International Journal of Multidisciplinary Horizon

ISSN:**3049-2017**
IJMH 2025; 2(5): 30-35

www.themultijournal.com
Received: 15-09-2025
Accepted: 26-09-2025
Publish : 27-09-2025

Dr. Vikram Singh
Assistant Director,
PE, Sports Office,
JNU, New Delhi – 110067

Dr. Surender Singh
Associate Professor,
PE, Kehsav Mahavidyalay,
University of Delhi

Dr. Rashmi Gupta
Asst. Professor,
Aditi Mahavidyalaya,
University of Delhi.

Dr. Parmod Kumar Sethi
Professor of Physical Education,
PGDAV College (E),
Delhi University

Correspondence:
Dr. Vikram Singh
Assistant Director,
PE, Sports Office,
JNU, New Delhi – 110067

Investigating The Use Of Ibm Spss Software To Analyze Yoga Research Data With A One-Sample T-Test

Dr. Vikram Singh, Dr. Surender Singh, Dr. Rashmi Gupta, Dr. Parmod Kumar Sethi

Abstract
The one-sample t-test is a fundamental statistical test used in research to compare the mean (average) of a single sample to a hypothesized population mean. It's particularly useful when you don't have data from a comparison group but want to see if your sample data deviates from a known or expected value.
This study explored the Body Mass Index (BMI) of individuals practicing yoga. SPSS software 25 step by step was used to analyze data from 60 participants (30 male, 30 female) with an average age of 22.6 years (SD = 1.88). A one-sample t-test compared their mean BMI (24.54, SD = 1.31) to a hypothesized average BMI of 25. The results showed a statistically significant difference ($p < .05$), suggesting the participants' BMI deviated from the hypothesized value. This initial analysis using SPSS paves the way for further research on how yoga practice might influence BMI.
Key words: SPSS, one sample t-test, Body Mass Index

I.Introduction:

Body Mass Index (BMI), is a fairly good indicator of health-related fitness that is calculated from weight and height. Some consider BMI as a crucial indicator of weight status and potential health risks associated with underweight, overweight, or obesity (World Health Organization, 2023). Analyzing BMI data holds significant value in public health research, allowing for the evaluation of weight management interventions, comparisons between populations, and testing of specific hypotheses related to body mass status.

One of the powerful statistical tools for analyzing BMI data is the one-sample t-test. This parametric test, readily available in software like SPSS (Statistical Package for the Social Sciences), is designed to compare the mean (average) BMI of a sample population to a predetermined, hypothesized mean value (Field, et al., 2021). The one-sample t-test plays a vital role in various research scenarios involving BMI, offering valuable insights:

- **Evaluating Intervention Effectiveness:** Researchers can leverage this test to assess the effectiveness of interventions aimed at modifying weight status. For example, a study might compare the pre- and post-intervention BMI of a group participating in a weight loss program. If the one-sample t-test reveals a statistically significant difference between the average BMI after the program and the hypothesized average BMI before the program (often national or regional averages), it suggests the intervention has a measurable impact on lowering average BMI (Cumming, 2009).
- **Population Comparisons:** The one-sample t-test facilitates comparisons between different population groups. Imagine a study comparing the average BMI of yoga asana athletes to a national average BMI. The test can determine if the average BMI of athletes deviates significantly from the hypothesized national average, providing insights into the weight status distribution within specific populations.
- **Hypothesis Testing:** This test allows researchers to test specific hypotheses about the average BMI in a sample. For instance, a researcher might hypothesize that the average BMI of a specific age group is higher than the national average. Conducting a one-tailed one-sample t-test (focusing on a specific direction of the difference) allows for testing this hypothesis (Pallant, 2020).

Table-1: Types of t-tests (for parametric and non-parametric data)

S. No.	Name	Parallel non parametric statistics
1.	Independent samples t-test	Mann Whitney U test
2.	Paired samples t-test	Wilcoxon Signed rank test
3.	One sample t-test	Sign test

By employing the one-sample t-test in SPSS on BMI data, researchers gain valuable insights into the central tendency (average) of weight status within a population and its potential deviations from a hypothesized standard. This knowledge can alert the local health and fitness authorities towards weight management. For instance, if research consistently reveals that public-school boys in the age group of 13 to 15 years have average BMIs significantly exceeding national norms, the school can inform the parents and guide them, bring syllabus changes to make room for physical exercises and yoga in the daily time table to improve the health status of these children.

Understanding how to conduct and interpret the results of a one-sample t-test for BMI analysis in SPSS empowers researchers to contribute to a deeper understanding of weight status trends within populations. The present research paper will delve into the practical steps involved in conducting this test, along with the interpretation of its key outputs, such as p-values and confidence intervals, to draw meaningful conclusions about the average BMI of a sample population using one sample t-test.

Objectives:

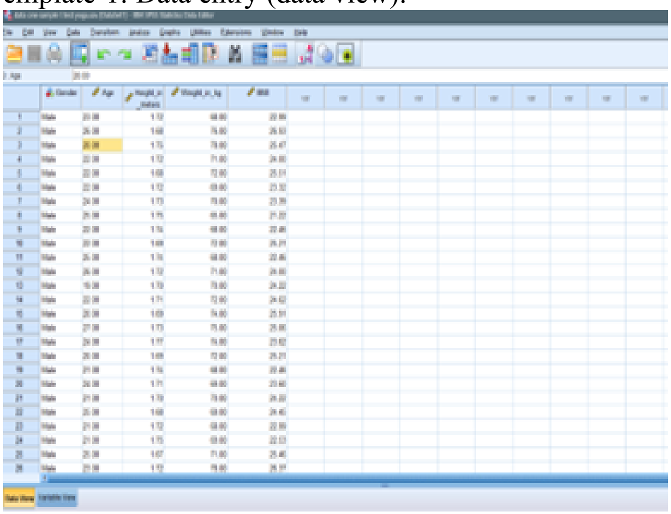
1. To learn about step-by-step application of SPSS 25 in data entry and commands
2. To analyze the data tables and interpretation of results
3. To compare the observed mean value of body mass index (BMI) with the hypothesized mean.

Hypothesis:

1. Null hypothesis (H_0) = The BMI mean shall not be significantly different than the hypothesized mean of 25.
2. (H_0) = Effect size will not be stronger for the observed mean as compared to the hypothesized mean.

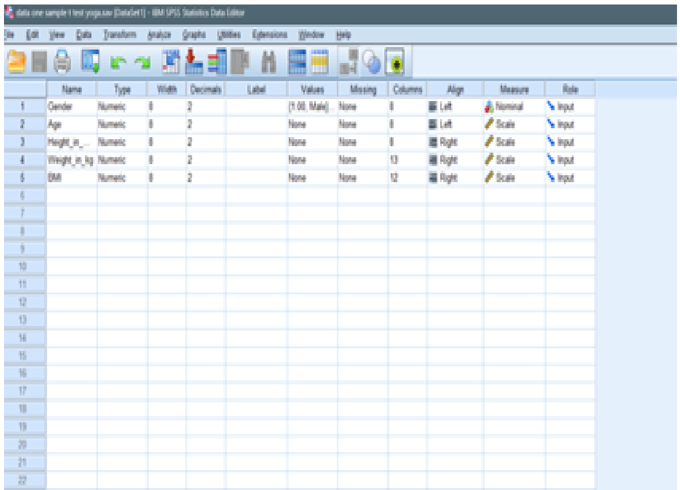
II. Methodology:

Template-1: Data entry (data view):

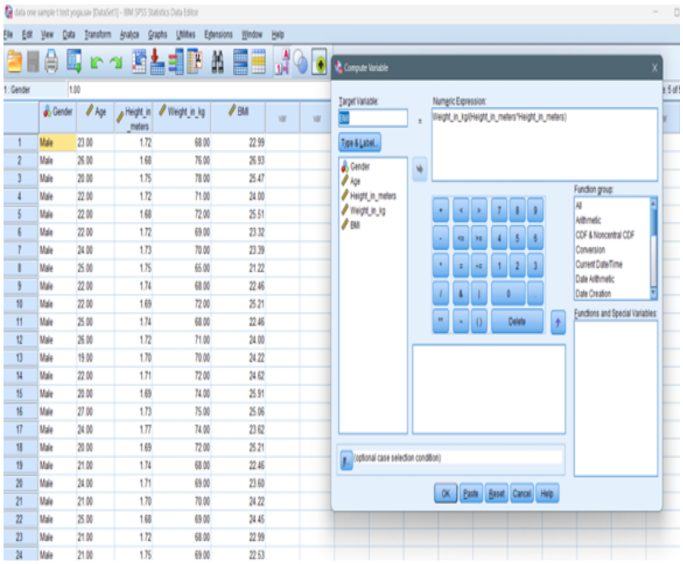


Define Variables: Make sure your data for BMI is a numeric variable. A numeric variable refers to data that represents quantities or numerical values. This means your Body Mass Index (BMI) data should be entered in the SPSS data sheet as numbers (e.g., 23.5, 18.2) and not as text characters (e.g., "Normal", "Overweight").

Template-2: Variable view

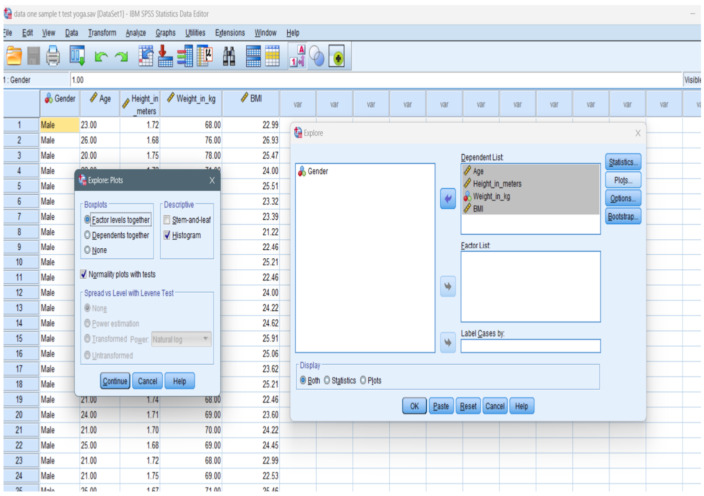


Template-3: For calculating BMI, Transform > compute variable

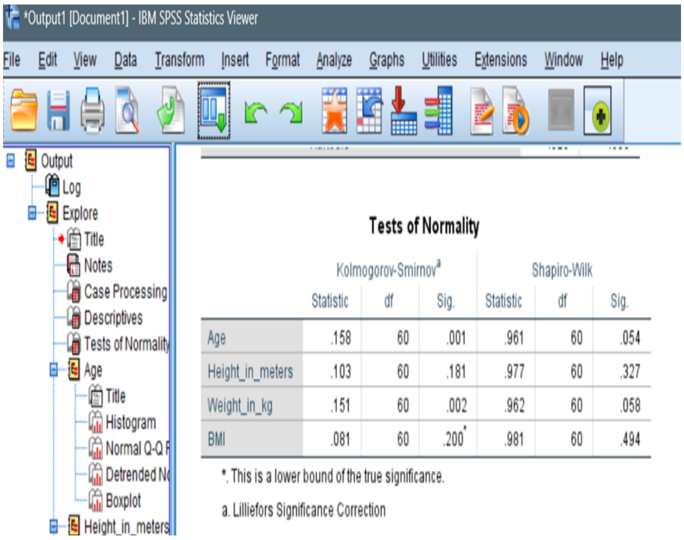


Checking data normality assumption: Make sure your data meets the assumptions of a t-test, such as normality of the residuals. You can explore data normality using plots (e.g., histograms) or normality tests.

Template -4: Analyze > descriptive statistics > explore



Template-5: Output for normality assumption: Shapiro - Wilk's test shall be considered

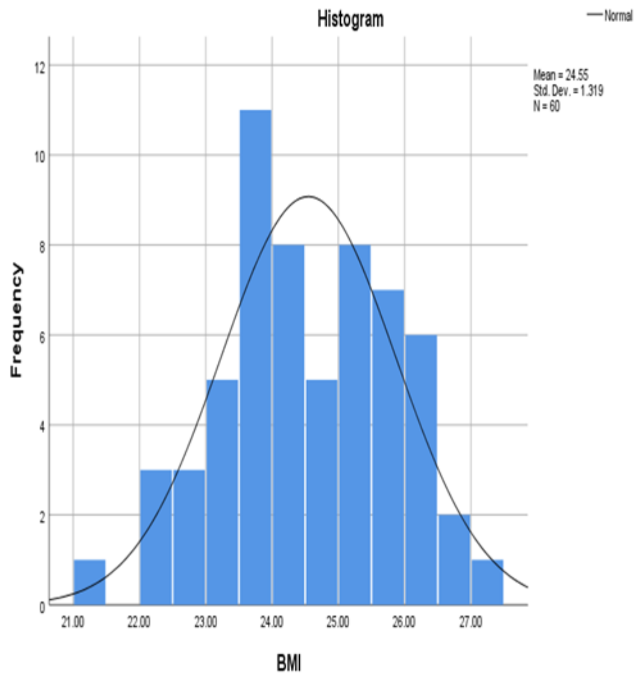


Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age	.158	60	.001	.961	60	.054
Height_in_meters	.103	60	.181	.977	60	.327
Weight_in_kg	.151	60	.002	.962	60	.058
BMI	.081	60	.200*	.981	60	.494

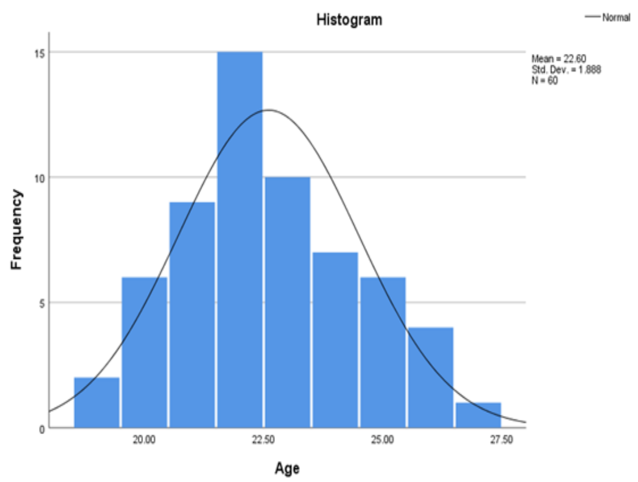
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

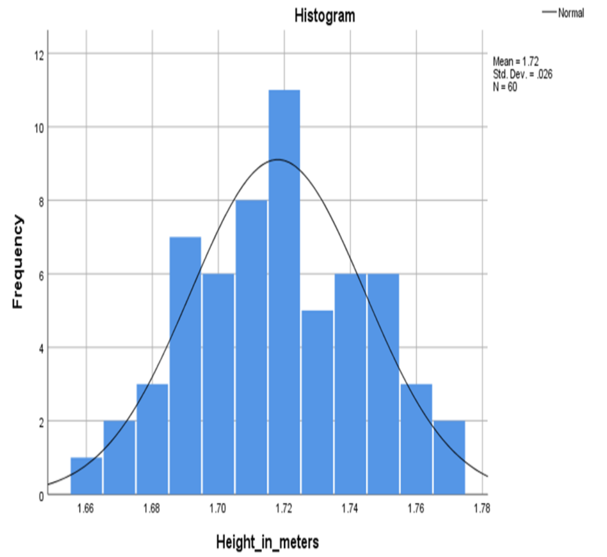


Graphs: Following visual outcomes to support the test of normality table above

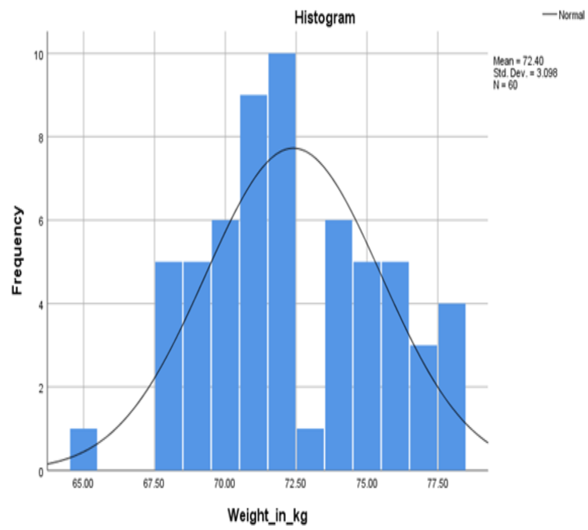
Age



Height_in_meters



BMI



III. Results and discussion:

Use descriptive statistics (e.g., mean, standard deviation) for BMI before running the test.
Analyze > descriptive statistics > descriptives

Table-2: Descriptives for BMI

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
BMI	60	21.22	27.22	24.5482	1.31857
Valid N (listwise)	60				

As also for the demographic variables, the data for which has been collected.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	60	19.00	27.00	22.6000	1.88841
Height_in_meters	60	1.66	1.77	1.7180	.02628
Weight_in_kg	60	65.00	78.00	72.4000	3.09839
Valid N (listwise)	60				

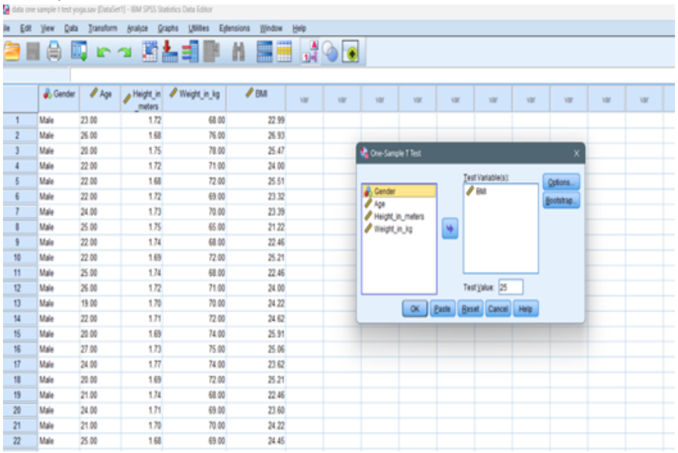
After checking that all the assumptions are being met, we shall follow the steps for performing a one-sample t-test for Body Mass Index (BMI) in SPSS:

Go to **Analyze** > **Compare Means** > **One-Sample T Test**.

Setting the Hypothesized Mean

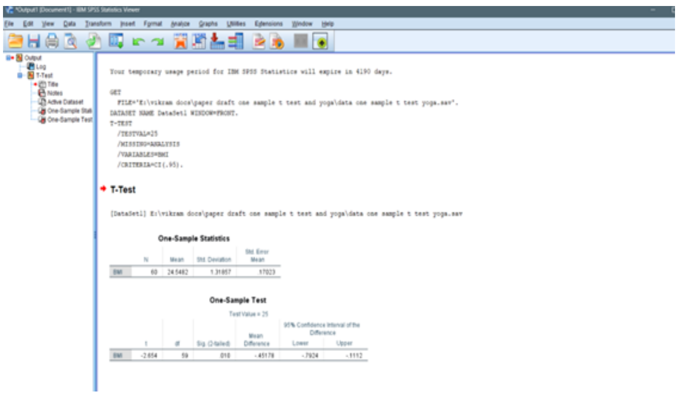
- By default, SPSS assumes a hypothesized mean of 0.
- If you have a specific hypothesized mean for BMI (e.g., 25 here in this example), enter that value in the "Test Value" box.

Template-6



Specify Variables: Transfer the variable containing your BMI data to the "Test Variable(s)" box.

Template-7



Options (Optional):

1. Click "Options" to specify additional settings if needed.
2. You can choose to display descriptive statistics for BMI.
3. You can also choose between a two-tailed or one-tailed test depending on your research question.

It is important to discus point number 3 above.In SPSS, both one-tailed and two-tailed t-tests are available for hypothesis testing, but they differ in what they aim to discover about your data (Body Mass Index or BMI in this case).

Two-Tailed Test (by Default in SPSS):

- This is the most common type of t-test used in SPSS (and often the default option).
- It tests whether the mean (average) BMI in your sample is **different** from a hypothesized value (e.g., national average BMI) in **either direction** (higher or lower).
- Imagine a bell curve representing the distribution of possible BMI values. A two-tailed test considers the **tails on both ends** of the curve, looking for deviations from the hypothesized mean in either positive or negative direction.

One-Tailed Test (Less Common):

- This test is used when you have a **specific prediction** about the direction of the difference.
- You can choose either a **left-tailed** test or a **right-tailed** test.
- A left-tailed test checks if the mean BMI is **lower** than the hypothesized value.
- Conversely, a right-tailed test checks if the mean BMI is **higher** than the hypothesized value.
- Here, you only consider **one tail** of the bell curve distribution, focusing on the specific direction you predicted.

Choosing Between One and Two-Tailed Tests:

- Use a **two-tailed test** if you're unsure about the direction of the difference or want to explore if the mean BMI deviates from the hypothesized value in either direction (higher or lower).
- Use a **one-tailed test** only if you have a **strong theoretical reason** to believe the mean BMI will be **higher** or **lower** than the hypothesized value.

Let's learn from an example from yoga field.

Scenario: A yoga studio owner believes that after a month of consistent yoga practice, the average BMI of their clients will be **lower** than their initial BMI. They want to statistically test this hypothesis using a one-tailed t-test.

Steps:

1. **Collect Data:** Measure the BMI of participants before and after a month of yoga practice.
2. **Import Data:** Enter the initial and final BMI values for each participant into SPSS.
3. **One-Sample t-Test:** Perform a one-tailed t-test (left-tailed) on the final BMI data with a hypothesized mean equal to the average initial BMI (assuming no change).
4. **Interpret Results:** SPSS will provide a two-tailed p-value. Divide this value by half to get the one-tailed significance level. If the one-tailed p-value is less than your chosen significance level (e.g., 0.05), you can reject the null hypothesis (average BMI remains the same) and conclude that there's evidence to suggest a decrease in average BMI after yoga practice. This is a hypothetical example to understand the one sample t-test. Real-world

5. research might involve a control group and more robust study design
6. **Two-Tailed vs. One-Tailed in this Example:**

- A two-tailed test would be appropriate if the studio owner wasn't sure whether yoga would increase or decrease BMI.
- The one-tailed test is used here because the owner has a specific prediction (decrease in BMI).

As shown in the template-7, SPSS has performed the one-sample t-test and provided output including:

- The test statistic (t-value)
- Degrees of freedom (df)
- Sig. (two-tailed p-value)
- Mean difference between your data and the hypothesized mean
- Confidence interval for the mean difference

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
BMI	60	24.5482	1.31857	.17023

One-Sample Test

	Test Value = 25					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
BMI	-2.654	59	.010	-.45178	-.7924	-.1112

Unlike SPSS 27 version, the SPSS Version 25 doesn't have the option to calculate the effect size. So, we will have to calculate the effect size manually or online. Lets first understand the meaning and importance of effect size.

In a one-sample t-test, the most common way to determine effect size is by calculating **Cohen's d**. This statistic expresses the difference between the observed sample mean ($\bar{x}$) and a hypothesized mean (μ_0) in units of the sample standard deviation (s).

We can Calculate Cohen's d by using the formula:

$d = (\bar{x} - \mu_0) / s$ .... a

It effectively captures the difference between the sample mean ($\bar{x}$) and the hypothesized mean (μ_0) relative to the variability within the sample (represented by the sample standard deviation, s). Common interpretations of Cohen's d values are:

- **Small effect:** $d \approx 0.2$
- **Medium effect:** $d \approx 0.5$
- **Large effect:** $d \approx 0.8$

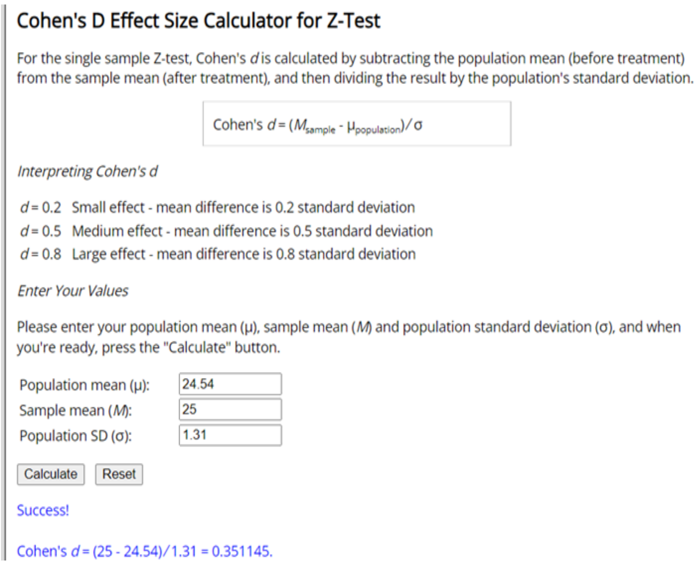
Cohen's d is appropriate when you have a normally distributed sample.

Putting the observed values in the equation -a above.

$d = (24.54 – 25)/1.31 = 0.351$

Alternately, we can use the following website: https://www.socscistatistics.com/effectsize/default2.aspx

Template -8



Writing the results:

A one-sample t-test was conducted to examine whether the mean body mass index (BMI) in the sample differed significantly from a hypothesized mean of 25.

Reporting the descriptive statistics and the test results:

The mean BMI in the sample was (M = 24.54, SD = 1.31) and was significantly lower than the hypothesized mean of 25, t (59) = -2.65, p = .01. We can, therefore reject the null hypothesis.

The effect size (using Cohen's d) was found to be 0.351, which is a small effect size. This suggests that the observed difference between the sample mean (24.54) and the hypothesized mean (25) is only about two-tenths of a standard deviation within the data.

In simpler terms, the effect of the observed variable (BMI) is relatively weak, despite the fact that there is a statistically significant difference ($p<.05$) that was observed between the observed and the hypothesized mean. It is important to note that, the practical significance of this small difference might be minimal as even a small effect size can make a huge difference in some one's health. We can, therefore, accept the second null hypothesis.

Note: It's important to discuss the above findings in the back drop of other such similar studies preferably from the last ten years' time period. For that the researcher can use some good artificial intelligence apps and websites.

1. https://www.researchrabbit.ai/
2. https://consensus.app/search/
3. http://shodh.inflibnet.ac.in:8080/jspui/advanced-search
4. https://elicit.com/users/auth?redirectToPath=

Conclusion: Based on the significant difference found in the one-sample t-test, we can conclude that the average Body Mass Index in the sample (M = 2.54) is statistically different from the hypothesized mean of 25.

References:

1. Cumming, G. (2009). Understanding the new statistics: Effect sizes, confidence intervals, and meta-analysis. Routledge.
2. Field, A. P., Miles, J., & Groves, D. R. (2021). Discovering statistics using SPSS (Australian edition). Sage Publications.
3. Pallant, J. (2020). SPSS statistics for social science research: A guide to data analysis using SPSS version 28. Routledge.
4. World Health Organization. (2023). [Body mass index - Healthy weight nutrition and physical activity]. who.int. Retrieved July 10, 2024.

5.https://www.socscistatistics.com/effectsize/default2.aspx

6. Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences (2nd ed.). Lawrence Erlbaum Associates.