**CHOLESTEROL ANALYSIS**

**Dataset:**

Sixty-five patients with high cholesterol were studied for eight weeks. These patients received one of the following three treatments: Lipitor, Zocor, or Placebo. In addition, each patient had their age recorded. Total cholesterol (mg/dL) was recorded for every patient at the beginning of the study and at eight weeks. Efficacy of their cholesterol treatment was assessed by the change from baseline (pre-treatment) in total cholesterol after eight weeks of treatment.

The objectives of the trial were to compare the efficacy of the three treatments and to determine if there was a relationship between the change in total cholesterol values (treatment effect) and age.

**Data Description:**

The description of the variables in the CHOLESTEROL datasets is provided in the table below.

|  |  |
| --- | --- |
| **Variable** | **Description** |
| Patient | Patient Number |
| PostCh | Total Cholesterol (mg/dL) after Eight Weeks of Treatment |
| PreCh | Total Cholesterol (mg/dL) at the Beginning of the Study |
| Treatment | Treatment Group Coded as 1 = Lipitor, 2 = Zocor, 3 = Placebo |
| Age | Age (years) at the Beginning of the Study |
| ChangeCh | Total Cholesterol after Eight Weeks of Treatment - Total Cholesterol at the Beginning of the Study |

Research Answers:

1. Null Hypothesis: (H0): Posttreatment Cholesterol = Pre-treatment Cholesterol

Alternative Hypothesis (H1): Posttreatment Cholesterol Pre-treatment Cholesterol

The changes in total cholesterol are statistically significant after eight weeks of treatment. The p-value (=0.00) is less than the alpha level (), which is considered as significant for the confidence interval of 99%. Based, on the p-value, we can reject our null hypothesis and support the alternative hypothesis. Hence, the result is that the changes in total cholesterol are statistically significant after eight weeks of treatment.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Paired Samples Test** | | | | | | | | | |
|  | | Paired Differences | | | | | t | df | Sig.  (2-tailed) |
| Mean | Std. Deviation | Std. Error Mean | 99% Confidence Interval of the Difference | |
| Lower | Upper |
| Pair 1 | Posttreatment Cholesterol - Pretreatment Cholesterol | -22.692 | 19.554 | 2.425 | -29.131 | -16.253 | -9.356 | 64 | .000 |

2. The mean changes in cholesterol after eight weeks are the different for the three treatment groups.

Null Hypothesis (H0): mean groups of treatment are same

Alternative Hypothesis (H1): At least one of them are different.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Multiple Comparisons** | | | | | | |
| Dependent Variable: ChangeCh | | | | | | |
| Tukey HSD | | | | | | |
| (I)  Treatment Group | (J)  Treatment Group | Mean Difference  (I-J) | Std. Error | Sig. | 99% Confidence Interval | |
| Lower Bound | Upper Bound |
| Lipitor | Zocor | -4.2333 | 3.70670 | .492 | -15.4430 | 6.9763 |
| Placebo | -36.5667\* | 4.06049 | .000 | -48.8462 | -24.2871 |
| Zocor | Lipitor | 4.2333 | 3.70670 | .492 | -6.9763 | 15.4430 |
| Placebo | -32.3333\* | 4.38583 | .000 | -45.5968 | -19.0699 |
| Placebo | Lipitor | 36.5667\* | 4.06049 | .000 | 24.2871 | 48.8462 |
| Zocor | 32.3333\* | 4.38583 | .000 | 19.0699 | 45.5968 |
| Based on observed means.  The error term is Mean Square(Error) = 164.876. | | | | | | |
| \*. The mean difference is significant at the .01 level. | | | | | | |

Tukey HSD ("honestly significant difference"): The p-value of two comparisons (i.e., Lipitor and Zocor) is higher than the significance level of alpha (0.01 or 99%). Based on the evidence, we cannot reject the null hypothesis and does not support the alternative hypothesis. Hence, the mean changes in cholesterol after eight weeks are the same for the three treatment groups.

3. Null Hypothesis (H­0): Age = 0

Alternative Hypothesis (H1): Age 0

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa** | | | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 99.0% Confidence Interval for B | |
| B | Std. Error | Beta | Lower Bound | Upper Bound |
| 1 | (Constant) | -49.194 | 14.233 |  | -3.456 | .001 | -86.999 | -11.389 |
| Age | 0.551 | .292 | .231 | 1.889 | **0.064** | -.224 | 1.326 |
| a. Dependent Variable: ChangeCh | | | | | | | | |

Chart, scatter chart

Description automatically generated

Regression Equation:

Where, Y(hate) is change in total Cholesterol.

Therefore,

The slope, , implies that for each increase in 1 year in age, then the value of change in total cholesterol estimated to increase by 0.551 mg/dL.

The p-value (=0.06) is higher than the significance level of alpha i.e., 0.01 or 99%. Based on the p-value, we cannot reject our null hypothesis and against the alternative hypothesis. Hence, the age is not statistically significant but there is a linear relationship between change in total cholesterol and age. The scatter plot tells that there is a linear relationship between the variables. The correlation between the variables is 0.2324, which is positive, however the strength is slightly weak. Hence, there is no significant relationship but there is a weak positive relationship between change in total cholesterol and age.

**Syntax**

Answer 1:

T-TEST PAIRS=PostCh WITH PreCh (PAIRED)

/CRITERIA=CI(.9900)

/MISSING=ANALYSIS.

Answer 2:

UNIANOVA ChangeCh BY Treatment

/METHOD=SSTYPE(3)

/INTERCEPT=INCLUDE

/POSTHOC=Treatment(TUKEY)

/PRINT DESCRIPTIVE

/CRITERIA=ALPHA(.01)

/DESIGN=Treatment.

Answer 3:

REGRESSION

/MISSING LISTWISE

/STATISTICS COEFF OUTS CI(99) R ANOVA CHANGE

/CRITERIA=PIN(.05) POUT(.10)

/NOORIGIN

/DEPENDENT ChangeCh

/METHOD=ENTER Age

/SCATTERPLOT=(ChangeCh ,\*ZPRED)

/RESIDUALS NORMPROB(ZRESID).