Potential Effect of Green Coffee and White Tea on Weight Reduction of Obese Women

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ABSTRACT

This research was conducted in order to investigate the potential effect of green coffee and white tea water extracts on the weight reduction of obese women. Eighty obese women (25-50 years old) with a BMI of 35- 39.9 was selected from Kasr Elainy Hospital, Cairo, Egypt. All obese women don't have any other diseases. All subjects were randomly classified into four groups. The 1st didn't receive any treatment, the 2nd treated with green coffee extract (GCE) twice a day, 3rd treated with white tea extract (WTE) twice a day, 4th treated with both (GCE & WTE) once a day of each. The phenolic content of both tested extracts was analyzed. Body mass index, waist/hip ratio, lipid profile, liver functions, kidney functions, leptin hormone, lipase, GSH and MDA were determined before and after the treatment period (8 weeks). After serum sample results indicated that obese subjects treated with GCE, WTE in groups 2,3 and 4 recorded an improvement in all tested parameters compared with obese subjects who hadn't received any treatment. According to the above results, green coffee as well as white tea water extracts may be used in the weight reduction of obese women and also may be useful for human beings.

Key words: obese women, green coffee, white tea, BMI, lipid profile.

Introduction

Obesity is a global health issue with an increasing prevalence in the past decades and since its positive relationship with a wide range of morbidities, low quality of life, social problems and impaired mental health has been shown, obesity has become a major concern in many societies. This disease is defined by excessive body fat accumulation and measured by some indexes such as the MBI (body mass index) and the WHR (waist/hip ratio). Since obesity co-morbidities and elevated rates of mortality are widely increasing in many

countries, weight control and management strategies besides obesity treatment seem to be urgent needs in modern life **Carrageta *et al.*, (2018)**.

Globally, coffee is one of the most commonly consumed beverages. Several studies have reported the beneficial effects of coffee on human health. One of the common traditional forms of coffee beans is green coffee beans, which are raw coffee beans that have not been roasted. The raw green coffee beans are rich in caffeine, chlorogenic acid, and its related metabolites, such as quinic acid, caffeic acid, and p-coumaric acid. Moreover, recent clinical trials showed promising therapeutic effects of green coffee for improving lipid and hormonal profiles in obese humans **Gorji *et al.* (2019).**

Tea is a pleasant drink widely used by many populations across the world and prepared from the leaves of Camellia sinensis. This herb is categorized into six variations: white, green, and yellow. oolong. black and dark tea. The diversity is made up of different types of processing steps. Tea is not only favorable for its beloved taste, but also for its rich capacity for bioactive components that possess a variety of health functions. This worldwide-used drink has been reported to contain about 4000 bioactive components. Many of these components have been identified as health-effective biomolecules in human studies. Tea is considered a safe drink that can be used in a daily diet. Many studies have shown the beneficial effects of tea consumption on health including weight control and obesity treatment. It is stated that this historical drink has antioxidation, anti-inflammation, cardio-vascular protection, anti-cancer, and hepatoprotection functions as well as regulation of the gut microbiota **Shang *et al.*, (2021)**. Therefore, this research was conducted to investigate the potential effect of green coffee and white tea extracts on weight reduction in obese women.

Material and Methods

Materials, Methods and Subjects

Materials

- Green coffee and white tea (*Camellia sinensis* L.) were obtained from the Agricultural Research center, Giza, Egypt.
- Kits were obtained from Gamma Trade Company, Giza, Egypt.

Methods

Preparation of green coffee bean extract:

The dried green coffee bean was milled using a coffee grinder into a fine powder. The green coffee was papered by using 2.5g fine powder in 200 ml of distillated water and soaked for 10 minutes at 60 ºC **Reeno,)2006).**

Preparation of white tea water extract:

White tea (2.5g) was soaked in 200 ml of boiling water for 10 minutes. **Reeno,)2006).**

Determination of phenolic compound:

The phenolic compounds of green coffee and white tea extracts were fractionated, identified and determined by HPLC according to **Goupy *et al.*,)1999).**

Subjects

Experimental design

Eighty obese women (25-50 years old) were selected from the Clinical Nutrition Outpatient the Clinic at Kasr Elainy Hospital, Cairo, Egypt. Obese women had a body mass index of 35 to 39.9. All obese women don't any other diseases. Obese women were divided into 4 groups (20 of each) as follows:

Group 1: control group: 20 obese women fed their regular diet for 8 weeks.

Group 2: As the same of Group 1 with the 2.5g green coffee extract (GCE) twice per day for 8 weeks.

Group 3: As the same of Group 1 with 2.5 g white tea (WTE) twice per day for 8 weeks.

Group 4: As the same of Group 1 with green coffee extract which was described in Group 2 but once a day and white tea extract as described in Group 3 once a day also for 8 weeks.

Blood samples were collected for biochemical analysis before and after the experiment then analyzed in the Kasr-Elainy Hospital Laboratory, Cairo, Egypt.

The Analytical Methods of Blood Serum

Serum total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (**HDL-c**), very low-density lipoprotein cholesterol (**VLDL-c**) and low-density lipoprotein cholesterol (**LDL-c**) were determined

according to the methods described by **Allain *et al.*, (1974); Fossati and Principe,)1982); Burstein, (1970) and Friedwald *et al.*, (1972)** for both last parameters**,** respectively**.** Serum aminotransferases **(ALT** and **AST**) activities were measured according to **Reitman and Frankel, (1975).** Serum total and direct bilirubin concentrations were determined according to **Young, (2001)**. Serum urea nitrogen and serum creatinine were determined according to **Patton and Crouch, (1977)** and **Bohmer, (1971),** respectively. Leptin hormone was determined according to the method described by **Guillaume and Bjorntorp, (1996).** Serum lipase was determined according to the method described by **Stoytcheva *et al.*, (2012).** Glutathione reductase (GSH) was determined according to the method described by **Paglia and Valentine, (1967).** Malondialdehyde (**MDA**) was determined according to the method described by **Ohkawa *et al.*, (1979).** Body mass index (BMI) and waist/hip ratio were measured according to **WHO (2000)** and **WHO (2011),** respectively

Statistical analysis

Data were statistically analyzed using the T test and statistical analysis system **SAS, (2006).** A one-way analysis of variance (ANOVA) was used to test the variations among groups and a post hoc test (Duncan's Test) was used to compare mean of groups.

Results and Discussion

Concerning to the phenolic content of green coffee and white tea extracts (Table 1), green coffee extract contains the highest content of vanillic acid followed by rosemarinic, Chlorogenic, Myricetin, Benzoic acid, Kampherol, Rutin, Cinnamic acid, Quercitin, Caffeic acid, Ferulic acid, p-Coumaric acid, Gallic acid, Syringic acid and o- Coumaric acid with mean values 9593.36, 5550.52, 2134.26, 1047.72, 969.30, 517.79, 511.13, 207.52, 187.51, 169.97, 84.38, 33.45, 25.67, 5.65 and 1.48 respectively. Whereas, white tea extract contains the highest content of vanillic acid followed by Chlorogenic, β- Hydroxy benzoic acid, Ellagic, Gallic acid, β-Coumaric acid, Kampherol, rosemarinic, Ferulic acid, Syringic acid, Benzoic acid, Pyrogallol, Catechin, Myricetin, Quercitin, o- Coumaric acid, Cinnamic acid and Rutin with mean values 2822.08, 1654.39, 243.41, 197.20, 165.94, 108.24, 102.65,

101.89, 96.79, 93.48, 80.54, 39.52, 26.78, 12.00, 9.18, 7.32, 6.93 and 1.10 respectively.

These experimental results were consistent with **Norazlin *et al.*, (2023),** who reported that the total phenolic content specially chlorogenic acid was highest in green coffee. Total phenolic content has a vital role in human health in protecting against diseases related to oxidation and free-radical damage **Vladimir-Knezevic *et al.*, (2012).** Moreover, **Erskine *et al.*, (2022)** indicating that chlorogenic acid and vanillic acid which were recorded to have a high content in green coffee extract may be strong OH• radical scavengers.

As indicated in this research, **Van-Long and Woo-Sik, (2021)** reported that numerous phenolic acids and their hydrolysable tannins such as gallic, hydroxybenzoic, hydroxycinnamic, quinic, and affeoylquinic acids have been identified in teas. White tea contains the maximum level of polyphenols as it undergoes the least amount of processing. Therefore, white tea has abundant potent antioxidants and may be even more effective.

Table 2 showed the body mass index of obese subjects. Data illustrated the comparison between after and before measurements that the highest improvement was recorded in obese women who received GCE followed by GCE &WTE, WTE and at the last obese women with any treatment with mean values of 33.6±2.80 vs 37.7±4.99, 34.9±6.12 vs 38.00±6.99, 34.9±5.74 vs 36.8±6.01 and 35.9±4.35 vs 36.2 ±5.30, respectively.

Data reported by **Cimi *et al.*, (2020),** is in a line with this work which illustrated that green coffee extract resulted in weight loss in obese rats. Similarly, mice were given a heigh fat diet and GCE showed that GCE supplementation decreased body weight gain. The observed anti-obesity effect may work by suppressing lipogenesis and stimulating lipolysis**.** Chlorogenic acid (CGA) affects obesity by lowering body fat accumulation through adipogenesis regulation. Moreover, CGA increases lipid metabolism in high fat diet-induced obese rats and significantly reduces visceral fat accumulation, improvs insulin resistance, and when combined with an energy-restricted diet, may lead to a significant reduction in body mass index and fat mass **Tanaka *et al.*, (2009)**.

These research results were in contrast with data reported by **Oral *et al.*, (2023),** who reported that white tea can stimulate the sympathetic nervous system (SNS) and activate brown 5 adipose tissue (BAT) via increasing UCPs gene expression which can elevate thermogenesis as an outcome.

Regarding to Total cholesterol (Table 3), the data of the after serum samples of women subjects in group one significantly decreased compared to before serum samples with mean values of 243.37±17.66 vs. 250.01±16.91 mg/dl, respectively. Group two which received green coffee twice a day showed a significantly decreased in after serum samples compared to before serum samples with mean values of 235.50±8.66 vs. 276.51±6.32 mg/dl, respectively. Group three which received white tea twice a day showed a significantly decreased in after serum samples compared to before serum samples with mean values of 199.61±9.01 vs. 217.89±10.41 mg/dl, respectively. Group four which received green coffee and white tea once a day showed a significantly decreased in after serum samples compared to before serum samples with mean values 207.04±14.67 vs. 247.00±19.46 mg/dl, respectively.

Regarding triglycerides, data of the after serum samples of the subjects in group one significantly decreased compared to the before serum samples with mean values of 202.77±8.71 vs. 210.96±9.55 mg/dl, respectively. Group two which received green coffee twice a day showed a significantly decreased in after serum samples compared to before samples with mean values of 142.49±20.91 vs. 176.86±6.06 mg/dl, respectively. Group three which received white tea twice a day showed a significantly decreased in after serum samples compared to before samples with mean values of 115.71±8.33 vs. 135.57±13.17 mg/dl, respectively. Group four which received green coffee and white tea once a day showed a significantly decreased in after serum samples compared to before samples with mean values of 177.29±15.17 vs. 205.00±9.67 mg/dl, respectively.

Regarding **HDL-c**, data of the after serum samples of the subjects in group one significantly increased compared to the the before serum samples with mean values of 37.30±1.00 vs. 35.86±0.94 mg/dl, respectively. Group two which received green coffee twice a day showed a significantly increase in after serum samples compared to before serum samples with mean values 36.86±1.90 vs. 34.23±1.67 mg/dl, respectively. Group three which was received

white tea twice a day significant increase in after serum samples compared to before serum samples with mean values of 47.64±2.06 vs. 44.06±1.87 mg/dl, respectively. Group four which was received green coffee and white tea once a day significant increase in after serum samples compared to before serum samples with mean values of 43.09±2.96 vs. 46.57±2.77 mg/dl, respectively.

Regarding **VLDL-c**, data of the after serum samples of the subjects in group one significantly decreased compared to the before serum samples with mean values of 40.55±1.74 vs. 42.19±1.91 mg/dl, respectively. Group two which was received green coffee twice a day significant decreased in after serum samples compared to before samples with mean values of 33.37±1.10 vs. 34.51±1.46 mg/dl, respectively. Group three which was received white tea twice a day significantly decreased in after serum samples compared to before samples with mean values of 23.14±2.97 vs. 27.11±2.30 mg/dl, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before samples with mean values 35.46±2.87 vs. 41.00±3.06 mg/dl, respectively.

Regarding **LDL-c**, data of the after serum samples of the subjects in group one significantly decreased compared to before serum samples with mean values of 165.52±17.28 vs. 171.96±17.01 mg/dl, respectively. Group two which received green coffee twice a day significant decreased in after serum samples compared to before samples with mean values of 165.27±7.99 vs. 207.77±6.27 mg/dl, respectively. Group three which was received white tea twice a day significant decreased in after serum samples compared to before samples with mean values of 128.83±1.67 vs. 146.78±2.63 mg/dl, respectively. Group four which was received green coffee and white tea once a day significantly decreased in after serum samples compared to before samples with mean values of 107.01±3.03 vs. 162.91±1.93 mg/dl, respectively.

Regarding the before values of total cholesterol as well as LDL, women in group two which receive GCE recorded significantly higher value compare to group one and other treatments. Therefore, TG mean values as well as VLDL indicated that subjects in group one and four significant increased compared with GCE and WTE groups. Meanwhile, HDL of groups received WTE and group four (GCE & WTE) compared to control and GCE groups.

Data of after values of TC, TG, HDL and VLDL of subjects treated with WTE recorded the highest improvement among the control and other treated groups. Meanwhile, the LDL of the group receiving GCE and WTE was recorded as highly improvement compared to control and other all treatments.

Cimi *et al.*, (2020) findings were in harmony with these research results who reported that the effect of GCE on serum lipids of HFD-induced obese rats Obese male rats treated with GCE at 10, 20, and 40 mg/kg BW/day for 13 days showed statistically significantly lower serum total cholesterol and triglycerides levels compared to the control group. Treatment with GCE at the dose of 20 and 40 mg/kg BW/day also resulted in statistically significantly lower serum LDL-cholesterol levels. GCE treatment showed no effect on serum HDL-cholesterol levels except at the dose of 40 mg/kg BW/day, where HDL-c level decreased slightly.

These above findings were in agreement with **Zeinab *et al.*, (2023),** which reported that accumulation of fatty acids in cells can lead to triglycerides synthesis and consequently increase fat storage and we know the AMPK cellular pathway can activate lipid catabolism by activating β-oxidation and inhibiting de novo synthesis of fatty acids, cholesterol, and triglycerides. Moreover, studies provide evidence that polyphenols of tea can activate the AMPK cellular pathway promoting fatty acid oxidation in liver cells and muscle fibers.

Additionally, caffeine, a bioactive component in white tea leaves can activate the triglyceride (TG) degradation pathway via two intracellular mechanisms. Caffeine can stimulate the β-adrenergic receptor on adipocytes followed by activating the cAMP signaling pathway to lipolysis. As the second function, caffeine can inhibit cAMP degradation by blocking phosphodiesterase and increase cAMP concentrations as upregulation of PKA and lipolysis at the end however it is worth mentioning that the caffeine levels in coffee are considerably higher than in tea.

Regarding **ALT** (Table 4), the data of the after serum samples of the subjects in group one non-significantly decreased compared to the before serum

samples with mean values 19.71±0.69 vs. 19.74±0.68 u/l, respectively. Group two which received green coffee twice a day, experienced a significant decrease in serum samples after compared to before samples with mean values of 14.28±0.92 vs. 14.86±2.50 u/l, respectively. Group three which was received white tea twice a day significant decreased in after serum samples compared to before samples with mean values of 16.43±1.19 vs. 19.43±1.09 u/l, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before samples with mean values 15.86±1.37 vs. 21.29±2.09 u/l, respectively.

Concerning **AST**, data of the after serum samples of the subjects in group one significantly decreased compared to the before serum samples with mean values of 17.60±0.74 vs. 18.27±0.80 u/l, respectively. Group two which was received green coffee twice a day significant decreased in after serum samples compared to before serum samples with mean values of 13.29±0.61 vs. 16.14±0.74 u/l, respectively. Group three which was received white tea twice a day significant decreased in after serum samples compared to before samples with mean values of 15.57±0.87 vs. 19.00±0.85 u/l, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before samples with mean values of 14.57±1.13 vs. 18.14±1.82 u/l, respectively.

Regarding total bilirubin, the data of the after serum samples of the subjects in group one non-significant decrease compared to the before serum samples with mean values of 0.25±0.01 vs. 0.26±0.02 mg/dl, respectively. Group two which received green coffee twice a day significant decreased in after serum samples compared to before serum samples with mean values of 0.44±0.03 vs. 0.44±0.03 mg/dl, respectively. Group three which was received white tea twice a day significant decreased in after serum samples compared to before samples with mean values 0.25±0.02 vs. 0.31±0.03 mg/dl, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before samples with mean values of 0.25±0.03 vs. 0.32±0.04 mg/dl, respectively.

Pertaining to Bilirubin direct**,** data of the after serum samples of the subjects in group one non-significant decreased compared to before samples

with mean values 0.22±0.02 vs. 0.23±0.02 mg/dl, respectively. Group two which was received green coffee twice a day significant decreased in after serum samples compared to before serum samples with mean values 0.11±0.01 vs. 0.16±0.02 mg/dl, respectively. Group three which was received white tea twice a day significant decreased in after serum samples compared to before samples with mean values 0.10±0.02 vs. 0.13±0.02 mg/dl, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before samples with mean values 0.09±0.008 vs. 0.12±0.01 mg/dl, respectively.

With regard to ALT and AST there were slight differences among the before samples for WTE and fourth group compared to the non-treated group. Therefore, GCE showed a significant decrease compared to control and other tested groups.

Data for before total bilirubin for GCE group was significant increase compared with subjects without any supplementation and other tested groups. Whereas, before direct bilirubin of all tested groups significant decrease compared with women of group one.

Regarding to after samples, data showed that there was improvement in all liver function parameters for all testes groups compared with subjects without in supplementation (G1) except women received GCE which were significant decreased in total bilirubin compared to group one and other testes groups.

Rabey *et al.*, (2021), reported that the administration of the green coffee methanolic extract, silymarin, or their combination significantly and advantageously improved serum levels of these liver function parameters approaching them to the negative control group levels. **Yılmaz *et al.*, (2024),** found that serum ALT levels were lower in the group inducted by CCl4 and was given white tea, although it was not statistically significant. In the literature, there are studies indicating that white tea is protective against CCl4-induced liver damage. In a study by **Wang *et al.*, (2019),** rats were given low and high doses of white tea for 14 days, and on day 14, CCl4 was given intraperitoneally to induce liver damage. When the experiment was terminated

after 24 h and the blood and tissues of the animals were examined, it was found that serum liver enzymes were lower in rats that were given white tea.

Regarding to blood urea nitrogen (**BUN)** which was presented in Table 5, data of the after serum samples of the subjects in group one significantly decreased compared to before serum with mean values of 10.29±0.42 vs. 11.00±0.58 mg/dl, respectively. Group two which received green coffee twice a day significant decreased in after serum samples compared to before serum samples with mean values of 07.14±0.46 vs. 10.00±0.62 mg/dl, respectively. Group three, which received white tea twice a day significant decreased in after serum samples compared to before serum samples with mean values of 08.00±0.53 vs. 09.57±0.56 mg/dl, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before serum samples with mean values of 08.43±0.61 vs. 10.43±0.51 mg/dl, respectively.

Concerning to Creatinine, data of the after serum samples of the subjects in group one non-significant decreased compared to before serum samples with mean values 0.78±0.05 vs. 0.79±0.04 mg/dl, respectively. Group two which was received green coffee twice a day significant decreased in after serum samples compared to before serum samples with mean values 0.74±0.05 vs. 0.91±0.04 mg/dl, respectively. Group three which was received white tea twice a day significant decreased in after serum samples compared to before serum samples with mean values 0.72±0.04 vs. 0.82±0.05 mg/dl, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before serum samples with mean values of 0.68±0.009 vs. 0.83±0.04 mg/dl, respectively.

Mean values of kidney functions showed that, BUN for all before samples of tested groups significant decreased compared with G1which was not receive any treatment. data of before creatinine (Cr) serum samples of women were drank GCE significant increase compared with group 1 and other tested groups.

Regarding to after BUN and Cr serum samples, there were significant reduction of all tested groups for all these parameters compare to the first group

(G1) which was not receive any supplementation. These results with an accordance with the results reported by **Nour El-Deen and Taha (2019),** which reported that the serum levels of creatinine, BUN, uric acid and ROS in-group administrated green coffee extract with Cisplatin injection showed significant reduction compared to the Cisplatin administered group only by showing a better renal function. This in accordance with this study and the other that proven that rats received oral GCE for 7 days with induction of acute renal failure showed a significant improvement in kidney functions tests (decrease in serum urea, serum creatinine, and blood urea nitrogen). This also in agreement with the studies that proven that caffeine in coffee reduce oxidative stress and protect antioxidant system: in hypoxia-induced pulmonary epithelial cells; it is an inhibitor of hydrogen peroxide-induced lipid peroxidation products in human skin fibroblasts, and it reduces tissue lipid peroxidation and ROS production. Since oxidative stress has been carried out as a leading cause of a wide range of chronic diseases, it is important to understand the effect of antioxidants in different physiological and pathological conditions. There is evidence that GCE has antioxidants effect that may be protective against oxidation reactions by up-regulating antioxidant enzymes expression and decreasing cell apoptosis.

Subject's serum kidney function results were in accordance with **Singh *et al.*, (2022),** who reported that Vanillic acid which was found in highly concentration in white tea attenuated the impaired renal function as evidenced by a reduction in serum creatinine, urea, uric acid and urinary microproteinuria levels with a concomitant increase in urinary creatinine clearance in the nephropathic rats. Hence, from the above observation it might be conclude that reno-protective effects of chlorogenic acid enriched green coffee and white tea extracts were accomplished through the inhibition of oxidative stress, inflammation, apoptosis, and with an increase in regenerative capabilities and recovery of renal cells **Hazra *et al.*, (2020).**

Regarding to Leptin hormones, data in Table 6 of the after serum samples of the subjects in group one significant decreased compared to before serum samples with mean values 25.09±0.51 vs. 25.46±0.47 ng/ml, respectively. Group two which was received green coffee twice a day significant decreased in after serum samples compared to before samples with mean values 21.76±0.92 vs. 27.66±0.66 ng/ml, respectively. Group three which

was received white tea twice a day significant decreased in after serum samples compared to before samples with mean values 21.79±1.31 vs. 27.94±0.46 ng/ml, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before samples with mean values 18.41±0.42 vs. 21.66±0.55 ng/ml, respectively.

Pertaining to Lipase enzyme**,** data of the after serum samples of the subjects in group one significant decreased compared to before samples with mean values 31.43±4.77 vs. 33.29±4.30 u/l, respectively. Group two which was received green coffee twice a day significant decreased in after serum samples compared to before serum samples with mean values 35.43±2.02 vs. 40.14±3.80 u/l, respectively. Group three which was received white tea twice a day significant decreased in after serum samples compared to before serum samples with mean values 34.43±2.96 vs. 47.14±1.79 u/l, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before serum samples with mean values 26.14±2.38 vs. 34.71±2.01 u/l, respectively.

Mean values of leptin hormone for before serum samples of groups received GCE and WTE was significant increase compare to groups 1 and 4 but fourth group recorded the lowest value compare to G1 and other tested groups. Mean values of lipase of WTE group recorded the highest value followed by GCE groups compare to G1 and G4.

Regarding after leptin samples, all tested samples significant decreased compare to group one. Data for lipase showed that GCE and WTE samples significant increased compare to G1 (with any supplementation) but group for recorded the lowest value among group 1 and other tested groups.

Leptin is secreted by the adipocytes to regulate food intake and fatty acid oxidation. Leptin is transported to the brain, which signals the inhibition of lipid accumulation in the adipose tissue. Treatment with green coffee bean extract is reported to reduce leptin concentrations **Choi *et al*., (2016)** which was in harmony with this study results. Another investigation found quercetin, which found in these two extracts specially GCE, to interact with leptin genes, limiting leptin synthesis **Maryam *et al*., (2017).**

The above results suggested that GCE as well as WTE may inhibit the pancreatic lipase secretion which negatively affected the lipid digestion and the absorption of the lipids which was in agreement with **Rezaee *et al.*, (2023),** who suggested that catechins may inhibit pancreatic lipase and consequently reduce dietary lipid absorption and it can also inhibit catechol methyltransferase (COMT) an enzyme that degrades norepinephrine (NE) so NE can cause its thermogenic effect in the adipose tissue.

Regarding glutathione reductase (Table 7), data of the after serum samples of the subjects in group one non-significant increased compared to before serum with mean values of 30.64±1.35 vs. 30.29±1.30 U/ml, respectively. Group two which was received green coffee twice a day significant increase in after serum samples compared to before serum samples with mean values of 37.76±0.77 vs 32.39±0.83. U/ml, respectively**.** Group three which was received white tea twice a day significant increase in after serum samples compared to before serum samples with mean values of 37.36±1.00 vs. 32.07±1.32 U/ml, respectively. Group four which was received green coffee and white tea once a day significant increase in after serum samples compared to before serum samples with mean values of 41.54±0.94 vs. 33.55±0.96 U/ml, respectively.

Concerning to malondialdehyde, data of the after serum samples of the subjects in group one significant decreased compared to before serum samples with mean values of 4.39±0.40 vs. 4.61±0.40 ng/ml, respectively. Group two which was received green coffee twice a day significant decreased in after serum samples compared to before serum samples with mean values of 4.33±0.31 vs. 5.31±0.35 ng/ml, respectively. Group three which was received white tea twice a day significant decreased in after serum samples compared to before serum samples with mean values of 3.93±0.36 vs. 5.19±0.39 ng/ml, respectively. Group four which was received green coffee and white tea once a day significant decreased in after serum samples compared to before serum samples with mean values of 41.54±0.94 vs. 5.24±0.29 ng/ml, respectively.

Regarding to before mean values of glutathione reductase, data revealed that subjects treated with GCE and WTE recorded the highest value compared

to control and other groups. Therefore, before values of MDA of group two (GCE) recorded the highest value among control and other treated groups.

After mean values of serum GSH showed that subjects treated with GCE and WTE had the highest improvement followed by GCE, WTE, and control group. Whereas, after values of MDA showed that obese subjects of group four treated with GCE & WTE recorded the highest improvement followed by WTE, GCE and non-treated group (G1).

These results were in a line with **Priftis *et al.*, (2018),** which proved that the antioxidative effect of green coffee extract accompanied by silymarin on enzymatic antioxidant systems was reflected by increased concentrations of antioxidants (TAC, GSH, GST, CAT and SOD) and a decreased lipid peroxidation that may be ascribed to its richness in caffeine, which is considered as an important component of coffee. Moreover, the antioxidant activity of green coffee makes it able to trap hydroxyl radicals or superoxide anions because of its content of both phenolic compounds and chlorogenic acid. Moreover, it is known that the reactive oxygen species (ROS) are harmful when present at high concentrations, however a certain level of ROS is important in utilizing redox cell signaling to sustain cellular homeostasis.

As the main non-enzymatic regulator of intracellular redox balance, GSH is used as a sensitive marker of oxidative stress. GSH participates in redox reactions by oxidation of the active thiol group and turns into its oxidized form, glutathione disulfide (GSSH). As a result of cell damage caused by free radicals, the level of GSH decreases because of consumption. Malondialdehyde, another marker used to assess oxidative stress, is one of the byproducts caused by the oxidation of lipids containing polyunsaturated fatty acids, which is caused by free radicals, and an increased MDA level indicates an excess of oxidative damage **Arauz *et al.*, (2016**). Wang et al., (**2019),** results were in agreement with this research results which found that MDA levels was lower and GSH-Px (glutathione peroxidase) activity was higher in rats that were given white tea. In addition, it was found that the healing effect was greater in the group given a high dose (200 mg/kg) of white tea. Moreover, a similar study was conducted and the hepatoprotective effect of white tea was associated with

the polyphenols it contained, such as gallic acid, catechin, hyperoside, and sulfuretin **Yi *et al.*, (2020).**

Conclusion

The green coffee as well as white tea water extracts may be used in the weight reduction of obese women and also may be useful for human beings. The green coffee showed highly improvement in weight reduction of the obese women followed by the usage of both green coffee and white tea and in the last white tea extracts.

Table (1): Phenolic content of green coffee and white tea extracts

	Green coffee	White tea
	mg/kg	
Pyrogallol	--	39,52
Quinol	--	--
Gallic acid	25,67	165,94
3-Hydroxytyrosol	--	--
Catechol	--	--
p- Hydroxy benzoic acid	--	243,41
Catechin	--	26,78
Chlorogenic	2134,26	1654,39
Vanillic acid	9593,36	2822,08
Caffeic acid	169,97	--
Syringic acid	5,65	93,48
p- Coumaric acid	33,45	108,24
Benzoic acid	969,30	80,54
Ferulic acid	84,38	96,79
Rutin	511,13	1,10
Ellagic	--	197,20
o- Coumaric acid	1,48	7,32
Resvertol	--	--
Cinnamic acid	207,52	6,93
Quercitin	187,51	9,18
Rosemarinic	5550,52	101,89
Neringein	--	--
Myricetin	1047,72	12,00
Kampherol	517,79	102,65

Tabel (2): Effect of green coffee and white tea on body mass index (BMI) and waist / hip ratio (W/ H) ratio of obese women

Parameters		BMI
Group 1	Before	36.2 ±5.30^{Ab}
	After	35.9±4.35^{Aa}
G2: GCE	Before	37.7±4.99^{Aa}
	After	33.6±2.80^{Bd}
G3: WTE	Before	36.8 ±6.01^{Ab}
	After	34.9±5.74^{Bb}
G4: GCE& WTE	Before	38.00±6.99^{Aa}
	After	34.9±6.12^{Bc}

*Mean values are expressed as means ± SE.

* Mean values at the same column in after and before of each group with the same capital superscript are not statistically significant at P≤0.05.

* The same small superscript is not statistically significant at P≤0.05 compared after among all groups and also compared before among all groups.

Tabel (3): Effect of green coffee and white tea on lipid profile on obese women

Parameters		Cholesterol	Triglyceride	HDL-c	VLDL-c	LDL-c
		mg/dl				
Group 1	Before	250.01 ± 16.91^{Ab}	210.96 ± 9.55^{Aa}	35.86 ± 0.94^{Bb}	42.19 ± 1.91^{Aa}	171.96 ± 17.01^{Ab}
	After	243.37 ± 17.66^{Ba}	202.77 ± 8.71^{Ba}	37.30 ± 1.00^{Ab}	40.55 ± 1.74^{Ba}	165.52 ± 17.28^{Ba}
G2: GCE	Before	276.51 ± 6.32^{Aa}	176.86 ± 6.06^{Ab}	34.23 ± 1.67^{Bc}	34.51 ± 1.46^{Ab}	207.77 ± 6.27^{Aa}
	After	235.50 ± 8.66^{Bb}	142.49 ± 20.91^{Bc}	36.86 ± 1.90^{Ab}	33.37 ± 1.10^{Bb}	165.27 ± 7.99^{Ba}
G3: WTE	Before	217.89 ± 10.41^{Ab}	135.57 ± 13.17^{Ac}	44.06 ± 1.87^{Ba}	27.11 ± 2.30^{Ac}	146.78 ± 2.63^{Ad}
	After	199.61 ± 9.01^{Bd}	115.71 ± 8.33^{Bd}	47.64 ± 2.06^{Aa}	23.14 ± 2.97^{Bc}	128.83 ± 1.67^{Bb}
G4: GCE& WTE	Before	247.00 ± 19.46^{Ac}	205.00 ± 9.67^{Aa}	43.09 ± 2.96^{Ba}	41.00 ± 3.06^{Aa}	162.91 ± 1.93^{Ac}
	After	207.04 ± 14.67^{Bc}	177.29 ± 15.17^{Bb}	46.57 ± 2.77^{Aa}	35.46 ± 2.87^{Bb}	107.01 ± 3.03^{Bc}

*Mean values are expressed as means ± SE.

* Mean values at the same column in after and before of each group with the same capital superscript are not statistically significant at P=0.05.

* The same small superscript is not statistically significant at P=0.05 compared after among all groups and also compared before among all groups.

Tabel (4): Effect of green coffee and white tea on liver functions on obese women

Parameters		ALT	AST	Bilirubin Total	Bilirubin Direct
		u/l		mg/dl	
Group 1	Before	19.74±0.68^{Ab}	18.27±0.80^{Ab}	0.26±0.02^{Ac}	0.23±0.02^{Aa}
	After	19.71±0.69^{Aa}	17.60±0.74^{Ba}	0.25±0.01^{Ab}	0.22±0.02^{Aa}
G2: GCE	Before	14.86±2.50^{Ac}	16.14±0.74^{Ac}	0.44±0.03^{Aa}	0.16±0.02^{Ab}
	After	14.28±0.92^{Bc}	13.29±0.61^{Bc}	0.34±0.02^{Ba}	0.11±0.01^{Bb}
G3: WTE	Before	19.43±1.09^{Ab}	19.00±0.85^{Aa}	0.31±0.03^{Ab}	0.13±0.02^{Ac}
	After	16.43±1.19^{Bb}	15.57±0.87^{Bb}	0.25±0.02^{Bb}	0.10±0.02^{Bc}
G4: GCE& WTE	Before	21.29±2.09^{Aa}	18.14±1.82^{Ab}	0.32±0.04^{Ab}	0.12±0.01^{Ac}
	After	15.86±1.37^{Bb}	14.57±1.13^{Bb}	0.25±0.03^{Bb}	0.09±0.008^{Bd}

*Mean values are expressed as means ± SE.

* Mean values at the same column in after and before of each group with the same capital superscript are not statistically significant at P≤0.05.

* The same small superscript is not statistically significant at P≤0.05 compared after among all groups and also compared before among all groups

Tabel (5): Effect of green coffee and white tea on kidney functions on obese women

Parameters		BUN mg/dl	Creatinine mg/dl
Group 1	Before	11.00±0.58^{Aa}	0.79±0.04^{Ac}
	After	10.29±0.42^{Ba}	0.78±0.05^{Aa}
G2: GCE	Before	10.00±0.62^{Ab}	0.91±0.04^{Aa}
	After	07.14±0.46^{Bc}	0.74±0.05^{Bb}
G3: WTE	Before	09.57±0.56^{Ac}	0.82±0.05^{Ab}
	After	08.00±0.53^{Bb}	0.72±0.04^{Bb}
G4: GCE& WTE	Before	10.43±0.51^{Ab}	0.83±0.04^{Ab}
	After	08.43±0.61^{Bb}	0.68±0.009^{Bc}

*Mean values are expressed as means ± SE.

* Mean values at the same column in after and before of each group with the same capital superscript are not statistically significant at P≤0.05.

* The same small superscript is not statistically significant at P≤0.05 compared after among all groups and also compared before among all groups.

Tabel (6): Effect of green coffee and white tea on leptin hormones and lipase enzyme on obese women

Parameters		Leptin hormones ng/ml	Lipase enzyme u/l
Group 1	Before	25.46 ± 0.47^{Ab}	33.29 ± 4.30^{Ac}
	After	25.09 ± 0.51^{Ba}	31.43 ± 4.77^{Bb}
G2: GCE	Before	27.66 ± 0.66^{Aa}	40.14 ± 3.80^{Ab}
	After	21.76 ± 0.92^{Bb}	35.43 ± 2.02^{Ba}
G3: WTE	Before	27.94 ± 0.46^{Aa}	47.14 ± 1.79^{Aa}
	After	21.79 ± 1.31^{Bb}	34.43 ± 2.96^{Ba}
G4: GCE& WTE	Before	21.66 ± 0.55^{Ac}	34.71 ± 2.01^{Ac}
	After	18.41 ± 0.42^{Bc}	26.14 ± 2.38^{Bc}

*Mean values are expressed as means ± SE.

* Mean values at the same column in after and before of each group with the same capital superscript are not statistically significant at $P\leq0.05$.

* The same small superscript is not statistically significant at $P\leq0.05$ compared after among all groups and also compared before among all groups

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الملخص العربي

التأثير المحتمل للقهوة الخضراء والشاي الأبيض على خفض الوزن لدى النساء البدينات

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أُجري هذا البحث من أجل دراسة التأثير المحتمل لمستخلصات القهوة الخضراء والشاي الأبيض على إنقاص الوزن لدى النساء البدينات. تم اختيار ثمانين امرأة بدينة (٢٥-٥٠ سنة) مع مؤشر كتلة الجسم من ٣٥-٣٩,٩ من مستشفى القصر العيني، القاهرة، مصر. جميع النساء البدينات ليس لديهن أي أمراض أخرى. تم تصنيف جميع السيدات بشكل عشوائي إلى أربع مجموعات. الأول لم يتلق أي علاج، والثاني عولج بمستخلص القهوة الخضراء (GCE) مرتين يوميًا، والثالث عولج بمستخلص الشاي الأبيض (WTE) مرتين يوميًا، والرابع عولج بكل من (GCE وWTE) مرة واحدة يوميًا لكل منهما. تم تحليل المحتوى الفينولي لكلا المستخلصين المختبرين. تم تحديد مؤشر كتلة الجسم، ونسبة الخصر / الورك، وصورة الدهون، ووظائف الكبد و الكلى، هرمون اللبتين، الليباز، GSH وMDA قبل وبعد فترة العلاج (٨ أسابيع). ولقد أشارت نتائج عينة المصل إلى أن السيدات المصابات بالسمنة والذين عولجوا بـ GCE، WTE في المجموعات ٢ و٣و ٤ اظهرن تحسنًا في جميع التحاليل التي تم اختبارها مقارنة مع الأشخاص الذين يعانون من السمنة ولم يتلقوا أي علاج. ووفقًا للنتائج المذكورة أعلاه، يمكن استخدام المستخلصات المائية للقهوة الخضراء و الشاي الأبيض في إنقاص الوزن لدى النساء البدينات وقد تكون لها فوائد اخرى أيضًا للإنسان.

الكلمات المفتاحية: النساء البدينات، القهوة الخضراء، الشاي الأبيض، مؤشر كتلة الجسم، صورة الدهون.