



Research Article

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Effect of Orlistat Drug and Green Coffee in Body Weight of Hypercholesterolemia Male Albino Rats

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ABSTRACT

Background: The study was to determine the effect of orlistat drug and green coffee in the body weight and lipid profiles in hypercholesterolemia rats.

Methods: Forty male albino rats with hypercholesterolemia were classified into 4 groups, group one Control rats normal diet, group two Control rats fed with high fat diet, group three rats fed with high fat diet were gavaged 4 mg/Kg/day b.w orlistat, group four rats fed with high fat diet were gavaged 2.5 g/kg /day b.w Green Coffee. Blood was collected from all groups at zero time and after 4 weeks.

Results: Reduction in body weight highly significant and significant by administration of Orlistat drug and Green Coffee respectively also reduced in cholesterol and LDL by Orlistat drug more than Green Coffee. While triglyceride, Glucose and HDL were highly significant in Green Coffee more than Orlistat drug.

Conclusion: Both the Green Coffee and Orlistat drug were reduced the body weight and lipid profile in hypercholesterolemia rats.

Keywords: Green coffee; Orlistat drug; Body weight; Lipid; Hypercholesterolemia rats

INTRODUCTION

Green coffee bean extract before it is roasted because roasting has an effect on coffee taste and also effect the active compound of green coffee especially chlorogenic acid. The chlorogenic acids having healthy benefits reducing glucose level and fat metabolism [1].

Overweight and obesity are defined by a body mass index (BMI) of 25-30 kg/m², respectively. An estimated 1 billion adults are overweight and at least 300 million are obese worldwide, with prevalence increasing in most countries [2]. Obesity has become a public health problem in the world and increasing rapidly in recent years [3]. Obesity known as a low grade inflammation condition and it is excess accumulation of body fat [4]. Obesity, related to the many chronic diseases, including insulin resistance, type 2 diabetes, cardiovascular disease and hypertension also affect the body [5,6]. Therefore, it is important to find a safe and effective way to manage body weight especially in obese patients. Weight management is a long-standing goal of achieving a healthy life that is including healthy eating and physical activity to maintain a balance between intake and energy consumption [3]. However, several strategies have been used to treat obesity and its related complications. Behavioral therapy, surgery and drug therapy are the most usual treatment of obesity [7]. Since human diets contain many different components that may act synergistically to prevent or promote overweight and obesity, studying the components of the diet may be an informative strategy to assess their efficacy and underlying mechanisms [7]. Recently, patients to try nutraceuticals that may cause weight loss because of high costs and potential adverse effects of most weight loss drugs have led obese [8,9]. Chlorogenic acid is a natural chemical compound; it is an important biosynthetic intermediate which is the ester of caffeic acid and quinic acid [10]. Chlorogenic acid is an antioxidant compound known as an important intermediate in lignin biosynthesis. This compound become active after a meal also slows the release of glucose into the bloodstream [11].

MATERIALS AND METHODS

Green coffee seeds were purchased from Almafraaq Market. Green coffee seeds were grinded to powder. Green coffee seeds powder was used in preparation of aquatic extract. The study was approved by medical ethical committee of the Alahlyya Amman University.

Preparation of Aqueous Extract of Green Coffee Seeds

The extract was prepared by boiling 3 g of dried powdered seeds of Green coffee in 300 ml of distilled water for 20 min and left for 25 min to become cooled and filtered. The filtrate was lyophilized and the desired dose was then prepared and reconstituted in 10 ml of distilled water per kilogram body weight just before oral administration. The dose was 20 mg/kg body weight daily by oral intubations.

Animals

Forty male albino rats 60 days old with weights between 190 and 210 gm were procured from Department of Medical Technology, Alahlayya Amman University, Jordan. The animals were housed in a well-ventilated 12 h light and dark cycle. The rats were fed on standard diet with 4% cholesterol, bile salt (0.25%) and animal fat (15%) to induce hypercholesterolemia for 2 weeks; the rats then classified into 4 groups each group 10 rats.

Group one. Control rats normal diet

Group two. Control rats with high fat diet

Group three. Rats with high fat diet were gavaged 4 mg/kg/day b.w orlistat.

Group four. Rats with high fat diet were gavaged 2.5 g/kg b.w Green coffee /day

Blood Sampling

Blood was collected from eyes orbit of all groups in heparinized tubes which considered as a zero time. And also after 4 weeks with orally administered with Green Coffee extract (20 mg/kg). The collected blood samples were centrifuged at 4000 rpm/ 8 minutes to obtain plasma and the plasma was separated and kept in freezer till the time of assay.

Biochemical Analysis

The following analyses were carried out: Glucose, Cholesterol, Triglycerides, Low and high density lipoprotein using kits from Syrbio, France.

Statistical Analysis

Collected data were tabulated and needed statistical analyses were done using the computer data processing (SPSS, version 16). A probability value (P) of <0.05 was considered to be statistically significant.

RESULTS

Table 1 shows the body weight of high fat diet rats at zero time and after 4weeks. The increased in body weight was 40% but after administration of green coffee extract for 4 weeks there is only 22% increase in body weight and 11% increased when administered orlistat drug. Table 2 shows the mean value of the plasma glucose, cholesterol, triglyceride, HDL and LDL in both control and experimental rats at zero time and after using green coffee extract for 4 weeks. Their reduction of 10% in glucose level, 28% in cholesterol, 21% in triglyceride, 29% in LDL and increase of 34% in HDL were significant at $p < 0.01$. While when administered orlistat drug, their reduction of 17% in glucose level, 20% in cholesterol, 30% in triglyceride, 18% in LDL and increase of 37% in HDL were significant at $p < 0.05$.

Table 1: Initial and final body weight (g), in all studied groups (Mean $\pm$ SD)

	Body weight At zero time	Body weight After 4 weeks	Percentage
Control Rats. normal diet	172 $\pm$ 14	225 $\pm$ 6	24%
Control Rats. (HFD)	193 $\pm$ 12	320 $\pm$ 15	40%
Green Coffee. (HFD)	184 $\pm$ 10	233 $\pm$ 8	22%
orlistat. (HFD)	190 $\pm$ 9	213 $\pm$ 16	11%

($P < 0.05$ and $P < 0.001$)

Table 2: Plasm glucose and lipid profile levels (mg/dl) of different high fat diet groups

	Control rats At zero time	Orlistat After 4 weeks	Percentage	Green Coffee After 4 weeks	Percentage
cholesterol (mg/dl)	183 ± 19	133 ± 11	28%	148 ± 9	20%
triglyceride (mg/dl)	196 ± 23	155 ± 23	21%	139 ± 16	30%
LDL(mg/dl)	64 ± 1.1	46 ± 3	29%	53 ± 5	18%
HDL(mg/dl)	26 ± 6.3	39 ± 2	34%	41 ± 4	37%
Glucose (mg/dl)	316 ± 15	285 ± 18	10%	263 ± 14	17%

(P<0.05and P<0.001)

DISCUSSION

In the present study, decaffeinated green coffee bean extract has demonstrated a significant weight-lowering effect in high fat diet rats and lipid profiles. Some of the attributed effects of green coffee extract and orlistat drug are: improved glucose and insulin balance. Our study agree with Thom E studies shown that glucose absorption was reduced in one of these studies, thus reducing blood and liver fats triglycerides [12]. In the present study, increasing the 'fat' burning effect, green coffee extract was researched in rats showing good benefits in abdominal fat reduction. In our study it seems the chlorogenic acids and caffeine work together in reducing abdominal fat in rats by increasing lipolysis or fat cells being opened up for energy release. However, this loss in body weight accompanying high intake coffee may be due to caffeine where Lopez-Garcia et al. [13]. Murase et al. found that green coffee increase energy metabolism and also reduces lipogenesis by down regulating Sterol regulatory element-binding protein and anther related molecules, which leads to decrease fat accumulation in the body [14]. While anther studies by Suzuki et al. and Zheng et al. have shown green coffee extract still has caffeine also high in polyphenol's and other antioxidants. Because cholorogenic acid and caffeine together have synergistic effect between caffeine and cholorogenic acid in green coffee, also green coffee extract was shown to suppress body weight gain better than cholorogenic acid or caffeine alone [15,16]. All these studies supported my results. Green coffee beans are a rich source of polyphenols, especially chlorogenic acids, 5-CQA has been known to modulate glucose metabolism also protect tissues from oxidative stress and mediate anti-obesity effect [17,18]. All those studies agree with present study and explain the reduction in body weight and lipid profiles. Orlistat drug do not alter brain chemistry. Rather, they reduce energy intake by inhibiting fat absorption which selective inhibitor of gastrointestinal lipases, orlistat binds to lipase molecules, thereby preventing them from acting upon triglycerides [19,20]. Dietary triglycerides can be absorbed only after they are hydrolyzed by gastrointestinal lipases. As a result, in my study the intact triglycerides pass through the gastrointestinal tract to be excreted with the feces. Orlistat inhibits about 30% of dietary fat absorption. Because the drug leaves the stomach rapidly, only lipases released soon after the meal are inhibited, whereas fats are released by the stomach over several hours [20]. Given a 33% fat diet, about 10% of the total calories will not be absorbed. Our results revealed that green coffee had favorable effects on serum cholesterol, LDL, HDL, glucose and body weight.

CONCLUSION

Obesity and hypercholesterolemia are chronic diseases that must be treated. The obesity is a risk factor for many other diseases, Green Coffee and Orlistat Drug can significantly affect obesity.

Competing Interests

Authors have declared that no competing interests exist.

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