Original Article

Correlation of Exercise on Body Mass Index (BMI) among Birmingham University College Students, United Kingdom (UK)

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Abstract

Background: Obesity is increasing worldwide more than the undernutrition problem. Among students, maintaining health is essential, as this age group is vulnerable to lifestyle changes, sedentary habits, and poor diet choices. Physical activity plays an important role in regulating BMI and reducing the risk of obesity-related complications such as diabetes, cardiovascular disease, and mental health disorders.

Objective: This study aimed to investigate the correlation between physical activity and BMI among a specific college student in Birmingham, United Kingdom.

Methods: A descriptive type of cross-sectional study was conducted at the University College of Birmingham Sixth Form between July 2022 and June 2023. A total of 90 A-level students, randomly selected from 118 eligible participants, were enrolled. Data were collected using a semi-structured questionnaire and face-to-face interviews. Physical activity levels and sports participation were recorded alongside anthropometric measures for BMI calculation. Data were analyzed using SPSS version 22, applying descriptive and inferential statistics, including correlation coefficients.

Result: Sample was 90 students, the mean age of participants was 16.74 ± 0.59 years, with male being predominant 75 (83%). More than half of the students (54%) reported engaging in physical activities up to 18 days per month, while 16% had inconsistent workout routines. Football was the most popular sport 44 (50%), followed by cricket, with other activities including boxing and basketball. This was reflected in their BMI distribution, with 75 (83%) of students having a normal weight (18.5–24.9 kg/m^2), indicating an overall healthy nutritional status and here physical activities was positively associated with healthier BMI status in the study population.

Conclusion: The study found a positive correlation between higher levels of physical activity and normal BMI among students.

Keywords: Correlation of Exercise; BMI; College Students.

Introduction

Body Mass Index (BMI) is an anthropometric measure calculated as weight in kilograms divided by height in meters squared (kg/m^2), according to World Health Organization (WHO) standards.[1] It provides a simple index for classifying individuals as underweight, normal weight, overweight, or obese. Despite its wide application, obesity rates are increasing worldwide, highlighting a growing public health problem. Among college students, maintaining a healthy BMI is essential, as this stage of life often involves lifestyle transitions that influence diet, activity levels, and overall health.[2]

The extent of this issue is significant. Global evidence shows that obesity has nearly tripled since 1975, and young adults are particularly vulnerable due to sedentary behaviors and dietary shifts. In the United States, approximately (36%) of college students are overweight, while in China the prevalence is lower but rising steadily, reaching around (9%).[3] Within the United Kingdom, studies suggest that around (69%) of students

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fall within the normal BMI range, leaving 31% either underweight or overweight/obese.[4] These conditions pose health risks; obesity increases the likelihood of type 2 diabetes, cardiovascular disease, and poor mental health, while underweight status is linked to malnutrition, weakened immunity, eating disorders, and impaired academic performance. Physical activity is a key modifiable factor that influences BMI, yet many students fail to engage in sufficient levels to maintain healthy weight and fitness.

Although research has explored BMI and obesity trends globally, more studies need to examine the correlation between physical activity and BMI among college students in the UK. This gap makes it important to investigate the relationship in the context of Birmingham, a diverse student population where lifestyle factors vary.

This study aims to determine the correlation between physical activity and BMI among college students in Birmingham and to analyze how activity patterns relate to BMI categories.

Materials and Methods

Study design:

This research was designed as an observational, descriptive type of cross-sectional study conducted among college students.

Study Area:

The study was carried out at the University College of Birmingham Sixth Form, located at Weoley Park Road, Selly Oak, Birmingham, UK.

Study population:

The target population included all 118 students enrolled in years 12 and 13 at the Sixth Form.

Time period:

The study was conducted over a 12-months period, from July 2022 to June 2023.

Sample size and sampling method:

Using the formula Z^2pq/d^2 (Z=1.96, p=50%, q=100–p, d=9, 95% CI), the required sample size was calculated to be 118 students. However, a total of 90 students were successfully enrolled through simple random sampling (SRS) from the eligible 115 students.

Operational definition:

Correlation- It measures the direction and strength of the linear relationship between two quantitative variables.

Body Mass Index (BMI) is an anthropometric measure calculated as weight in kilograms divided by height in meters squared (kg/m^2)

Exercise- It is a physical activity that is planned, structured, and repeated for the goal of maintaining physical health, like different indoor and outdoor games.

Inclusion and exclusion criteria:

All students in years 12 and 13 were considered eligible. Students unwilling to participate were excluded.

Data collection instrument and procedure:

Data were collected using a self-designed semi-structured questionnaire. Information was obtained through face-to-face interviews during free intervals, ensuring minimal disruption to students' academic schedules. The questionnaire included sections on demographic information, physical activity habits, and anthropometric data (height and weight for BMI calculation). Physical activity was defined as voluntary movement involving skeletal muscles, including exercise and differents sports.

Data analysis:

All information was carefully collected and entered into SPSS version 22 for analysis. Descriptive statistics such as frequency, percentage, mean, median, mode, and standard deviation were calculated. Inferential statistics, including correlation coefficients, were used to examine the relationship between physical activity and BMI. Results were presented in tables with percentages.

Result

Table 1 shows that the majority of college students are male, with 75 students (83%) being male. In comparison, only 15 students (17%) are female. Overall, the study included 90 college students, indicating a clear gender imbalance in favor of male students.

Table 1: Gender Variation of College Students

Sex	Number (%)
Male	75 (83)
Female	15 (17)

The table indicates that 25(28%) students engage in physical activities every day in a month. The majority, 51(56%) students , participate in physical activities for up to 18 days in a month. A smaller proportion of students, 14(16%), perform physical activities irregularly. Overall, the findings show that most students participate in physical activities regularly, although not on a daily basis.

Table 2: Physical Activities of College Students

Physical activities done	Number (%)
Each day in a month	25 (28)
Up to 18 days in a month	51 (56)
Irregularly done	14 (16)

Table 3 summarizes the favourite games among the college students. Football was the most preferred game, reported by 40 (44.4%) students. Cricket was the second most preferred game, with 17 (18.9%) students, followed by basketball, which was preferred by 11 (12.2%) students. Boxing was preferred by 6 (6.7%) students, while table tennis and lawn tennis were each preferred by 1 (1.1%) student. Additionally, 14 (15.6%) students reported that they participated in physical activities irregularly. Overall, football was the most popular game among the college students.

Table 3: Favourite Games of College Students

Favourite games	Number (%)
Football	40 (44.4)
Cricket	17 (18.9)
Basketball	11 (11.2)
Boxing	06 (6.7)
Table tennis	01 (1.1)
Lone tennis	01 (1.1)
Physical activities done irregularly	14 (15.6)

The table depicts that the majority of college students, 75 (83%), have a normal weight according to their BMI. A total of 9 (10%) students is overweight, while 2 (2%) students are classified as obese. Only 4 (4%) students are underweighting according to their BMI. Overall, the findings indicate that most of the students have a normal nutritional status based on BMI.

Table 4: Nutritional Status According to Body Mass Index (BMI)

Nutritional status according to BMI	Frequency (%)
Obese (>30kg/m2)	02 (2)
Over weight (25-29.9 kg/m2)	09 (10)
Normal weight (18.5-24.9 kg/m2)	75 (83)
Under weight (<18.5)	04 (4)

The analysis using Kendall's tau correlation showed a statistically significant positive relationship between Body Mass Index (BMI) and physical activities among 90 students. The correlation coefficient between BMI and physical activity was 0.155, with a p-value of 0.038, indicating significance at the 0.05 level (two-tailed). This suggests that as physical activity increased, BMI tended to remain within the normal range. Similarly, the correlation coefficient between physical activity and BMI was further supported by another value of 0.220, also significant (p = 0.037). These findings confirm that higher engagement in physical activities was positively associated with healthier BMI status in the study population.

Table 5: Correlation Coefficient

			BMI	Physical activities
Kendall's tau (Ƭ)	BMI	Correlation coefficient	1.000	0.155*
		Significant (2-tailed)		0.038
		Number of students	90	90
	Physical activities	Correlation coefficient	0.155*	1.000
		Significant (2-tailed)	0.038	
		Number of students	90	90
	Physical activities	Correlation Coefficient	0.220*	1.000
		Significant (2-tailed)	0.037	
		Number of students	90	90

*Correlation is significant at the 0.05 level (2-tailed)

Discussion

This study set out to examine the correlation between physical activity and BMI among college students at the University College of Birmingham Sixth Form. These findings showed that increased physical activity tends to be associated with healthier BMI-that is, students who engage more in regular physical activity are less likely to be overweight or underweight-and that a minority (around 31%) have BMI outside the normal range (Table-4).

These results are broadly consistent with previous literature. The correlation coefficient between BMI and physical activity was 0.155, with a p-value of 0.038, indicating significance at the 0.05 level (Table-5). A Norwegian study, Physical Exercise and Body-Mass Index in Young Adults, found that overweight and obesity prevalence among university students increased when exercise frequency, intensity, and duration were low. Students who met higher exercise criteria had lower BMI values.[5] This aligns with our findings, suggesting that higher physical activity is associated with healthier BMI. Similarly, a UK observational cohort characterizing activity, lifestyle behaviours, and health outcomes of university students reported that about 32% of students were overweight or obese, with low physical activity and sedentary behaviour contributing significantly.[6] These UK data strengthen the inference that student populations in regions like Birmingham are likely to show similar correlations between activity and BMI (Table-5).

However, there are studies that complicate the relationship. A study among Chinese university students found that both underweight and obese students had poorer physical fitness indicators compared to normal-weight students. The relationship was not simply linear, showing U-shaped or inverted U-shaped associations.[3] This suggests that underweight status is also problematic, and activity-BMI correlations may vary across BMI categories. Additionally, a Belgian longitudinal study showed that male students gained more weight and BMI over 1.5 years than females, with baseline BMI and waist circumference predicting greater increases.[7] This indicates that gender, baseline BMI, and demographic factors may modify the relationship between activity and BMI.

Limitations

This study includes a cross-sectional design, which limits causal inference. It is unclear whether low physical activity leads to abnormal BMI or vice versa, or whether other confounding variables exist. Data were collected from a single location, limiting generalizability to all students in Birmingham or the UK. Seasonal variations, semester stress, exams, or pandemic effects during the 12-month study period may have influenced activity and BMI but were not controlled.

Conclusion

This study demonstrated a significant and positive correlation between physical activity and BMI among college students in Birmingham. Colleges should integrate structured physical activity programs into daily routines and raise awareness about the importance of balanced nutrition. Policies supporting active lifestyles-such as sports facilities, wellness campaigns, and flexible schedules-can motivate students.

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