



Examination of Body Mass Index, Health status and associated risk factors among Life Science Students: Cross-Sectional Study.

B.Arirudran^{1*}, G.Kumar², G.Sriram Prasath³, K.Gautam⁴, S.Tamilselvi⁵, C.Sharmi K.Sreenidhi⁶

^{1*} Assistant Professor of Biochemistry, Department of Biochemistry, ²Assistant Professor of Statistics, Department of Mathematics, ⁶Students, SRM Arts and Science College, Kattankulathur, Kanchipuram district, Tamil Nadu - 603203.

³Department of Biochemistry, Dwaraka Doss Goverdhan Doss Vaishnav College, (Autonomous), Arumbakkam, Chennai, Tamil Nadu, India - 600106.

⁴Assistant Professor, P.G. & Research Department of Microbiology, Asan Memorial College of Arts and Science, Chennai - 600100.

⁵Sri Sairam Siddha Medical College and Research Centre, Tamil Nadu, India- 600044.

(Received: 16 January 2025

Revised: 20 February 2025

Accepted: 20 March 2025)

KEYWORDS

Body mass index, Obesity, Over weight, Over nutrition, Nutritional imbalance,

ABSTRACT:

Introduction: Adolescents in India, comprising 21.4% of the population, frequently suffer from poor health due to unhealthy eating habits, with BMI being a crucial diagnostic tool. This article investigates the impact of determining body mass index, blood group, and sugar levels on life science students to raise awareness about healthy eating, behaviour, and weight maintenance.

Objectives: Body mass index is a valuable tool for diagnosing disorders caused by nutritional imbalance, undernutrition or over nutrition. Being underweight or overweight or obese is a desirable health condition and can have negative health consequences.

Aim: The present study was focused to determine body mass index, blood grouping, and sugar level among life science students and to assess the factors associated with it.

Methods: In this article the descriptive study was carried out among Life Science students of SRM Arts and Science College, from June 2022 to April 2023. Body mass index was calculated for 100 students including male and female. Blood samples were collected from the students and glucose levels were assessed before and after meals.

Results: In this article a total of 50 study population was considered for statistical analysis and the majority were between 17 and 23 years of age. The data classifies individuals into two weight status categories, healthy and overweight, based on their BMI values. The mean BMI values show some variation across these age groups. Mean \pm S.D values for 17, 18 and 19 Year-olds were 24.198 ± 0.724 , 23.310 ± 1.027 and 22.199 ± 0.418 respectively. They were healthy. Mean \pm S.D values for 20, 21, 22 and 23 year-olds were 25.293 ± 0.454 , 25.079 ± 0.621 , 25.349 ± 0.665 and 27.173 ± 0.097 respectively. They were overweight.

Conclusions: The rise in overweight people as they age is often due to irregular lifestyles, study stress, hormonal changes, and teenage psychology, which can lead to frequent eating habits. As a result, glucose concentration rises significantly, which is associated with higher BMI. Further analysis is required to find the exact cause of being overweight..

1. Introduction

Food provides essential nutrients that enhance and sustain a person's health. Adolescence is the period between childhood and adulthood. Its lifespan is 10 to 19 years. Adolescents constitute more than 21.4% of India's population. Improper eating habits can lead to poor health or malnutrition. BMI is a valuable tool for

diagnosing disorders caused by nutritional imbalances, undernutrition or over nutrition. Being underweight, overweight, or obese is not a desirable health condition and can have negative health consequences.^[1] BMI, calculated from weight and height, helps assess health. A BMI below 18.5 is underweight, 18.5-24.9 is normal, 25-29.9 is overweight, and 30 or above is obese. ^[2] BMI



values serve as reliable indicators of growth, health risks, diseases and obesity. Present study of this article focused on the determination of body mass index, blood group and sugar levels among life, science students to create awareness about healthy eating, behaviour and weight maintenance among students at critical stages of life. With them comes the potential to promote healthy living.

2. Methods

In this article, the study surveyed fifty individuals from Life Science students at SRM Arts and Science College, analysing their age, height, weight, body mass index, blood groups, and pre- and post- glucose levels were examined.

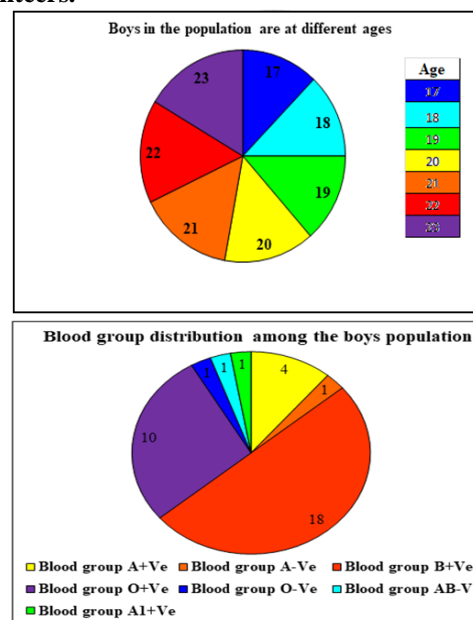
Laboratory tests include the collection of blood samples and determination of blood group: After cleaning with 70% ethyl alcohol, blood samples were collected on a clean slide from the left ring fingertip using a sterile lancet. Blood groups were determined on a single slide to reduce errors. The ABO and Rh (D) blood groups were identified using the slide method. A drop of blood from each person was placed in three spots on a glass slide, with one drop of antisera A, B, and D added to each spot. Each sample was gently mixed with a glass rod for 60 seconds, and agglutination results were observed and recorded immediately. Agglutination in the A spot showed group A, in the B spot showed group B, in both spots showed group AB, and no agglutination showed group O. For the Rh factor, agglutination meant Rh positive, and no agglutination meant Rh negative.

Body Mass Index Calculation: A relationship between age and BMI has been studied for many years.^[4] A random survey was conducted among adolescents between 18 and 25 years of age after obtaining prior approval from the Department of Biochemistry. This information was recorded using a well-structured proforma covering their lifestyle, family background, health, dietary habits, height and weight etc. BMI and BMI percentiles were calculated using the online BMI calculator for adolescents.^[2] The collected information was further analysed using scientific methods. Our approach uses units and dimensions carefully. International standards require mass to be measured in kilograms (kg), length or height in meters (m), and force or weight in Newtons (N). The term "kilopond" (= 9.80665 N) was used to refer to kg weight to avoid confusion.^[5]

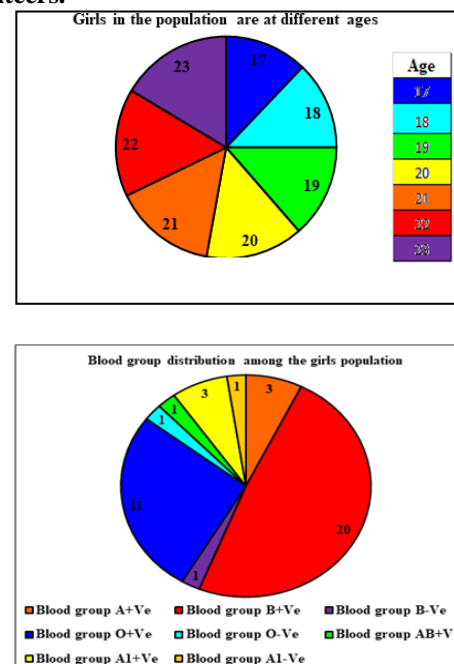
Statistical analysis: The particulars of each participant were recorded in a data collection sheet, and all statistical analyses were conducted using Microsoft Office Excel 2007 and represented as percentages.

3. Results

Pie diagram 1(a, b): Distribution of A, B, AB and O blood groups among different age groups of male volunteers.

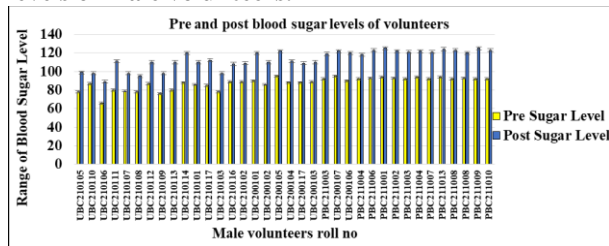


Pie diagram 2(a, b): Distribution of A, B, AB and O blood groups among different age groups of female volunteers.

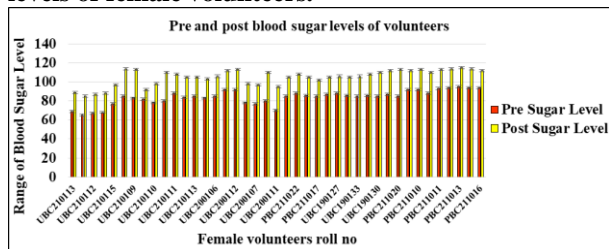




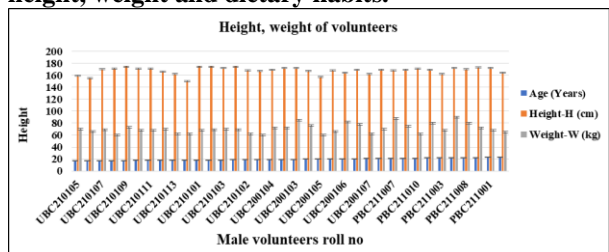
Graph 1: Distribution of pre- and post-blood sugar levels of male volunteers.



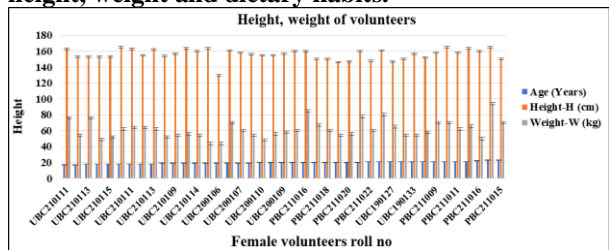
Graph 2: Distribution of pre- and post-blood sugar levels of female volunteers.



Graph 3: BMI of male volunteers with age-wise height, weight and dietary habits.



Graph 4: BMI of female volunteers with age-wise height, weight and dietary habits.



4. Discussion

Observation for age and blood groups: Statistical analysis of 50 individuals aged 17-23 revealed blood group, determined by inherited antigenic substances on red blood cell surfaces, identified using specific antibodies.^[6] In 1901, Landsteiner first discovered the ABO blood groups. The ABO system has four blood types: A, B, O, and AB, based on the A and B antigens on red blood cells. These blood types occur in different frequencies across populations worldwide. This system

is important because A and B antigens are highly reactive, antibodies (anti-A and anti-B) naturally occur in people who don't have the matching antigen. These antibodies can cause serious reactions if blood transfusions are mismatched.^[8] This study intended to recognize A, B, AB, O and Rhesus blood groups between students and enhance their understanding of blood collection and distribution systems. In this article the pie diagram 1 depicts the blood groups of different age groups of male volunteers. The study revealed that 20 students have B+ve blood group, 11 students have O blood group and few have A+ve. The pie diagram 2 depicts the blood groups of different age groups of female volunteers. The study found that 18 students have B+ blood group, 10 have O, and a few have A+ blood group. Identifying blood groups is important for safe transfusions, organ transplants, and is also useful in forensic medicine, genetic research, and anthropology. This article gives information about A, B, O, AB, and Rh blood groups and promotes awareness about safe transfusions and haemolytic diseases.

Observation for sugar levels: Normal blood glucose levels in humans are typically 70-100 mg/dL after more than eight hours of fasting, below 125 mg/dL in random measurements, and below 180 mg/dL two hours after eating.^[10] This study intended to determine and recognize the blood sugar levels and improve knowledge-based awareness about hyperglycemia and hypoglycemia among students. Graph 1 shows that the fasting blood sugar range for males in the age group of 17 to 23 was 66 mg/dL to 94 mg/dL, while their post-sugar level range was 89 mg/dL to 125 mg/dL. Graph 2 shows that the fasting blood sugar range for females in the age group of 17 to 23 is 67 mg/dL to 95 mg/dL, while the post-sugar level range was 85 mg/dL to 115 mg/dL. Pre- and post-diabetes sugar levels were found to be normal among the students, indicating that none had diabetes. If blood sugar levels are high, there are several ways to reduce them, including regular exercise, consuming more fiber-rich foods, staying hydrated, eating moderate portions, managing stress, getting enough sleep, and consuming foods rich in chromium and magnesium.

Observation for BMI: The data classifies individuals into two weight status categories: healthy and overweight, based on their BMI values. The public health community requires a precise definition of overweight and obesity to effectively design and monitor interventions. BMI, measured in kg/m², is the current metric for defining overweight and obesity, with an average recommended value of 21.7 for healthy individuals.^[11, 12] Undernutrition today is influenced by social practices, economic development, the value of girls, and eating habits. If poor nutrition lasts a lifetime, it can cause



health problems like anemia, osteoporosis, weak immunity, infertility, and type 1 diabetes. (<http://weightgain.lifetips.com/cat/61224/health-risks-of-being-underweight/index.html>). Overweight and obesity are serious health problems^[11, 13], and their prevalence has increased in recent decades, ^[13,14] both globally^[15] and nationally.^[12] They can lead to significant health issues with potentially substantial healthcare costs.^[12, 15] In this article the graph 3 shows that, in terms of dietary habits, the majority of male students are non-vegetarians. Regarding height, most male students are above 170cm tall. However, concerning weight, very few male students weigh more than 75kg. Early report says that higher BMI due to factors such as poor diet and lack of exercise.^[16, 17] It is recommended that students who engage in regular physical activity have better control over their BMI.^[18] Graph 4 shows that in terms of dietary habits, most of the female students are non-vegetarians. Regarding height, most of the female students are above 150 cm tall. However, in terms of weight, very few female students weigh more than 75kg. In adolescence requires a balanced diet rich in proteins, minerals, and vitamins for optimal energy levels. At the same time avoiding fatty non-vegetarian foods prevents obesity and heart diseases. ^[19] Nutrition education is deemed crucial for students.^[20] High body mass index is related to long-term health risks like obesity and cardiovascular disease.^[21] The mean BMI values exhibit some variation across these age groups. Mean \pm S.D values for 17, 18, and 19 year-olds were 24.198 ± 0.724 , 23.310 ± 1.027 , and 22.199 ± 0.418 , respectively, indicating that they are in a healthy range. Mean \pm S.D values for 20, 21, 22, and 23 year-olds were 25.293 ± 0.454 , 25.079 ± 0.621 , 25.349 ± 0.665 , and 27.173 ± 0.097 , respectively, suggesting that they are overweight.

5. Conclusion

The study showed that 20 male and 18 female students had B+ blood group, 11 male and 10 female students were universal donors, and a few had A+ blood group. The pre and post-sugar levels of students aged 16 to 25 were normal, showing that there were no diabetic patients. Obesity among students is increasing due to irregular lifestyles, academic stress, onset of the menstrual cycle, and adolescent psychology, leading to frequent eating habits. Consequently, there is a significant increase in glucose concentration associated with a higher BMI. Further analysis is required to determine the exact causes of overweight.

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