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Does green coffee has a positive effect on body mass index and lipid profile in a sample of obese people

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Abstract

Background : obesity is a global health issue .It causes many health problems like cardiovascular disease and diabetes mellitus. There are many options for treatment of obesity which include : exercise , diet , medical remedies and surgical intervention as the last resort . Green coffee proved as an effective option for the treatment of obesity . Furthermore green coffee improves a lot of harmful complication of obesity.

Objectives: This study aim to test the efficacy of green coffee in weight reduction and to assess the effect of green coffee on fasting blood sugar and lipid profile.

Patients and Method : 35 healthy obese patients(24 females and 11 males) were enrolled in this study for the period from 1/12/2016 to 1/7/2017.The study was done in 3 centers which include Merjan Medical City , AL- Mussayeb General Hospital and Babylon Collage of Medicine. Any person with BMI above 25 kg/m^2 was included in this study. All the participants were given 1000mg green coffee as a capsule once daily for 6 weeks. The following parameters were done all the patients before starting treatment and after completion of the treatment: body mass index , lipid profile and fasting blood sugar.

Results: The study showed highly significant decrease in the BMI after 6 weeks treatment with green coffee with a p-value was 0.0001. The results of this study showed statistically significant increase in HDL(p –value =0.001) and also it showed clear significant decrease in VLDL (p-value=0.009).The mean fasting blood sugar for the patients in this study expressed clear significant reduction in the FBS post treatment with green coffee p value 0.00

Conclusion: There is a preponderance of obesity in females and the green coffee has an effective role in decrease of the BMI after this clinical trials. The green coffee cause clear reduction of VLDL and increase in the HDL in this study .Other lipid profile such as TG, cholesterol and LDL there is visible decrease in the mean amount but not below the level of significance.

Keywords :Obesity , Green coffee , BMI.

INTRODUCTION

Obesity and overweight are serious health problems that have reached epidemic proportions. Weight problems can have a negative impact on quality of life and, in the case of obesity, can even lead to a significant reduction in life expectancy. Due to safety concerns and side effects of many prescription weight loss drugs, herbal remedies are becoming widely popular as alternatives to prescription medications for weight loss(1).

Obesity has recently been recognized to contribute to cardiovascular mortality and morbidity through an increased sympathetic drive leading to end organ damage and hypertension (2). Increased body fat deposition has been specifically correlated to sympathetic overdrive at rest, with resting levels of muscle sympathetic nerve activity (MSNA) in the obese reported as greater than 50% higher in some studies. Elevated levels of MSNA are associated with obesity-induced subclinical organ damage to the heart, blood vessels, and kidneys in young subjects, even in the absence of hypertension(3).

Tools for obesity management, including caffeine, ephedrine and green tea have been proposed as strategies for weight loss and weight maintenance, they may increase energy expenditure and have been proposed to counteract the decrease in metabolic rate that is present during weight loss(4).

The rising in prevalence of the metabolic syndrome has need a greater effort for therapeutic and prevention strategies. The world prevalence of obesity has increased considerably in the last decade(5).

Green coffee extract(GCE) is present in green or raw coffee .It is also present in roasted coffee, but much of the GCE is destroyed during the roasting process. Some GCE constituents, such as chlorogenic acid (CGA) can also be found in a variety of vegetables and fruits (6).

Evidence is accumulating from animal and human studies regarding the use of GCE as a weight loss supplement (7) . In human subjects coffee intake has been reported to be inversely associated with weight gain (8). Consumption of coffee has also been shown to produce changes in several glycaemic markers in older adults (9). Other researches has indicated that the consumption of caffeinated coffee can lead to some reductions in long-term weight gain, an effect which is likely to be due to the known thermogenic effects of caffeine intake as well as effects of GCE and other pharmacologically active substances present in coffee (10). GCE has also been postulated to modify hormone secretion and glucose tolerance in humans(11) . This effect is accomplished by facilitating the absorption of glucose from the distal, rather than the proximal part of the gastrointestinal tract (6).The aim of the study is to test the efficacy of green coffee in weight loss and to assess the effect of green coffee on fasting blood sugar and lipid profile.

PATIENTS AND METHODS

This study is a multicentric ,clinical trial done at Merjan Medical City , Al-Musayeb General Hospital and Medical Collage of Babylon University at the period from 1/12/2016 to 1/7/2017 .The study protocol was approved by the Ethical Committee and fully explained to the subjects who gave their written informed consent before participation. The participants from the above centers include persons seeking for medical help and volunteers from the employee in the college of medicine . In this clinical trial study 35 obese patients (11 males and 24 females) their ages range between (20-55) were enrolled in this study . They were selected randomly from the above centers .The diagnosis of obese and overweight patients was done according to the body mass index and included all persons above 25 kg/m^2. Data base were arranged for all involved patients which include the following : age , gender , occupation , residence , educational level , past medical history , duration of obesity according to the formula of questionnaire .

The participants of the study were given green coffee capsules for six weeks as 2 cap1000 mg OD before breakfast .This time has been allocated for this study according to the resources and facilities available for this study.

The following variables were studied before and after completion of treatment with green coffee :measurement of weight , height and body mass index, measurement of fasting blood sugar and measurement of lipid profile. Appetite were also

evaluated by scoring system and classified into decreased and unchanged for qualitative assessment .Inclusion criteria include any male and female with BMI above 25 kg/m^2, all patients were between 20 and 55 years old and all the patients were cooperative and have desire to decrease their body weight. The exclusion criteria involved all patients who were taking any medication or nutritional supplement or have a medical disease (12).
The chemical included in this study are displayed in Table (1) and instruments used are shown in Table (2).

Table 1 : The chemicals used in this study.

Chemical material	Company	Nation
Glucose Kit	LINEAR CHEMICALS S.L	SPAIN
Triglyceride kit	BIOLABO	France
Cholesterol kit	BIOLABO	France
HDL kit	ARKRAY	Japan

Table 2 : The instruments used in this study .

Instruments	Company and /or Country
Deep Freeze	Liebhe (Austria)
Micropipette	Glison (France)
Centrifuge	PLC series (USA)
Plane tube	Afma-Dispo-(Jordan)
Disposable syringe	Witeg(Malaysia)
Spectrophotometer	Cambridge (England)
SPOTECHEM	ARKRAY (Japan)
Electronic balance	Seca (Germany)
Electrocardiogram	GE Healthcare (Germany)
Sphygmomanometer	United kingdom
Stethoscope	Littmann (U.S.A)
Modified sphygmomanometer	China

Detailed history was taken from each patient regarding personal history , medical history and duration of obesity .General examination to assess blood pressure , weight and height was done for all the patients. The examination consist of Height (m) and weight (Kg). Body mass index (BMI) was then calculated using the following standard equation: BMI (Kg/m^2) = (weight Kg/(height m)^2)(13).
Venous blood samples were aspirated at about 9 a.m. from anticubital fossa after a 12 hours overnight fast. From each person 5 ml of blood aspirated , collected in tubes containing gel centrifuged for 10 minutes after waiting for 45 minutes to separate serum from whole blood . Serum samples stored in refrigerator (-20 C) .Serum samples were used for measurement of blood sugar and lipid profile
Certain biochemical investigations were done to evaluate the effect of green coffee before and after usage .Fasting blood sugar and lipid profile measured for all participants .

Statistical Analysis:
Computerized SPSS program software 24 was used to analyze data which were expressed by means ± standard deviation (SD) . Correlation between different parameters where done using T – test and Chi square whenever it is applicable. The statistical difference considered to be significant when p value < 0.05 and highly significant when p value < 0.01 (14) .

RESULTS

Demographic Data:
The study group were 35 obese patients .They were 24 (68.6%) females and 11(31.4%) males. The age of patients in this study ranged from 20 -55 years and the mean and SD was 36 ±9.7.The age old as summarized Table 3,4.

Table 3 .Distribution of Gender in the study group.

Variable	Frequency	Percentage%
Male	11	31.4%
Female	24	68.6%
Total	35	100%

Table 4: Distribution of age of total patients :

Variable	Mean Age
Male	36.36 ± 10.46
Female	36.96 ± 9.63
Total	36.77 ± 9.7

Results of BMI:
The study showed significant decrease in the BMI after 6 weeks treatment with green coffee with a mean of 36.026 ,33.871 pre and post respectively .The p-value was 0.0001.Table 5.

Table 5: Mean difference of BMI pre and post treatment :

Variable	Pre treatment	Post treatment	p-value
BMI(mean ± SD)	36.026 ± 5.14	33.871± 4.69	0.0001**

Distribution of body mass index in the studied group according to age pre and post intervention:
Distribution of BMI according to age showed highly significant correlation between BMI and all age group with the least significant being above 50 years old as summarized in table 6.

Table 6: Distribution of body mass index in the studied group according to age pre and post intervention.

Age group(no.)	BMI Pre treatment(mean± SD)	BMI Post treatment (mean± SD)	P- value
20-29 (10)	35.99 ± 4.44	33.68 ± 4.86	< 0.001**
30-39 (10)	38.02 ± 8.81	35.42 ± 5.98	< 0.001**
40-49 (11)	35.6 ± 4.07	33.66 ± 4.18	< 0.001**
>50 (4)	32.3 ± 8.81	31.05 ± 8.43	< 0.023

Results of Lipid Profile:
The results of this study showed statistically significant increase in HDL(p –value =0.00) and also it showed clear significant decrease in VLDL (p-value=0.009) .Also the study showed clear decrease in the mean of triglyceride ,cholesterol and LDL but the decrease was not statistically significant or sometime specially in triglyceride was very near to significant level (p-value = 0.061) as shown in table 7.

Table 7: Effect of Green coffee on Lipid profile :

Lipid ProfileMg/dl	Pre treatment	Post treatment	P –value
Triglyceride	157.31 ± 61.79	140.31 ± 63.54	0.061*
Cholesterol	157.26 ± 68.28	138.57 ± 38.13	0.151
HDL	34.80 ± 9.38	40.23 ± 9.40	0.03**
LDL	90.89 ± 65.03	69.94 ± 36.82	0.133
VLDL	33.83 ± 16.44	27.83 ± 12.49	0.009**

Results of Fasting Blood Sugar:
The mean fasting blood sugar for the patients in this study expressed clear significant reduction in the FBS post treatment with green coffee .(Table 8)

Table 8 :Results of FBS pre and pot treatment.

Variable Mg/dl	Pre treatment	Post treatment	P- value
FBS (mean)	94 ± 15.96	80 ± 24.76	0.001**

Appetite change :

Upon questionnaire of the patients in this study pre and one week after starting treatment with green coffee , there is clear decrease in the appetite (figure 1)

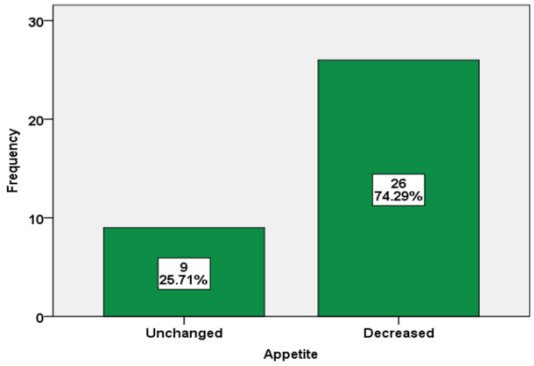

Figure 1: Frequency of appetite Change.

DISCUSSION

The present study illustrated that 68.6% of the total obese patients were female . This preponderance is well known and supported by many previous studies (15). Women are more obese than men for many reasons: previous reports found that women's own incomes fully explain the association between total household income and women's obesity. Part of the association between women's incomes and their obesity appears to work through the fact that women with higher incomes have more participation in type and quantity of food . Also they find that women residing in households with greater total household income are significantly more likely to be obese. In contrast, we find no association between household income and men's risk of obesity. Illness is a possible third factor that may influence both women's income and obesity. Perhaps women who are healthy are more obese , while women who are ill are thin and unable to work (16).

This study demonstrated clear significant reduction of BMI after 6 weeks of regular green coffee intake .The mean BMI was 36.026 ,33.87 pre and post treatment respectively with a p-value of 0.0001.This result is compatible with many previous reports (6;1).GCE may exert its weight loss effects due to an increase in the burning of fatty deposits, as shown by a change in the fat mass percentage, and the prevention of fat deposition (17). Chlorogenic acid might act by inhibiting glucose absorption in the small intestine. Further research is needed to examine the variety of molecules present in GCBE and the safety issues of caffeine consumption. In addition, preclinical trials reveal that the inhibition of the activity of glucose-6-phosphatase would limit the release of glucose into the general circulation and, therefore, limit insulinemia(18).

The relevance of these results is very important as an already available option of obesity treatment . Green coffee is an over the counter drug (OTC) available drugs ,its preparation and consuming is very easy. As it is a herbal and can be used once per day ,the compliance for this type of treatment is very high and very effective as it shown in this study. Green coffee is emerged as an effective long term treatment of obesity and thus prevent the many complications of obesity such as coronary heart disease , diabetes and atherosclerosis.

Distribution of BMI in the studied group according to age showed that the BMI reduction was most significant in the age between 30-39 years old. The reduction of BMI in The other age groups was also significant but less than the previous age. The reduction of BMI above the age 50 years was not significant probably because of small number of participants involved in this age group. This results indicate that the greatest amount of weight gain occur for the youngest adults . Young adulthood appeared to be critical time at which accelerated weight gain occurred. (19).

The current study proved that there is significant improvement in all the lipid profile levels . This improvements was very clear and significant in the parameters of HDL and VLDL. This improvement is seemed to be reasonable and expected as green coffee cause significant decreased in the BMI(20) . also it is well known that green coffee has a direct effect on all the parameters of lipid profile (21).The mechanism by which green coffee decrease lipid profile is that CGA is possibly effective against weight gain and fat accumulation by inhibition of fat absorption and activation of fat metabolism in the liver. And oral administration of CGA (30 and 60 mg/kg/day) for 14 days dramatically reduced the level of hepatic TG in mice. The suppressive effect of CGA on hepatic TG accumulation was more potent than that of GCBE(21). The results of lipid profile in this study is in concordance with many previous studies which stated that green coffee has a significant and powerful effect on harmful lipids and it has a unique positive effect on HDL which is the beneficial and useful lipids(22) . The other parameters like cholesterol , TG and LDL were also decreased in this study and this results is similar to many previous reports(23) . The non-significant decrease in the last parameters reflect the small size of this study and the short duration of the treatment .Also it is well known that lipid profile levels are affected by a lot of other factors such as compliance with treatment , habits of eating ,exercise and other cofounders . Our results showed that the green coffee is very effective in lowering harmful lipids which has a protective effect on coronary heart disease , hypertension ,diabetes and many other systemic illnesses. This experimental trials illustrated important significant decrease in the fasting blood sugar post treatment with green coffee . Green coffee is a well -known herbal which decrease blood sugars . It is proved that daily consumption of 3 to 4 cups of decaffeinated coffee significantly reduced the risk for T2DM by 30% (24). Researchers has also been postulated that GCE can modify hormone secretion and glucose tolerance in humans (11) .This effect is achievd by increasing the absorption of glucose from the distal, rather than the proximal part of the gastrointestinal tract(6). This study consolidate the previous knowledge about this issue by showing decrease fasting blood sugar by all the mentioned mechanism of the previous reports .But my own explanation of this decrease in FBS is the apparent decrease in two parameters which are BMI and appetite.

This study reinforces the fact that green coffee curb appetite to the degree that it help to decrease body weight. The way by which decrease appetite is unknown , but probably it may act on the obesity hormone called leptin. Leptin is thought to play a key role in the regulation of body weight . It is produced by adipose tissue and act on satiety centers in the hypothalamus to decrease appetite. this results is compatible with many previous reports about this hot topic(7).In the other studies explain the other parameters in the obesity and the level genetic study[25-28].

CONCLUSIONS AND RECOMMENDATIONS:

The preponderance of obesity in females and the green coffee is effective in decrease of the BMI after the clinical trials which lead to clear reduction of VLDL and increase in the HDL. We recommend to repeat this study on a larger sample and longer duration and we encourage using of chlogenic acid extract instead of crude green coffee to increase the effectiveness and decrease the side effects.

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