 doi:10.20944/preprints202010.0445.v1

Effect of Garcinia Cambogia and Green Coffee Bean in Weight Reduction

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 doi:10.20944/preprints202010.0445.v1

Abstract

Introduction:

Various studies have widely documented how weight (being overweight, underweight or obese) plays a significant role in increasing health problems and adversely affects the quality of life. Out of all the weight-related issues, obesity is the number one contributing factor for causing health problems. To overcome this factor, a trial was conducted where a drug 'Lite plus' (Garcinia Cambogia and Green Coffee bean) was given to a select number of people for a period of three months.

Materials and Methods:

'Lite Plus' is a drug which contains Garcinia cambogia 500 mg + Green Coffee Bean Extract 400 mg, with a recommended dosage of 2 tablets/day with or before meals for 3 months. Most of the patients included in our study were females suffering from obesity-related problems such as PCOs and Infertility. During the trial, all patients were given the recommended dosage of 'Lite plus', while those with diabetes had the dose amended accordingly.

Results:

As a result of this trial, it was found that the use of 'Lite Plus' was very effective in decreasing weight/BMI with continuous use. After 6 weeks, out of the 250 respondents participating in the trial, 232 got a reduction in their BMI, and after 12 weeks (end of the trial), 29 respondents (11.6%) reached the desired level of BMI.

Conclusion:

Garcinia cambogia and Green Coffee bean are effective and safe in weight reduction.

Keywords:

Garcinia cambogia, Green Coffee bean, Pakistan, Weight loss, Obesity

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Introduction

The Body Mass Index (BMI) is directly related to the bodyweight of a person, and therefore an increase or decrease in body weight results in an increase or decrease of the BMI, respectively. For clarity, we shall use the WHO's criteria for categorizing based on weight. According to the World Health Organization (WHO), an adult with a Body Mass Index (BMI) between 18.5 and 24.9 is considered to have a healthy weight, while those having a BMI value below 18.5 are considered underweight, those with a BMI value between 25 and 29.9 are considered overweight, and an adult with a BMI of 30 or more is considered obese [1]. This trial focuses on people falling under the two latter categories, i.e. overweight and obese.

Excessive weight gain is a serious health concern globally. Obesity has been a documented risk factor of chronic diseases like Hypertension, Type II Diabetes, Cardiovascular disease, Polycystic Ovarian Syndrome (PCOS) and Infertility. According to the National Nutrition Survey 2018 (NNS), the prevalence of overweight and obese women is increasing in Pakistan. In 2011, 28% people were reported to be overweight and obese; however, the percentage rose to 37.8 in 2018 [2].

To combat this increasing prevalence, several medicines and weight loss treatments are available. Our trial is based on the use of organic products like Garcinia cambogia and green coffee bean extract to achieve weight loss. Garcinia cambogia, previously known as Gummi gata, is a South-East Asian fruit found in countries like India and China. It is popularly used as a culinary ingredient for flavouring and preservation, but it has some therapeutic uses as well. It has been used as a treatment for constipation, piles, rheumatism, oedema and irregular menstrual cycle [3]. Furthermore, studies have revealed that Garcinia cambogia has a prominent role in weight reduction. It has various phytochemicals such as terpenes, flavonoids and polyisoprenylated, benzophenone derivatives like garcinol, and xanthochymol. [4]. But the major constituent of Garcinia cambogia that plays an important role in weight loss is α-, β-dihydroxy tricarboxylic acid (HCA) [5]. HCA inhibits the activity of ATP Citrate Lyase enzyme which causes the catalysis of mitochondrial cleavage of citrate to oxaloacetate and acetyl-coenzyme A (Acetyl-CoA), which is the building block of fatty acid synthesis citrate to Acetyl-CoA [6].

Coffee, native to Brazil, [7] contains several organic compounds such as caffeine, trigonelline and free sugars. Out of these organic compounds, Chlorogenic Acid, which is a major constituent of unroasted [8] and green coffee beans, is a great subject of interest to us. Studies reveal that chlorogenic acid enhances hormonal secretion as well as inhibits the conversion of Glucose 6 phosphate to glucose in the presence

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of hepatic glucose-6-phosphatase, which is a rate-limiting enzyme involved in gluconeogenesis, consequently aiding weight loss. [9, 10].

Methods

Our study consisted of 250 respondents, and the duration of the study was 12 weeks (3 months). Most of the respondents included in the trial were females who were unable to conceive due to having PCOS and were overweight. At the beginning of the trial, the height (feet) and weight (kg) of every respondent were noted. For the treatment of obesity "Lite Plus" tablet was given to the respondents. "Lite Plus" consisted of a mixture of Garcinia Cambogia and Green Coffee Bean Extract as under:The quantity of Garcinia Cambogia extract was 500 mg whereas, the amount of Green Coffee Bean Extract was 400 mg, respectively. The prescribed dosage of 'Lite Plus' was 2 tablets taken daily with or before meals for 3 months, while the dosage was amended accordingly for patients who were diabetic. Weekly changes (12 weeks) in the weight of every respondent were noted.

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki. IRB approval was taken from Jinnah Post Graduate Medical Center and approval number of JSMU/18/29-A.

To investigate the statistically significant changes in weight, analysis of variance (ANOVA) technique was applied. Least Significant Different (LSD) test at 5% level of significance was used to check the significant differences among weekly means regarding weight and body mass index of the respondent.

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Results

Height

Height of the 250 respondents was taken for calculation of body mass index (BMI). The height of respondents was ranged from 4.00 feet to 6.00 feet. The average height of the respondents was found 5.33 feet with standard deviation of 0.272 feet. The histogram of height of the respondents was also drawn as figure 1

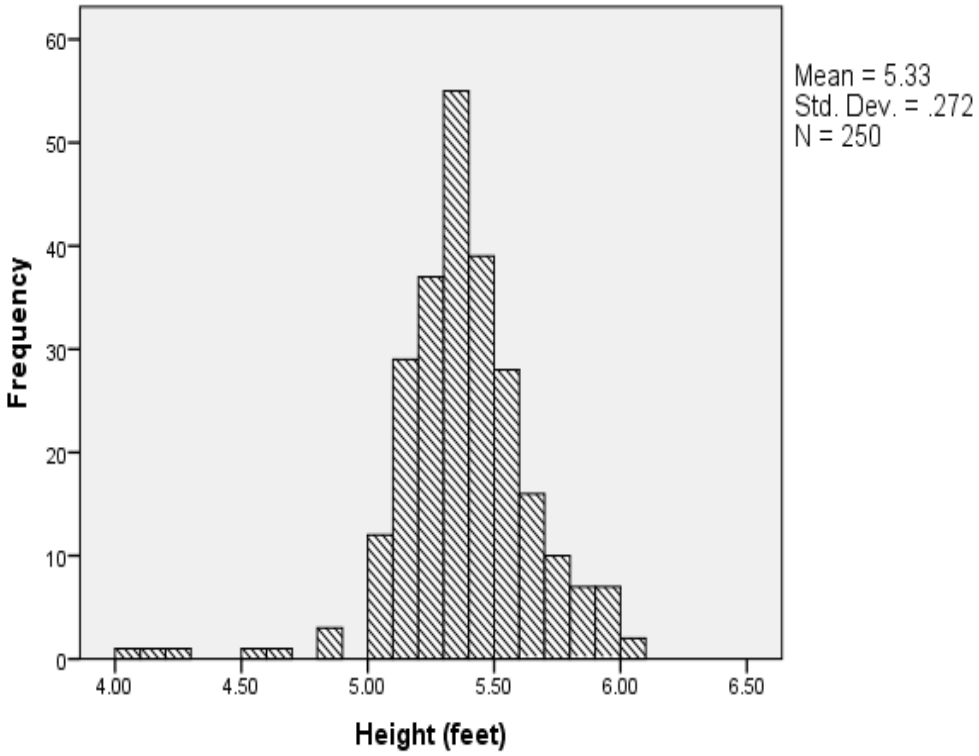

Figure 1: Histogram for height of 250 respondents

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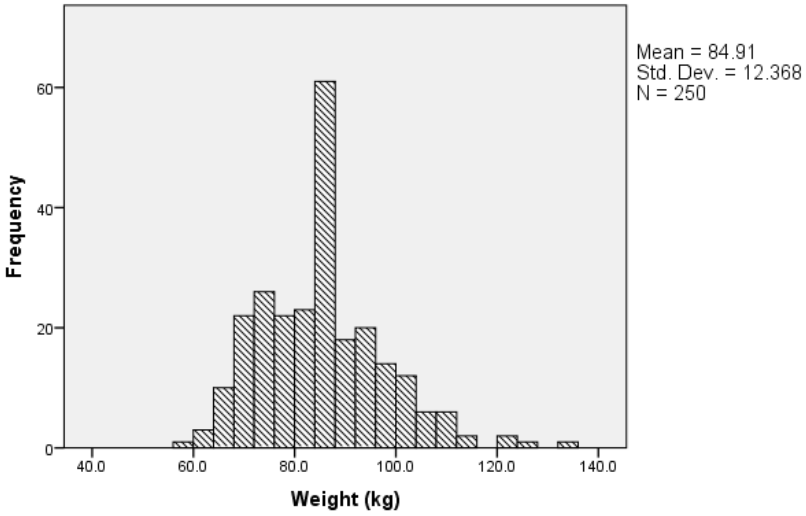
Weight

Descriptive statistics (number of observations, minimum, maximum, mean, standard deviation and standard error) for weight of 250 respondents on weekly basis are given in Table 1B. It was observed from the table that at the 1st week, minimum value of weight was 58.0 kg and maximum value was 135.0 kg with mean value of 84.91 kg (figure 2).

The histogram of weight of 250 respondents at 1st week was as under:



Histogram for weight of 250 respondents at week 1

The analysis of variance (ANOVA) table 1, which indicates that weekly body weight was highly significant (P<0.01) for different weeks by using "Lite Plus" tablets.

Table 1: Body weight of respondents

(A) Analysis of variance table

Source of variation	Degrees of freedom	Mean Square	F	Sig.
Week	11	1900.89	13.1**	0.000
Error	2864	145.28		
Total	2875			

** = Highly significant (P<0.01)

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It is cleared that with increase in week, average weight of the respondents weekly decreased during the study period. Maximum mean weight (84.91 kg) was found at 1st week of the study, which statistically remains same from week 2 to week 3. At week 4, the average weight (82.24 kg) decreased significantly as compared to week 1 (84.91 kg). From week 4 to week 6, statistically no decrease in weight was found but at 7th week, average weight of 79.95 kg was observed which was statistically different (decreased) from 4th week. For the last 3 weeks, i.e., from week 10 to week 12 weight (77.68 kg, 76.92 kg and 76.09 kg, respectively) remains same statistically at 5% level of significance but different and less than from week 1 to week 7 (table 2).

(B) Descriptive statistics for weight of the respondents.

Week	N	Min	Max	Mean	SD	SE
w1	250	58.0	135.0	84.91 a	12.368	0.7823
w2	250	57.0	135.0	84.06 ab	12.407	0.7847
w3	250	56.0	134.0	83.14 abc	12.388	0.7835
w4	250	55.0	133.0	82.24 bcd	12.369	0.7823
w5	250	54.0	132.0	81.25 cde	12.335	0.7801
w6	248	53.0	128.0	80.45 def	12.295	0.7808
w7	242	56.0	125.0	79.95 ef	11.959	0.7688
w8	240	55.0	120.0	79.10 fg	11.887	0.7673
w9	229	54.0	119.0	78.64 fg	11.658	0.7704
w10	224	54.0	117.0	77.68 gh	11.607	0.7755
w11	222	53.0	117.0	76.92 gh	11.580	0.7772
w12	221	53.0	116.0	76.09 h	11.522	0.7750

Min = Minimum value, Max = Maximum value, SD = Standard deviation, SE = Standard

The graphical presentation of the weekly change in average weight due to use of "Lite Plus" was given in Figure 3 and Figure 4 in the form of Box plot and Line plot, respectively. From these figures, it was also seen that with increase in time (weeks), the body weight was continuously decreased.

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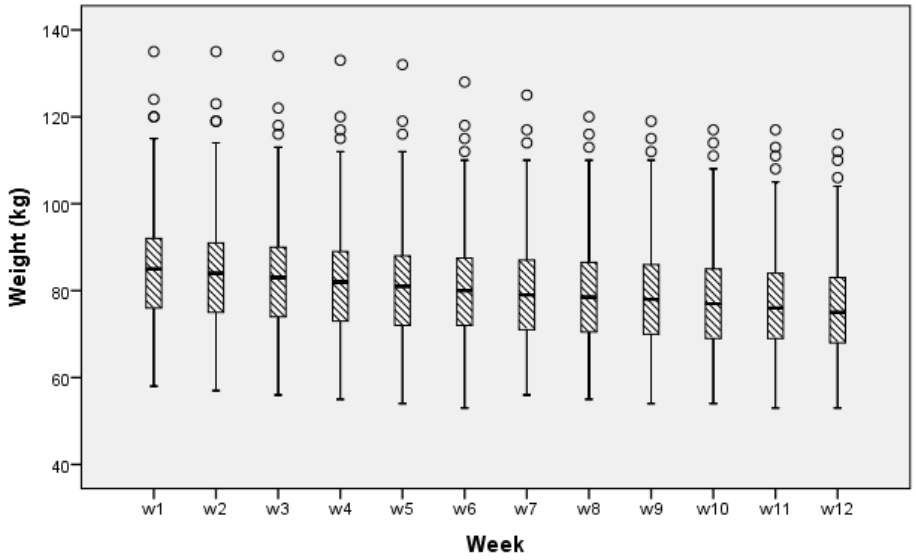

Figure 3. **Box plot for weekly weight of respondents.**

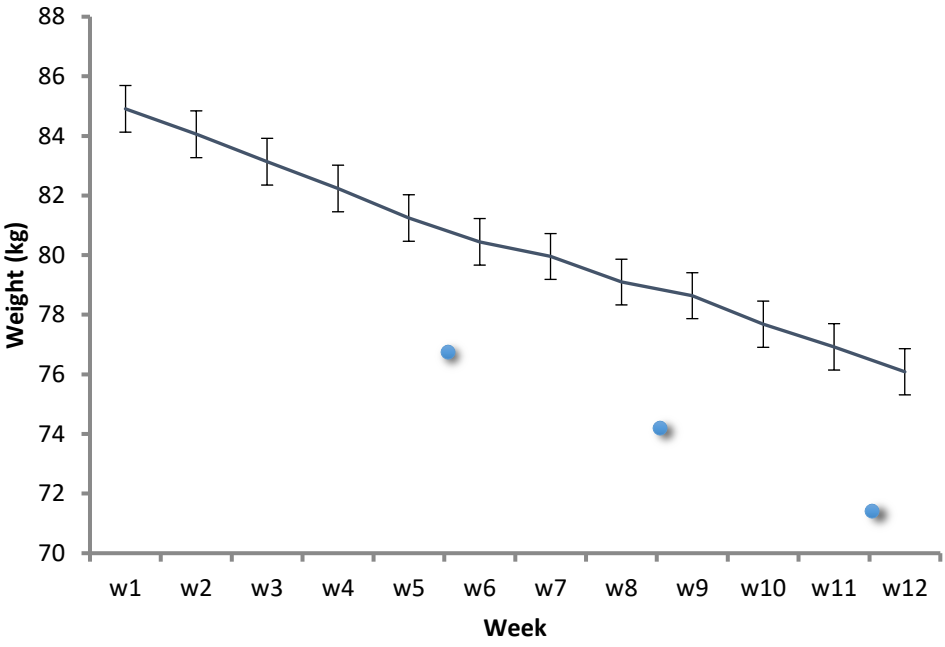

Figure 4. **Graph showing the decrease in weekly mean weight of respondents due to use of "Lite Plus" tablet.**

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The weekly details of weight loss (kg) due to use of "Lite Plus" is given in Table 3.

Table 3: Weekly weight loss (due to use of "Lite Plus") in the respondents during the study (from week 2 to week 12)

(A) Analysis of variance table

Source of variation	Degrees of freedom	Mean Square	F	Sig.
Week	10	0.50276	3.47**	0.0002
Error	2615	0.14499		
Total	2625			

** = Highly significant (P<0.01)

Analysis of variance shows highly significant (P<0.01) F-value. The comparison of means using Least Significant Different test was applied, which indicated that maximum decrease was found at week 5 (0.99 kg) which was non-significantly (P>0.05) different from week 6 (0.926 kg), week 7 (0.985 kg), week 8 (0.991 kg), week 9 (0.985 kg) and week 10 (0.966 kg). The lowest decrease in weight was found at 2nd week (0.854 kg), which was statistically at par with 3rd, and 4th weeks with mean values of 0.919 kg and 0.899 kg, respectively (Table 4).

Table 4 Descriptive statistics with comparison of means

Week	N	Min	Max	Mean	SD	SE
w2	250	-1.00	2.00	0.8538 d	0.389	0.0246
w3	250	0.00	3.00	0.9194 bcd	0.332	0.0210
w4	250	0.00	2.00	0.8988 cd	0.359	0.0227
w5	250	0.00	3.50	0.9908 a	0.313	0.0198
w6	248	-1.00	4.00	0.9259 abc	0.378	0.0240
w7	242	-0.50	3.00	0.9850 ab	0.315	0.0202
w8	240	0.00	5.00	0.9915 a	0.462	0.0298
w9	229	0.00	6.00	0.9849 ab	0.576	0.0380

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w10	224	0.00	2.00	0.9665 abc	0.275	0.0184
w11	222	0.00	2.00	0.9189 bcd	0.305	0.0205
w12	221	0.00	3.00	0.9186 bcd	0.396	0.0267

Min = Minimum value, Max = Maximum value, SD = Standard deviation, SE = Standard error

Means sharing similar letters in a column are statistically non-significant (P>0.05)

The same results can be seen from Figure 5.

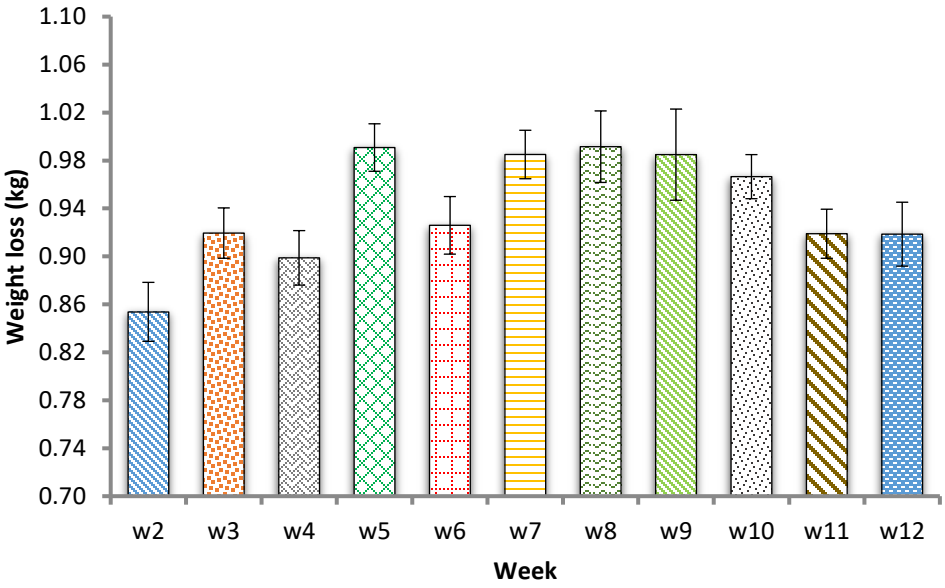

Fig. 4. Weekly weight loss (mean±SE) in respondents.

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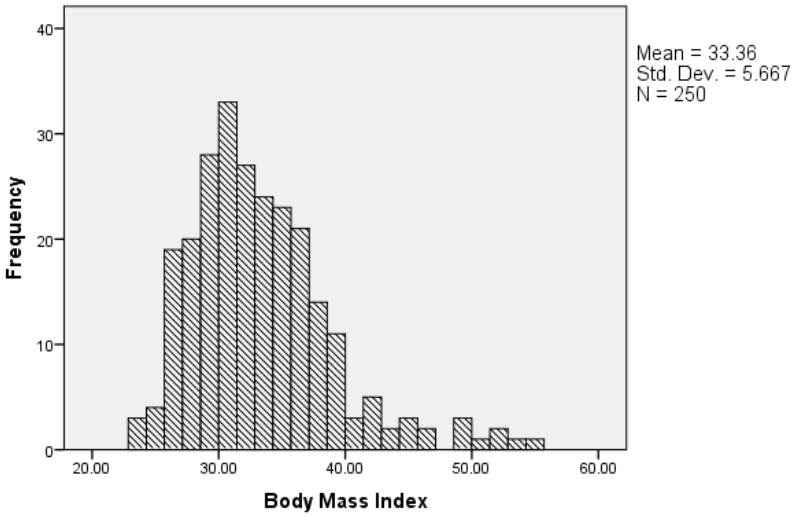
BMI (Body Mass Index)

The main objective of our study was to reduce the body mass index (BMI) by using "Lite Plus" treatment (Garcinia Cambogia 500 mg + Green Coffee Bean Extract 400 mg). For this purpose, a sample of 250 people (respondents) was selected and the 2 tablets of "Lite Plus" were given daily to these respondents from a period of 12 weeks (3 months). The histogram for body mass index (BMI) at the 1st week is shown in figure 6.



Histogram for BMI of 250 respondents at week 1

The number of observations (N), minimum (Min), maximum (Max), mean, standard deviation (SD) and standard error (SE) of BMI was presented in Table 5 for 1st to 12th week.

(B) Descriptive statistics with comparison of means of BMI

Week	N	Min	Max	Mean	SD	SE
w1	250	23.39	55.52	33.36 a	5.667	0.3584
w2	250	22.99	54.88	33.02 ab	5.656	0.3577
w3	250	22.58	54.88	32.66 abc	5.638	0.3565
w4	250	22.18	54.88	32.30 bcd	5.604	0.3544
w5	250	21.78	54.23	31.91 cde	5.570	0.3523
w6	248	21.37	53.59	31.62 def	5.519	0.3505
w7	242	22.45	52.94	31.43 d-g	5.383	0.3460

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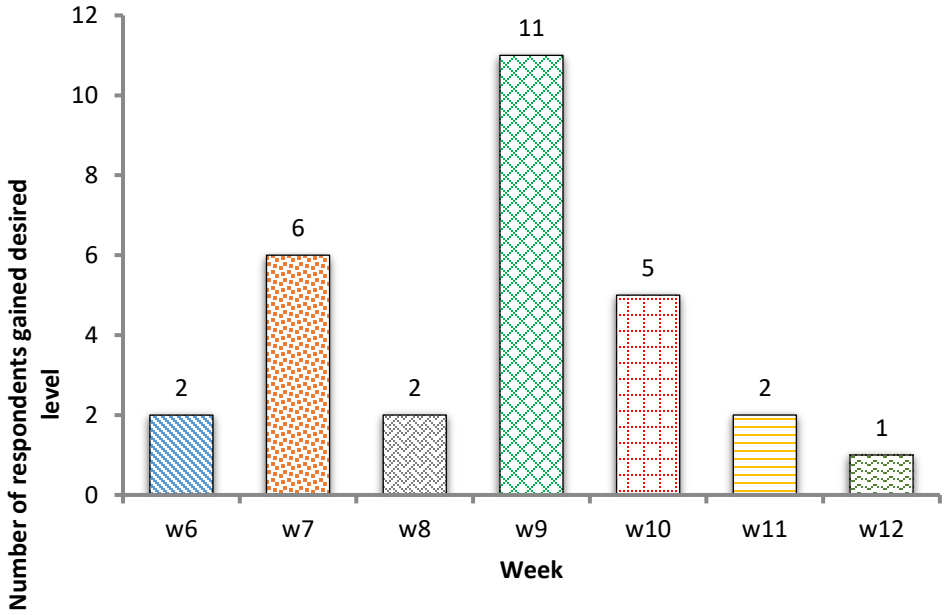
w8	240	22.10	52.29	31.10 e-h	5.337	0.3445
w9	229	21.75	51.65	30.88 f-i	5.322	0.3517
w10	224	21.41	51.00	30.54 ghi	5.312	0.3550
w11	222	21.41	51.00	30.24 hi	5.290	0.3550
w12	221	21.06	51.00	29.90 i	5.273	0.3547

Min = Minimum value, Max = Maximum value, SD = Standard deviation, SE = Standard error

Means sharing similar letters in a column are statistically non-significant (P>0.05)

At the start of the study, 250 respondents were taken and weekly weight was noted. During the study of 12 weeks, when a person gained the desired BMI value (i.e., normal in range), he was excluded from the study. By using this method, at the 6th week, 2 respondents gained the desired BMI value and 248 (250-2 =248) respondents were left in the study. At the end of 7th week, six more respondents reduced the desired level of BMI and 242 were remained in the study. Similarly, two respondents gained desired BMI level at 8th week, 11 respondents gained normal BMI value at 9th week and 5 were excluded from the study at 10th week and at last 3 respondents were excluded from the study from week 11 to week 12. At the end of study, 29 respondents were gained desired level (excluded from the study) and 221 were left. The number of respondents who gain the desired level of BMI is shown in the following figure 7:



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It was concluded from Table 5, that all the respondents were loss their weight /BMI gradually with the use of "Lite Plus" tablets. Descriptive statistics for total loss (from week 1 to week 12) in weight/BMI of respondents as below (table 6):

(from week 1 to week 12)	N	Min	Max	Mean	SD	SE
Total weight loss	250	3.00	20.00	9.883	2.189	0.138
Total decrease in BMI	250	1.14	7.81	3.897	0.968	0.061

It was observed from Table 5 that the minimum mean value of BMI 23.39 was observed at the 1st week of the study which was reduced to 21.06 at the 12th week i.e., at the end of study, the minimum value of BMI was decreased by 2.33 and maximum value of was decreased by 4.42 from week 1 to week 12. Similarly, the mean value of BMI at first week was 33.36 with standard deviation of 5.67 and standard error of 0.358 reduced to mean value of BMI 29.90 at 12th week with standard deviation of 5.27 and standard error of 0.355.

The analysis of variance table showed a highly significant (P<0.01) F-value (9.69) for BMI (body mass index) in the respondents (Table 7), which indicated that statistically BMI value not remained the same during different weeks.

Table 7: Analysis of variance for BMI

Source of variation	Degrees of freedom	Mean Square	F	Sig.
Week	11	290.185	9.69**	0.0000
Error	2864	29.955		
Total	2875			

** = Highly significant (P<0.01)

The Least Significant Different (LSD) test was applied and given in the "Mean" column of Table 5 in the form of small alphabets. From the "Mean" column, it was cleared that the maximum mean value of BMI (33.36) was found at the start of the experiment at 1st week which was non-significantly (P>0.05) different from 2nd and 3rd weeks but statistically significantly higher than

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from week 4 to week 12. After 4th week BMI was statistically remained same till 7th week i.e., statistically no change (increase or decrease) was found during this period. The minimum value 29.90 with standard deviation 5.27 of BMI was observed at last i.e., 12th week which was statistically at par with week 9, week 10 and week 11 with mean values of 31.10, 30.54 and 30.24, respectively.

Box plot for BMI was given in Figure 8 , which showed the decreasing trend in BMI with increase in week i.e., as "Lite Plus" was used by the respondents, body mass index (BMI) gradually decreased, which was the indication of the success of our treatment.

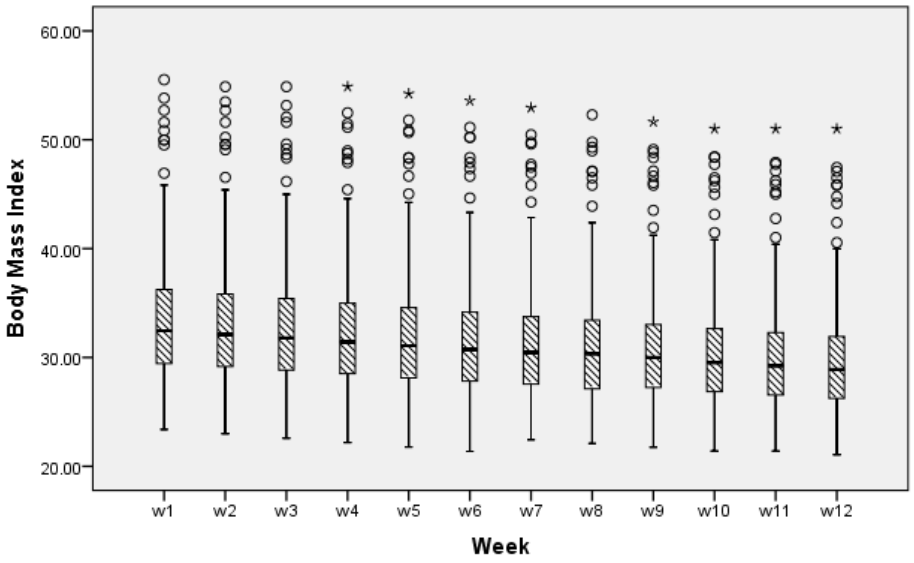

Fig. 6: Box plot for weekly Body Mass Index of respondents.

A linear regression was also applied to see the change in body mass index (BMI) with time (weeks). The graph showed a decreasing linear trend with R^2 (coefficient of determination) value of 99.62%, which was a very strong indicator of goodness of fit of the linear model. The following linear regression was found

$Y = 33.57 – 0.3065\ X$

Where Y = BMI (body mass index) X = weeks

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The regression equation given in equation (1) showed with increase in one week, the BMI was decreased by 0.3065. The constant value of the model showed that the value of BMI was 33.57 at week 0 (before start of the experiment) (figure 9)

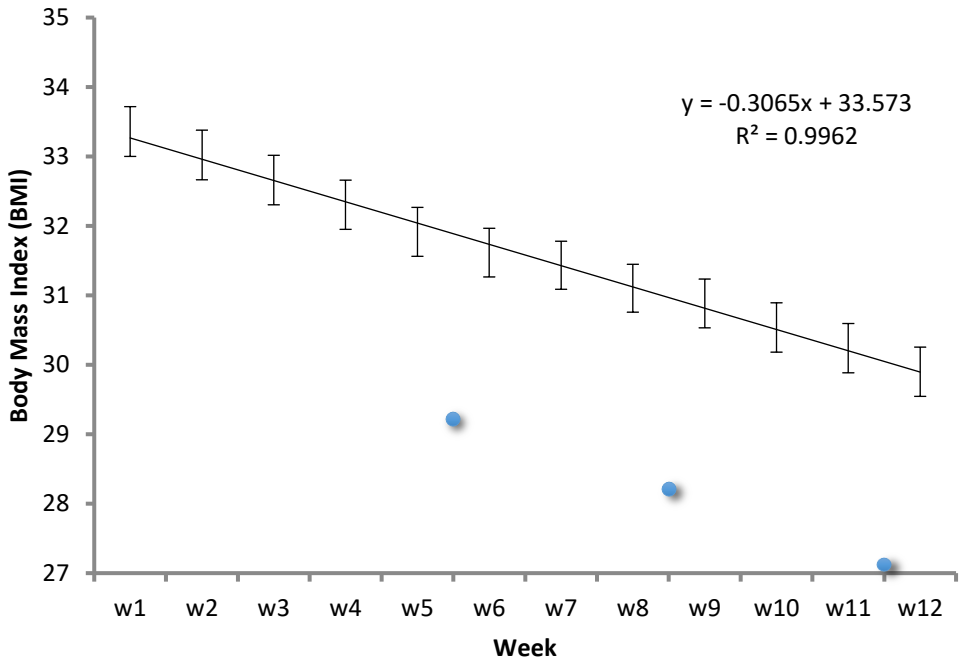

Fig. 7: Graph showing the weekly change in mean BMI of respondents due to "Lite Plus" treatment with linear regression line.

The analysis of variance Table 8 for weekly decrease in body mass index showed significant ($P<0.05$) results.

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Table 8: Weekly decrease in Body Mass Index (BMI) of the respondents (from week 2 to week 12)

Source of variation	Degrees of freedom	Mean Square	F	Sig.
Week	10	0.07602	3.22**	0.0004
Error	2615	0.02360		
Total	2625			

NS = Non-significant (P>0.05)

On the other hand, Least Significant Different (LSD) test showed that maximum decrease (0.391) was found at 8th week which statistically significantly different from 11th (0.362) and 12th (0.361) weeks but non-significantly different from all other weeks i.e., week 5, week 6, week 7, week 9 and week 10 (Table 9).

Table 9 Descriptive statistics for BMI of the respondents

Week	N	Min	Max	Mean	SD	SE
w2	250	-0.37	0.83	0.337 d	0.157	0.010
w3	250	0.00	1.25	0.361bcd	0.137	0.009
w4	250	0.00	0.83	0.356 cd	0.148	0.009
w5	250	0.00	1.25	0.390 a	0.128	0.008
w6	248	-0.37	1.34	0.366 abc	0.149	0.009
w7	242	-0.20	1.01	0.389 ab	0.129	0.008
w8	240	0.00	1.95	0.391 a	0.180	0.012
w9	229	0.00	2.34	0.387 ab	0.226	0.015
w10	224	0.00	0.83	0.382 abc	0.118	0.008
w11	222	0.00	0.83	0.362 bcd	0.129	0.009
w12	221	0.00	1.14	0.361 bc	0.160	0.011

Min = Minimum value, Max = Maximum value, SD = Standard deviation, SE = Standard error

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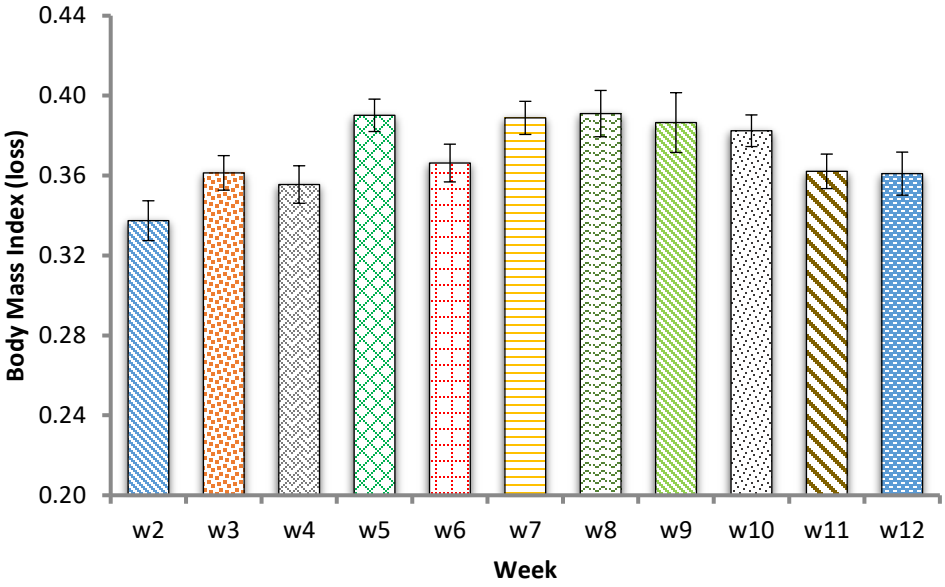

Fig. 8: Weekly decrease in Body Mass Index (mean±SE) due to "Lite Plus".

Discussion:

Obesity has been associated with a number of conditions like fatty liver disease, osteoarthritis, digestive problems, cardiovascular disease, type II Diabetes Mellitus, and even some forms of cancer [11]. Along with its consequent comorbidities, obesity represents a socio-economic burden which has been shown to reduce life expectancy significantly. To tackle this problem, several strategies have been proposed, out of which caloric restriction combined with exercise is the most commonly used one. In cases of extreme obesity, surgical intervention has been recommended [12]. Pharmacological obesity treatment is principled by the ESCP Guideline, according to which it should be only intended for patients with a BMI > 30 or BMI >27 with comorbidity [13]. Considering the potential side effects of anti-obesity drugs, they should be prescribed only when the benefits outweigh the risks.

In the face of the many reported adverse effects of synthetic drugs, the choice of natural products is much more preferable due to their effectiveness in managing obesity with minimal side effects. For instance, traditional herbal medicines have a long history of use in suppressing appetite and promoting weight loss and have little to none toxic effects when compared to synthetic ones [14]. Going by this theory, we studied the role in weightloss of alternative natural medicine (Garcinia

cambogia and green coffee beans) in this study, and we found that 92.8% of participants experienced weight loss after using Garcinia cambogia and green coffee bean extract for 6 weeks. After 12 weeks of use, 11.6% of participants reached their desired BMI.

To the best of our knowledge, this study trial is the first of its kind to research the combined role of Garcinia cambogia and green coffee bean extract in weight loss. Several reports support that the administration of Garcia cambogia reduces weight; however, not much evidence is available on its long term effects. Some reported minor side effects might be related to the different compositions of administered GC extracts [11]. A meta-analysis showed that the reported adverse effects were similar to placebo, and it is safe for human consumption [15]. Similarly, the meta-analysis indicates the effectiveness of green coffee bean extract in weight loss [9].

In summary, obesity is a complex, chronic disorder caused by an amalgamation of factors like diet, lifestyle, genetic and environmental. Appropriate lifestyle and dietary modifications are the fundamentals of successful weight loss but maintaining such a lifestyle can prove to be challenging. Therefore, it is important to identify the herbs and natural products which can promote weight loss while being safe for human consumption.

Conclusion:

This study identifies that the combined use of Garcia cambogia with green coffee bean extract can effectively promote weight loss with minimal adverse effects. This study also raises the possibility that the combination of multiple natural products can produce a synergistic effect which increases their individual anti-obesity action on different targets, thus offering a distinct advantage over chemical treatments. Natural products may give not only an anti-obesity effect but also other health benefits like anti-diabetic and anti-hyperlipidemic activities. In light of our findings, we anticipate that natural sources will provide a beneficial basis for developing novel anti-obesity drugs in the future.

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