMI and BFP were found to be positively correlated (r)=0.697 with BFP with p-value=0.001.

Conclusion: The study showed that high BMI and body fat percentage are signs of an unhealthy lifestyle, so they can be used to catch lifestyle-related diseases early. So, we can say that if future healthcare providers adopt healthy habits and keep an eye on their BMI and body fat percentage, it will have a positive impact on their health.

Keywords: Body Mass Index (BMI), Body Fat Percentage (BFP), Lifestyle choices, Health, Medical students.

INTRODUCTION

Non-communicable diseases, also known as the "New World Syndrome," have had a big impact on health and money all over the world. The World Health Organization (WHO) and many different researchers have been studying how these diseases affect people globally. [1]

One of the main reasons of non-communicable disease is our lifestyle choices. Lifestyle is basically how we live our lives, including things like what we do, how we think, and what we like. These choices can be changed based on what we need and what we enjoy. Lately, many people have been living in a way that is not good for their health. This could be because they are not taking care of themselves every day, they are stressed out, or they have the wrong ideas about their bodies and how to stay healthy. [2,3]

Obesity is becoming a big problem in India. It used to be that people in India were more likely to be underweight, but now there are more and more people who are overweight or obese. This happens when people eat more food than they need for a long time. According to the National Family Health Survey (NFHS) -4, released in January 2017, the number of obese people in India has doubled in the past 10 years. [4,5] This is a big increase! And it's not just adults who are affected - even teenagers are becoming overweight or obese, with rates between 10-30%. Interestingly, women in India are more likely to be either underweight or overweight/obese compared to men. This means that women need to pay extra attention to their diet and exercise habits to stay healthy. [1,5]

Weight isn't just about how much fat or muscle you have in your body. It also includes water and visceral fat. [5] There are different ways to measure body fat, like BMI, waist circumference, waist height ratio, underwater weighing, Bioelectrical Impedance Analysis (BIA), Dual Energy X-Ray Absorptiometry (DEXA), Magnetic Resonance Imaging (MRI). DEXA & MRI are really accurate but they're expensive and need trained professionals to operate them.[6] On the other hand, BMI and BIA are easier to use for larger groups of people, but they have their limitations. BMI is a common tool used to classify people as underweight, overweight, or obese. [6,7] But it can't tell the difference between muscle and fat, so it might not give the most accurate results for everyone. [5,8] BIA is a quick and safe way to estimate body fat by measuring impedance. It's a good option for estimating fat mass, but it's not perfect either. [5,9] Body fat is not just one thing - there's subcutaneous fat and visceral fat. Both types play important roles in our bodies. Too much visceral fat, especially in the belly area, can lead to health problems like NCDs. [10] Some people, like Indians, tend to store more fat in their bellies, even if they look thin but putting them in the category of metabolically obese, normal weight individuals. [11]

Medical students have a tough first year with lots of studying and not much time for exercise or eating right. This can lead to them gaining more body fat. But shouldn't the people who will take care of our health be healthy themselves? It's important for medical students to take care of themselves so they can take care of others.

The present study was designed to assess the impact of lifestyle choices on body mass index and body fat percentage among medical students of a tertiary care teaching hospital of north Bihar.

MATERIALS AND METHODS

Study site: Department of Physiology of Darbhanga medical College and Hospital, Laheriasarai, Darbhanga, Bihar

Study duration: 2 months (November 2023 to December 2023)

Study design: Cross-sectional, observational and questionnaire-based study conducted on 100 first year undergraduate medical students of 18 to 25 years of age and both the gender. The study participants were enrolled after taking ethical approval. Their participation was voluntary and informed consent was taken from each student before stating the study.

Inclusion criteria:

1) First year undergraduate medical students
2) Age between 18 to 25 years
3) Both the gender
4) Healthy student

Exclusion criteria:

1) Age below 18 and above 25 years
2) Students had any illness
3) Female student who was mensurating
4) Student who was not interested

Methodology: After enrolment the students were divided into 5 groups (20 students in a group) and instructed to visit at 10 AM under controlled conditions in Physiology Lab at specified date.

A. First of all, general information of students was taken like date of birth and gender.

B. After that height was measured using a wall-mounted stadiometer.

C. Then Weight, Body Mass Index (BMI) and Body Fat Percentage (BFP) was analysed by body composition analyser. It determines the body composition using bioelectrical impedance or biological resistance method by using weak current (50 KHz, 500 µA) flowing through both hands and feet [5,9].

1) BMI was categorised based on Asian standards (WHO)[12] which shows

a) Underweight: <18.5 kg/m^2

b) Normal: 18.5-22.9 kg/m^2

c) Overweight: 23.0-24.9 kg/m^2

d) Obese: ≥ 25 kg/m^2

2) Body fat levels were categorised based on gender Male and Female

a) Very High: $\geq 25\%$ for Male & $\geq 35\%$ for Female

b) High: 20-25% for Male & 30-35% for Female

c) Normal: 10-20% for Male & 20-30% for Female

d) Low: <10% for Male & <20% for Female

D. Finally, the students were given lifestyle and behaviour-based questions as an online google form link and instructed them to fill and submit within 24 hours. This questionnaire contained 25 multiple choice questions with nine areas arranged in the form of Likert's Scale related to family & friends, physical activity, nutrition, use of tobacco and toxins, use of alcohol, sleep pattern/stress conditions/ anxiety/ anger/ depression, type of personality, insight about life and thinking pattern, career satisfaction.

- This questionnaire was derived from the "Lifestyle Assessment: Testing the FANTASTIC Instrument" developed by Douglas and Donna. [13] Its purpose is to assess lifestyle-related factors.

- **Questionnaire Structure**: There are a total of 25 questions. Out of these, 23 questions have 5 possible answers each. 2 questions have 2 possible answers each.

- **Scoring System**: Responses are encoded by points and the sum of all points provides a total score. 0 points for "almost never", 1 point for "seldom", 2 points for "some of the time", 3 points for "fairly often" and 4 points for "almost always"

- **Categorization**: Based on the total score, individuals are categorized as Excellent: 85-100 points, Very good: 70-84 points, Good: 55-69 points, Fair: 35-54 points and Poor: 0-34 points

- **Lifestyle Categories**: In the present study, two Lifestyle categories were used

  - "Good lifestyle category" (>35 points): Includes excellent, very good, good, and fair scores.

  - "Poor lifestyle category" (<35 points): Encompasses scores below 35 points.

Statistical Analysis

The data obtained from this study was analysed using graph pad Instat Software. Bivariate analysis for correlation and Fisher's-Exact test for associations through cross-tabulation was done to find the correlation and significance respectively of the lifestyle with BMI and BFP.

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The correlation and significance values have been explained in each table. In the present study, p-values of <0.05 were considered statistically significant.

RESULTS

Table 1: Distribution of good lifestyle and poor lifestyle among the students.

n=100		Frequency	Percent (%)
Lifestyle	Good	32	32%
	Poor	68	68%
	Total	100	100%

Out of 100 first-year medical students, 56 were females and 44 were male subjects aged between 18-25 years.

Majority of the students belonged to poor lifestyle group (68%) based on total scoring of lifestyle questionnaire.

According to the questions on lifestyle parameters, the responses by the students were broadly divided into three categories "Never (Score 0 & 1)", "Sometimes (Score 2 & 3)" and "Always (Score 4)". It had been found that 54% had good communication skills, 46% were emotionally appreciated, 40% lacked physical activity, 65% sometimes preferred junk foods, 48% had a balanced meal regularly, 20% used either alcohol, drugs or cigarettes, 52% lacked 7-8 hours of sleep, 65% had stress, 68% had competitive personality, 72% has sense of anger most of the time, only 20% had a positive thinking mind, 44% were having anxiety all the time, 12% had depression and 38% had career satisfaction.

Table 2: Percentage of responses against lifestyle questions by students (100)

Lifestyle questionnaire	Always (%)	Sometimes (%)	Never (%)
1. Communication	54	41	5
2. Emotional appreciation	46	44	10
3. Physical activity	22	38	40
4. Junk food preference	30	65	5
5. Balanced meal regularly	48	36	16
6. Alcohol, Cigarettes or drugs use	20	40	40
7. Sleep 7-8 hours	25	23	52
8. Stress	65	15	20
9. Competitive personality	68	17	15
10. Anger	72	20	8
11. Positive thinking	20	65	15
12. Anxiety	44	40	16
13. Depression	12	35	53
14. Career satisfaction	38	50	12

Table 3: Comparison of BMI versus Lifestyle

n=100		Lifestyle		Total (Count %)	p-value
		Good (Count %)	Poor (Count %)		
BMI	Underweight	5%	3%	8%	0.412
	Normal	16%	43%	59%	
	Overweight/ Obese	11%	22%	33%	
Total		32%	68%	100%	

Categorical measurements are presented in number (%). Significance is assessed at 5% level of significance (p<0.05, r=0.062) and Fishers-Exact test was used to find out the p-value.

Table 4: Comparison of BFP versus Lifestyle

n=100		Lifestyle		Total (Count %)	p-value
		Good (Count %)	Poor (Count %)		
BFP	Low	4%	1%	5%	0.148
	Normal	19%	46%	65%	
	High	9%	21%	30%	
Total		32%	68%	100%	

Categorical measurements are presented in number (%). Significance is assessed at 5% level of significance (p<0.05, r=0.086) and Fishers-Exact test was used to find out the p-value.

Table 5: Comparison between BMI and BFP

n=100		BFP			Total (Count %)	p-value
		Low (Count %)	Normal (Count %)	High (Count %)		
BMI	Underweight	2%	6%	0%	8%	
	Normal	2%	49%	8%	59%	0.001
	Overweight/ Obese	1%	10%	22%	33%	
Total		5%	65%	30%	100%	

Categorical measurements are presented in number (%). Significance is assessed at 5% level of significance (p<0.05, r=0.697) and Fishers-Exact test was used in this table. Table 5 showed clearly that BMI is positively correlated (r)=0.697 with BFP with p-value=0.001

In table 3, out of 68 belonging to poor lifestyle group, 22 students were overweight/obese, 43 were normal and 3 were underweight but among 32 students belonging to good lifestyle, 11 were overweight/obese category. Here, the lifestyle was found to be influencing BMI but due to the smaller sample size, the significance of this analysis (r=0.068, p-value=0.412) was not achieved.

In the table 4, students belonging to poor lifestyle group (n=68), 21 had high BFP, 46 had normal BFP and 1 had low BFP. Under the good lifestyle category (n=32), 19 had normal BFP, 3 students had low BFP and 8 students had high BFP. Lifestyle was found to be influencing BFP but due to the smaller sample size, the significance of this analysis (r=0.086, p-value=0.148) was not achieved.

DISCUSSION

It is already known that making unhealthy choices in life can lead to serious non-communicable diseases. A recent study focused on individuals aged 18-25, who will be responsible for healthcare in the future. [14] The World Health Organization has reported that 15 million people between 30-70 years old die from non-communicable diseases, with 23% of these deaths happening too soon. This highlights the need to understand why young people are adopting unhealthy lifestyles. [14]

The data collected from this study revealed alarming lifestyle trends among students. Table 1 showed that 68 students had a poor lifestyle, while only 32 students had a good lifestyle. This is concerning because we expected more students to have a good lifestyle, especially since they were just starting their academic journey and stress levels were not yet high. Studies conducted by Anand T et al., and Lakshmi Y and Devi BV, [2,7] support our findings, suggesting that many students may have had poor lifestyle habits before entering medical college. Kanikowska D et al., and Baxter SD et al., have also found that children with poor lifestyle habits may face obstacles to healthy living as they transition into adulthood, potentially leading to health issues. [4,15] Research by Karla S and Unnikrishnan AG, Majeed F, and Alswat KA et al., indicates that the period between childhood and adulthood can have a significant impact on energy balance and weight gain. This transition period is crucial for establishing healthy habits that can prevent future health problems. [1,16,17]

The table 2 showed that 40% were not very active, 52% were not getting enough sleep, 44% had anxiety, and 15% were struggling with staying positive. Experts like Suresh N and Reddy RPL, Bowen L, and Barbosa RR had also found similar results in their own studies. They agree that students were dealing with both physical and emotional issues that are affecting their lifestyles. When students don't get enough physical activity, it can have a negative impact on their bodies. This can happen because they're not moving enough, leading to less muscle and more fat. [5,11,13]

Data in table 3 & 4 showed that out of 68 students with poor lifestyles, 22 were overweight and 21 had high BFP. These can lead to serious health problems like heart disease, diabetes, sleep apnoea and joint disorders. Anand T et al., Lakshmi Y and Devi BV Majeed F, and Pribis P et al., had found out similar findings with increase in the number of students in the overweight and obese category. [2,7,16,18] A study done by Kim J, Suresh N and Reddy RPL., Swainson MG et al., and Bowen L et al. showed that due to the consequence of sedentary lifestyle, BFP was found to be high. [3,5,10,11] Kanikowska D et al., has highlighted the fact that increasing BMI at the age of 18 years was strongly considered to be a predictive of obesity later in adulthood. [4]

Some students in this study had low Body Mass Index (BMI) and Body Fat Percentage (BFP). Nutrition plays a crucial role in overall health, preventing complications such as memory loss, slow heart rates, and decreased hormone production. [7,17] Baxter SD et al. and Alswat KA et al. [15] found no direct correlation between BMI and academic performance. However, other studies have described a relationship between BMI and academics, with nutrition potentially playing a role. [15,17] In the present study, 59 students had normal BMI out of which 43 students belonged to poor lifestyle and 65 students had normal BFP out of which 46 students belonged to the poor lifestyle.

Indeed, this study findings underscore the multifaceted nature of the relationship between lifestyle and BMI/BFP. Factors like gender-specific fat storage patterns, stress levels, and genetic influences contribute to this complex interplay. Maintaining a healthy weight and body fat percentage requires conscious choices, including a balanced diet and regular physical activity. By prioritizing these lifestyle elements, students can proactively safeguard their health. [2,7,17,19]

This study, along with other research (Suresh N and Reddy RPL, Akindele MO et al., Carpenter CL et al.), [5,6,8] found a consistent association between BMI and BFP. As BMI increases, BFP tends to increase as well, and vice versa. Some individuals may have higher BMI values but lower BFP. This phenomenon is known as "muscular obesity." It occurs due to increased muscle mass rather than excess fat. Conversely, there are people with normal BMI but higher BFP, termed "invisible obesity." [5,18] Their weight is primarily due to fat accumulation despite a seemingly normal BMI. Suresh N and Reddy RPL, Swainson MG et al., and Pribis P [5,10,18] emphasized that BMI alone may be misleading in assessing an individual's health status. These findings highlight the importance of considering other factors beyond BMI. Individuals with increased lean mass (muscle) and low-fat mass may not be unhealthy, even if their BMI suggests otherwise. Focusing on overall health, including muscle development and body composition, is crucial. Encouraging young adults to adopt good health habits early can significantly impact their future well-being. Remember that health is multifaceted, and a holistic approach that considers both BMI and other health markers is essential.

LIMITATION

The sample size was small, so we didn't get as much information as we hoped for. We also didn't look at factors like body fat distribution, which could have changed the results. It's also important to compare students from urban and rural areas to see how their lifestyles differ. Lifestyle questionnaires are a useful tool for identifying people with unhealthy habits. However, they rely on people's own perceptions, so the information they provide may not always be accurate.

CONCLUSION

From this study it has been assessed that unhealthy lifestyle choices are impacting adversely on body mass index and body fat percentage of medical students. Due to lack of physical activity, using excessive junk food, lack of sleep, anxiety, stress and not thinking positively, are setting up health problems. This is occurring due to change in lifestyle choices and the students can be used to catch lifestyle-related diseases early.

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