

# EXPLORING THE RELATIONSHIP AMONGST BODY MASS INDEX (BMI) AND WEIGHT CHANGE BEHAVIOR IN COLLEGE GOING GIRLS OF URBAN AREA OF BHOPAL CITY

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## ABSTRACT

Adolescence phase of life includes the college going age and girls are the nutritionally vulnerable in this phase of life. So, these girls more likely to suffer from nutritional deficiencies as comparing to boys. Many of the girls are stunted i.e. below the median height and weight and therefore having lower Body Mass Index (BMI). BMI is used to assess relative health and fitness, BMI is a useful way to classify body weight, but it is not the best indicator of health and fitness or chronic disease risk. This study is a community centered study which was conducted at various college students of Bhopal city, all participants were 18 years of age or older and provided informed consent at the time of the survey and from the survey we find that abnormal BMI, whether underweight or overweight/obese, increases the risk of anemia. There is a negative correlation of hemoglobin concentration with BMI among individuals with abnormal BMI. There are many factors that influence the BMI, skipping breakfast, higher intake of junk foods, lack of nutritional education are some of the finding from this study that strictly influences in lowering of BMI in college going girls of Bhopal city, even reading the nutrition label on packaged food also helps these girls make the healthiest selection. All these factors are affecting the BMI negatively or positively.

**Keywords:** BMI, college girls, health, fitness and nutritional education etc.

## INTRODUCTION

College going age is the Adolescence phase of life, which is a period of noteworthy progress that starts with the onset of puberty and ends in the mid-20s. Puberty is a developmental transition by both social and biological processes, actually it is a gradual process that occurs between childhood and adolescence, which takes many years to complete [1-2]. Health factors, family factors, and some stress inducing factors effects the maltreatment that have associated with pubertal timings and tempo. Adolescents develop dynamic and more independent before they have developed good decision-making skills [3]. A strong need for peer approval may excite a young one to participate in any risky behaviors, because of these, number of adolescents are at risk for depression and suicidal efforts. This may be due to pressures and clashes or battles in their intimate relationships, peer groups, school, and family.

College girls are more probable to suffer from various types of malnutrition than boys because of their reproductive physiology, poverty, low social status and lack of education in family [4]. Researches show that, malnourished women's productivity mostly leads to higher rates of mortality and illness.

Abnormal BMI, whether overweight/obese or underweight, intensifies the risk of anemia. There is a negative correlation of concentration of hemoglobin with BMI among the individuals with abnormal BMI. Many girls who are underweight or malnourished are mostly found stunted, or underneath the median height for their age. Stunting is a recognized as a risk factor for obstetrical difficulties such as obstructed labor and the need for skilled intervention during delivery, leads to death or injury for newborns as well as mothers [5-6].

Adolescent girls need an access to services and information associated to family planning, reproductive health, nutrition and overall health. These awareness programs can spread between girls through workplaces, youth-oriented health programs, marriage registration systems. Schools can also play important role of helping adolescent girls become healthy adults. Research shows that encouraging female literacy and education can progress in their nutritional status and inspire females to pursue for regular health care. Proper nutritional intake during young adulthood supports physical health, affects risk for future disease and plays a role in the prevention of excess weight gain [7].

**Necessity of study-** Sufficient nutrition is very significant for women not for the reason that it helps them be productive, but also as it directly effects the maternal nutrition, and college going girls are the target vulnerable groups.so, to through this study, we can easily find out the status of BMI, that directly relates with the health status of any individual.

There are about 1.2 billion youths which covering about 18% of the global population. These youths represent about 19.6% (253 million) of the Indian population, so the adolescent girls constitute about one -tenth of the Indian population. On an average, these girls become mature by 10½ -11years of age, for this duration, these girls gain up to 50% of their adult weight, more than 20% of their adult height and 50% of their adult skeletal mass, this rise in their height and weight leads to increased nutritional requirement [8]. Additionally, there are many more problems which are associated with the malnutrition, like modernization, urbanization, and changing food habits. The major nutritional problems that affect the

nutritional status of these adolescent girls are malnutrition that includes all the nutritionally deficient diseases and underweight.

From 2005~2006 to 2019~2021, NFHS estimated that prevalence of anemia among Indian adolescents aged 15~19 years has to some extent increased (girls: 55.8% to 59.1%, boys: 30.2% to 31.1%) (International Institute for Population Sciences, 2022) [9].

Whereas, prevalence of undernutrition in developed countries like Korea and China, in urban adolescent girls has dropped to 4.2% in 2010 [8]. In India, malnutrition is even at increased rate i.e., 47% adolescent girls are malnourished. These malnourished adolescent girls are at risk for delivering low birth weight babies (22% in India), consequently this is causative factor to intergenerational vicious cycle of malnutrition [10-12]. The only technique to interrupt this vicious cycle is to develop the nutritional status of adolescent girls previous to conception.

Apart from some cultural and socio-economic factors, numerous other factors or issues also play a significant role in the causing of malnutrition in adolescent girls like poor environmental sanitation, worm infestation, lack of toilet facilities, dietary practices and menstruation.

## MATERIALS AND METHODS

This study is community-based research which was conducted at various college students of Bhopal city. Written consent was achieved from all the participants, as well as their parents, this consent letter informs all about the study to each of them and also ensures for the concealment of their voluntary participation. All participants were above 18 years of age and provided with informed agreement at the time of the survey. This study period was from June 1st 2023 to December 31st 2023.

Measures includes height, weight, BMI, weight change behavior and body weight perception. The obtained data were investigated through vivid statistics that is, Chi-square test and t-test.

Inclusion criteria for the samples are, they should be adolescent unmarried girls living in the urban area

**Table 1.** Characteristics of Participating Female College Students (Mean values and standard deviations or percentages)

Table 1. mean values and standard deviation of the characteristics of participating samples	NMs	OMs		
	Mean	SD	Mean	SD
Age (years)	23.3	3.1	21.6	3.7
Weight (kg)	57.6	7.6	58.4	8.4
Height (cm)	166.4	6.8	167.3	7.2
BMI (kg/m <sup>2</sup> )*	22.2	2.1	23.4	3.6
BMI classification (%)†				
Underweight	5.0	2.1		
Normal	92.3	1.2		
Overweight/obese	3.0	1.1		

for more than a year and most importantly these girls should be ready to partake in the study. Whereas, those girls who could not be communicated even after 3 consecutive visits are excluded from the study.

**Study tools-** The preparatory phase was completed and needed approval was attained from the authorities of college. records from survey were verified so that, exact number of adolescent girls (samples) were estimated and listed. Pre-designed, semi-structured and pre-tested questionnaire regarding socio-demographic variables, Dietary intake assessment by 24-hour recall method and Anthropometric Measurements was filled by the participants. Relevant data to the present study was collected by the questionnaire survey which was earlier tested and partially self-managed in a language consisting of English as compulsory and the other one is Hindi language (local vernacular language). Body weight and height were measured using standard procedures of the WHO.

Height was measured to the closet 0.1 cm using a stadiometer. For the measurement of height, all the participants were directed to remove footwear or any helmet, stand on a stiff floor with feet together, knees straight, face straight ahead and not tilted, and keep eyes at the same level as the ears.

Weight was measured to the nearest 0.1 kg using a salter scale while they were wearing light clothes, without shoes, standing still, facing forward and placing arms on the side [13].

Body Mass Index (BMI) was calculated by (weight in kgs divided by height in meter square) BMI was categorized in weight classes in accordance with the WHO definition for the Asian population.

Descriptive statistics (mean, standard deviation and percentages) wherever necessary were recorded. The various factors and their association with nutritional status were studied using Chi square test as applicable.

### Statistical analysis

Data, presented as means and standard deviations and statistical significance was calculated at  $P \leq 0.06$ .  
Demographics

**Lifestyle pattern of the selected participating samples**

In this sample of female college students, 90 % were non-smokers and 73% reported drinkers of alcohol. Of the subjects, 69 % answered that they

have sufficient sleep to recover from fatigue but 31 % feel not sufficient; 47 % of subjects reported feeling ‘slightly stressed’ while 49 % reported feeling ‘very stressed’. Overall, more than 90 % cited school and family as the reasons for stress.

Table 2 percentage of the lifestyle pattern of the selected participating samples	NMs	OMs	Overall
No smoking	94	88	90
Alcohol drinking	72	79	75
Sleep sufficient	69	66	69
Stress			
Slight	47	47	47
Very	50	53	49
Try to lose body weight	49	53	57
To improve health	44	40	42
To look better	50	53	53
How to control body weight			
Diet control*	21	13	16

NMs- Nutrition major students, OMs- non nutrition major students, SD- standard deviations

This study was designed to know the significant factors for effecting the body mass index (BMI) in urban area of various college going girls of Bhopal city. Numerous factors were evaluated to determine the reason for lowering the BMI among the college going girls of urban area of Bhopal city. A probable cause for the lowering of BMI are focused on their healthy lifestyle. These finding are reliable with other researches that shows that young people who continuously have breakfast as an essential meal, have better management of body-weight and lowered the cardiometabolic risk factors as compared to those who usually omit their breakfast. Breakfast skipping encourages strong hunger sensation which results in successive overeating in high-fat, carbohydrate meals and snacks which are usually heavy. Researches, have shown a noteworthy relationship between skipping of breakfast and low intake of vegetable and fruits among adolescent’s girl student [14]. Even though, there is some discussion or debate concerning an association with snacking, satiety and energy intake compensation in next meal, healthy snack consumption should be beneficial to a quality diet and improved health. Based on obtained data, girls with additional formal nutrition, found to choose healthier foods for their meals regardless of the times of day and frequencies at which they choose to eat and also look for total energy, energy from fat, sodium and sugar content of the foods [15-17]. Data from the study confirmed that girls who received energy information chose significantly lower-energy meals than women who did not receive energy information, Reading the nutrition label in its entirety is essential to help people make the healthiest selection. [18-20]

There is contradictory evidence whether nutrition education increases the risk of a potential eating disorder or disordered eating. Future studies are required and suggested to investigate this possible association further.

**CONCLUSIONS**

Statistics from the college Quick Serve canteen and outside vendors confirms for the student’s consuming higher amount of unhealthy food and smaller consumption of healthier items. The Dietary intake of these girls are low in vegetables and fruits whereas they consume higher amount of refined carbohydrates and fats which is closely related to BMI and this directly associates with the risk of chronic diseases in late adulthood

In the context, of the growing trend of obesity and overweight, young peoples are more worried about their weight, and so there is a higher prevalence of dieting behaviors are seen among these college girls to avoid gaining more body fat, and are also anxious with body size and shape this also leads to specific type of malnutrition

Nutrition counselling and education during these (college) years is vigorous in order to communicate these students about their healthy dietary and lifestyle choices that may affect their overall health and wellbeing. Preserving their healthy eating habits in college is challenging task for them, various interventions also focused on nutrition counselling and education that can assist in reversing these trends of poor eating habits amongst college students.

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