The current study consists of 100 patients for whom Garcinia Caplets have been prescribed and 8 variables were measured before and after consumption of the Caplets. These variables were Weight, Triceps, Subscapular, Midaxillary, Cholesterol, Triglycerides, HDL and LDL. Moreover, the BMI values were also calculated before and after the trial. The aim of the statistical analysis was to identify the presence of significant differences in the variables before and after the medicine was given to the patients. The paired t-test is a commonly used test to check if the mean of a dependent variable is the same in two related groups. In this case the dependent variables would be the 8 chosen variables and the two related groups would be before and after consumption of the medicine. The paired t-test has the following assumptions that need to be satisfied in order for the test results to be valid:

i. The dependent variable must be continuous.

ii. The independent variable must consist of two categorical related groups (or same subjects in both groups).

iii. There should be no significant outliers in the difference values between the two related groups.

iv. The distribution of the differences between the two groups should be approximately normally distributed.

The assumptions i. and ii. are satisfied by the current dataset. Assumptions iii and iv were checked for using STATA. In order to check for assumption iii, box plots of the difference values were plotted and checked for outliers. It was observed that the most of the variables showed a few outliers. Also, the assumption iv was checked by using the Shapiro-Wilk normality test for each of the variables. Since the Shapiro-Wilk normality test was also not significant for all the variables, variable transformation was done. All the difference variables were transformed to:

\[ \text{LOG}(Y + 1 - \text{MIN}(Y_p)) \]  

\( (1) \)

MIN\((Y_p)\) is the minimum value among the differences. The log transformation gives a better estimate of the distribution and presence of outliers in the difference variable. Therefore, box plots and shapiro wilk test was once again conducted for these transformed values. The assumptions were satisfied except for a few more failures, which were dealt with by removing either 5% or 10% of the lowest and highest end of the spectrum. Since the difference values satisfied the assumptions after transformation and data trimming, the paired t-test was done for the variables. The tests were evaluated at a 0.05 alpha level.

The summary of the results of the t-test have been displayed in Table 1.

| No of Observations | Variable     | Mean value Before | Mean value after | Difference | P-value  |
|--------------------|--------------|-------------------|------------------|-----------|----------|
| 100                | Weight       | 84.25             | 82.52            | -1.73     | <10^-4   |
| 100                | Triceps      | 27.67             | 25.53            | -2.14     | <10^-4   |
| 100                | Subscapular  | 32.16             | 30.83            | -1.33     | <10^-4   |
| 100                | Midaxilliar  | 31.26             | 30.01            | -1.25     | <10^-4   |
The paired t-test results showed that the mean value of all the 8 variables measured after giving Garcinia Caplets was lesser than the mean values measured before. The p-values for the mean difference being negative was less than $10^{-4}$ for all the cases. The same was verified with the help of box plots showing the before and after groups for the variables as shown in Figures 2 & 3. Corresponding tables depicting the results of statistical analysis for each of these 8 variables along with BMI values before and after the trial is shown below in Tables 2 – 10.

### Table 2a. Statistical analysis of initial weight (kg) for 100 subjects.

| Percentile | Weight | Percentile | Weight | Median | 85 |
|------------|--------|------------|--------|--------|----|
| 1%         | 78     | 75%        | 88     | Mean   | 84.2 |
| 5%         | 78     | 90%        | 89     | Std. Dev. | 4.14 |
| 10%        | 78     | 95%        | 89     | Skewness | -0.2124 |
| 25%        | 81     | 99%        | 90     | Kurtosis | 1.49 |

### Table 2b. Statistical analysis of final weight (kg) for 100 subjects.

| Percentile | Weight | Percentile | Weight | Median | 82 |
|------------|--------|------------|--------|--------|----|
| 1%         | 72     | 75%        | 87     | Mean   | 82.5 |
| 5%         | 72     | 90%        | 94     | Std. Dev. | 6.80 |
| 10%        | 73     | 95%        | 94     | Skewness | -0.17 |
| 25%        | 79     | 99%        | 95     | Kurtosis | 2.25 |

### Table 3a. Statistical analysis of initial skinfold measurement of triceps (mm) for 100 subjects.

| Percentile | Triceps | Percentile | Triceps | Median | 27.1 |
|------------|---------|------------|---------|--------|------|
| 1%         | 17.8    | 75%        | 32.2    | Mean   | 27.6 |
| 5%         | 19.0    | 90%        | 38.3    | Std. Dev. | 6.6 |
| 10%        | 19.9    | 95%        | 39.5    | Skewness | 0.46 |
| 25%        | 21.7    | 99%        | 42.7    | Kurtosis | 2.21 |

### Table 3b. Statistical analysis of final skinfold measurement of triceps (mm) for 100 subjects.

| Percentile | Triceps | Percentile | Triceps | Median | 24.6 |
|------------|---------|------------|---------|--------|------|
| 1%         | 15.8    | 75%        | 30.2    | Mean   | 25.5 |
| 5%         | 17.4    | 90%        | 36.3    | Std. Dev. | 6.6 |
| 10%        | 17.9    | 95%        | 37.7    | Skewness | 0.54 |
| 25%        | 19.7    | 99%        | 41.2    | Kurtosis | 2.28 |

### Table 4a. Statistical analysis of initial skinfold measurement of subscapular (mm) for 100 subjects.

| Percentile | Subscapular | Percentile | Subscapular | Median | 30.5 |
|------------|-------------|------------|-------------|--------|------|
Table 4b. Statistical analysis of final skinfold measurement of subscapular (mm) for 100 subjects.

| Percentile | Subscapular | Percentile | Subscapular | Median  |
|------------|-------------|------------|-------------|---------|
| 1%         | 22.0        | 75%        | 35.9        | Mean 32.2 |
| 5%         | 23.3        | 90%        | 43.1        | Std. Dev. 6.8 |
| 10%        | 24.5        | 95%        | 45.2        | Skewness 0.68 |
| 25%        | 26.7        | 99%        | 49.1        | Kurtosis 2.62 |

Table 5a. Statistical analysis of initial skinfold measurement of midaxillary (mm) for 100 subjects.

| Percentile | Midaxillary | Percentile | Midaxillary | Median  |
|------------|-------------|------------|-------------|---------|
| 1%         | 18.5        | 75%        | 36.9        | Mean 31.1 |
| 5%         | 21.3        | 90%        | 45.0        | Std. Dev. 8.4 |
| 10%        | 21.6        | 95%        | 46.4        | Skewness 0.58 |
| 25%        | 24.0        | 99%        | 50.2        | Kurtosis 2.22 |

Table 5b. Statistical analysis of final skinfold measurement of midaxillary (mm) for 100 subjects.

| Percentile | Midaxillary | Percentile | Midaxillary | Median  |
|------------|-------------|------------|-------------|---------|
| 1%         | 17.8        | 75%        | 35.5        | Mean 29.9 |
| 5%         | 20.2        | 90%        | 43.4        | Std. Dev. 8.2 |
| 10%        | 20.8        | 95%        | 44.7        | Skewness 0.57 |
| 25%        | 23.0        | 99%        | 48.4        | Kurtosis 2.20 |

Table 6a. Statistical analysis of initial measurements of serum triglyceride levels (mg/dL) for 100 subjects.

| Percentile | Triglyceride | Percentile | Triglyceride | Median  |
|------------|--------------|------------|--------------|---------|
| 1%         | 87.8         | 75%        | 142.0        | Mean 127.4 |
| 5%         | 96.5         | 90%        | 158.1        | Std. Dev. 20.3 |
| 10%        | 99.1         | 95%        | 161.2        | Skewness 0.17 |
| 25%        | 112.8        | 99%        | 170.8        | Kurtosis 2.36 |

Table 6b. Statistical analysis of final measurements of serum triglyceride levels (mg/dL) for 100 subjects.

| Percentile | Triglyceride | Percentile | Triglyceride | Median  |
|------------|--------------|------------|--------------|---------|
| 1%         | 75.9         | 75%        | 118.1        | Mean 107.4 |
Table 7a. Statistical analysis of initial measurements of serum cholesterol levels (mg/dL) for 100 subjects.

| Percentile | Cholesterol | Percentile | Cholesterol | Median | Std. Dev. | Skewness | Kurtosis |
|------------|-------------|------------|-------------|--------|-----------|----------|----------|
| 1%         | 108.0       | 75%        | 178.0       | Mean   | 162.2     | -0.35    | 2.79     |
| 5%         | 118.5       | 90%        | 195.5       | Std. Dev. | 26.9     |          |          |
| 10%        | 130.5       | 95%        | 212.5       | Skewness | -0.35    |          |          |
| 25%        | 141.0       | 99%        | 235.5       | Kurtosis | 3.14     |          |          |

Table 7b. Statistical analysis of final measurements of serum cholesterol levels (mg/dL) for 100 subjects.

| Percentile | Cholesterol | Percentile | Cholesterol | Median | Std. Dev. | Skewness | Kurtosis |
|------------|-------------|------------|-------------|--------|-----------|----------|----------|
| 1%         | 105.1       | 75%        | 173.2       | Mean   | 157.7     | -0.34    | 3.08     |
| 5%         | 115.2       | 90%        | 189.9       | Std. Dev. | 26.3     |          |          |
| 10%        | 124.8       | 95%        | 206.7       | Skewness | -0.34    |          |          |
| 25%        | 137.2       | 99%        | 229.1       | Kurtosis | 3.07     |          |          |

Table 8a. Statistical analysis of initial measurements of LDL levels (mg/dL) for 100 subjects.

| Percentile | LDL | Percentile | LDL | Median | Std. Dev. | Skewness | Kurtosis |
|------------|-----|------------|-----|--------|-----------|----------|----------|
| 1%         | 69.5| 75%        | 116.6| Mean   | 105.3     | 0.24     | 3.07     |
| 5%         | 75.3| 90%        | 127.3| Std. Dev. | 17.4     |          |          |
| 10%        | 84.3| 95%        | 136.3| Skewness | 0.24     |          |          |
| 25%        | 92.7| 99%        | 152.1| Kurtosis | 3.07     |          |          |

Table 8b. Statistical analysis of final measurements of LDL levels (mg/dL) for 100 subjects.

| Percentile | LDL | Percentile | LDL | Median | Std. Dev. | Skewness | Kurtosis |
|------------|-----|------------|-----|--------|-----------|----------|----------|
| 1%         | 64.6| 75%        | 111.9| Mean   | 100.6     | 0.20     | 3.04     |
| 5%         | 70.0| 90%        | 122.1| Std. Dev. | 17.1     |          |          |
| 10%        | 79.3| 95%        | 130.8| Skewness | 0.20     |          |          |
| 25%        | 88.3| 99%        | 146.0| Kurtosis | 3.04     |          |          |

Table 9a. Statistical analysis of initial measurements of HDL levels (mg/dL) for 100 subjects.

| Percentile | HDL | Percentile | HDL | Median | Std. Dev. | Skewness | Kurtosis |
|------------|-----|------------|-----|--------|-----------|----------|----------|
| 1%         | 23.2| 75%        | 42.2| Mean   | 38.0      | -0.11    | 3.00     |
| 5%         | 25.4| 90%        | 46.6| Std. Dev. | 7.0      |          |          |
| 10%        | 29.9| 95%        | 50.3| Skewness | -0.11    |          |          |
| 25%        | 33.2| 99%        | 55.5| Kurtosis | 3.00     |          |          |

Table 9b. Statistical analysis of final measurements of HDL levels (mg/dL) for 100 subjects.

| Percentile | HDL | Percentile | HDL | Median | Std. Dev. | Skewness | Kurtosis |
|------------|-----|------------|-----|--------|-----------|----------|----------|
| 1%         | 23.2| 75%        | 42.2| Mean   | 38.0      | -0.11    | 3.00     |
| 5%         | 25.4| 90%        | 46.6| Std. Dev. | 7.0      |          |          |
| 10%        | 29.9| 95%        | 50.3| Skewness | -0.11    |          |          |
| 25%        | 33.2| 99%        | 55.5| Kurtosis | 3.00     |          |          |
Table 10a. Statistical analysis of initial BMI levels (Kg/m²) for 100 subjects.

| Percentile | BMI  | Percentile | BMI  | Median  |
|------------|------|------------|------|---------|
| 1%         | 28.7 | 75%        | 38.4 | Mean    |
| 5%         | 30.6 | 90%        | 40.2 | Std. Dev. |
| 10%        | 31.5 | 95%        | 40.8 | Skewness |
| 25%        | 33.6 | 99%        | 43.2 | Kurtosis |

Table 10b. Statistical analysis of final BMI levels (Kg/m²) for 100 subjects.

| Percentile | BMI  | Percentile | BMI  | Median  |
|------------|------|------------|------|---------|
| 1%         | 28.1 | 75%        | 37.5 | Mean    |
| 5%         | 29.1 | 90%        | 40.7 | Std. Dev. |
| 10%        | 29.7 | 95%        | 41.7 | Skewness |
| 25%        | 32.1 | 99%        | 44.4 | Kurtosis |

Table 11. Ingredients of HCA extract.

| Ingredient                  | Composition (w/w) |
|-----------------------------|-------------------|
| Hydroxy Citric Acid         | 63 ± 3%           |
| Calcium                     | 23 ± 4%           |
| Free Citric Acid            | 4 ± 1%            |
| Lactone                     | 2 ± 1%            |
| Moisture                    | 8 ± 2%            |

STABILITY ANALYSIS OF THE GARCINIA CAPLET

The stability studies were conducted at different conditions up to 3 months. The table given below reports the colour changes (if any), disintegration time, loss on drying, hardness, total HCA content, TLC fingerprint, total viable aerobic count and total yeast and mould count in the caplet for different storage time points upto 3 months. All the measured values were within the specified limits.

Table 12. Stability study for a particular batch of Garcinia caplets.

| Parameter | Limits  | 60 °C | 50 °C |
|-----------|---------|-------|-------|
|            | 0       | 7 days| 15 days| 30 days| 1M | 2M | 3M |
| Description | Light brown to brown coloured caplets | Complies | Complies | Complies | Complies | Complies | Complies |
| Disintegration Time (minutes) | NMT 60 | 13min 12secs | 11min 53secs | 12min 04 secs | 12min 04secs | 18min 11secs | 14min 20secs | 13min 50secs |
|-----------------------------|--------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Loss on drying (%w/w)       | NMT 6.0 | 5.3          | 5.07         | 5.21         | 5.19         | 5.13         | 5.01         | 5.06         |
| Hardness (kg/cm²)           | NLT 3  | 5.5-6.5      | 5            | 5            | 4            | 6            | 5            | 6            |
| Assay – Total Hydroxy Citric acid (%w/w) | NLT 84% | 100          | 90.31        | 93.15        | 89.68        | 96.38        | 95.50        | 96.32        |
| TLC Fingerprint             | The fingerprint of the sample should match with the standard | Complies | Complies | Complies | Complies | Complies | Complies | Complies |
| Total Viable Aerobic Count (cfu/g) | NMT 10000 | 30           | Not done     | Not done     | <10          | <10          | <10          | <10          |
| Total Yeast and Mould Count (cfu/g) | NMT 1000 | 10           | Not done     | Not done     | <10          | <10          | <10          | <10          |

NLT: Not Less Than; NMT: Not More Than; TLC: Thin Layer Chromatography.
Figure S1. Schematic of metabolic network in Hepatocytes\(^1\).
Figure S2. Box plots representing changes in Body Mass Index (kg/m²) in population due to HCA - Initial- 33.56, 35.45, 38.43; final- 32.07, 34.39, 37.52. Initial and final (measurements taken after 90 days of study) box plots are shown with labels ‘0’ and ‘1’ respectively on the x axis. Values for each box plots are given in the order – Lower Quartile, Median and Upper Quartile respectively.

References

1. Somvanshi, P. R., Patel, A. K., Bhartiya, S. & Venkatesh, K. V. Influence of plasma macronutrient levels on hepatic metabolism: role of regulatory networks in homeostasis and disease states. RSC Adv. 6, 14344–14371 (2016).