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Potential Anti-Obesity Effects of Matcha Tea in Rats Fed on a High Fat Diet

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Abstract :

Matcha is a kind of powdered green tea produced by grinding with a stone mill. Lately, Matcha green tea has gained popularity as a beverage and food additive. It has proved to be effective in preventing obesity and related metabolic syndromes. The primary goal of this study is to determine the efficacy of Match tea in reducing obesity in obese rats. In this investigation, thirty male albino rats weighing 140g±5g were divided into five groups, each with six rats. To induce obesity in rats, a high fat diet (20 % animal fat) was fed to them. The study also measured glucose levels, liver functions {Alanine amino transferase (GPT) & Aspartate amino transferase (GOT)}, total cholesterol, triglycerides, high-density lipoprotein, low-density lipoprotein, very low-density lipoprotein, atherogenic index and kidney functions (urea, uric acid, and creatinine). The results showed that the obese group had reduced glucose levels, liver functions, and kidney functions when they were fed 6 % Matcha tea, with significant differences. Matcha tea had the lowest cholesterol and triglyceride levels, as well as the lowest low-density lipoprotein, very low-density lipoprotein and atherogenic index values, with significant differences. The group fed 6 % Matcha tea had the highest high-density lipoprotein levels. The lowest levels were found in the group fed 2% Matcha tea, with a significant difference. Obese rats given 6%Match tea powder demonstrated superior lipid profiles, glucose levels, liver and kidney functioning.

Key words: Tea, weight loss, Biochemical analysis.

Introduction

Obesity is derived from the Latin term obesities, which meaning chubby, fat, or plump. Obesity is a medical term for a condition in which extra body fat has accumulated to the point where it may be harmful to one's health, resulting in shortened life expectancy and/or increased health problems [(1)]. Obesity is a life-threatening, chronic, and

progressive disease that has reached epidemic proportions around the world. Obesity has been linked to a number of comorbidities, including hypertension, osteoarthritis, cardiovascular disease, type 2 - diabetes, and non-alcoholic fatty liver disease (NAFLD), according to numerous researches [(2)]. Obesity has developed at an alarming rate since then, and it has become a serious public health concern. Obesity, in addition to chronic diseases, promotes the development of metabolic disorders (e.g., diabetes, hypertension) and cardiovascular diseases (e.g., stroke, osteoarthritis, sleep, and inflammation-based pathologies) [(3)]. Obesity has been a major concern to human health in recent years, since it has been linked to a variety of disorders including diabetes, hypertension, hyperlipidemia, and some types of cancer [(4)]. Obesity is becoming one of the most common health concerns among all populations and age groups globally, according to [(5)], resulting in a considerable increase in mortality and morbidity from coronary heart disease, diabetes type 2, metabolic syndrome, stroke, and malignancies. Disappointing outcomes following the termination of lifestyle modification or medication prompted researchers and physicians to reconsider their approach in quest of a novel, safe, and effective therapeutic option for this global health issue. Many natural products reduce body weight and associated problems by acting as anti-obesity agents through diverse ways. Obesity is primarily caused by an imbalance in energy intake and expenditure as a result of excessive dietary fat consumption. It's marked by a slew of lipid issues, including elevated TG and TC levels, lower HDL-C levels, and an aberrant LDL-C composition [(6)].
Tea is one of the three most popular beverages on the planet. It has been used as a health product, stimulant, and medicine for the prevention of numerous ailments since time immemorial. Tea has antioxidant, bacteriostatic, anti-cancer, anti-obesity, anti-diabetic, anti-cardiovascular, anti-infectious, anti-neurodegenerative, and lipid metabolism regulating properties, to name a few [(7 and 8)]. Tea (*Camellia sinensis*) has been grown in over 30 countries for centuries. For about 4,000 years, people have consumed brewed tea. Tea, particularly green tea, has been regarded as a healthy beverage by traditional Chinese medicine since ancient times. Tea has been shown in a number of human studies to reduce the risk of cardiovascular diseases (CVDs) and certain types of cancer. Tea use has also been shown to be good to dental health (fluoride from tea has been shown to be effective in preventing caries). Tea also has anti-hypertensive, weight-control, antibacterial, and antiviral properties, making it useful for stomach discomfort and other physiological functions [(9)].
Matcha tea was developed in Tang Dynasty China and popularized in Japan during the 14th and 16th centuries. It's a type of green tea that's made in a unique way: the leaves of shade-grown tea trees are ground into powder after the veins, stems, and impurities are removed. It's a one-of-a-kind tea that's made from the entire leaf, and the gathered leaves are heated briefly to keep them from oxidizing [(10)]. When you drink Matcha or eat meals

containing Matcha, you consume practically all of the tea leaves' components, including both the water-soluble and water-insoluble parts. This is the most significant distinction between Matcha and other green teas. Matcha has recently been claimed to have more potential health benefits than other green teas. However, there has been a scarcity of information about the functional roles of water-insoluble portions of Matcha until yet [(11)]. Green tea's health advantages come from the presence of natural antioxidants such polyphenols: a diverse set of chemicals that make up up to 30% of the dry weight of green tea [(12)]. Polyphenols are thought to be extremely potent antioxidants, with antioxidant properties comparable to vitamins C and E, as well as carotene and tocopherol. The amount of health-promoting active compounds in tea beverages varies depending on the type of tea, the amount of tea leaves per serving, the brewing temperature, and the amount of time spent brewing [(13)]. Matcha, a powdered green tea from Japan, contains a high concentration of antioxidant and anti-inflammatory compounds. It offers promising prospective health advantages, owing to its high catechin concentration. It may aid the body's efforts to preserve health and avoid sickness if consumed on a regular basis [(14)].
One of the key catechins in green tea is EGCG (Epigallocatechin-3-gallate). It has a high antioxidant content, which is thought to contribute to the health advantages associated with tea drinking. EGCG is also used as a cancer, obesity, and cardiovascular disease chemo-preventive agent [(15)]. Green tea and its catechins, particularly EGCG, have been shown to lower body weight, adipose tissue, and blood lipid levels [(16)]. The mechanism of action of EGCG includes changes in the activities of fat, liver, muscle, and intestinal cells, as well as (1) a decrease in energy intake, (2) an increase in energy expenditure, and (3) changes in the activities of fat, liver, muscle, and intestinal cells [(17 and 18)].
The purpose of this study was to see how varying concentrations of Match green tea powder affected the biochemical analyses of obese rats.

Material and Methods

Materials:

Matcha tea (*Camellia sinensis*) was obtained from local market, Cairo City, Cairo Governorate, Egypt.

Experimental animals

A total of 30 adult normal male albino rats Sprague Dawley strain weighing 140±10 g was obtained from Vaccine and Immunity Organization, Ministry of Health, Helwan Farm, Cairo, Egypt.

Casein, cellulose, choline chloride, and DL- Methionine

Casein, cellulose, choline chloride powder, and DL- methionine powder, were obtained from Morgan Co. Cairo, Egypt.

The chemical kits

Chemical kits used for determination the (TC, TG, HDL-c, ALT, AST, ALP, urea, uric acid and creatinine) were obtained from Al-Gomhoria Company for Trading Chemical, Drug and Medical Instruments, Cairo, Egypt.

Methods

Preparations of Matcha tea

To prepare the dried Matcha tea were obtained from local market, then it grinds using an air mill, high speed mixture (Molunix, Al-Araby, Company, Egypt, and weighs until the drying process is complete then serving as powder seize and packed in plastic bags and placed at -18 °C in a deep freezer until further treatments.

The induction of experimental obesity

Obesity was inducing in normal healthy male albino rats by fed on high fat diet (20% animal lipid) supplemented in the basal diet and used as a positive control group.

Experimental design

The study was carried out and approved at Animal House, Department of Nutrition and Food Science, Faculty of Home Economics, Menoufia University, Egypt.

Thirty adult male white albino rats, Sprague Dawley Strain, 10 weeks age, weighing (140±10g) were used in this experiment. All rats were fed on basal diet (casein diet) prepared according to [19] for 7 consecutive days. After this adaptation period, rats are divided into 5 groups, each group which consists of six rats as follows: group (I): rats fed on basal diet as negative control. Group (2): Obese rats induced by fed on high fat diet (20% animal lipid) supplemented in the basal diet and used as a positive control group. Group (3): A group obese rats fed on Matcha tea as powder by 2% of the weight of basal diet. Group (4): A group infected obese rats fed on Matcha tea as powder by 4% of basal diet. Group (5): A group infected obese rats fed on Matcha tea as powder by 6% of the weight of basal diet.

At the end of the experiment period (4weeks), animals were fasted for 12-h then rats were scarified. Blood samples were collected from the portal vein into dry clean centrifuge tubes for serum separation, blood samples centrifuged for 10minutes at 4000 rpm to separate, the serum according to [20]. Serum samples were frozen at -18 ˚C until chemical analysis.

Lipid profile

Total cholesterol was determined according to **[21]**, Triglycerides (T.G) according to **[22]**. High Density Lipoprotein (H.D.L- c) according to **[23]**, Low Density Lipoprotein (L.D.L-c) and Very Low Lipoprotein (V.L.D-c) were calculated according to the following equation: LDL- cholesterol=Total cholesterol – (HDL-c + TG/5). VLDL-c=TG/5 **[24]**. Atherogenic index was calculated as the (VLDL-c+ LDL-c/HDL-c ratio according to the formula of **[25]**.

Liver functions

Alanine amino transferase (GPT) activities were measured in serum using the modified kinetic method of [26]. Aspartate amino transferase (GOT)activities were measured in serum using the modified kinetic method of [27and 28].

Serum glucose

Enzymatic determination of Serum glucose was carried out calorimetrically according to the method of [29].

Kidney functions

Serum uric acid, serum urea and serum creatinine were determined by enzymatic method according to [30, 31 and 32].

Statistical analysis:

The data was analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) [33]. Quantitative data were described using mean ± standard deviation. The significance of the obtained results was judged at the 5% level [34].

Results And Discussion

The effect of various levels of Matcha tea on diabetic rats' glucose levels is shown in Table (1). The acquired data revealed that the positive control group had a higher glucose level, whereas the negative control group had a lower level, with a significant difference ($P \leq 0.05$). The average blood sugar levels were 185.5 mg/dl and 106.0 mg/dl, respectively. Rats fed 6% Matcha tea, on the other hand, had the lowest glucose levels, with a significant difference ($P \leq 0.05$) when compared to the control positive group. The average concentration was 118.50 mg/dl. While the highest glucose level in diabetic rats was 158.00 mg/dl, with a significant difference ($P \leq 0.05$) when compared to the control positive group. It was concluded that 6 % Matcha tea has been the most effective treatment, resulting in the greatest drop in glucose levels. These findings are consistent with those reported by [35], who found that Matcha tea can significantly lower blood glucose levels. These findings suggest that Matcha has beneficial effects by suppressing blood glucose accumulation and promoting lipid metabolism and antioxidant activities. In addition, the majority of the dietary fiber was water-insoluble. Matcha tea was found to have a positive effect on hyperglycemia, dyslipidemia, and oxidative stress.

Furthermore, in rat adipocytes, Matcha green tea has been shown to increase basal and insulin-stimulated glucose absorption. The major green tea catechin, (-)-Epigallocatechin Gallate (EGCG), has been shown to inhibit Sodium-dependent Glucose Transporter (SGLT1) intestinal glucose uptake, whereas a catechin-rich green tea extract and EGCG have been reported to mimic insulin by lowering the expression of genes that control gluconeogenesis [36].

Table (1) Effect of different concentrations of Matcha tea on glucose level in obese rats

Parameters / Groups	Glucose (mg/dl)
G_1 C (-)	$106.0^{e} \pm 0.10$
G_2 C (+)	$185.50^{a} \pm 0.40$
G_3 Obese rats+2% Matcha tea	$158.0^{b} \pm 1.20$
G_4 Obese rats+4% Matcha tea	$140.10^{c} \pm 0.40$
G_5 Obese rats+6% Match tea	$118.50^{d} \pm 0.30$
LSD (P≤0.05)	3.160

Each value represents mean of three replicates± standard deviation. Means in the same column with different superscript letters are significantly different at P≤0.05.

Table 2 shows the effect of Matcha tea powders on the levels of liver functions (GOT and GPT) in obese rats. It is obvious that the positive control group had the highest GOT liver enzyme levels, while the negative control group had the lowest, with significant differences (P≤0.05), the average value were 88.54 and 38.98 U/L were, respectively. On the other hand, with significant differences (P≤0.05), the highest GOT liver enzyme of treated groups (obese groups) was recorded for 2 % Matcha tea, while the lowest value was observed for 6 % Matcha tea, the average values were 69.32 and 46.14 U/L, respectively.

In the case of the GPT liver enzyme, the positive control group had the highest levels, while the negative control group had the lowest, with significant differences (P≤0.05), which were 93.22 and 45.84 U/L, respectively. On the other hand, with significant differences (P≤0.05), the highest GPT liver enzyme of treated groups (obese groups) was recorded for 2 % Matcha tea, while the lowest value was observed for 6 % Matcha tea, which were 78.24 and 54.96 U/L, respectively. According to [(37)], liver function tests (LFTs) are commonly used in clinical practice to screen for liver disease, monitor the course of recognized disease, and evaluate the effects of potentially hepatotoxic medicines.

Matcha tea supplementation effectively prevented excessive visceral and hepatic lipid accumulation, elevated blood glucose, dyslipidemia, abnormal liver function, and steatosis hepatitis. RNA sequencing analyses of differentially expressed genes in liver samples revealed that Matcha treatment decreased the activity of lipid droplet-associated proteins and increased the activity of cytidine dehydrogenase [(38)].

The effects of Matcha tea powders on blood total cholesterol and serum triglycerides levels in obese rats are shown in Table (3). The acquired data revealed that the positive control group had the highest serum total cholesterol levels, while the negative control group had the lowest, with significant differences (P≤0.05), which were 237.60 mg/dl and

119.80 mg/dl, respectively, On the other hand, 2 % Matcha tea had the highest serum total cholesterol levels in obese groups, whereas 6 % Matcha tea had the lowest, with significant differences (P≤0.05). The average values were 113.50 and 95.70 mg/dl.

Table (2) Effect of different concentrations of Matcha tea on liver functions of obese rats

Parameters / Groups	(GOT) U/L	(GPT) U/L
G_1 C (-)	38.98^{e}±0.15	45.84^{e}±0.14
G_2 C (+)	88.54^{a}±0.12	93.22^{a}±0.10
G_3 Obese rats+2% Matcha tea	69.32^{b}±0.16	78.24^{b}±0.12
G_4 Obese rats+4% Matcha tea	54.66^{c}±0.11	60.72^{c}±0.15
G_5 Obese rats+6% Match tea	46.14^{d}±0.10	54.96^{d}±0.12
LSD (P≤0.05)	2.741	2.980

Each value represents mean of three replicates± standard deviation. Means in the same column with different superscript letters are significantly different at P≤0.05.

In terms of serum triglycerides levels, it can be stated that the positive control group had the highest serum triglycerides levels, while the negative control group had the lowest, with significant differences (P≤0.05). The mean values were 145.20 and 69.90 mg/dl, respectively. On the other hand, 2 % Matcha tea had the highest serum triglyceride levels in obese groups, whereas 6 % Matcha tea had the lowest, with significant differences (P≤0.05), which were 95.60 and 73.30 mg/dl, respectively. These findings are consistent with those of [39] who stated that levels of TG and TC in the liver have also been estimated to explain liver condition. The presence of high levels of TG and TC in the liver is a sign of liver damage.

Matcha green tea administration dramatically reduced triglyceride and total cholesterol levels in rats, according to [40]. Several other researches, on the other hand, found a link between green tea consumption and lower TC and LDL cholesterol.

Green tea supplementation effectively reduced hyperlipidemia status in high-fat diet produced rats, including reducing TC, LDL cholesterol, and triglycerides, according to [41]. The high concentration of green tea catechins, which play a vital role as potent antioxidants, may be the mechanism underpinning green tea's favorable effect on lipid management.

The effects of varies levels of Matcha tea on the high-density lipoprotein cholesterol (HDL-c), low-density lipoprotein cholesterol (LDL-c), and very low-density lipoprotein cholesterol (VLDL-c) in obese rats are shown in Table (4). The collected data revealed that the negative control group had the highest levels of high-density lipoprotein cholesterol, while the positive control group had the lowest, with significant differences (P≤0.05). The average concentrations were 48.05 and 29.50 mg/dl, respectively. On the

other hand, 6 % Matcha tea had the greatest levels of high-density lipoprotein cholesterol in obese groups, whereas 2 % Matcha tea had the lowest, with significant differences (P≤0.05), which were 44.50 and 40.61 mg/dl, respectively.

Table (3): Effect of different concentrations of Matcha tea on serum triglycerides and serum total cholesterol of obese rats

Parameters / Groups	Total cholesterol mg/dl	Triglycerides mg/dl
G_1 C (-)	92.50^{e}±0.15	69.90^{e}±0.11
G_2 C (+)	137.00^{a}±0.11	145.20^{a}±0.15
G_3 Obese rats+2% Matcha tea	113.50^{b}±0.13	95.60^{b}±0.11
G_4 Obese rats+4% Matcha tea	99.80^{c}±0.14	81.00^{c}±0.12
G_5 Obese rats+6% Match tea	95.70^{d}±0.12	73.30^{d}±0.10
LSD (P≤0.05)	3.130	3.641

Each value represents mean of three replicates± standard deviation. Means in the same column with different superscript letters are significantly different at P≤0.05.

The highest levels of low-density lipoprotein cholesterol were found in the positive control group, whereas the lowest were found in the negative control group, with significant differences (P≤0.05). The average LDL-c levels were 78.46 mg/dl and 30.47 mg/dl, respectively. On the other hand, 2 % Matcha tea had the greatest levels of LDL-c in obese groups, whereas 6 % Matcha tea had the lowest, with significant differences (P≤0.05). The average concentrations were 53.77 and 36.54 mg/dl, respectively.

In terms of very low-density lipoprotein cholesterol (VLDL-c) levels, it can be stated that the positive control group had the highest VLDL-c levels, while the negative control group had the lowest, with significant differences (P≤0.05). The average readings were 29.04 and 13.98 mg/dl, respectively. On the other hand, 2 % Matcha tea had the greatest VLDL-c levels of obese groups, whereas 6 % Matcha tea had the lowest, with significant differences (P≤0.05), which were 19.12 and 14.66 mg/dl, respectively.

As for atherogenic index (AI), data indicated that the positive control group had the highest VLDL-c levels, while the negative control group had the lowest, with significant differences (P≤0.05). The average readings were 3.64 and 0.93 mg/dl, respectively. On the other hand, 2 % Matcha tea had the greatest AI levels of obese groups, whereas 6 % Matcha tea had the lowest, with significant differences (P≤0.05), which were 1.79 and 1.15 mg/dl, respectively. These findings correspond with that of [42] who found that green tea drinking lowers LDL cholesterol and TC, but not HDL cholesterol or triglycerides, in both normal weight and overweight/obese participants; nevertheless, more well-designed studies with more diverse populations and longer duration are needed. Both in vitro and animal experiments have shown that green tea catechins can significantly reduce the levels of plasma triglycerides, total cholesterol (TC), and low-density lipoprotein (LDL) cholesterol [43]. Some randomized controlled trials (RCTs) and meta-analyses have

suggested that green tea may affect the lipid profiles in subjects with cardiovascular-related diseases such as hypercholesterolemia, and glucose intolerance as well as in healthy individuals [44].

Table (4): Effect of different concentrations of Matcha tea on lipid profile of obese rats

Parameters / Groups	(HDL-c) (mg/dl) Mean±SD	(LDL-c) (mg/dl) Mean±SD	(VLDL-c) (mg/dl) Mean±SD	AI % Mean±SD
G_1 C (-)	48.05^{a} ± 2.80	30.47^{e}± 0.13	13.98^{d}± 0.69	0.93±0.11
G_2 C (+)	29.50^{e} ± 1.71	78.46^{a}± 1.58	29.04^{a}±1.20	3.64^{a} ±0.15
G_3 Obese rats+ 2% Match tea	40.61^{d}±0.50	53.77^{b}± 1.91	19.12^{b}±1.72	1.79^{b}±0.13
G_4 Obese rats+ 4% Match tea	42.46^{b} ±1.38	41.14^{c}±0.33	16.20^{c} ± 0.10	1.35^{c}±0.12
G_5 Obese rats+ 6% Match tea	44.50^{b} ±1.10	36.54^{d}±1.10	14.66^{c}±2.20	1.15^{c}±0.10
LSD (P≤0.05)	3.021	3.010	2.110	0.250

Each value represents mean of three replicates± standard deviation. Means in the same column with different superscript letters are significantly different at P≤0.05.

HDL-C= High density lipoprotein cholesterol. LDL =Low density lipoprotein cholesterol. VLDL = Very low-density lipoprotein cholesterol AI= Atherogenic index

The effects of Match tea powders on renal functions (serum urea, serum uric acid, and serum creatinine) in obese rats are shown in Table (5). The collected data revealed that the negative control group had the highest serum urea levels, while the positive control group had the lowest, with significant differences (P≤0.05). The average readings were 68.05 mg/dl and 37.00 mg/dl. On the other hand, with significant differences (P≤0.05), the greatest values of obese groups were recorded for 2 % Match tea, while the lowest value was reported for 6 % Match tea, which were 54.81 and 41.10 mg/dl, respectively.

The collected data revealed that the positive control group had the highest serum uric acid levels, while the negative control group had the lowest, with significant differences (P≤0.05), which were 3.27 and 1.41 mg/dl, respectively. On the other hand, 2 percent Match tea had the highest serum uric acid levels in obese groups, whereas 6 percent Match tea had the lowest, with significant differences (P≤0.05), which were 2.21 and 1.25 mg/dl, respectively.

In terms of serum creatinine, the acquired data revealed that the positive control group had the highest levels, while the negative control group had the lowest, with significant differences (P≤0.05). The mean values were 4.80 and 1.52 mg/dl, respectively. On the other hand, 2 percent Match tea had the highest serum creatinine levels in obese groups; whereas 6 percent Matcha tea had the lowest, with significant differences (P≤0.05). The

mean values were 3.49 and 2.45 mg/dl, respectively. These findings are consistent with those of [45], who found that Matcha tea therapy significantly reduced kidney advanced glycation end products AGE levels as well as serum thiobarbituric acid-reactive compounds. Match supplementation also resulted in lower levels of renal N (6)-(carboxylmethyl) lysine (CML), N (6)- (carboxylethyl) lysine (CEL), and RAGE expression, as well as an increase in hepatic SREBP-2 expression, but not sterol regulatory element binding proteins (SREBP-1). These findings imply that Matcha protects against hepatic and renal damage by inhibiting the buildup of AGE in the kidneys, lowering hepatic glucose, triglyceride, and total cholesterol levels, and acting as an antioxidant.

Green tea is also promising as a nephroprotective drug against diethyl nitrosamine (DEN) and ferric nitrilotriacetate (Fe-NTA) caused nephrotoxicity in Wistar rats, according to [46]. Green tea can help to bring urea, creatinine, and uric acid levels back to normal. To guard against kidney toxicity, green tea-rich substances are highly suggested, particularly for those who are more exposed to drug intoxication, environmental toxins and pollutants, such as workers in laboratories, chemical industries, and factories.

Table (5): Effect of different concentrations of Match tea on kidney functions of obese rats

Parameters / Groups	Urea mg/dl	Uric acid mg/dl	Creatinine mg/dl
G_1 C (-)	$37.00^{d} \pm 1.10$	$1.41^{b} \pm 0.10$	$1.52^{c} \pm 0.10$
G_2 C (+)	$68.05^{a} \pm 2.20$	$3.27^{a} \pm 0.20$	$4.80^{a} \pm 0.60$
G_3 Obese rats+2% Match tea	$54.81^{b} \pm 1.20$	$2.21^{b} \pm 0.30$	$3.49^{b} \pm 0.30$
G_4 Obese rats+4% Match tea	$43.40^{c} \pm 0.80$	$1.30^{b} \pm 1.20$	$2.77^{b} \pm 0.11$
G_5 Obese rats+6% Match tea	$41.10^{c} \pm 0.70$	$1.25^{b} \pm 1.10$	$2.45^{b} \pm 0.20$
LSD (P≤0.05)	3.201	1.003	1.102

Each value represents mean of three replicates± standard deviation. Means in the same column with different superscript letters are significantly different at P≤0.05.

Conclusion:

Obese rats given Match tea powder, especially at a concentration of 6%, had better lipid profiles, glucose levels, liver, and kidney function. Matcha also includes a high level of the phenolic compounds can use as antioxidant like catechin epigallocatechin gallate (EGCG), which is thought to protect against oxidative damage and prevent a variety of illnesses

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التأثيرات المضادة للسمنة لشاي الماتشا في الفئران المغذاه على نظام غذائي غني بالدهون

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الملخص العربي

الماتشا هو نوع من مسحوق الشاي الأخضر. في الآونة الأخيرة ، اكتسب شاي الماتشا الأخضر شعبية كمشروبات ومضافات غذائية. لقد أثبت فعاليته في الوقاية من السمنة والمتلازمات الأيضية ذات الصلة. الهدف الأساسي من هذه الدراسة هو تحديد فعالية شاي الماتشا في تقليل السمنة لدى الفئران السمينة. في هذا البحث، تم استخدام ثلاثين من ذكور الفئران الألبينو وزنها ١٤٠ جم ± ٥ جم وقسمت إلى خمس مجموعات، كل منها ستة فئران. لإحداث السمنة في الفئران ، تم تغيتهم على نظامًا غذائيًا عالي الدهون (٢٠ ٪ من الدهون الحيوانية). قامت الدراسة أيضًا بقياس مستويات الجلوكوز ووظائف الكبد (GOT، GPT) والكوليسترول الكلي والدهون الثلاثية والبروتين الدهني عالي الكثافة والبروتين الدهني منخفض الكثافة والبروتين الدهني منخفض الكثافة ومؤشر تصلب الشرايين ووظائف الكلى (اليوريا وحمض اليوريك والكرياتينين). أظهرت النتائج أن مجموعة الفئران المصابة بالسمنة قللت من مستويات الجلوكوز ووظائف الكبد ووظائف الكلى عند تغذيتهم على ٦٪ من مسحوق شاي الماتشا مع وجود فروق معنوية. احتوت مجاميع الفئران المغذاه على شاي الماتشا على أقل مستويات الكوليسترول والدهون الثلاثية ، بالإضافة إلى أقل مستويات البروتين الدهني منخفض الكثافة ، والبروتين الدهني منخفض الكثافة جدا و مؤشر تصلب الشرايين مع وجود فروق معنوية. كانت المجموعة التي تغذت على ٦٪ من شاي الماتشا تحتوي على أعلى مستويات البروتين الدهني عالي الكثافة. تم العثور على أقل المستويات في المجموعة التي تغذت ٢٪ شاي الماتشا، مع وجود فروق معنوية. أظهرت الفئران السمينة التي تغذت على٦٪ من مسحوق شاي الماتشا تحسن ملحوظ فى صورة دهون الدم ومستويات الجلوكوز ووظائف الكبد والكلى.

الكلمات الأفتتاحية: الشاى , خفض الوزن , التحاليل الكيميائية.