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Effects of Green Tea on the Body Weight of Malaysian Young Obese Females: Single Blind Clinical Trial Study

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ABSTRACT

Obesity prevalence has increased dramatically over the past three decades worldwide. Animal studies found that green tea decreased food intake, body weight, and fat mass in mice. Therefore, the objective of this study was to examine the effectiveness of green tea in reducing weight among Malaysian obese students. A single blinded intervention study was conducted among female university students. Thirty female obese participants were randomly selected among the students who were voluntary recruited in this intervention study. Their weight and body circumference were measured. Subjects were divided into two groups; 15 cases and 15 controls. Cases matched with control using age and weight. The participants have to drink 1.5 litres of green tea per day. For the control group, placebo of 1.5 litres per day was given. The participant age was range from 20 to 25 years old. In case group, the differences in body weight, BMI and waist showed significant differences before and after green tea consumptions ($p < 0.001$). However, in control group there were no significant differences. Conclusions: This study showed that daily consumption of green tea beverage in amount of 1.5 liters per day for up to consecutively 25 days is affectively way to reduce body weight.

Keywords: Green Tea, Obesity, Clinical Trail, Malaysia

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INTRODUCTION

Obesity is an exaggeration of normal adiposity and its effect largely due to secretion of excessive adipokines [1]. Obese individuals are at increased risk for many diseases and health conditions including: hypertension, osteoarthritis, dyslipidemia, type 2 Diabetes, coronary heart disease, stroke, gallbladder disease, sleep apnea with respiratory problems, and some cancers (e.g., endometrial, breast and colon) [2]. Obesity prevalence has increased dramatically over the past 30 years in the all parts of the world [3]. Over two-thirds of the adults in the United States are overweight or obese and over one-third of U.S. adults are obese [3-4]. The prevalence of obesity is rising rapidly in many countries, so obesity is seen as a global pandemic [4]. However, the progress in the pharmacotherapy of obesity has been slow with limited medications [5]. Meanwhile, there were a number of adverse side effects of medications of obesity, the most concerning being an increased prevalence of depressed mood and anxiety in individuals receiving anti-obesity medications. The adverse effects are neurological events, depression, suicidal ideation, attempted suicides, seizure risks [5]. Meanwhile, some recent studies have suggested a role for green tea in promoting weight loss in obese individuals.

Green tea is made from the leaves from *Camellia sinensis* that have undergone minimal oxidation during processing. Green tea originates in China [6], but it has become associated with many cultures throughout Asia. Green tea has recently become more widespread Worldwide. It has become the raw material for extracts which are used in various beverages, health foods, dietary supplements, and cosmetic items [7]. The antioxidant and anti-obesity effects of green tea have been associated with its catechin content: epigallocatechin-3- gallate (EGCG ,48%–55%), epigallocatechin (EGC ,9%– 12%), epicatechin gallate (ECG ,9%–12%), and epicatechin (EC) (5%–7%), with EGCG being the most abundant and pharmacologically active of the catechins [8].

Most of the research on green tea has been done on the isolated catechins or powdered supplement. One cup of green tea generally contains 100 to 200 mg of EGCG [9]. A report from an animal study, supplemented a group of female laboratory mice with green tea (from 1% to 4% of their diets) for 4 months to determine which effects it may have on food intake and weight [10]. At the end of the study, researchers found that green tea supplemented mice had significantly decreased food intake, body weight gain, and fat mass. Levels of cholesterol and triglycerides were also lower. In addition, serum leptin levels were shown to be lower. Another animal study, supplemented green tea catechin EGCG (50-100mg/kg) in pure form and found that it, but not other green tea catechins, reduced or prevented an increase in body weight in obese Zucker rats [11]. Same evidence reported by study conducted on human [12]. A study in 10 subjects found that compared to placebo, green tea extract resulted in a significant (4%) increase in energy expenditure. In addition, the excretion of norepinephrine was higher during treatment with the green tea extract than with placebo. This supports the finding that there was an increase in thermogenesis due to increased norepinephrine levels in the body [12].

Since the overall obesity prevalence in Malaysian adults is 19.5% [13] due to continued urbanization and improved socioeconomic status, and adoption of more sedentary lifestyle and unhealthy dietary habits, obesity is now a leading public health concern even among the rural communities, replacing the traditional public health problems such as malnutrition and infectious diseases [13-15]. With these high rates of overweight and obesity among Malaysians, green tea could be a valuable natural treatment option. Therefore, the objective of this study was to examine the effectiveness of green tea in reducing weight among Malaysian obese university female students as a first trial according to the best of our knowledge.

MATERIALS AND METHODS

This study is single blinded intervention study conducted among female university students from Management and Science University, Malaysia. The protocol of this study was approved by the ethical committee of the University. In this study 30 female participants were randomly selected among the students who were voluntary recruited in this intervention study. The objective of the study was clearly explained to the volunteers. Their weight and body circumference were recorded and mark as an initial measurements. The participants were divided into two groups; 15 cases and 15 controls. Cases matched with control using age and weight. For the case group 25 sachet of green tea (BOH®) were provided for each individual. The participants have to drink 1.5 litres (one sachet) of green tea per day. For the control group, Placebo of 1.5 litres per day was given. The participants were followed up weekly. Descriptive analysis was used in this study using SPSS 13. Paired samples, t-test was used to examine changes over time within groups. Means were considered significantly different at $p < 0.05$.

RESULTS

A total number of 30 female university students were participated in this study. The participant age was range from 20 to 25 years old. All participants were single. Out 30 participants, 9 of them were smokers. For family history of chronic illnesses 8 Diabetes Mellitus and 10 Hypertension in their family history 3 of participants' family history were having other disease, while another 9 participants doesn't has any chronic diseases in their family history. For alcohol intake, only 3 of them drink alcohol (Table 1).

In case group, the mean values of body weight (80.82 ± 12.10), BMI (29.90 ± 4.93) and waist (35.07 ± 4.99) after tea perversion showed significantly ($P < 0.001$) less than the initial mean values of body weight (79.37 ± 12.17), BMI (29.27 ± 4.95) and waist (34.41 ± 5.18) (Table 2). In contrast control group showed no significant difference between initial means of body weight, BMI and waist (83.87 ± 14.13 ; 31.07 ± 5.24 ; 35.97 ± 5.79 respectively) and end of treatment (83.89 ± 14.00 ; 31.07 ± 5.22 ; 31.07 ± 5.22 respectively) (Table 3). This study showed a significant reduction of body weight, BMI and waist for those who consumed 1.5 litters per day for 25 days consecutively. However controls who were given placebo showed no significant difference in the control group.

Table 1 Socio-demographic characteristics (n=15)

Variable	Number	%
Age (Year)	20	6
	21	5
	22	7
	23	4
	24	5
	25	3
Race	Malay	22
	Chinese	3
	Indian	5
Smoking	Yes	9
	No	21
Drinking alcohol	Yes	3
	No	27
Family history of chronic diseases	DM	8
	Hypertension	10
	Others	3
	non	9

Table 2 Initial and final body weight, BMI and waist for cases (n=15)

	Initial Mean ± SD	After intervention Mean ± SD
Body weight	80.82 ± 12.10	79.37 ± 12.17***
BMI	29.90 ± 4.93	29.27 ± 4.95***
Waist	35.07 ± 4.99	34.41 ± 5.18***

The data represent (Mean ± SD; n 15) *** represent 0.001 significant difference. Paired sample t test was used

Table 3 Initial and final body weight BMI and waist for control (n=15)

	Initial Mean ± SD	After intervention Mean ± SD
Body weight	83.87 ± 14.13	83.89 ± 14.00
BMI	31.07 ± 5.24	31.07 ± 5.22
Waist	35.97 ± 5.79	35.93 ± 5.57

DISCUSSION

This study demonstrates for the first time, to the best of our knowledge, the effect of green tea administration on Malaysian young adult females. Our principal finding is; daily consumption of green tea beverage in amount of 1.5 liters per day for up to consecutively 25 days affectively reduces body weight. The mean values (body weight 80.82 ± 12.10, BMI 29.90 ± 4.93 and waist 35.07 ± 4.99) after tea perversion showed significantly (P<0.001) less than the initial (body weight 79.37 ± 12.17, BMI 29.27 ± 4.95 and waist 34.41 ± 5.18) (Table 2). However in control group did not show significant difference (Table 3).These observations are consistent with other findings in the Asian population, in which green tea catechin supplementation was

shown to reduce body weight and body fat in overweight and obese subjects [16-18], and findings in other population [19].

The health benefits of green tea have been proven in many epidemiological and clinical trial studies. Studies reported that green tea intervention to lower oxidative stress in both smokers and healthy individuals [20-22]. It has been found that green tea significantly decreased low-density lipoprotein oxidation [23]. However, some studies reported that chronic green tea consumption is to be significantly associated with reduced risk factors of cardiovascular diseases [24-26], beside other reports that it could decrease serum cholesterol and glucose [27-28]. Green tea in all above mentioned studies caused higher attention to be studies in term of risk factors for atherosclerosis, hypertension, and cardiovascular diseases. Hence, some studies have been conducted to study its effects on the obesity which is the most common risk factor of cardiovascular diseases [16-19]. Some Malaysian young adults females in the our present trial study had higher body weight and BMI, which may explain the fact that a weight loss was observed over a shorter time (25 days) versus previously reported findings in several weeks period [16-19]. This may suggest like other study that the effects of green tea may be more pronounced in subjects with clinically significant obesity [19].

The mechanisms of its action against obesity were reported based on various laboratory data. These mechanisms may be related to certain pathways, such as through the modulations of energy balance, endocrine systems, food intake, lipid and carbohydrate metabolism, and redox status [29-30]. A study reported that consumption of a beverage containing green tea catechins, leads to inhibition of growth and suppression of lipogenesis in MCF-7 breast cancer cells may be through down-regulation of fatty acid synthase gene expression in the nucleus and stimulation of cell energy expenditure in the mitochondria [30-32]. A study on animals reported that when fed to mice, EGCG purified from green tea decreased diet-induced obesity in mice by decreasing energy absorption and increasing fat oxidation [33]. However, data from human studies indicate that the reduction of body weight due to consumption of green tea is mainly by increasing postprandial thermogenesis and fat oxidation [30, 34]. These findings suggest that EGCG alone has the potential to increase fat oxidation in men and may thereby contribute to the antiobesity effects of green tea. However, more studies with a greater sample size and a broader range of age and body mass index are needed to define the optimal dose [30, 35].

Our present study demonstrated that daily drinking green tea was effective in reducing body weight in Malaysian young adult females and it was safe when given continuously for 25 days. Although this reduction was mild but since green tea is safe and available for long-term intake, hence it is useful for peoples whom have mild over weight and mild obesity. The limitation of this study was that our subjects were the sample size was small and the short duration. One more limitation is this study conducted in Malaysia population and further studies should be conducted in other countries such as US, UK, Australia, Japan, Africa and Arabic World to confirm our findings.



CONCLUSIONS AND RECOMMENDATIONS

This study showed that daily consumption of green tea beverage in amount of 1.5 liters per day for up to consecutively 25 days is affectively and safe way to reduce body weight. Further investigation is needed to include participants from different age groups, male and female. Furthermore, the duration of follow-up should be at least 8 weeks. Further investigation should be emphasized specially cholesterol level and triglycerides; which all considered in our ongoing clinical trial.

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Conflict of interest

This study is self-funded by the main researcher. The authors declare that they have no conflict of interest.

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