THEORY FILE

AIM:- Biostatistical method in experimental pharmacology – Student T-Test.

INTRODUCTION

- Biostatistical methods in experimental pharmacology involve the application of statistical tools to design experiments, analyse data, and draw valid conclusions about drug effects. These methods help ensure reliability, minimize bias, and determine significance in drug testing.
- For analysis of data, we use T-test, ANOVA (Analysis of Variance), Regression.

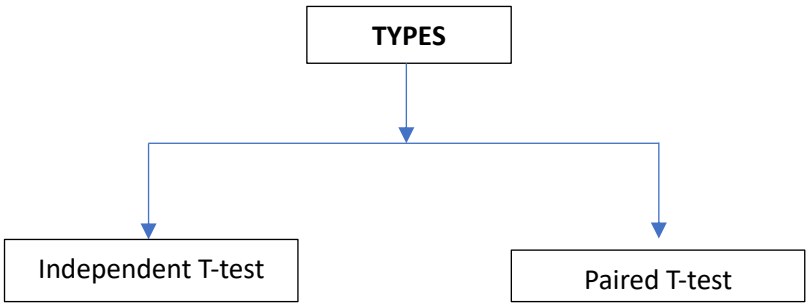
<u>STUDENT'S T-TEST</u> (Parametric Test)

Student's t-test is a statistical test used to compare the means of two groups and determine if they are significantly different from each other.

Purpose: Tests if the difference between two means is due to chance or statistically significant.

Used When:

- Sample size is small (usually n < 30)
- Population standard deviation is unknown



ASSUMPTIONS:-

- Population from which samples drawn is normally distributed.
- Samples are randomly selected.
- Group has equal variance.
- Used to compare only 2 sets of measurement
- Observations are independent

FORMULA:-

One-Sample T-Test

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

$\bar{x}$ = obersved mean of the sample
μ = assumed mean
s = standard deviation
n = sample size

INTERPRETATION

- Calculated t critical <Theoretical t- test statistic then **rejects null hypothesis.**
- Calculated t critical >Theoretical t- test statistic then **fails to rejects null hypothesis.**

EXAMPLE (Ref**:-** https://www.youtube.com/watch?v=l9T9-P6JInE)

A researcher wants to test whether the average height of sample of 30 male students is significantly different from the population average height of 175cm. The sample has an average height of 180cm and a standard deviation of 5cm.

To test the hypothesis that the average height of the sample is significantly different from the population average height of 175cm, we can use a one-sample t-test.

The null hypothesis (H0) is that the population mean is equal to 175 cm, while the alternative hypothesis (Ha) is that the population mean is different from 175cm.

We can calculate the t-statistic using the above-mentioned formula.
Sample mean =180 cm
Assumed mean =175 cm
Standard deviation = 5cm
Sample size = 30

T = (180 – 175) / (5 / √30)
= 5.48

The degree of freedom for this test is n-1
= 30 – 1

= 29

Using t-distribution table with 29 degrees of freedom and significance level of 0.05, we find the critical values to be ± 2.045.

Since our calculated t-value (5.48) is greater than critical value (± 2.045), we reject the null hypothesis. This means that there is sufficient evidence to suggest that the sample mean height is significantly different from the population mean height at a significance level of 0.05.

We can interpret this result as meaning that the sample of male students has an average height that is significantly greater than the population average height of 175cm.