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Anti-obesity Effect of chamomileand Camel's hey in -Induced Obese Rats

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Abstract

The effect of different concentrations (2.5and5%) as powder of camel's hey and chamomile on obese rats was evaluated. Forty eight male albino rats weighting 140 ±10 g were used in this study and divided into 8 groups, each group contain 6 rats. Rats were treated by high fat diet (20% animal fat) to induce obese. Body weight gain, feed intake, feed efficiency ratio, serum liver functions (ALT, AST and ALP), kidney functions (urea, creatinine, uric acid), total cholesterol T.C, triglycerides T.G, and lipoproteins: (HDL-c, LDL-c, VIDL-c) were determined. Results showed that the highest body weight gain, feed intake and feed efficiency ratio recorded for 5 mixture plants, while, the lowest recorded for 5% camel hey, respectively with significant difference. The lower liver functions (ALT, AST and ALP), cholesterol, triglycerides, lipid profile (LDL-c and VLDL-c), kidney functions (urea, creatinine, uric acid) and higher HDL-c were recorded for 5% mixture plants. As conclusion, obese rats treated with 5 % mixture plants had improvement lipid profile, liver and kidney functions compared with camel hey and chamomilealone. The best results were recorded for 5% mixture plants (chamomile and camel's hey)which can use to reduce obesity and improve health status.

Key words: Camel's hey, Chamomile, Rats, Anti-obesity and Biochemical analysis.

Introduction

The word obesity comes from the Latin obesitas, which means stout, fat, or plump. Medically, obesity is a condition in whichexcess body fat has accumulated to the extent that it may havean adverse effect on health, leading to reduced life expectancyand/or increased health problems (**Etymology Dictionary 2001)**.

Since then, obesity incidence increased at an alarming rate and is becoming a major public health concern. Indeed, obesity facilitates the development of metabolic disorders (e.g. diabetes, hypertension), and cardiovascular diseases in addition to chronic diseases (e.g. stroke, osteoarthritis, sleep, and inflammation-based pathologies) **(Singla*et al.*, 2010)**.

Hassan and El-Gharib, (2015) concluded that obesity is becoming one of the most prevalent health concerns among all populations and age groups worldwide, resulting in a significant increase in mortality and morbidity related to coronary heart diseases, diabetes type 2, metabolic syndrome, stroke, and cancers. Disappointing results after cessation the lifestyle modification or pharmacotherapy compelled the researchers and physicians to rethink to find a new, safe, and striking therapeutic alternative for this global health concern. Many natural products act as anti-obesity through various mechanisms to reduce body weight and its complications.

Srivastava*et al.*, (2010) reported thatchamomile is one of the most ancient medicinal herbs known to mankind. It is a member of the *Asteraceae/ Compositae*family and is represented by two common varieties, German chamomile (*Chamomillarecutita*) and roman chamomile (*Chamaemelumnobile*).

Miraj and Alesaeidi, (2016) indicated that this plant is commonly used for its antioxidant, antimicrobial, antidepression, anti-inflammatory, antidiarrheal and angiogenesis activity, anti-carcinogenic, hepatoprotective, and anti-diabetic effects. Besides, it is beneficial for knee osteoarthritis, ulcerative colitis, premenstrual syndrome, and gastrointestinal disorders. Antimicrobial activity (anti-parasitic, antibacterial, antiviral properties) was reported.

Chamomile, and marigold were compared regarding to their antioxidant activities, and it was found that extracts from flower heads and leaves of chamomile are the richest source of antioxidant activity

and among their chemical compounds; bisabolol and chamazulene have the highest antioxidants **(Kustrin *et al.*,2015)**.

Shelbaya (2017) studied the effect of chamomile powder against high fat, high fructose diet induced-metabolic disturbances in rats. The results concluded that consumption of chamomile powder can improve the lipid profile, reduce insulin resistance, blood glucose level and inflammatory cytokines as well as it can protect the body from the oxidative stress, related to their phenolic compounds.

Jabri*et al.*, (2017) demonstrated that chamomile decoction extract (CDE) had a significant protective effect against high fat diet (HFD)-induced obesity and oxidative stress, owing in part to its antioxidant properties, by inhibiting effect on intestinal glucose absorption and/or by negatively regulating the studied intracellular mediators such as calcium, hydrogen peroxide and free iron.

Camel's hay or camel grass (*Cymbopogonschoenanthus,* L. Spreng), is an aromatic spice that belongs to the family *Poaceace*, and is cultivated almost in all tropical and subtropical countries. This plant is commonly cultivated for the fine fragrance of the leaves which are often used as a flavoring material. The leaves of this herb, when fresh and young are consumed in salads and also used for preparation of traditional meat recipes **(Khadri, *et al.*, 2008)**.

Camel's hay is used in the treatment of colds, epilepsy, abdominal cramps and pains, as well as in culinary and perfume products. In Saudi traditional medicine, it is mainly used as a diuretic to inhibit kidney stone formation and as an anti-infectious agent in urinary tract infections **(Al-Ghamdi*et al.*, 2007)**.

Mirghani*et al.*, (2012) identified antioxidant potentials of camel grass extracts and documented their abilities to reduce ROSs. Such mechanism include inhibition of lipoperoxidation and decolorization of 2,2-diphenyl-1-picrylhydrazyl (DPPH).

Adejuwon and Esther, (2007) stated that several investigations have been carried out on the potentials of lemon grass extract as a source of hypolipidemic and hypoglycemic substances which may lower the risks of hypertension and obesity.

This work was conducted to study the effect of different concentration of camel's hey and chamomile as powder on biochemical analysis of obese rats.

Materials and Methods

Materials:

Camel's hey (*Cymbopogonschoenanthus*, L.) and chamomile (*Matricariachamomilla*, L.) herbs were obtained from local market, Cairo City, Cairo Governorate, Egypt.

The induction of experimental obesity

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

Casein, cellulose, choline chloride, and DL- Methionine

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

Experimental animals

A total of 48 adult normal male albino rats Sprague Dawley strain weighing 140±10 g were obtained from Vaccine and Immunity Organization, Ministry of Health, Helwan Farm, 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 Chemical, Medical and Instruments, Cairo, Egypt.

Methods

Preparations of herbs

To prepare the dried camel hey and chamomile were obtained from local market. Herbs were washed thoroughly under running tap water, shade dried, and ground to a fine powder using an air mill.

Experimental design

Forty eight 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 **AIN, (1993)** for 7 consecutive days. After this adaptation period, rats are divided into 8 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 camel hey as powder by 2.5% of the weight of basal diet. Group (4): A group infected obese rats fed on camel hey as powder by 5% of basal diet. Group (5): A group infected obese rats fed on chamomile as

powder by 2.5% of the weight of basal diet. Group (6): A group infected obese rats fed on chamomile as powder by 5% of the weight of basal diet. Group (7): A group infected obese rats fed on mixture of camel hey and chamomile as powder by 2.5% of the weight of basal diet. Group (8): A group infected obese rats fed on mixture of camel's hey and chamomile as powder by 5% of the weight of basal diet.

During the experimental period, the body weight and feed intake were estimated daily and the general behavior of rats was observed. The experiment period was take 28 days, at the end of the experimental period each rat weight separately then, rats are slaughtered and collect blood samples. Blood samples were centrifuged at 4000 rpm for ten minute to separate blood serum, and then kept in deep freezer till using.

Blood sampling:

After fasting for 12 hours, blood samples in initial times were obtained from retro orbital vein, while it obtained from hepatic portal vein at the end of each experiment. Blood samples were collected into a dry clean centrifuge glass tubes and left to clot in water bath (37°C) for 30 minutes, then centrifuged for 10 minutes at 4000 rpm to separate the serum, which were carefully aspirated and transferred into clean cuvette tube and stored frozen in deep freezer till analysis according to method described by **Schermer (1967)**.

Body weight gain (BWG), feed intake (FI), and feed efficiency ratio(FER):

During the experimental period (28 days) the net feed intake was daily recorded, while body weight was weekly recorded. The net feed intake and gained body weight were used for the calculation of feed efficiency ratios (FER) according to **Chapman *et al.*, (1959)** as follow:

$$\text{FER \%} = \frac{\text{Body weight gain (g)}}{\text{Food intake (g)}} \times 100$$

Biochemical analysis:

Lipids profile:

Determination of total cholesterol:

Serum total cholesterol was determined according to the colorimetric method described by **Thomas (1992)**.

Determination of serum triglycerides:

Serum triglyceride was determined by enzymatic method using kits according to the **Young, (1975) and Fossati, (1982)**.

Determination of high density lipoprotein (HDL-c):

HDL-c was determined according to the method described by**Friedewaid (1972) and Grodon and Amer (1977)**.

Calculation of very low density lipoproteincholesterol (VLDL-c):

VLDL-c was calculated in mg/dl according to **Lee and Nieman (1996)** using the following formula:

VLDL-c (mg/dl) = Triglycerides / 5

Calculation of low density lipoprotein cholesterol (LDL-c):

LDL-c was calculated in mg/dl according to **Lee and Nieman (1996)** as follows:

LDL-c (mg/dl) = Total cholesterol – HDL-c – VLDL-c

Liver functions

Determination of serum alanine amino transferase (ALT), serum asparatate amino transferase (AST), serum alkaline phosphatase (ALP) were carried out according to the method of **Hafkenscheid (1979) , ClinicaChimicaActa (1980)**, **and Moss (1982**), respectively.

Kidney functions

Determination of serum urea

Serum urea and serum creatinine were determined by enzymatic method according to **(Henry (1974)** and **Patton & Crouch 1977)**.

Statistical analysis:

The data were analyzed using a completely randomized factorial design **(SAS, 1988)** when a significant main effect was detected; the means were separated with the Student-Newman-Keuls Test. Differences between treatments of ($P \leq 0.05$) were considered significant using Costat Program. Biological results were analyzed by One Way ANOVA.

Results And Discussion

1. Effect of chamomile and camel's hayon body weight gain, (BWG), feed intake (FI) and feed efficiency ratio (FER) of obese rats:

The effect of chamomile and camel's hay on body weight gain, (BWG), feed intake (FI) and feed efficiency ratio (FER) of obese rats are shown in Table (1). It is clear to notice that the higher body weight gain (BWG) recorded for negative control group, while positive control group

recorded the lower value with a significant difference. The mean values were 56.21 and 22.10 g, respectively.

On the other hand, the higher body weight gain of treated groups (obese groups) recorded for 5 % mixture, while the lower value recorded for 5% camel's hay with a significant difference. The mean values were 48.25 and 39.35 g, respectively.

In case of feed intake (FI), it could be concluded that the higher feed intake recorded for negative control group, while positive control group recorded the lower value with a significant difference. The mean values were 22.75 and 17.45 g/day, respectively.

On the other hand, the highest feed intake of treated groups (obese groups) recorded for 5 % mixture, while the lowest value recorded for 5% camel's hay with a significant difference. The mean values were 24.18 and 19.15 g/day, respectively.

In case of feed efficiency ratio (FER), it could be noticed that the higher feed efficiency ratio recorded for negative control group, while positive control group recorded the lower value with a significant difference. The mean values were 0.078 and 0.045 %, respectively.

On the other hand, the higher feed efficiency ratio of treated groups (obese groups) recorded for 5 % camel's hay, while the lower value recorded for 5% camel's hay with significant differences. The mean values were 0.073 and 0.064 %, respectively. These results are in agreement with **Jurgens*et al.*, (2015)** reported that, rats reduce energy ingested from liquid than that intake from the solid diet.

Also, **Saravanan and Leelavinothan (2006)** reported that, chamomile enhances body weight loss due to its antihyperglycemic effect and improvement in insulin secretion and protective effect in controlling muscle wasting.

2. Effect of chamomile and camel's hay as powders on liver functions levels of obese rats:

Data given in Table (2) show the effect of chamomile and camel's hayas powders on liver functions levels (ALT, AST and ALP) of obese rats. It is clear to mention that the higher ALT liver enzyme levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 66.40 and 22.20 U/L, respectively.

On the other hand, the highest ALT liver enzyme of treated groups (obese groups) recorded for 5 % camel's hay, while the lowest value

recorded for 5% mixture with a significant difference. The mean values were 59.40 and 25.90 U/L, respectively.

In case of AST liver enzyme, the higher levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 68.60 and 22.27 U/L, respectively.

On the other hand, the highest AST liver enzyme of treated groups (obese groups) recorded for 5 % camel's hay, while the lowest value recorded for 5% mixture with significant differences. The mean values were 61.00 and 35.80 U/L, respectively.

In case of ALP liver enzyme, the higher levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 84.56 and 64.10 U/L, respectively.

On the other hand, the highest ALP liver enzyme of treated groups (obese groups) recorded for 5 % camel's hay, while the lowest value recorded for 5% mixture with a significant difference. The mean values were 79.20 and 66.11 U/L, respectively. Our results agreed with that of **Gupta and Misra (2006)**, who reported that the administration of *Chamomile capitula* extract reduced the elevated serum levels of ALT and AST induced by paracetamol. This reduction could be attributed to the protective effect of *Chamomile capitula* extract and the maintenance of the functional integrity of hepatic cells.

3. Effect of chamomile and camel's hay as powders on total cholesterol and serum triglycerides levels of obese rats:

Data presented in Table (3) show the effects of chamomile and camel's hay as powders on serum total cholesterol and serum triglycerides levels of obese rats. The obtained results indicated that the higher serum total cholesterol levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 233.60 and 115.80 mg/dl, respectively.

On the other hand, the highest serum total cholesterol levels of treated groups (obese groups) recorded for 5% camel's hay, while the lowest value recorded for 5 % mixture with a significant difference. The mean values were 191.40 and 130.10 mg/dl, respectively.

In case of serum triglycerides levels, it could be concluded that the higher serum total cholesterol levels recorded for positive control group,

while negative control group recorded the lower value with significant differences. The mean values were 207.20 and 100.80 mg/dl, respectively.

On the other hand, the highest serum triglycerides levels of treated groups (obese groups) recorded for 5% camel's hay, while the lowest value recorded for 5 % chamomile with a significant difference. The mean values were 170.0 and 114.60 mg/dl, respectively. These results are in agreement with **Torres-Duran *et al.*, (1998)** they reported thatlevels of TG and TC in the liver also have been estimated to explain the status of liver. High level of TG and TC in the liver is the indication of the liver injury.

Also, **Salujа*et al.*, (1978)** plant phytochemicals (such as tannins, glycosides, terpenoids, alkaloids, saponins, and flavonoids etc) inhibit the absorption of dietary cholesterol, but the resulting decrease in serum cholesterol has been slight. Also, high level of blood cholesterol especially LDL-c is a known major risk factor for CHD whereas HDL-c is cardio protective. Treatment with aqueous extract of St. John's Wort tea, Chamomile tea and their blend, at three different doses significantly decreased the levels of total cholesterol and LDL-c with respect to the normal control without tea extract.

4. Effect of chamomile and camel's hay powder on serum lipid profile levels of obese rats:

Data presented in Table (4) show the effects of chamomile and camel's hayon high density lipoprotein cholesterol (HDL-$_C$), low density lipoprotein cholesterol (LDL$_{-C}$) and very low density lipoprotein cholesterol (VLDL$_{-C}$),levels of obese rats. The obtained results indicated that the increase high density lipoprotein cholesterol levels recorded for negative control group, while positive control group were recorded the lower value with a significant difference. The mean values were 44.00 and 31.00 mg/dl, respectively.

On the other hand, the highest high density lipoprotein cholesterol levels of treated groups (obese groups) recorded for 5% mixture, while the lowest value recorded for 5% camel's haywith a significant difference. The mean values were 41.40 and 34.80 mg/dl, respectively.

Data also indicated that the higher low density lipoprotein cholesterol levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 160.60and 51.00 mg/dl, respectively.

On the other hand, the highest low density lipoprotein cholesterol levels of treated groups (obese groups) recorded for 5% camel's hay, while the lowest value recorded for 5 % mixture with a significant difference. The mean values were 129.00and 73.88 mg/dl, respectively.

In case of very low density lipoprotein cholesterol levels, it could be concluded that the higher VLDL-c levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 41.40 and 20.00 mg/dl, respectively.

On the other hand, the highest low density lipoprotein cholesterol (VLDL-c) levels of treated groups (obese groups) recorded for 5% camel's hay, while the lowest value recorded for 5 % mixture with significant differences. The mean values were 34.00 and 23.20mg/dl, respectively. These results are in agreement with **Akinseye, (2016)**, they reported that John's Wort and chamomile showed a very significant influence on lipid profile compare to the control reinforcing their individual ability to lower LDL-C. The benefits and therapeutic significance of the two type of tea are visible in the average values of their blend sample as they exhibit the combination of the individual sample's cholesterol-reducing ability.

Atherogenic index indicates the deposition of foam cells or plaque or fatty infiltration or lipids in heart, coronaries, aorta, liver and kidneys. The higher the atherogenic index, the higher is the risk of the above organs for oxidative damage **Mehta *et al.*, (2003)**. Atherogenic index was significantly reduced as the concentration of St. John's Wort, Chamomile and the blended groups compared to the control value.

Also, **Garcia*et al.*, (2012)**, they reported that the after treatment with FA for a period of 5 weeks, a significant decrease in plasmatic TC accompanied by a reduction in its LDL-c fraction was observed in hyperlipidemic rats. FA alsoshowed a beneficial effect, causing a weak increase in HDL-c level, although the differences were not statistically significant.

5. Effect of chamomile and camel's hay as powders on kidney functions (urea, uric acid and creatinine) levels of obese rats:

Data given in Table (5) show the effects of chamomile and camel's hayas powderson kidney functions (serum urea, serum uric acid and serum creatinine),levels of obese rats. The obtained results indicated that the higher serum urea levels recorded for negative control group, while

positive control group recorded the lower value with a significant difference. The mean values were 35.40 and 18.00 mg/dl, respectively.

On the other hand, the highest serum urea levels of treated groups (obese groups) recorded for 5% camel's hay, while the lowest value recorded for 5 % mixture with a significant difference. The mean values were 32.60 and 19.70 mg/dl, respectively.

The obtained results showed that the higher serum uric acid levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 3.60 and 1.92 mg/dl, respectively.

On the other hand, the highest serum uric acid levels of treated groups (obese groups) recorded for 5% camel's hay, while the lowest value recorded for 5 % mixture with a significant difference. The mean values were 3.38 and 2.18 mg/dl, respectively.

The obtained results showed that the higher serum creatinine levels recorded for positive control group, while negative control group recorded the lower value with a significant difference. The mean values were 0.91 and 0.58 mg/dl, respectively.

On the other hand, the highest serum creatinine levels of treated groups (obese groups) recorded for 5% camel's hay, while the lowest value recorded for 5% mixture with significant differences. The mean values were 0.77 and 0.47 mg/dl, respectively. These results are in agreements with **Salama, (2010)**, they reported that *M. chamomilla*significantly increased normalized the kidney functions, improved the apoptotic markers, reduced the oxidative stress markers and corrected the hypocalcemia that resulted from cisplatin nephrotoxicity. *M. chamomilla*is a promising nephroprotective compound reducing cisplatin nephrotoxicity most probably by its antioxidant activities and inhibition of gamma glutamyltransferase activity.As conclusion, the best results were recorded for 5% mixture plants (chamomile and camel hey) which can use to reduce obesity and improve health status.

Table (1): Effect of chamomile and camel's hay powder on body weight gain, feed intake and feed efficiency ratio of obese rats

Groups	Parameters		
	BWG (g)	FI (g/day)	FER (g/day)
	Mean±SD	Mean±SD	Mean±SD
Group1(negative control)	56.21^{a}±0.12	25.75^{a}±1.20	0.078^{a} ± 0.004
Group 2 (positive control)	22.10^{e}±0.21	17.45^{d}±1.22	0.045^{e} ± 0.002
Group3 (2.5% chamomile)	47.40^{b}±0.10	24.18^{a}±1.15	0.070^{c} ± 0.001
Group 4 (5% chamomile)	44.65^{c}±0.40	23.27^{b}±1.35	0.069^{c} ±0.002
Group5 (2.5%camel's hey)	40.62^{d}±0.23	22.70^{b}±1.14	0.064^{d} ±0.003
Group 6 (5% camel's hey)	39.35^{d}±0.30	19.15^{c}±1.30	0.073^{b} ±0.005
Group 7 (2.5% mixture)	42.37^{c}±0.10	23.27^{b}±1.23	0.065^{d} ±0.003
Group 8 (5% mixture)	48.25^{b}±0.42	24.15^{a}±1.20	0.071^{c} ±0.005
LSD (P ≤ 0.05)	2.54	1.80	0.0023

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (P ≤ 0.05).

Table (2): Effect of chamomile and camel's hay powder on liver functions ofobese rats

Groups	Parameters		
	ALT(U/L)	AST(U/L)	ALP(U/L)
	Mean ±SD	Mean ±SD	Mean ±SD
Group1(negative control)	20.20^{f}±1.48	22.27^{f}±1.64	64.10^{e}±2.00
Group 2 (positive control)	66.40^{a}±2.40	68.60^{a}±2.40	84.56^{a}±2.23
Group3 (2.5% chamomile)	40.60^{d}±3.57	50.00^{d}±5.70	73.00^{c}±2.54
Group 4 (5% chamomile)	27.40^{e}±3.71	37.60^{e}±2.50	68.04^{d}±1.58
Group5 (2.5%camel's hey)	50.80^{c}±4.60	56.00^{b}±2.12	77.85^{b}±2.44
Group 6 (5% camel's hey)	59.40^{c}±2.96^{b}	61.00^{b}±2.44	79.20^{b}±3.42
Group 7 (2.5% mixture)	38.90^{d}±1.04	48.80^{d}±1.30	71.00^{c}±1.14
Group 8 (5% mixture)	25.90^{e}±2.50	35.80^{e}±2.20	66.11^{de}±1.31
LSD (P ≤ 0.05)	3.57	4.10	2.28

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (P ≤0.05).

Table (3): Effect of chamomile and camel's haypowder on totalcholesterol and triglyceride of obese rats

Groups	Parameters	
	Total cholesterol(mg/dl)	Triglycerides(mg/dl)
	Mean ±SD	Mean ±SD
Group1(negative control)	115.80^{f}±2.44	100.80^{f}±2.25
Group 2 (positive control)	233.60^{a}±1.31	207.20^{a}±3.00
Group3 (2.5% chamomile)	150.40^{d}±5.45	120.00^{d}±5.24
Group 4 (5% chamomile)	134.40^{e}±4.16	114.60^{e}±2.07
Group5 (2.5%camel's hey)	174.80^{c}±3.20	137.20^{c}±1.60
Group 6 (5% camel's hey)	191.40^{b}±4.32	170.00^{b}±13.24
Group 7 (2.5% mixture)	146.60^{d}±5.75	117.50^{e}±5.22
Group 8 (5% mixture)	130.10^{e}±2.10	116.10^{e}±2.00
LSD (P ≤ 0.05)	3.980	2.750

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (p ≤0.05).

Table (4): Effect of chamomile and camel's hay as powders on lipid profile of obese rats

Groups	Parameters		
	HDL-c(mg/dl)	LDL-c(mg/dl)	VLDL-c(mg/dl)
	Mean ± SD	Mean ± SD	Mean ± SD
Group1(negative control)	44.00^{a}±2.10	51.00^{f}±4.51	20.00^{e}±0.71
Group 2 (positive control)	31.00^{d}±2.14	160.60^{a}±3.35	41.40^{a}±0.63
Group3 (2.5% chamomile)	36.80^{c}±2.30	89.20^{d}±2.28	24.00^{d}±1.06
Group 4 (5% chamomile)	40.40^{b}±2.42	70.80^{e}±3.87	22.80^{d}±0.53
Group5 (2.5%camel's hey)	36.20^{c}±1.50	110.40^{c}±3.39	27.40^{c}±0.80
Group 6 (5% camel's hey)	34.80^{c}±3.50	122.20^{b}±5.17	34.00^{b}±2.60
Group 7 (2.5% mixture)	36.91^{c}±2.70	85.69^{d}±2.16	23.40^{d}±0.22
Group 8 (5% mixture)	41.40^{b}±2.34	65.40^{e}±4.25	23.20^{d}±0.31
LSD (P ≤ 0.05)	3.160	3.890	1.920

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are different significantly (p ≤0.05).

Table (5): Effect of chamomile and camel's hay on kidney functions on of obese rats

Groups	Parameters		
	Urea(mg/dl)	Uric acid(mg/dl)	Creatinine(mg/dl)
	Mean ± SD	Mean ± SD	Mean ± SD
Group1(negative control)	18.00^{f}±1.58	1.92^{f}±0.83	0.58^{d}±0.04
Group 2 (positive control)	35.40^{a}±2.07	3.60^{a}±0.15	0.91^{f}±0.13
Group3 (2.5% chamomile)	26.20^{d}±2.77	2.66^{d}±0.11	0.71^{a}±0.081
Group 4 (5% chamomile)	21.20^{e}±3.03	2.30^{e}±0.16	0.55^{d}±0.10
Group5 (2.5%camel's hey)	30.80^{c}±1.48	3.30^{c}±0.20	0.71^{c}±0.03
Group 6 (5% camel's hey)	32.60^{b}±3.04	3.38^{b}±0.08	0.77^{b}±0.07
Group 7 (2.5% mixture)	24.70^{d}±3.51	2.49^{d}±0.14	0.60^{d}±0.050
Group 8 (5% mixture)	19.70^{e}±1.12	2.18^{e}±0.14	0.47^{f}±0.20
LSD (P ≤ 0.05)	1.58	0.181	0.028

Each value is represented as mean ± standard deviation (*n* = 3).
Mean under the same column bearing different superscript letters are differentsignificantly (p ≤0.05).

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التأثير المضاد للسمنة للبابونج والحلفابر فى الفئران المصابة بالسمنة

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الملخص العربى:

تم تقييم تأثير تركيزبن مختلفين (2,5 , 5٪) كمسحوق من البابونج والحلفابر على الفئران السمينة. تم استخدام ثمانية وأربعون من ذكور الفئران البيضاء وزنها 140 ± 10 جم في هذه الدراسة وتم تقسيمهم إلى 8 مجموعات ، تحتوي كل مجموعة على 6 فئران. تم معاملة الفئران بنظام غذائي غني بالدهون (20٪ دهون حيوانية) لتحفيز السمنة. وتم تقدير الزيادة فى وزن الجسم ، الغذاء المتناول ، كفاءة استخدام الغذاء ، وظائف الكبد (ALP,AST ، ALT)، وظائف الكلى (اليوريا ، الكرياتينين ، حمض اليوريك) ، الكوليسترولالكلى ، الدهون الثلاثية، والبروتينات الدهنية عالية الكثافة، والبروتينات الدهنية منخفضة الكثافة، والبروتينات الدهنية منخفضة الكثافة جدا). أوضحت النتائج أن أعلى زيادة في وزن الجسم والغذاء المتناول ، كفاءة استخدام الغذاء سجلت مع تركيز5% مخلوط النباتات ، بينما سجلت أقل نسبة 5٪ من الحلفابرعلى التوالي مع وجود فرق معنوي. تم تسجيل أقل قيم لكلا من وظائف الكبد ، والكوليسترول ، والدهون الثلاثية ، وصورة دهون الدم LDL-c, VLDL-c، ووظائف الكلى بينما ارتفعت قيم HDL-c مع تركيز 5% من مخلوط النباتين . خلصت الدراسة ، فإن الفئران التي تم معاملتها بمخلوط النباتات بتركيز 5 ٪ أدت إلى تحسين صورة دهون الدم ووظائف الكبد والكلىبالمقارنة بالفئران المصابة بالسمنة والتى تغذت على مسحوق البابونج والحلفابر على حده. سجلت أفضل النتائج مع مخلوط النباتات بتركيز 5 ٪ وتوصى الدراسةباستخدامها كمشروب لتقليل السمنة وتحسين الحالة الصحية.

الكلمات الأفتتاحية: البابونج ـ الحلفابر ـ الفئران ـ التأثير المضاد للسمنة ـ التحاليل الكيميائية الحيوية.