Therapeutic effect of leafy herbs (*Camellia sinensis, Malva parviflora, Rosmarinus officinalis* and *Salvia officinalis*) as a tool for anti-over-obesity

Abor M. M. Abd EL- Rahman
Home Economics Dept., Faculty of specific Education, Ain Shams University, Egypt.
Email:dr.abour20333@gmail.com

INTRODUCTION

Obesity is a pathological condition in which excess body fat has accumulated to the extent that it may have an adverse effect on health, leading to reduced life expectancy and/or increased health problems (**Haslam and James, 2005)**

White tea (*Camellia sinensis)* is just made by drying only without any other normal fermentation process which is adopted for other tea varieties. The biochemical components like flavonoids, total polyphenols, tannins and catcehins are prominent in white tea. Catechin content is higher than tannin content. All those active components are higher in methanolic extracts than their corresponding aqueous extracts. The higher antioxidant activities are manifestations of all those active components. Higher antimicrobial property is a beneficial aspect of white tea regarding health concern. Moreover lowering of in vitro blood glucose level and inhibition of digestive enzymes (α-amylase, β - D Glucosidase, lipase) may attribute to the biomedical application of white tea **(Saha *et al.*, 2017).**

Several components of tea have specific health benefits **(Hayat *et al.*, 2015).** Catechins, which are polyphenolic compounds, are associated with the anti-cancer, anti-obesity, anti-atherosclerotic, anti-diabetic, anti-bacterial, anti-viral, and anti-dental caries effects of tea **(Yang *et al.*, 2016).** Caffeine stimulates wakefulness, decreases the sensation of fatigue, and has a diuretic effect **(Miyoshi *et al.*, 2015).** Theanine and-aminobutyric acid lower blood pressure and regulate brain and nerve functions **(Suzuki *et al.*, 2016).** Vitamin C is antiscorbutic, prevents cataracts, and strengthens the immune system **(Sorice *et al.*, 2014).**

Mallow (*Malva parvilora* L.) is a perennial herb. It is not cultivated but harvested from wild or from farmers' fields, waste ground, roadside. Mallow leaves are mostly consumed by rural people in Egypt. Other common names of mallow are cheese weed mallow, Egyptian mallow, and little mallow **(Raheem *et al.*, 2014).** The raw leaves are usually added to salads or eaten in the cooked form. The leaves are rich in phenols and also contain other substances such as terperoids, coumarins, mucilage and pigments **(Messaoudi *et al.*, 2015).**

Rosmarinus officinalis, L. originating from the Mediterranean region is an aromatic plant from the Lamiaceae family. Rosemary is a unique spice commercially available for use as an antioxidant and its extracts have been used in the treatment of diseases, due to its hepatoprotective potential **(Raškovic´ *et al.*, 2014),** the therapeutic potential for Alzheimer's disease **(Habtemariam, 2016)** and its antiangiogenic effect **(Kayashima, and Matsubara, 2012).** As well as, they have been used in food preservation, because they prevent oxidation and microbial contamination **(Nieto *et al.*, 2011).** Therefore, rosemary extract could be useful for replacing or even decreasing synthetic antioxidants in foods. As preservatives, rosemary extracts offer several technological advantages and benefits to consumers **(Nieto *et al.*, 2018).**.

Sage (*Salvia officinalis* L.) an aromatic plant and one of the widest-spread members of the family Lamiaceae, has been used as a traditional herbal medicine against a variety of diseases. The plant is reported to have multiple pharmacological effects, including antibacterial, antiviral, anti-inflammatory, hypoglycemic, fungistatic, antimutagenic, anticancer and antioxidative effects **(Smidling *et al.*, 2008).** The leaves of *S. Officinalis* possess some therapeutic effects due to the presence of main flavonoids and phenolic compounds **(Alkan *et al.*, 2012).**

The aim of this investigation was carried out to recognize the effect of a mixture of leafy herbs (*Camellia sinensis*, *Malva parviflora*, *Rosmarinus officinalis* and *Salvia officinalis*) on the obesity .

MATERIALS AND METHODS

Materials

Leaves White tea (*Camellia sinensis*), Mallow (*Malva parviflora*), Rosemary (*Rosmarinus officinalis*) and *Sage* (*Salvia officinalis*) were obtained from Horticulture Res. Instit., Agricultural Research Center, Giza, Egypt. The leaves were dried in a cool dark place at room temperature (25 C) for 4 days. The average moisture content for the dry plant material was 11%.

Kits for determination of the parameters were purchased from Sigma-Aldrich Corp., MO, USA,

Male Wister albino adult rats (36 rats) with weight ranging from 170-180g were purchased from National Organization For Drug and Control Research, Giza, Egypt.

Methods

Determination of nutritional content or raw materials

Proximate analysis including crude protein, crude lipids, ash, crude fibers and total carbohydrates were determined in the raw materials according to the methods of **AOAC (2012)**.

Total phenolic compunds was carried out according to existing protocols in the laboratory as described by **Rajauria *et al.* (2013)** using the Folin Ciocalteu assay**.** Results were expressed in gallic acid equivalents per gram of dry herbs (GAE/g) extrapolated from a calibration curve of gallic acid (0-500 μg/mL).

The aluminium chloride assay described by **Jaiswal *et al.* (2012)** was used to quantify the total flavonoids compounds of each herb. Results were expressed in quercetin equivalents per gram (QE/g) of dry tea, through a calibration curve of quercetin (0-100 μg/mL).

Biological experimental

36 Rats were housed in individual cages with screen bottoms and fed ad *libitum* on a basal diet for one-week for acclimatization, which containing casein (20 %), corn oil (8%), corn starch (31%), sucrose (32%), cellulose (4%), salt mixture (4%) and vitamin mixture (1%) according to the method **Pell *et al*. (1992).**

Experimental rats were fed on fat and basal diet for 15 days and randomly divided into six groups six rats for each. The 1st main group was fed on basal diet for another 6 weeks and considered as control negative rats.

The five rat groups which obesity has been induced to them were fed with basal diet substituted with 20% fat from the corn oil and starch are namely fatty basal diet. These groups were reclassified into control positive +(ve) as a group (2), also, the rats of 3^{ed} and 4th groups were fed separately on fatty basal diet and substituted from the mixture leaves herbal *Camellia sinensis*, *Malva parviflora*, *Rosmarinus officinalis* and *Salvia officinalis* at 5.0 and 10.0g level for six week. The rats of 5th and 6th groups were fed separately on fatty basal diet and it was taken orally 1mL/day for six weeks from the mixture herbes aqueous extract were extracted from 0.25 and 0.5g mixture herbal in 50.0 mL distilled water.

The body weight and food consumption were recorded every three days for six week. At the end of experimental, the blood samples were taken with drawn from the orbital plexus and centrifuged at 3000 rpm to obtain the sera after that, the sera were kept in a deep - freezer at -20°C until their analysis. The organs such as liver, heart, kidney, spleen and lung were immediately removed from the scarified rats and it was gently pressed during filter paper to free it from surface blood and weight.

Blood hemoglobin (Hb), Hematocrite (Ht) and platelets were determined using a whole blood sample according to the method described by **Dacie and Lewis (1984)** respectively. Red blood cells (RBCs) and white blood cells (WBCs) were measured as recommended by **Riley (1960)**.

Triglycerides, total cholesterol, HDL and (LDL) were determined according to the method of **Fossati and Principe (1982), Allain *et al.* (1974)**, **Lopes-Virella *et al*. (1977)** and **Steinberg (1981),** respectively.

Liver function as Alanine (ALT) and Aspartate (AST) transaminoferase were determined according to the method described by **Reitman and Frankel (1957).** Alkaline phosphates activity (ALk) was determined using modified kinetic method of **Belfied and Goldberg (1971).**

Kidney functions as uric acid, Albumin, creatinine, urea, uric acid and total protein were estimated according to the method described by **Barham and Trider (1972)**, **George (2009), Schirmeister (1964) and Patton and Crouch (1977), Jelikić-Stankov *et al.* (2003) and Bjorsten *et al*. (2007),** respectively**.** Moreover, total bilirubin is assessed using caffeine benzoate to split bilirubin from the unconjugated bilirubin protein complex according to **Vinchi et al. (2008)**.

The spectrophotometric methods of biuret, Bradford, and erythrosin-B were used to determine total protein as described by **Soedjak, (1994).**

Blood sugar, α-amylase enzyme and Lipase enzyme were determined according to **Tietz (1986)**, **Lorentz (2005)** and **Lorentz (1998),** respectively.

Statistical analysis

The obtained data were exposed to the analysis of variance. Duncan's multiple range tests at ($P \leq 0.05$) level was used to compare omong means. The analysis was carried out using the ANOVA procedure of Statistical Analysis System **(SAS, 2004).**

RESULTS AND DISCUSSION

Nutritional content of raw materials

Chemical constituents and quantitative of phytochemicals were determined in raw materials in leaves of White tea (*Camellia sinensis*), Mallow (*Malva parviflora*), Rosemary (*Rosmarinus officinalis*) and *Sage* (*Salvia officinalis*) and the results are reported in Table (1). The results showed that the white tea and mallow were the highest in protein (35.15 and 34.70%), whilst, rosemary and sage the highest in fat, crude fiber, and ash content were 16.32 and 9.32%, 14.97 and 15.34% and 18.24 and 19.24%, respectively. The green leafy herbs are a rich source of macro and micronutrients, such as proteins, dietary fibers, pigments, vitamins (beta-carotene, ascorbic acid, etc.), as well as non-nutrient bioactive phytochemicals as polyphenols and flavonoids, which offer many functions for health benefits **(Khan *et al*., 2015).**

The results showed that the sage and rosemary were the highest in total phenolic and flavonoids content 5.4 and 3.4 mg gallic acid equivalents/g and 3.9 and 2.2 mg quercetin equivalents/g followed by mallow and white tea**.** These results are agreement with **Haida *et al.* (2015)** showed that the highest

concentrations of total polyphenols (3.094 ± 0.069 mg GAE/g DM) and flavonoids (2.643 ± 0.116mg QE/g DM) in methanol extract. Also, Mallow powder contained relatively high levels of dietary fiber and flavonoids **(Fakhfakh *et al.*, 2016).** Moreover, **(Unachukwu *et al* 2010)** quantified total phenolic compounds of 1.17mg GAE/g in green tea; and 0.96mg GAE/g in white tea. **Yoo *et al.* (2008)** found a TPC of 0.746 mg GAE/g in black tea, and 0.84 mg GAE/g in chamomile tea. **Carloni *et al.* (2013)** quantified total flavonoids compounds of 3900 µg catechin equivalents/g in white tea

Table (1): Chemical and phytochemical compounds in raw materials on dry weight

Nutritional analysis	White tea (*Camellia sinensis*)	Mallow (*Malva parviflora*)	Rosemary (*Rosmarinus officinalis*)	*Sage* (*Salvia officinalis*)
Crude protein	35.15±2.14	34.70±4.21	10.10±1.51	12.0±1.56
Fat content	0.50±0.01	3.31±0.16	16.32±2.16	9.23±0.94
Crude fiber	7.31±0.82	9.81±1.27	14.97±2.34	15.34±2.57
Ash content	8.54±1.05	10.81±1.38	18.24±2.46	19.24±2.68
Total carbohydrates	48.50±2.38	41.37±4.39	40.37±3.81	44.19±5.31
Total phenolic	1.3±0.04	2.8±0.07	3.4±0.26	5.4±0.46
Total flavonoids	0.6±0.001	1.2±0.04	2.2±0.17	3.9±0.07

Data presented as the mean± standard deviation (n = 3).

Total flavonoids compounds as mg quercetin equivalents (QE)/ g of raw materials

Total phenolic compounds as mg gallic acid equivalents (GAE)/ g of raw materials

Effect of different fatty diets on body weight in the rat groups

Table (2) showed that the effect of fatty basal diet supplemented with 5 and 10% from mixture herbs to rats group 3^{ed} and 4 th as well as the rats group 5th and 6th fed on fatty basal diet. Rats has been taken orally 1mL/day for six weeks from the mixture herpes aqueous extract were extracted from 0.25 and 0.50g mixture herbal in 50.0 mL distilled water, compared with control negative fed on basal diet and also control positive fed on fatty basal diet.

The results observed that the control negative rats was the lowest (130.5g) in body weight gain and the rats control positive was the highest (170.6g). This results may be due to diets high in energy, saturated fatty acids, low intake of fruits and vegetables as well as inactivity have been found to promote overweight and obesity. A diet high in fiber has been suggested to improve weight loss and decrease other anthropometrical indices (**Al Hammadi, 2017)**.

Moreover, the body weight gain in groups 3 and 5 was higher (16.3 and 150 g) than rats in groups 4 and 6 were 140.0 and 130.5g, respectively. These decreases in the bodyweight gain illustrated that when the mixture herbs

increased the bodyweight gain is decreasing may be caused the mixture herbs had contained the highest amounts from dietary fiber and natural antioxidant which scavenging the free radical and also herbal plants included reduced energy intake, increased energy expenditure **(Heymsfield *et al.*, 2011)** therefore the body weight is reduced**.** These results confirmed by **Rayalam *et al.* (2008)** suggested that a variety of natural products, including crude extracts and isolated compounds from some herbs, can induce body weight reduction and prevent diet-induced obesity. The natural products having anti-obesity effects can be arranged into five categories based on their distinct mechanisms; they may produce (1) decrease lipid absorption, (2) decrease energy intake, (3) increase energy expenditure, (4) decrease pre-adipocyte differentiation and proliferation, or (5) decrease lipogenesis and increase lipolysis **(Yun, 2010).**

Table (2): Some nutritional indicators of negative control and obesity rats group during the experimental period.

Groups	Initial B W (g)	Finial B W (g)	Gain B W (g)	Food intake (g)	Actual Daily intake(g)
G1 Negative control	174.2 ± 8.58^{a}	304.7 ± 15.43^{c}	130.5 ±10.24^{c}	422.7 ±25.16^{d}	10.06 ± 0.04^{d}
G 2Positive control	176.0 ±8.70^{a}	346.6 ± 12.58^{a}	170.6 ±12.35^{a}	498.6 ±28.61^{a}	11.87 ± 0.05^{a}
G 3 5% Herbs mixture	174.8 ± 7.49^{a}	335.1 ± 13.92^{b}	160.3 ±11.28^{b}	460.85 ±32.17^{b}	10.72 ± 0.08^{b}
G 4 10% Herbs mixture	178.5 ±6.91^{a}	313.5 ±12.38a^{b}	140.0 ±10.64^{ab}	440.0 ±31.21^{c}	10.47 ±0.04^{c}
G 5 1mL/day0.25g Herbs extract	176.4 ±7.6^{a}	326.4 ± 12.34^{ab}	150.0 ±15.29^{ab}	450.44 ±29.53^{c}	10.42 ± 0.07^{c}
G 6 1mL/day0.50g Herbs extract	179.3 ±5.38^{a}	309.8 ±13.25^{c}	130.5 ±9.86^{c}	420.62 ±24.56^{d}	10.01 ±0.02^{d}

Values are mean and SD (n = 3); where: Mean values in the same with the letter are significantly different at 0.05 levels.

Effect of different fatty diets on complete blood picture in the rats

Data present in table (3) showed that the hemoglobin was higher in group 6 fed on fatty diet and taken orally 1.0 ml/ day (0.50g mixture herbal in 50.0 mL) was13.8 g/dl followed by group 4 fed on fatty diet and substituted with 10% mixture herbs was 13.6 g/dl compared with negative and positive control 12.7 g/dl.

The results observed that the hematocrit was lower in positive control 35.3% compared with negative control 38%, and it was increased in different groups from 5.4% to 16.4%. From the results it could be found that the red blood cells was increased in groups 4 and 6 (7.91 and 8.04 m/cm) followed by groups 3 and 5 were 7.13 and 7.22 m/cm than negative and positive control (6.97 and 6.45 m/cm), respectively. This mixture of herbs has been increasing the RBCs when fed on the fatty diet substituted and taken orally extract by mixture herbs may be due to containing a large variety of several components

with different anti-obesity and anti-oxidant effects on body metabolism and fat oxidation. Medicinal plants have been investigated and reported to be useful in the treatment of obesity, diabetes and other chronic diseases (**Hasani-Ranjbar *et al.*, 2010)**.. White blood cells happened to increase in positive control group 10.4 cm compared with negative control 5.67cmm then in the others groups fed on cooking black rice mill 10% and 20% were (8.33 and 6.53 cm) respectively. These results showed that WBC count was significantly associated with overweight and obesity. This is in alignment with reports discussing the inflammatory nature of obesity (**Farhangi *et al.*, 2013)**.

Finally found that the platelets were lower in positive control 588.3 cm compared with negative control 753.3 (cm), and it was increased in groups 4 and 6 to 880.6 and 919.3 cm, respectively.

Table (3): Effect of different diets on complete blood picture in the rats.

Groups	Hemoglobin (g/dl)	Hematocrit (%)	Red blood cells (m/ cm)	White blood cells (cm)	Platelets (cm)
G1 Negative control	12.7 ±0.8^{b}	38.0 ±2.4^{ab}	6.97 ±0.30^{ab}	5.67 ±0.93^{b}	753.3 ±37.8^{b}
G 2 Positive control	11.8 ±1.03^{c}	35.3 ±3.1^{b}	6.45 ±0.43^{b}	10.4 ±1.05^{a}	588.3 ±54.7^{c}
G 3 5% Herbs mixture	12.5 ±1.02^{b}	37.2 ±2.56^{ab}	7.13 ±0.61^{ab}	8.33 ±2.85^{ab}	750.2 ±41.36^{b}
G 4 10% Herbs mixture	13.6 ±1.54^{a}	40.1 ±3.49^{a}	7.91 ±0.76^{ab}	6.53 ±1.47^{b}	880.6 ±60.58^{ab}
G 5 1mL/day0.25g Herbs extract	13.2 ±0.87^{a}	39.5 ±2.6^{ab}	7.22 ±0.53^{ab}	7.35 ±0.61^{ab}	876.3 ±111^{ab}
G 6 1mL/day0.50g Herbs extract	13.8 ±0.79^{a}	41.4 ±2.4^{a}	8.04 ±1.02^{a}	5.90 ±0.38^{b}	919.3 ±67.3^{a}

Values are mean and SD (n = 3); where: Mean values in the same with the letter are significantly different at 0.05 levels.

Effect of different fatty diets on lipid profile in the rat group

Results present in Table (4) found that the triglyceride, total cholesterol, high-density lipoprotein (HDL) and low-density lipoprotein (LDL) were in the normal range for healthy control negative (112.3, 85.0, 53.7 and 25.0 mg/dl, respectively). Whilst, the control positive was fed on fatty basal diet reported that the highest in parameter (245.7, 190.0 and 131.7 mg/dl) except HDL was the lowest (27.3 mg/dl).

Regarding, the different rats groups showed that gradually increased in the triglyceride, total cholesterol and HDL when mixture herds increasing from 120.7 to 181.0 mg/dl, 115.0 to147.0 mg/dl and 34.0 to 51.0 mg/dl, respectively, except LDL was gradually decreased from 34.0 to 79.67 mg/dl. These results have appeared the mixture had rich amounts from natural antioxidant and fiber which improvement the lipids profile. **Ninomiya *et al.* (2004)** demonstrated that

some leaves herbs in the methanolic extract have a significant inhibitory effect on serum triglyceride elevation. Moreover, the natural components in herbs have been shown to act on cholesterol metabolism by reducing its absorption or its synthesis, such as catechins **(Plana *et al.*, 2008).** Fiber has been reported to have beneficial effects on blood cholesterol, prevention of bowel diseases and improve the glucose tolerance **(Adebayo, 2010).** Phenolic compounds as well as carotenes and vitamins help in the destruction of free radical and other toxic compounds in human body **(Saikia and Mahanta, 2013).**

Table (4): Serum lipid patterns of negative control and obesity rats groups after treated by different experimental herbs

Groups	Triglycerides (mg/dl)	T. cholesterol (mg/dl)	HDL (mg/dl)	LDL (mg/dl)
G1 Negative control	112.3 ±6.1^{c}	85.0 ±11.1^{c}	53.7 ±4.10^{a}	25.0 ±2.56^{d}
G 2Positive control	245.7 ±17.9^{a}	190.0 ±16.5^{a}	27.3 ±2.42^{c}	131.7 ±10.2^{a}
G 3 5% Herbs mixture	181.0 ±10.0^{b}	147.0 ±17.0^{b}	34.0 ±2.53^{c}	79.67 ±8.10^{b}
G 4 10% Herbs mixture	150.0 ±12.28^{b}	123.0 ±10.38^{b}	41.0 ±2.30^{b}	45.3 ± 4.03^{c}
G 5 1mL/day0.25g Herbs extract	160.0 ±9.45^{b}	134.0 ±11.59^{b}	46.0 ±2.45^{b}	52.0 ±3.79^{c}
G 6 1mL/day0.50g Herbs extract	120.7 ±9.07^{c}	115.0 ± 13.5^{c}	51.0 ±3.11^{a}	34.0 ±2.82^{d}

Values are mean and SD (n = 3); where: Mean values in the same with the letter are significantly different at 0.05 levels.

Effect of different fatty diets on liver function in the rat group

Liver function as alanine transaminoferase (ALT), aspartate transaminoferase (AST) and alkaline phosphates activity (ALk) were determined in healthy control negative and compared with treated obesity rats groups and the results are reported in Table (5). From the results, it could be noticed that the mixture herbs had contained phenolic and flavonoids compounds, as well as fiber content which reduction the ALT from 49.0 to 28.9 mg/dl, AST from 13.0 to 8.0 mg/dl and ALK, was ranged from 53.0 to 39.0 mg/dl, respectively, in obesity rats groups. These results in treating obesity rats groups were decreased than rats group control positive fed on fatty diets which were 55.0, 15.0 and 65.0 mg/dl, respectively, in addition, it was equal and nearly the results from rats group control negative which fed on basal diets were 20.0, 8.0 and 35.0 mg/dl, respectively. These results agree with **Farhan *et al.* (2012)** found that the extract of polyphenols from leaves of *Malva parviflora* contain different amounts of phenols, flavonoid, saponin, alkaloid, resin and tannin. The methanol fraction showed high antioxidant potential. Traditionally *Malva parviflora* is used for the treatment of inflammation, pain and liver

injuries (**Afolayan *et al.*, 2010).** After drinking sage tea for two weeks the liver antioxidant status became better, maybe caused that the aqueous extract of *Salivia officinalis* has found to have an antioxidant and antiviral influence **(Stanojevic, 2010).**

Table (5) Liver function parameters of negative control and different experimental obesity rats groups

Groups	ALT (mg/dl)	AST (mg/dl)	ALK (mg/dl)
G1 Negative control	20.0± l.0[c]	8.0± 1.00[c]	35.0±3.28 [c]
G 2Positive control	55.0 ± 2.65 a	15.0 ± 0.97 [a]	65.0±4.16[a]
G 3 5% Herbs mixture	49.0 ± 0.91 [a]	13.0 ± 0.99 [a]	53.0±4.47 [b]
G 4 10% Herbs mixture	35.5 ± 0.90 [b]	10.3 ± 1.13 [b]	40.0±5.02 [c]
G 5 1mL/day0.25g Herbs extract	37.4 ± 1.00 [b]	10.7 ± 1.00 [b]	50.0±4.91 [b]
G 6 1mL/day0.50g Herbs extract	28.9 ± 1.00 [c]	8.2± 1.71 [c]	39.0±3.27 [c]

Alanine (ALT) and Aspartate (AST) transaminoferase, Alkaline phosphates (ALk),
Values are mean and SD (n = 3); where: Mean values in the same with the letter are significantly different at 0.05 levels.

Effect of different herbs on kidney function in the rat groups

Table (6) showed that the lowest in parameters urea, creatinine, uric acid, bilirubin, albumin and total protein were 26.5, 0.5, 2.96, 0.3 and 9.3 mg/dl in control healthy rats group except albumin was the highest (5.6 mg/dl) and the highest control positive fed on fatty diets was 62.6, 1.12, 5.73m 0.7 and 5.8 mg/dl except albumin was the lowest (3.0 mg/dl).

The rats groups 3th and 4 th fed on fatty basal diet supplemented with 5 and 10% from mixture herbs were improve and reducing the parameters to28.4, 0.7, 3.53, 0.44 and 7.9 mg/dl except albumin was increased to5.0 mg/dl. As well as the rats group 5th and 6th fed on fatty basal diet and taken orally 1mL/day for six weeks from the mixture herbs aqueous extract were extracted from 0.25 and 0.50g mixture herbal in 50.0 mL distilled water were improve and decrease the parameters to27.3, 0.6, 3.1, 0.35 and 8.4 mg/dl, except albumin was increased to5.3 mg/dl. Also, treatment with the herbal mix showed a decrease in renal function tests and improvement of kidney function. It was observed that the administration of herbal mixtures showed an significant decrease in the levels of serum urea and creatinine concentration as compared with the hyperlipidemic control group. Herbal mixtures are rich in a volatile oil and natural antioxidant compounds improving the kidney functions in obese rats **(Barakat and Mahmoud, 2011).**

Herbs constituents with their antioxidant properties overcame the lower in the total protein content perhaps by preventing oxidative stress and protein fragmentation and enhancing protein synthesis (**Durling and Catchpole, 2007)**

Table (6). Renal function parameters of negative control and different experimental obesity rats groups

Groups	Urea (mg/dl)	Ceatinine (mg/dl)	Uric acid (mg/dl)	Bilirubin mg/dl	Albumin (mg/dl)	Total protein (mg/dl)
G1 Negative control	26.5 ±4.4^{c}	0.5 ±0.1^{c}	2.96 ±0.25^{d}	0.30 ± 0.01^{c}	5.6 ± 0.11^{a}	9.3 ± 0.21^{a}
G 2Positive control	62.6 ±1.0^{a}	1.13 ±0.2^{a}	5.73 ±0.61^{a}	0.70 ± 0.02^{a}	3.0 ± 0.22^{c}	5.8 ± 0.24^{c}
G 3 5% Herbs mixture	35.2 ±5.3^{b}	0.8 ± 0.1^{b}	4.30 ±0.43^{b}	0.46 ± 0.05^{b}	4.5 ± 0.21^{b}	7.9 ±0.11 c^{b}
G 4 10% Herbs mixture	28.4 ±2.6^{c}	0.7 ±0.1^{b}	3.53 ±0.35^{c}	0.44 ± 0.04^{b}	5.0 ±0.23^{a}	7.9 ± 0.12^{b}
G 5 1mL/day0.25g Herbs extract	31.5 ±2.18^{b}	0.7 ±0.1^{b}	3.70 ±0.24^{c}	0.48 ±0.03^{b}	4.9 ± 0.14^{a}	8.0 ± 0.13^{a}
G 6 1mL/day0.50g Herbs extract	27.3 ±2.26^{c}	0.6 ±0.1^{c}	3.10 ±0.18^{d}	0.35 ± 0.02^{c}	5.3 ± 0.13^{a}	8.4 ± 0.21^{a}

Values are mean and SD (n = 3); where: Mean values in the same with the letter are significantly different at 0.05 levels.

Effect of different diets on pancreatic function in the rats

The results from blood sugar level of obesity rats fed on different diets during experimental period are presented in Table (7). The results showed that blood sugar level was 169.3 mg/dl in positive control. While rats fed on basal diet negative control was 116.5 mg/dl during the experimental period (six week). The statistical analysis confirmed the present data which showed that, significantly decreased in mean value of blood sugar group from fatty diets containing mixture herbs at level 5 and 10 % substitute were 160.2 and 140.1 mg/dl. While the lowest mean value were 150.3 and 130.6 mg/dl in groups 4 and 5 were taken herbs orally. These results in agreement with study reported that Rosemary leads to regeneration of the β-cells of the pancreas and potentiating of insulin secretion from surviving β cells, which indicates that Rosemary decrease blood glucose level by stimulating insulin secretion from the remnant β cells or regenerated β cells (**Alnahdi, 2012)** In addition, the remarkable antidiabetogenic effects of *R. officnalis* and *Salvia officinalis* could be due to its potent antioxidant properties besides some flavonoids and phenolic compounds **(Roby *et al.*, 2013).** It also might be producing its hypoglycemic activity by a mechanism independent from insulin secretion e.g. Inhibition of protein glycation, and the inhibition of endogenous glucose production (**Bakirel *et al.*, 2008).**

The results in same table showed that, α-amylase enzyme in negative control group was 1000U/L and significant increased in serum α-amylase enzyme in positive control group was 3382U/L. It could be noticed that the lowest in the α-amylase enzyme in groups fed on fatty diets as groups 3, 4, 5

and 6 were 2789, 183, 2400 and 1200U/L, respectively. These results agree with **Paloma *et at.* (2012)** as the intake of phenolic compounds is associated with many beneficial effects, it is also necessary to consider the dose for humans, because it is possible to reduce α-amylase activity by consuming food or medicinal herbs rich in poly phenols with strong α-amylase activity, if it takes in consideration that this source of poly phenols possess different kinds of this compounds in variable concentration. Therefore, more available evidences are necessary about the safety of using natural α-amylase inhibitor.

Concerning the lipase enzymes in the healthy rats was 77.33 U/L of the negative control concerning and obesity (positive control) was 88.66 U/L. It could be concluded that the lowest significant in the lipase enzymes in groups fed on fatty diets as groups 3, 4, 5 and 6 were 80.38, 78.59, 79.0 and 77.6 U/L, respectively. These results agree with **(Yasser *et al.*, 2010)** this reduced of activity lipase enzymes may be due to role poly phenols in the plants, the is a result decreased inflammation of the pancreas and thus lower to normal level lipase enzyme of the rats. Moreover, inhibition of enzymes involved in the metabolism of carbohydrates such as α-amylase is an important therapeutic approach for reducing postprandial hyperglycemia (**Shobana *et al.*, 2009)**. As well as, one of strategies used in the discovery of anti-obesity drugs is to search for potent lipase inhibitors from plant extracts. In fact, several synthetic drugs such as acarbose and orlistat are widely used as inhibitors of these enzymes in patients with obesity (**Padwal and Majumdar, 2007).**

Table (7): Effect of different diets on glucose and pancreatic function in the rats

Groups	**Blood sugar (mg/dl)**	**Amylase enzyme (U/L)**	**Lipase enzyme (U/L)**
G1 Negative control	116.3 ±5.7^{c}	1000 ±105.0^{d}	77.33 ±2.5^{bc}
G 2Positive control	179.5 ±3.8^{a}	3382 ±137.4^{a}	88.66 ±3.0^{a}
G 3 5% Herbs mixture	160.2±5.27	2789 ±169.9^{b}	80.38±4.12
G 4 10% Herbs mixture	140.1±5.68	1831 ±189^{c}	78.59±4.54
G 5 1mL/day0.25g Herbs extract	150.3 ±1.2^{b}	2400±210.15	79.0 ±1.0^{b}
G 6 1mL/day0.50g Herbs extract	130.6 ±1.2^{c}	1200±120.35	77.6 ±1.5^{c}

Values are mean and SD (n = 3); where: Mean values in the same with the letter are significantly different at 0.05 levels.

CONCLUSION

In conclusion, some leaves herbs as White tea (*Camellia sinensis*), Mallow (*Malva parviflora*), Rosemary (*Rosmarinus officinalis*) and *Sage* (*Salvia officinalis*) were mixture and fed rats groups at 5 and 10% substituted from fatty basal diet and another group with taken 1 ml/day orally from the mixture. The study may be useful for the treatment of obesity as it lowers body weight, lipid profile, liver functions, glucose level and hormones of obesity-

induced rats fed on a high-fat diet. Further studies are recommended to determine the medicinal effect of these herbs.

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ABSTRACT

Obesity is a condition in which excess body fat has accumulated to such an extent that health may be negatively affected. There is an increasing tendency by patients with hyperlipidemia to use natural products to overcome. Therefore the purpose of this work was to investigate the possibility of the mixture from some leaves White tea (*Camellia sinensis*), Mallow (*Malva parviflora*), Rosemary (*Rosmarinus officinalis*) and *Sage* (*Salvia officinalis*) as an anti-obesity activity. The chemical constituents and quantitative of phytochemical were determined and the results were reported that the raw materials were the highest in protein, fiber, phenolic acid and flavonoids compounds.

Experimental rats were divided into six groups the first group fed on basal diet as control negative. The five rat groups which was obesity has been induced by fed with fatty basal diet and it was reclassified into control positive as a group (2), also, the rats of 3^{ed} and 4th groups were fed separately on fatty basal diet and substituted by the mixture leave herbs at 5.0 and 10.0% level for six weeks. The rats of the 5th and 6th groups were fed separately on fatty basal diet and it was taken orally 1mL/day for six weeks from the mixture herpes aqueous extract were extracted from 0.25 and 0.5g mixture herbal in 50.0 mL distilled water. Complete blood picture, lipid profile, liver function, kidney function, pancreatic activity, and glucose were determined in all groups.

At the end of the experimental biological for obesity rats the results showed that the mixture herbs at 10% substituted from the fatty diet and also, taken orally 1 ml/day from 0.5g mixture herbal in 50.0 mL distilled water give the best results for complete blood picture, lipid profile, liver function, kidney functions, and pancreatic activity. Also, for improvement in the parameters in the obesity rats group, were taken orally 1 ml/day from 0.25g mixture herbal in 50.0 mL distilled water and 5% from the mixture herbs substituted from the fatty diet.From the results, it could be recommended that the herbs mixture had contained rich amounts from the protein, fiber, phenolic acid, and flavonoids compounds. These compounds when are taken orally and/or substituted in fatty diet improvement and as tools for anti-obesity.

Keywords: White tea (*Camellia sinensis*), Mallow (*Malva parviflora*), Rosemary (*Rosmarinus officinalis*) and *Sage* (*Salvia officinalis*)

الملخص العربي

السمنة هي الحالة التي تتراكم فيها دهون الجسم بصورة زائدة إلى حد التي تؤثر فيه على الصحة تأثرا سلبًا. هناك اتجاهات متزايد من جانب مرضى السمنة المفرطة إلى استخدام المنتجات الطبيعية للتغلب على السمنة . لذلك كان الغرض من هذا البحث هو دراسة تأثير خليط من من بعض أوراق الشاي الأبيض (كاميليا سينينسيس) ، مالو (مالفا بارفلورا) ، روزماري (روزمارينوس أوفيسينياليس) وساج (سالفيا أوفيسينياليس) كمواد مضادة للسمنة.

تم قياس كلا من المكونات الكيميائية و وأظهرت النتائج أن المواد الخام كانت الأعلى في مركبات البروتين والألياف وحمض الفينول ومركبات الفلافونويد. تم تقسيم الفئران التجريبية إلى ست مجموعات المجموعة الأولى التي تتغذى على النظام الغذائي الأساسي كنترول سالب . مجموعات الفئران الخمسة التي اصيبت بالسمنة نتيجة تغذيتها بنظام غذائي دهني ، وتم إعادة تصنيفها مجموعة كنترول موجب رقم (٢) ، أيضًا ، تم تغذية الفئران من المجموعتين الثالثة والرابعة بشكل منفصل على نظام غذائي عالي الدهون وتم استبدالها بأوراق المزيج الأعشاب في ٥,٠ و ١٠,٠ ٪ مستوى لمدة ستة أسابيع. تم تغذية الفئران من المجموعتين الخامسة والسادسة بشكل منفصل على نظام غذائي عالي الدهون وتم تناوله الخليط عن طريق الفم بمقدار ١ مل / يوم لمدة ستة أسابيع من خلاصة الأعشاب المستخلص المائي وتم استخلاصها من ٠,٢٥ و ٠,٥ جم من خليط الأعشاب في ٥٠,٠ مل من الماء المقطر. تم تحديد صورة الدم الكاملة ، الدهون ، وظائف الكبد ، وظائف الكلى ، نشاط البنكرياس ، والجلوكوز في جميع المجموعات

في نهاية التجربة البيولوجية التجريبية للفئران المصابة بالسمنة أظهرت النتائج أن مزيج الأعشاب بنسبة ١٠٪ يستبدل بالنظام الدهني وأيضًا ، يؤخذ عن طريق الفم ١ مل / يوم من ٠,٥ غ من خليط الأعشاب في ٥٠,٠ مل من الماء المقطر يعطي أفضل النتائج لصورة دم كاملة و دهون الدم ، وظائف الكبد ، وظائف الكلى ، ونشاط البنكرياس. أيضا ، لتحسين المعملات في مجموعة الفئران المصابة بالسمنة ، اتخذت عن طريق الفم ١ مل / يوم من ٠,٢٥ غرام خليط الأعشاب في الماء المقطر ٥٠,٠ مل و ٥ ٪ من مزيج الأعشاب استبداله من النظام الغذائي الدهني.ونستخلص من نتائج الدراسه انه يوصى بإستخجام الأعشاب الطبيعية (أوراق الشاي الأبيض (كاميليا سينينسيس) ، مالو (مالفا بارفلورا) ، روزماري (روزمارينوس أوفيسينياليس) وساج (سالفيا أوفيسينياليس) كمواد مضادة للسمنة.