



**Shikshan Prasarak Santha's  
Padmabhushan Vasantraodada Patil Mahavidyalaya  
Kavathe Mahankal  
DEPARTMENT OF STATISTICS**



**Case Study Report on  
“Effect of Exercise on Body Mass Index”**

**Submitted to  
Department of Statistics,  
P. V. P. Mahavidyalaya,  
Kavathe Mahankal**

**By  
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**As a partial fulfillment of the SEC-I (P): Practical on Data Analysis  
Using MS-Excel – I for B.Sc. II (Semester III)**

***Under the guidance of*  
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**2025-2026**

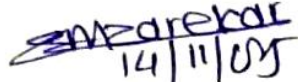
# CERTIFICATE

This is to certify that *Miss. Mane Vaishnavi Amrut, Miss. Mohite Pooja Kakaso and Miss. More Ravina Lahu* of B.Sc. II (Semester III), P. V. P. Mahavidyalaya, Kavathe Mahankal have successfully completed the case study report entitled “*Effect of Exercise on Body Mass Index*” based on SEC-I (P): Practical on Data Analysis Using MS-Excel – I, as prescribed by the curriculum of Shivaji University, Kolhapur, under my supervision and guidance during the academic year 2025 – 2026.



**Guide**

Department of Statistics  
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**Examiner's Signature**



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P. V. P. Mahavidyalaya,  
Kavathe Mahankal

**Place:** Kavathe Mahankal

**Date:** 10/11/2025

## DECLARATION

We hereby declare that the Case Study Report entitled “*Effect of Exercise on Body Mass Index*” submitted in partial fulfillment of the requirements of SEC-I (P): Practical on Data Analysis Using MS-Excel – I for B.Sc. II (Semester III) is our original work carried out under the guidance of Dr. A. M. Suryawanshi, Assistant Professor, Department of Statistics, P. V. P. Mahavidyalaya, Kavathe Mahankal.

We further declare that this report has not been previously submitted to any other university or institution for any other degree.

**Place:** Kavathe Mahankal

**Date:** 10/11/2025

<b>Sr. No</b>	<b>Seat No.</b>	<b>Name of the Student</b>
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**Abstract:**

Body Mass Index (BMI) is an important indicator of health, reflecting the balance between weight and height. This study examines the effect of regular exercise on BMI and overall well-being. By comparing BMI values before and after consistent physical activity, the research highlights how exercise frequency, duration, and type influence body weight regulation. The results emphasize that regular exercise helps maintain a healthy BMI, reduces health risks, and promotes both physical and mental well-being.

**Introduction:**

Body Mass Index (BMI) is a widely recognized measure used to evaluate whether an individual's body weight is appropriate for their height. It serves as an essential indicator of overall health status, helping to classify individuals as underweight, normal weight, overweight, or obese. Maintaining an ideal BMI is crucial for preventing lifestyle-related diseases such as cardiovascular disorders, diabetes, hypertension, and certain types of cancer. Both extremes—underweight and overweight—are associated with health risks that can significantly affect quality of life and longevity.

In recent years, the prevalence of overweight and obesity has risen globally due to sedentary lifestyles, unhealthy dietary habits, and reduced physical activity levels. Urbanization, technological advancement, and changes in work environments have contributed to prolonged sitting hours and minimal physical exertion, leading to an imbalance between calorie intake and expenditure. As a result, maintaining an optimal BMI has become a major public health concern.

Exercise plays a vital role in weight management by enhancing calorie expenditure, improving metabolism, and increasing lean muscle mass. Regular physical activity not only helps in controlling body fat but also boosts cardiovascular endurance, strengthens the musculoskeletal system, and supports mental health by reducing stress and anxiety. Moreover, incorporating different forms of exercise—such as aerobic workouts, strength training, yoga, and flexibility exercises—can lead to sustainable improvements in body composition and overall wellness.

This case study focuses on analyzing the effect of exercise on Body Mass Index (BMI) among individuals. It aims to explore how the frequency, duration, and type of exercise influence BMI changes over time. By comparing BMI values before and after consistent engagement in physical activities, the study seeks to emphasize the significance of regular exercise in maintaining a healthy weight and promoting a balanced lifestyle. Ultimately, the findings aim to raise awareness about the importance of physical activity as a key component of preventive healthcare and long-term well-being.

## **Objectives:**

- 1) To examine the relationship between exercise habits and BMI levels.
- 2) To compare BMI before and after regular exercise.
- 3) To assess whether the type and duration of exercise have a significant impact on BMI reduction.
- 4) To promote awareness about the importance of exercise in maintaining a healthy BMI and overall physical fitness.

## **Hypotheses:**

The null and alternative Hypotheses are:

H<sub>0</sub>: There is no significant effect of exercise on Body Mass Index (BMI) among individuals.

H<sub>1</sub>: There is significant effect of exercise on Body Mass Index (BMI) among individuals.

## **Methodology:**

A sample of 30 individuals was selected using the Simple Random Sampling method to ensure unbiased representation of the population. Data were collected through a Google Form, which included questions related to participants' age, gender, height, weight, and exercise habits such as frequency, duration, and type of physical activity.

The Body Mass Index (BMI) for each participant was calculated using the standard formula:

$$\text{BMI} = \text{Weight (kg)} / \text{Height (m)}^2$$

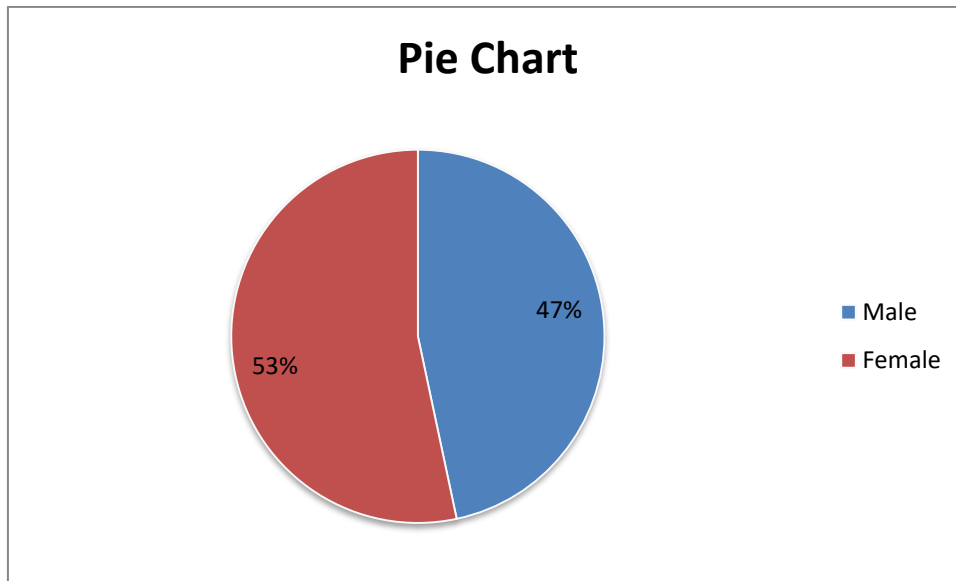
Participants' BMI values were recorded before and after a period of regular exercise to assess changes resulting from physical activity. The collected data were tabulated and analyzed using MS-Excel to determine the relationship between exercise patterns and BMI variations.

Descriptive statistics, such as mean and percentage change in BMI, were used to summarize the findings. The analysis aimed to highlight the effectiveness of regular exercise in maintaining or achieving a healthy BMI.

## Statistical Analysis:

### 1) Graphical representation:

#### A. Pie chart

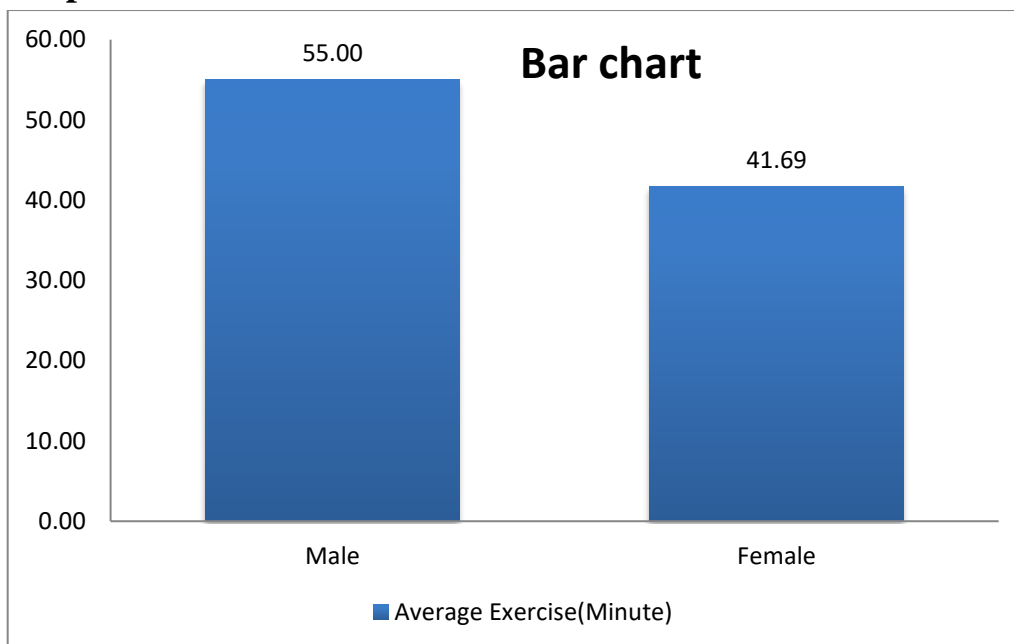


#### Interpretation:

The pie chart represents the gender distribution of a group. It shows that, 53% of the participants are female, 47% of the participants are male.

This indicates that the female population slightly exceeds the male population in the surveyed group. The difference of 6% suggests a fairly balanced but female-dominant distribution.

#### B. Simple bar chart

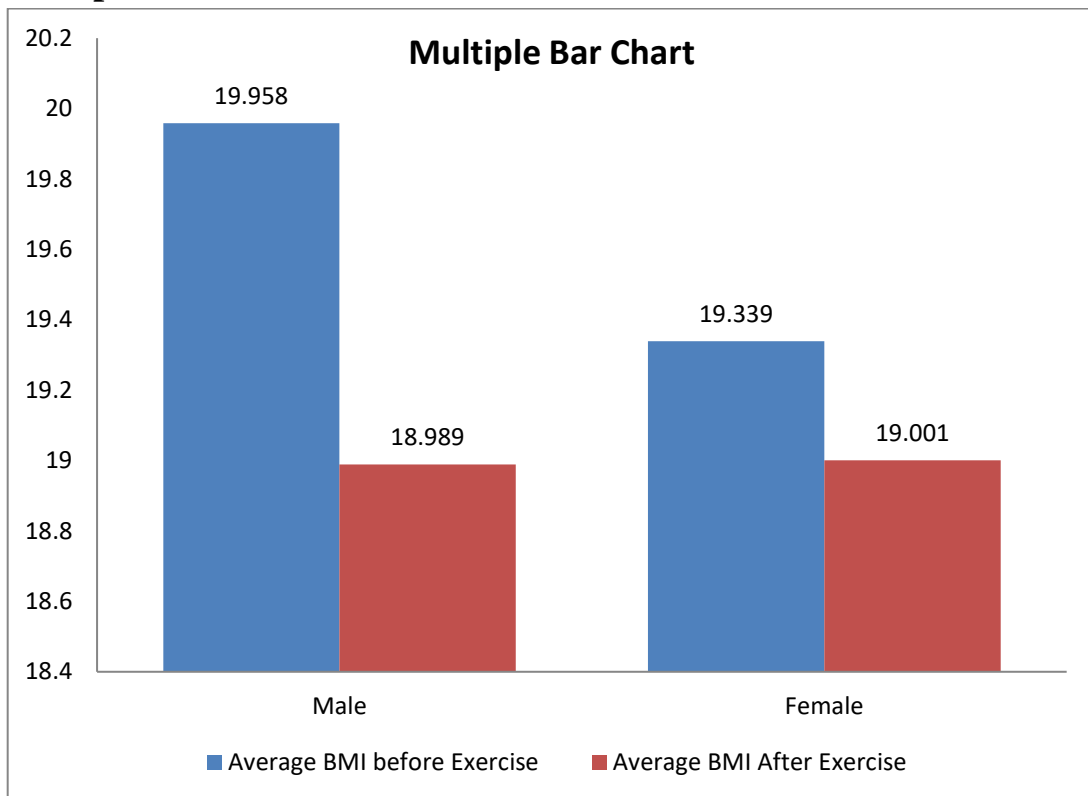


**Interpretation:**

The bar chart illustrates the average exercise duration (in minutes) per day among males and females. It is observed that males exercise for an average of 55 minutes per day, whereas females exercise for an average of 41.69 minutes per day.

This indicates that males spend more time on physical exercise compared to females, with a difference of approximately 13.31 minutes. Hence, males appear to be more engaged in regular physical activity than females in this sample.

**C. Multiple Bar chart**



**Interpretation:**

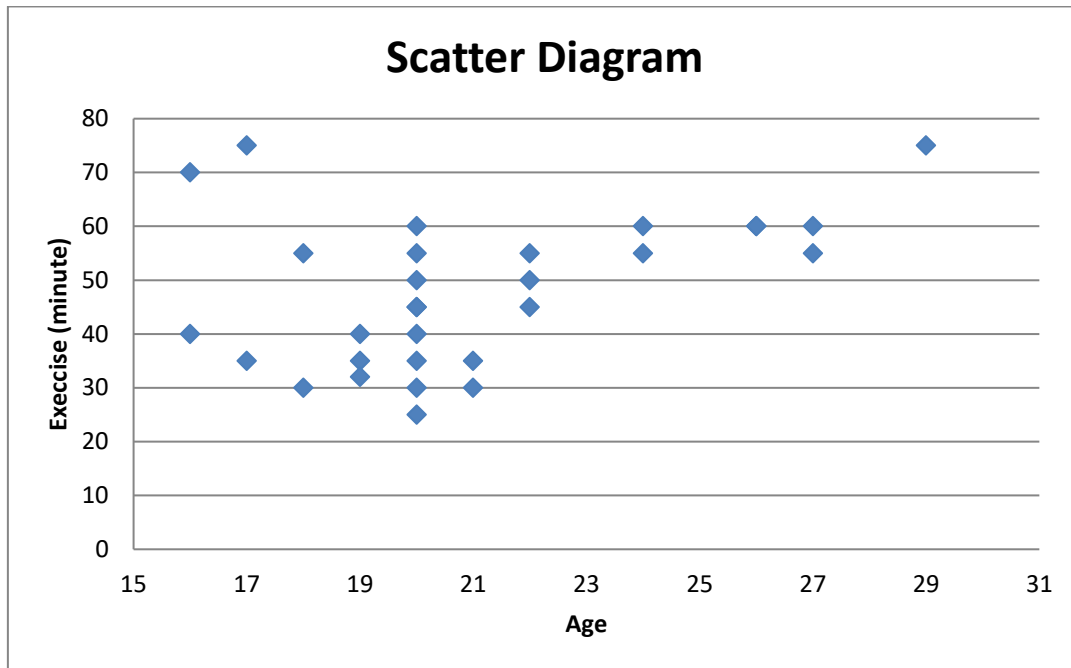
The multiple bar chart compares the average Body Mass Index (BMI) before and after exercise for both males and females. For males, the average BMI before exercise was 19.958, which decreased to 18.989 after exercise. For females, the average BMI before exercise was 19.339, which reduced to 19.001 after exercise.

This indicates that both males and females experienced a decrease in BMI after engaging in exercise, showing a positive impact of physical activity on maintaining a healthy body weight.

The reduction in BMI is slightly more pronounced in males than in females, suggesting that males showed a greater change in body composition due to exercise.

## D. Scatter diagram

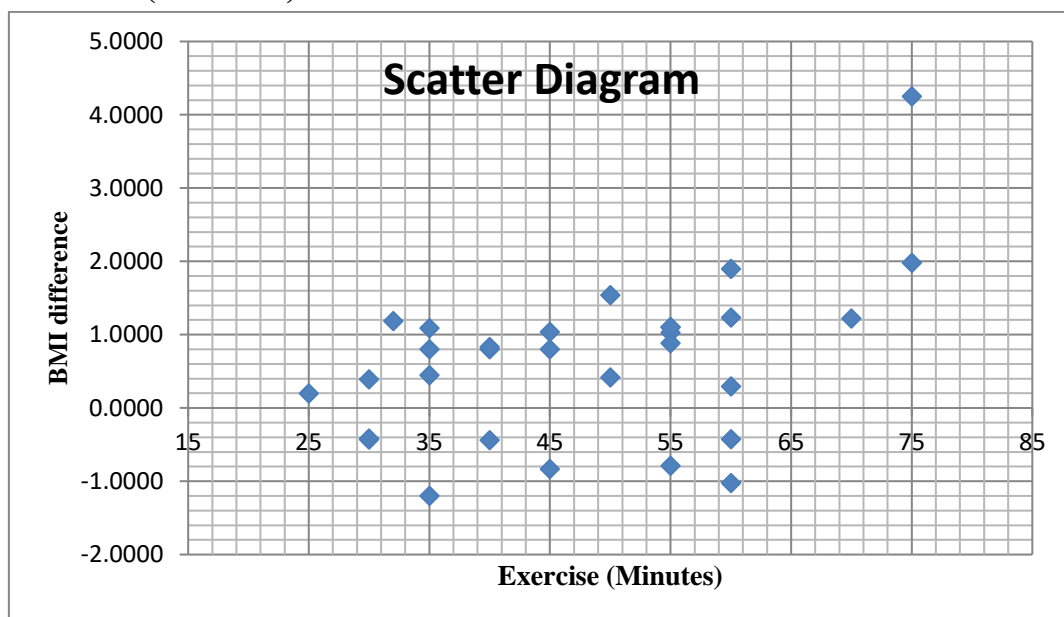
### i) Age Vs Exercise (Minutes)



### Interpretation:

The above scatter diagram indicates linear relationship between age and exercise duration. Exercise time varies across different age groups, with a slight tendency for older individuals to engage in longer exercise sessions.

### ii) Exercise (Minutes) Vs BMI difference



### Interpretation:

The scatter diagram shows the relationship between exercise duration (in minutes) and BMI difference. The data points are scattered without forming a clear upward or

downward pattern, indicating no strong correlation between exercise duration and BMI difference. While a few individuals with longer exercise durations show slightly higher BMI differences, the overall trend remains inconsistent.

**2) Descriptive Statistics: Mean, Median, Mode, Variance and Standard Deviation**

Measure	Excel Function	BMI Before Exercise	BMI After Exercise
Mean	=AVERAGE(BMI)	19.6276	18.9956
Median	=MEDIAN(BMI)	19.1204	18.7923
Mode	=MODE(BMI)	18.7305	20.9366
Variance	=VAR.S(BMI)	5.0170	3.0690
Standard deviation	=STDEV.S(BMI)	2.2399	1.7519

**Interpretation:** The descriptive statistics summarize the changes in BMI before and after exercise:

- ❖ The mean BMI decreased from 19.6276 to 18.9956, indicating a slight overall reduction in BMI following exercise.
- ❖ The median BMI also decreased from 19.1204 to 18.7923, confirming that the central tendency shifted lower after exercise.
- ❖ The mode changed from 18.7305 before exercise to 20.9366 after, suggesting that the most frequently occurring BMI value differed between the two conditions.
- ❖ The variance and standard deviation both decreased (from 5.0170 to 3.0690 and 2.2399 to 1.7519, respectively), showing that BMI values became less spread out after exercise.

**3) Comparative analysis:**

Paired t-test to compare BMI Before and BMI After Exercise.

A paired t-test was performed using Excel (T.TEST function).

Excel function: =T.TEST(BMI before, BMI after, two tailed, 1)

P-value = 0.00365

Significance Level ( $\alpha$ ) = 0.05

**Interpretation:**

Since p-value of paired t-test is less than 0.05 (significance level). Hence we reject the null hypothesis and conclude that there is significant effect of exercise on Body Mass Index (BMI) among individuals.

## Conclusions:

The analysis shows that exercise has a significant positive impact on BMI. Both males and females experienced a reduction in BMI after exercise, with males showing a slightly greater change. Descriptive statistics indicate decreased mean and variability in BMI, suggesting improved consistency in body weight. The paired t-test ( $p = 0.00365 < 0.05$ ) confirms that the reduction is statistically significant. Overall, regular exercise contributes effectively to maintaining a healthy body composition.

Therefore, Regular exercise, balanced nutrition, adequate sleep, stress management, and periodic health check-ups are essential for maintaining a healthy BMI and overall well-being. Individuals should also stay hydrated, avoid a sedentary lifestyle, and engage in recreational physical activities.

## References:

1. World Health Organization (WHO). (2020). Body mass index – BMI.
2. Centers for Disease Control and Prevention (CDC). (2022). About Adult BMI.
3. Mayo Clinic. (2021). Exercise: 7 benefits of regular physical activity.
4. Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, 100(2), 126–131.

## Questionnaire:

1. Name of participants: \_\_\_\_\_
2. Gender: Male Female
3. Age: \_\_\_\_\_ years
4. Height (m): \_\_\_\_\_
5. Weight before exercise (Kg): \_\_\_\_\_
6. Exercise duration (Minutes): \_\_\_\_\_
7. Weight after exercise (Kg): \_\_\_\_\_