Minufiya J. Agric. Res. Vol.39 No. 2(1): 577 - 589 (2014) "http://www.mujar.net"

TECHNOLOGICAL CHEMICAL AND BIOLOGICAL STUDIES ON SOME BAKED SUPPORTED HERBAL TO TREAT THE OBESITY

Thouraya M. Hassan, Nehad R. EL-Tahan, Abeer A. Khider and Afaf A. T. Zedan

Nutrition and Food Science Dep., Home Economic faculty, Monifiya University.

(Received : Dec. 24 , 2013)

ABSTRACT: *Traditional Medicines derived from medicinal plants are used by about 60% of the world's population. This search focused on Cichorium intybus, Commiphora myrrh, Cassia occidentalis as Herbal drugs and plants using in the treatment of some diseases in Egypt. Obesity is the oldest metabolic disturbance :similar evidence of obesity is found in Egyption Mummies and Greek Sculpture.Many studies conducted in Egypt revealed that obesity is becoming a problem of public health concern affecting different social and economic classes as well as different age groups. Though there are various approaches to reduce the ill effects of obesity and its secondary complications, herbal formulations as functional foods are preferred due to lesser side effects and low cost. One of the etiologic factors implicated in the development of obesity and its complications is the damage induced by free radicals and hence an antidiabetic compound with antioxidant properties would be more beneficial. Therefore, information on antioxidant effects of these medicinal plants is also included and investigated. Obesity is a chronic metabolic disorder characterized by altered carbohydrate, fat and protein metabolism, and an increased risk of multiple complications. Effect of cake flour extraction 72% with chicory, Senna , myrrh powder at doses of (2.5 and 5%) for chicory, Senna and (1% and1.5%) for myrrh on obesity rats were studied, Sprauge-Dawley albino rats (40 female) , weighing 210 ±5g were divided into* ***9****groups and administered chicory, Senna , myrrh powder daily for 28 days. Blood samples were taken from each rat and tested for total cholesterol, (LDL), (VLDL), (HDL), triglycerides, liver enzymes activities and thyroid hormone. obesity rats, , triglycerides, total cholesterol, LDL, VLDL, and liver enzymes activities (AST and ALT) were significantly increased, while HDL, thyroid hormone were significantly decreased compared with the negative control rats. Treating obesity rats with of (5%, 2.5%) for chicory, Senna and (1%,1.5%) for myrrh cakes caused a significant improvement in these biochemical measures and the best results were achieved by using (5%) chicory, Senna and (1.5%) myrrh cakes followed by 2.5% chicory, Senna and 1% myrrh cakes respectively. It could be concluded from these results that, chicory, Senna , myrrh cakes which, were found to be rich in total phenols and dietary fiber. It is hoped that this study would lead to the establishment of some compounds that could be used to formulate new and more potent natural drugs of natural origin.*

Key words: *Obesity rats; lipid profile ; kidney functions; weight gain.*

INTRODUCTION

Obesity and overweight occurs due to imbalance between calories consumed and calories utilized. Globally, there have been two reasons for overweight and obesity: 1) an increased intake of energy-dense foods that are high in fat, salt and sugars but low in vitamins, minerals and other micronutrients; and, 2) a decrease in physical activity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization (torres *et al.*,1993 and Grover *et al.*, 2002)

Changes in dietary and physical activity patterns are often results from sedentary lifestyle, not sleeping enough, endocrine disruptors, such as some foods that interfere with lipid metabolism, medications that make patients put on weight, medical and psychiatric illness and infectious agents.

Overweight and obesity are the fifth leading risk for global deaths. At least, 2.8 million adults die each year as a result of being overweight or obese. In addition, 44% of the diabetes burden, 23% of the ischemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity. WHO global estimates for the year 2008, reported 1.5 billion people were overweight, of these, over 200 million men and nearly 300 million women were obese. Overall, more than one in ten of the world's adult population was obese (Iwu.,1993 and Grover *et al* .,2002).

In 2010, around 43 million children under five were overweight. Overweight and obesity are now on the rise in low and middle income countries, particularly in urban settings. Close to 35 million overweight children are living in developing countries and 8 million in developed countries. Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood. But in addition to increased future risks, obese children experience breathing difficulties, increased risk of fractures, hypertension, cardiovascular diseases and psychological effects (Scartezzini and sproni.,2000).

Overweight and obesity are linked to more deaths worldwide than underweight. For an example, 65% of the world's population live in countries where overweight and obesity kill more people than underweight (this includes all high-income and most middle-income countries). Obesity is a major health threat. The extra weight puts added stress on every part of individual's body. People with obesity are at risk for these health problems: Bone and joint problems due to extra weight puts strain on the bones and joints. This can lead to osteoarthritis, a disease that causes joint pain and stiffness, gallstones and liver problems, heart attack from coronary heart disease, congestive heart failure, and stroke, high blood cholesterol and triglycerides (dislipidemia or high blood fats), high blood pressure (hypertension), high blood sugar (glucose) or diabetes, stopping breathing during sleep (sleep apnea). This can cause daytime fatigue or sleepiness, poor attention, and problems at work.

Obesity is recognized as the most crucial risk factor for type 2 diabetes. Obesity, in particular intraabdominal adiposity, is associated with increased free fatty acid (FFA) concentrations in blood plasma which exercise a major negative effect on insulin sensitivity in both muscle and liver. Besides insulin resistance, defective insulin secretion is a prerequisite for the development of type 2 diabetes. Both lipotoxicity and glucotoxicity may initiate and enable a vicious circle dependable for the metabolic impairment. Diabetes occurs as a late phenomenon in obesity and is preceded by years of impaired glucose tolerance. The progression to diabetes is indicated by an inability of the B cells of pancreatic langerhans to maintain its high rate of insulin secretion in response to glucose in face of insulin resistance (Caughron and Smith., 2002). The partial reversibility of the evolution of obesity towards diabetes is well demonstrated today by lifestyle changes and multidisciplinary weight loss programs (Lebovitz.,2001) Nature is enriched with plant wealth for all living creatures, which possess medicinal virtues (Cuncio., 1995). Anti diabetic activity has been re-ported in many plants during the last couple of years. Moreover, their mechanism of action differs from that of insulin in that they appear to act as anti-metabolites, capable of blocking the pathway of oxidation of fatty acids. Approximately 343 plants of the world have been tested for the blood glucose which showed lowering effect in the laboratory experiments. Of them, 158 species are claimed to be used in traditional system in the Indian medicine (Baynes and Thorpe.,1999).

The chief goal of obesity treatment is to maintain healthy weight. The treatment method to be undertaken often depends on the preferred choice of an individual undergoing treatment as well as the level of obesity. Common treatment measures include the following methods, dietary changes, exercise and activity, behavior change, prescription weight-loss medications and weight- loss surgery(Torres *et al.*,1993).

The preferred treatment modality for weight loss is dieting and physical exercise. But due to busy schedules and sedentary lifestyle follow-up the first two methods never seems to be practiced in a regular manner. On the other hand weight loss surgery runs out of the option considering the cost involved. There is a gradual shift towards an increase use of drugs. Drugs are pharmacological agents that reduce or control weight. These drugs alter one of the fundamental processes of the human body, weight regulation, by altering appetite, metabolism, or absorption of calories. Only one anti-obesity medications orlistat is currently approved by the FDA for long term use. It reduces intestinal fat absorption by inhibiting pancreatic lipas(Iwu.,1993). Rimonabant, a second drug often referred to as "the munchies", had been approved in Europe for the treatment of obesity but has not received approval in the United States and Canada due to safety concerns (Koleva *et al.*,2002). Sibutramine, which acts on the brain to inhibit deactivation of the neurotransmitters, thereby de-creasing appetite was withdrawn from the United States and Canadian markets in October 2010 due to cardio-vascular side effects(Lebovitz.,2001).. Because of potential side effects, it is recommended that anti-obesity drugs only be pre-scribed for obesity where it is hoped that the benefits of the treatment outweigh its risk (Aderibgbe *et al* .,2001).

The use of allopathic and pharmacological drugs has become a popular means to overcome excess weight gain(Yassin et al.,2007).. While these drugs generally are effective, severe adverse toxicities may limit their overall usefulness(Trinder.,1969 and Aderibgbe *et al.,*2001). A nutritional based intervention is being hailed as an inexpensive alternative to aid weight loss, and weight management(Perez *et al.*,1996). Medicinal herbal supplements are being extensively utilized due to their effectiveness in managing many chronic disorders. They are cost-effective, and exert less to no toxic side-effects in comparison with many chemically synthesized drugs(Campillo *et al.*,1991). Accordingly, recent preliminary reports suggested that herbs with a long history of use and other natural substances less likely to produce severe toxicity might be effective in reducing appetite and promoting significant weight loss are encouraging(Hayek *et al* .,1997).

Evidences are emerging to support that an increasing consumption of herbs are effective strategy for obesity control and weight management. Usage of plants and plant products has potential to keep the increasing prevalence of metabolic syndrome in control. There are few drugs in the market to prevent/manage obesity but there are the costs, efficacy and side effects to consider. For centuries people across the countries have been using natural products as plant based dietary supplements for weight control(Konyalioglu *et al.*,2005).

Chicory is a root vegetable whose green leafy part is often used in cooking or in salads. It has a long history of herbal use for its tonic effect upon the liver and digestive tract. Previous studies on chicory extracts and formulations containing its roots or leaves revealed that they produce hepatoprotective (Mitra *et al.,* 2001; Ahmed *et al.*, 2003 and Krylova et al., 2006). antihyperglycemic (Petlevski *et al.,* 2003) and antioxidant effects (Sarawathy and Devi, 2001; Rossetto *et al.*, 2005). Furthermore, (Urias-Silvas *et al.* 2007) concluded that inulin-type fructans extracted from chicory regulate appetite and lipid/glucose metabolism. It has also promising effects on the body weight and fat mass development. There are no scientific studies available on the effects of chicory extracts in obesity although this plant are widely used as a fork remedy for the treatment of obesity.

Coffee senna grows throughout the tropics and subtropics including United States from Texas to Iowa eastward, Africa, Asia and Australia (Stevens *et al.,* 2001). The study of phytochemicals of C.occidentalis reveals that the nature and amount of phytochemicals vary according to climate. For example stems, leaves and the root bark of the plant fromIvory Coast, Africa contain small amount of saponins, no alkaloids, sterols, triterpenes, quinines, tannins and flavonoids. However, a large amount of alkaloids were found in the stem, leaves and fruits from ethiopia (Smolenski *et al.,* 1975). Li *et al*., (2008) stated that "Juemingzi", a source of traditional Chinese herbal medicine, has been demonstrated to play a role in decreasing serum cholesterol Li concentration. In this study, a novel protein, which has shown an inhibitory effect on cholesterol biosynthesis, was isolated from Senna obtusifolia L.

Myrrh is an aromatic oleogum resin obtained as an exudate from the stem of Commiphora molmol (also called C. myrrh) and possibly from other plants of the family Bursearacae (Greene *et al.,* 1993).

Myrrh consists of 30-60% water-soluble gum, 20-40% alcohol-soluble resins and 3-8%volatile oil. The gum contains polysaccharides and proteins,- while the volatile oil is composed of steroids, sterols and terpenes. The characteristic odor of myrrh is derived from furanosesquiterpenes (Hanus *et al.,* 2005). It also contains terpenes, sesquiterpenes, cuminic aldehyde and eugenol (Zhu *et al.,* 2003).

Etman *et al*., (2011) stated that Myrrh has long been used for its circulatory, disinfectant, analgesic, antirheumatic, antidiabetic, and schistosomicidal properties. Myrrh essential oil (MEO) was extracted from the oleo-gum resin of Commiphora molmol and formulated into emulsions and suppositories to mask/avoid its bitter taste.

Therefore the present work was designed to study the effects of senna and chicory herbs and the myrrh of both on *Cichorium intybus*, *Commiphora myrrh*, *Cassia occidentalis* on some biological, biochemical parameters and histopathological changes of obese rats.

MATERIALS AND METHODS

This study was carried out using cakes with Cicharium intybus (Chicory), Commphora myrrh (Myrrh), Cassiaocci dentalis (Senna) which purchased from local market in Cairo city. Theses cakes left to dry in the dark at room temperature. The air-dried leaves were converted to powder form using an electric machine.

Induction of obesity:

Basal diet (AIN-93M) was prepared according to (Reeves *et al*. 1993) which provide about 9.5% of its energy from fat (40 g corn oil/kg diet). In order to induce obesity, High Fat Diet (HFD) was used in which at least 45% of its energy comes from fat as reported by (Bhatt *et al*. 2006). Basal diet was modified to contain 40 g corn oil + 200 g ghee/kg diet and the amount of add saturated fat was substituted from the amount of corn starch

Experimental Diets:

Forty female Sprague-Dawley albino rats weighing 210 ±5g were purchased from Conjunctivitis Eye Institute Giza Governorate.All rats were fed on basal diet for one week (adaptation period). The basal diet consisted of casein (10%), cellulose (5%) salt myrrh (4%), vitamin myrrh (1%), corn oil (10%) and corn starch (70%) according to (Lane Peter and Pearson.,1997). Nine groups of rats (5 rats each) were studied according to the following scheme for 28 days: Group (1): Control negative: Normal rats fed on basil diet. Group (2): Control positive :Obese rats fed on basil diet . Group (3): Rats fed on diet with cake supplemented with (2.5%) chicory . Group(4): Rats fed an diet with cake supplemented with (5%) chicory. Group(5): Rats fed on diet with cake supplemented with (2.5%) senna. Group(6): Rats fed on diet with cake supplemented with (5%) senna.Group (7): rats fed on diet with cake supplemented with (1%) myrrh. Group(8): rats fed on diet with cake supplemented with (1.5%) myrrh. Group(9) : rats fed on diet with cake supplemented with (5% senna + 5% chicory + 1.5 myrrh).

The supplemented cakes were added to the rat's diet by replacement of protein and carbohydrates levels.

During the experiment period, the feed intake and body weight were weighed daily and twice a week, respectively. Body Weight Gain (BWG) and Feed Efficiency Ratio (FER) were calculated at the end of the experimental period according to the following equations: BWG (g) = final weight (g) - initial weight (g)

FER = weight gain (g)/feed intake (g)

Collection of blood samples and organs:

At the end of the experimental period, rats were sacrificed following a 12 h fast. The rats were lightly anaesthetized by ether and about 7 ml of blood was withdrawn from the hepatic portal vein into dry centrifuge plastic tubes. Blood samples were centrifuged for 20 min at 3000 rpm to separate the serum samples which were kept in tubes at -20 ºC till biochemical analysis. livers of the sacrificed rats were removed for histopathological study.

Biochemical Analysis:

Serum glucose levels were determined according to the method described by(Trinder.,1969). Serum total cholesterol, (high- density lipoprotein cholesterol and low-density lipoprotein were determined according to the methods of (Roeschlua *et al*;1974 and Assmann,1979) (Hatch and Less,1968 and Uwajima *et al*.,1984). respectively. Asparate amino transferase (AST) and alanine amino transferase (ALT) activities were calorimetrically determined according to the method of (Bergmeyer and Harder1986).Thyroid hormones (free T4 and free T3) and thyrotrophin or Thyroid Stimulating Hormone (TSH) were estimated in serum using Radioimmunoassay (RIA) as described by (Patrono and Peskar 1987**).**

Histopathological study: Livers of the scarified rats were dissected, removed, washed with normal saline and put in 10% formalin solution. The fixed specimens were then trimmed, washed and dehydrated in ascending grades of alcohol. The tissue specimens were cleared in xylene, embedded in paraffin, sectioned at 4-6 microns thickness, stained with Hematoxylen and Eosin (H and E) and then studied under an electronic microscope according to (Carleton., 1979).

Statistical Analysis:

The standard analysis of variance procedure in a completely randomized design was applied for the present data according to (Gomez and Gomez1984 and Fisher 1970).

Results

Food intake was lower in the obese rats compared to normal diet fed rats and lower in the rats administration of either senna, chicory at 2.5 and 5% or myrrh at 1% and 1.5% but the difference was not significant as shown in (Table1). Body weight gain was markedly lower in the chicory groups (2.5% and 5%) and in myrrh group (1% and 1.5%) compared to positive control group. At the end of the study, body weight gain of chicory groups(at 2.5% and 5%) and in myrrh group (1% and 1.5%) was about 29%:35% lower compared to positive control group. Thus Food Efficiency Ratio (FER) was significantly lowered. FER of positive control group was higher than normal diet fed rats and lowered by giving senna, chicory cakes at 2.5% and 5% and myrrh at 1% and 1.5% to obese rats.

Feeding on senna or chicory cakes at 2.5% and 5% or myrrh at 1% and 1.5% caused significant decreases in serum levels of total cholesterol, triglycerides, LDL-c and VLDL-c compared to positive control group (Table 2). Serum HDL-c levels increased of rats fed on chicory cake (2.5% and 5%) but not significantly by feeding of senna 5% showed significantly higher levels of HDL-c compared to positive control. These values resembled to that of negative control group.

The administration of senna cake at 2.5% significantly reduced AST level but it did not affect ALT level. On the other hand, administration of senna at 5%, chicory at 2.5% and 5% and myrrh at 1 and 1.5% significantly reduced serum levels of AST and ALT enzymes in obese rats compared to positive control group (Table 3). More reduction in ALT enzyme was observed, that were not significant compared to negative control groups.

Table 1: Effect of supplemented cake with chicory, Senna , myrrh on Feed Intake (FI), Body Weight Gain (BWG), and Feed Efficiency Ratio (FER) .

Groups	FI (G/Day)	BWG (G/Day)	FER
Negative control	28.97±0.99c	2.42±0.49b	0.08±0.004a
Positive control	21.75±1.87ab	2.77±.093c	0.13±0.014d
Senna Cake at 2.5%	20.95±1.57ab	2.30±0.13b	0.11±0.002c
Senna Cake at 5%	22.60±0.67b	2.29±0.22b	0.10±0.012bc
Chicory Cake at 2.5%	19.96±1.77a	1.97±0.05a	0.10±0.008bc
Chicory Cake at 5%	19.88±0.77a	1.82±0.04a	0.09±0.003ab
Myrrh Cake at 1%	19.69±1.33a	1.79±0.11a	0.09±0.004ab
Myrrh Cake at 1.5%	19.59±1.05a	1.80±0.14a	0.09±0.006ab

Values are mean±SD. Values in the same column sharing the same superscript letters are not statistically significantly different .

Table 2: Effect of supplemented cake with chicory, Senna , myrrh on serum lipids parameters (mg/dl) in obese rats

Groups	TC	TG	HDL-c	LDL-c	VLDL-c
Negative Control	13.86±0.61a	100.67±2.08a	69.33±3.06a	50.27±6.81d	36.53±4.37
Positive Control	22.52±1.39d	160.20±9.23e	112.60±6.95d	28.36±5.57a	109.32±9.83e
Senna Cake at 2.5%	18.33±0.90c	138.33±2.88d	91.67±4.51c	34.17±1.93ab	85.83±4.03d
Senna Cake at 5%	18.00±0.82bc	135.00±4.08d	90.00±4.08bc	34.85±3.06ab	82.15±6.84d
Chicory Cake at 2.5%	16.72±0.93bc	120.60±4.39c	83.60±4.67bc	37.40±1.82b	66.48±6.22c
Chicory Cake at 5%	16.73±1.03bc	116.01±6.92bc	83.67±5.13bc	38.07±4.47b	61.20±5.39c
Myrrh Cake at 1%	16.53±0.50b	110.33±5.03b	82.67±2.52b	40.67±5.51bc	53.13±5.76bc
Myrrh Cake at 1.5%	16.80±1.26bc	111.00±5.48b	84.00±6.28bc	47.72±6.03cd	46.48±6.06ab

Values are mean±SD. Values in the same column sharing the same superscript letters are not statistically significantly different at ($p<0.05$)

Table 3: Effect of supplemented cake with chicory, Senna , myrrh on serum levels of liver function enzymes in obese rats .

Groups	AST (U/L)	ALT (U/L)
Negative Control	77.33±2.52a	23.67±4.81a
Positive Control	128.2± 4.76f	33.80±4.43c
Senna Cake at 2.5%	110.00±1.00e	32.67±2.51bc
Senna Cake at 5 %	94.00±3.91d	27.75±1.89ab
Chicory Cake at 2.5%	94.20±3.89d	26.60±2.51a
Chicory Cake at 5%	93.33±5.50cd	27.00±2.65a
Myrrh Cake at 1%	86.00±1.01b	26.01±1.01a
Myrrh Cake at 1.5%	88.20±2.39bc	23.80±1.64a

Values are mean±SD. Values in the same column sharing the same superscript letters are not statistically significantly different at ($p<0.05$)

From Table (4) it could be noticed that administration of senna cake at 2.5% and 5% did not affect free T4 activity. On the other hand, water extracts of chicory (2.5% and 5%), myrrh at (1% and 1.5%) induced significant increases in serum levels of free T4 and T3 hormones compared to positive control group. All tested water extracts caused non significant changes in serum level of Thyroid Stimulating Hormone (TSH).

Histopathological examination of liver of the negative control rats fed on basal diet revealed normal histological picture of hepatic lobule which consists of central vein surrounded by normal hepatocytes as shown in (Fig. 1-A). Examination of liver of positive control obese rats showed fatty degeneration of hepatocytes and infiltration of leucocytes in hepatic sinusoid (Fig. 1-B). Liver of rats given 2.5% senna cake showed little vacuolar degeneration of hepatocytes and some improvement in fatty degeneration (Fig. 1-C). In addition, portal edema and few leucocytes infiltration in hepatic lobule were observed in senna 5% (Fig. 1-D). Liver and myrrh cake at 1% showed marked improvements with no observed pathological lesions hydrolysed by human digestive enzymes (Wight and Niekerk, 1983).

DISCUSSION

Several studies have shown that each of chicory and senna contains considerable amounts of important compounds which may serve as antioxidants. For example, Yassin et al. (2007) reported that chicory had high content of phenolics compounds (58.1mg/g), flavonoids (7.23 mg/g) and carotenoids (0.52 mg/g). Furthermore, Vági et al. (2005) and Amarowicz *et al.* (2008) found that senna contain considerable amounts of total phenolics compounds and have antioxidant activity and free radical-scavenging capacity. It is well-known from the literature that the main active compounds of chicory extract are inulin and fructooligosaccharides (Kocsis *et al.*, 2003). Inulin is a polymer of fructose with ß-(2-1) glycosidic linkages stomach content, which can slow down the rate of gastric emptying of water, nutrients and lipids, or it can cause alterations in hormone secretions, which affect lipid metabolism. The observed effect of chicory extract on feed intake and body weight in this study was agreed with that reported by Cani *et al.* (2005) and Urias-Silvas *et al.* (2007) that the addition of oligofructose; a shortchain fructans obtained from chicory inulin; might enhance satiety, thereby resulting in greater reductions in energy intake and protects against the body weight gain, fat mass development in normal and obese rats.The effect of herbal myrrh on feed intake and body weight could be attributed to the presence of inulin-type fructans of chicory herb in that myrrh. In accordance with the present results, Yassin et al.(2007) reported that chicory cake improve lipid profiles by lowering plasma total cholesterol and triglyceride concentrations while Ninfali et al. (2005) reported similar results for senna. The hypocholesterolemic effect of senna and chicory water extract could be attributed to presence of isoflavones in both herbs which prevent intestinal absorption of cholesterol by competition for its absorption sites as mentioned by Rang and Dale (1991). The potent hypercholesterolemic and hypotriglyceridemic effects of chicory extract could be due to the presence of inulin which behaves like a soluble fiber and possesses hypolipidemic effect (Lairon, 1996). On the other hand, in Kim and Shin (1998) study, serum total cholesterol and triglyceride concentrations were not significantly affected by chicory or inulin feeding. The difference in the cholesterolemic effect of similar dietary fibers among different studies may be due to the percentage of added dietary cholesterol, the presence or absence of cholic acid, the level of dietary fiber and species.

The results of serum lipoproteins were coincide with that of Kim and Shin (1998) who reported that feeding rats on diets containing 1%, 5% chicory extract or 5% inulin for 4 weeks resulted in higher serum concentration of HDLc and lower serum concentration of LDL-c. In addition, Yassin *et al.* (2007) stated that HDL-c concentration was significantly elevated in chicory extract group than in normal control or high fat group.

Table 4: Effect of cake supplemented with chicory, Senna , myrrh on serum levels of thyroid hormones and Thyroid Stimulating Hormone (TSH) in obese rats

Groups	TSH (µg/L)	Free T3 (ng/dl)	FreeT4 (ng/dl)
Negative Control	75.73±5.96c	3.90±0.09c	0.005±0.002a
Positive Control	65.75±5.55a	2.05±0.03a	0.004±0.002a
Senna cake at 2.5%	69.80±4.35b	2.15±0.03a	0.004±0.001a
Senna cake at 5%	68.54±5.74b	2.18±0.01a	0.003±0.002a
Chicory cake at 2.5%	69.01±4.96b	2.22±0.06a	0.005±0.003a
Chicory cake at 5%	71.38±3.63b	2.82±0.05b	0.003±0.001a
Myrrh cake at 1%	72.76±4.35bc 3.	12±0.03b	0.004±0.002a
Myrrh cake at 1.5%	71.80±3.63b 3.	17±0.02b	0.005±0.001a

Values are mean±SD. Values in the same column sharing the same superscript letters are not statistically significantly different at ($p<0.05$)

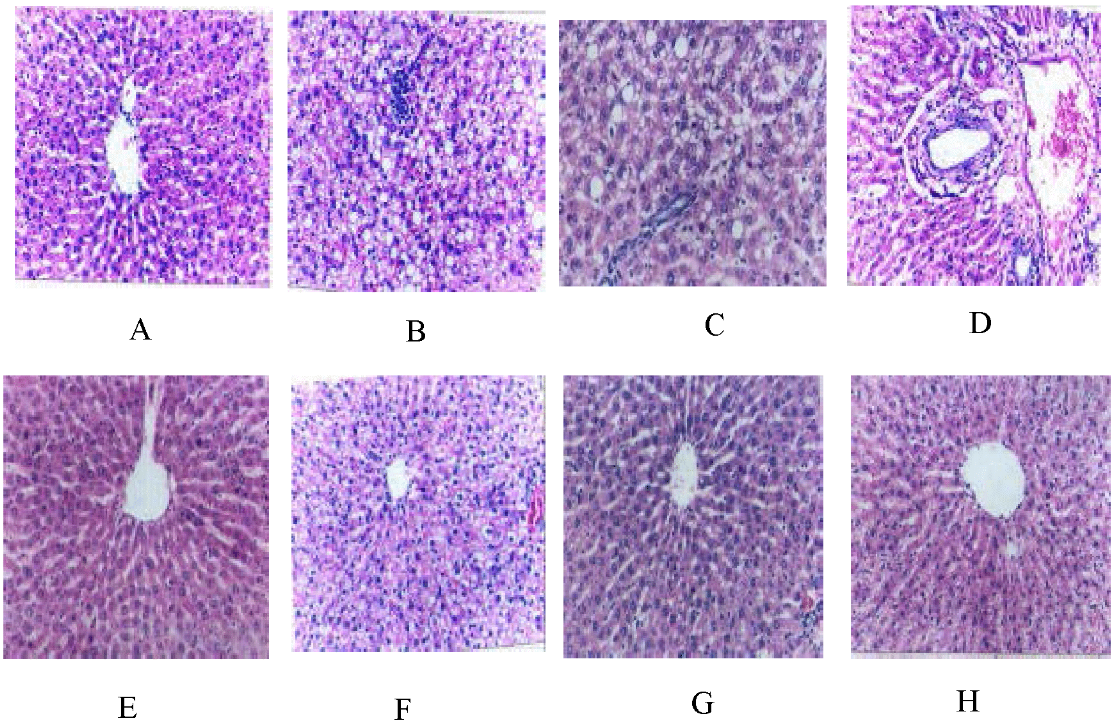

Fig. 1: Histopathological changes detected in the liver of (A) negative control, (B) positive control, (C) Senna cake at 2.5%, (D) Senna cake at 5%, (E) 2.5% chicory cake (F) 5% chicory cake, (G) Myrrh cake at 1% and (H) Myrrh cake at 1.5% (H and E X 100).

The observed elevation of Alanine Aminotransferase (ALT) and Aspartate Aminotransferase (AST) in high fat fed groups (obese groups) may be attributed to the incidence of fatty liver which is a metabolic consequence of obesity (Angulo, 2002; Angelico *et al.*, 2003). Moreover, Clark *et al.* (2003) and Clark and Diehl (2003) reported that fatty liver is commonly associated with long term elevations in liver enzymes. The reduction in the serum levels of aminotransferases as a result of herbal administration during the present study might probably be due in part to the presence of isoflavones, polyphenols and other antioxidants as mentioned before which aided in reducing the liver injury induced by HFD. For example, the water soluble antioxidant properties of Cichorium intybus was investigated by (Gazzani *et al.*,2000) and evaluated in vitro and in ex vivo as protective activity against rat liver cell microsome lipid peroxidation. Moreover, reduced fat cells in the liver as a result of reducing body weight may also improve liver function. In accordance with the present study, Zafar and Mujahid (1998); Mitra et al. (2001) and Ahmed et al. (2003) concluded that chicory has antihepatotoxic effect and significantly lowers serum levels of AST and ALT enzymes even in CCL4 intoxicated rats. High fat fed animals showed significant increase in thyroid hormones when compared to normal diet fed animals. This result was agreed with Kuroshim et al. (1971) who study the effects of a HFD for 4-5 weeks on thyroid activity and found that HFD caused a marked hypertrophy of brown and white adipose tissue, but no change in the weight of thyroid, while there was a significant decrease in the thyroid hormones. On the other hand, no available literature could be obtained concerning the effect of senna and chicory herbs on thyroid gland hormones but its effect on increasing thyroid hormones could be indirect result of their effect on lipids metabolism. Our histopathological results showed that obese rats supplemented with chicory or myrrh cakes can prevent/reduce diet induce fatty liver. This fat reduction in the liver was confirmed by serum lipid analysis and by measurement of liver specific marker enzymes as mentioned before. Zafar and Mujahid (1998) and Ahmed et al. (2003) reported that chicory extract had antihepatotoxic activity and rats given it showed almost complete normalization of liver tissues, no fatty degeneration and no necrosis. The observed improvements may be revealed to the presence of many antioxidant components found in both herbs.

On the basis of the present results, we could conclude that myrrh cake especially at 1.5% may have synergistic effect and its intake of be useful for treating obesity accompanied by hyperlipidemia as it reduces feed intake and body weight, improves serum lipid profile, liver function and thyroid activity in obese rats. Moreover, this myrrh has a promising effect on the liver tissues as it amelioratesthe histopathological lesions seen in this organ ofobese rats.

REFERENCES

Aderibigbe, A.O., T.S. Emudianughe and B.A. Lawal (2001). Phytoher. Res., 15(5): 456-458 .

Ahmed, B., T.A. Al-Howiriny and A.B. Siddiqui (2003). Antihepatotoxic activity of seeds of *Cichorium intybus*. J. Ethnopharmacol., 87: 237-240.

Amarowicz, R., Z. Zegarska, R. Rafalowski, R.B. Pegg, M. Karamac and A. Kosin´ska (2008). Antioxidant activity and free radical-scavenging capacity of ethanolic extracts of thyme, oregano and senna. Eur.J. Lipid Sci. Technol., 87: 237-240.

Angelico, F., M. Del-Ben, R. Conti, S. Francioso, K. Feole, D. Maccioni, T.M. Antonini and C. Alessandri (2003). Non-alcoholic fatty liver syndrome: a hepatic consequence of common metabolic diseases. J. Gastroenterol Hepatol, 18: 588-594.

Angulo, P. (2002). Non-alcoholic fatty liver disease. N. Engl. J. Med., 346: 1221-31.

Assmann, G. (1979). Cholesterol determination in high density lipoprotein separated by three different methods. Internist, 20: 559-604.

Baynes, J. and S. Thorpe (1999). The role of oxidative stress in diabetic

complications: A new perspective on an old paradigm. Diabetes, 48: 1-19.
Bergmeyer, H.U. and M. Harder (1986). A colorimetric method of the determination of serum glutamic oxaloacetic and glutamic pyruvic transaminase. Clin. Biochem., 24: 481-488.
Bhatt, B.A., J.J. Dube, N. Dedousis, J.A. Reider and R.M. Doherty (2006). Diet-induced obesity and acute hyperlipidemia reduce I6B" level in rats. Am. J. Physiol. Regul. Integr. Comp. Physiol., 290: 233-240.
Campillo, J.E., C. Perez, J.M. Romiro and M.D. Torres (1991). Hypoglycemic activity of an aqueous extract from Ficus carica (fig tree) leaves in Streptozotocin diabetic rats. Diabetologia, 34 (Suppl. 2): A- 181-187.
Cani, P.D., A.N. Neyrinck, N. Maton and N.M. Delzenne (2005). Oligofructose Promotes satiety in rats fed a high-fat diet: Involvement of glucagon-like peptide-1. Obesity Res., 13: 1000-1007.
Carleton, H. (1979). Histological Techniques, The 4th Edn., London, Oxford University Press, New York, USA.
Caughron, K.F. and E.L. Smith (2002). Definition and description of diabetes mellitus. South Med. J., 95(1): 35-49.
Clark, J.M. and A.M. Diehl (2003). Nonalcoholic fatty liver disease: an under recognized cause of cryptogenic cirrhosis. JAMA., 289: 3000-3004.
Clark, J.M., F.L. Brancati and A.M. Diehl (2003). The prevalence and etiology of elevated aminotransferase levels in the United States. Am. J. Gastroenterol., 98: 960-967.
Cuncio, F., I. Pegoraro, F. Falleti, G. Perrella and A. Ceriello (1995). SOD and GSH inhibited the high glucose induced oxidative damage and the PDGF increased secretion in cultured human endothelial cells Thrombosis Homeostasis, 74: 963-973.
Etman, M., M. Amin, A. H. Nada, M. Shams-Eldin and O. Salama (2011). Emulsions and rectal formulations containing myrrh essential oil for better patient compliance. Drug Discov Ther.;5(3):150-6.
Fisher, R.A. (1970). Statistical method for research workers, Edinburged . 14, Oliver and Boyd, pp: 140-142.(45).
Gazzani, G., M. Daglia, A. Papetti and C. Gregotti (2000). *In vitro* and *ex vivo* anti and prooxidant components of *cichorium intybus*. J. Pharm. Biomed. Anal., 3: 127-133.
Gomez, K.A. and A.A. Gomez (1984). Statistical Procedures for Agricultural Research. John Wiley and Sons Inc., USA.
Greene, D. A. (1993). Gold, frankincense, myrrh and, medicine. Natural Chemical Med. J.54:620-622.
Grover, J.K., S. Yadav and V. Vats (2002). Medicinal plants of India with antidiabetic potential. J. Ethnopharmacol., 81: 81-100.
Hanus, L. O., T. Rezanka, V. M. Dembitsky and A. Moussaieff (2005). Myrrh Commiphora chemistry. Ann. Intern. Med.49:123-127.
Hatch, F.T. and R.S. Lees (1968). Practical methods for plasma lipoprotein analysis. Adv. Lipid Res., 6:1-6.
Hayek, T., B. Fuhrman and J. Vaya (1997). Reduced progression of atheroscleros in apolipoprotein Edeficient mice Following consumption of red wine, or its polyphenols. Atheroscler. Thromb. Vase. Biol., 17: 2744.
Iwu, M.M. (1993). Handbook of African Medicinal Plants. Boca Raton: CRC Press Inc. pp: 223-224.
Kim, M. and H.K. Shin (1998). The water soluble extract of chicory influences serum and liver lipid concentrations, short chain fatty acids and fecal lipid excretion in rats. J. Nutr., 128: 1731-1736.
Kocsis, I., K. Hagymàsi, Á. Kéry, E. Szôke and A.A. Blàzovics (2003). Effects of chicory on pancreask, 47: 143-146.
Koleva, I., T. Beek, J. Linssen (2002). Screening of plant extracts for antioxidant activity: A comparative study on three testing methods. Phytochemical Anal., 13: 8-17.
Konyalioglu, S., H. Saglam and B. Kivcak (2005). A-tocopherol flavonoid and phenol contents and antioxidant activity

of some fruit leaves. Pharmaceutical Biol., 43: 683-686.

Krylova, S.G., L.A. Efimova and E.P. Zueva (2006). The effect of Cichorium root extract on the ethnopharmacol., 63:227-231.

Kuroshim, A., K. Doi and S. Itoh (1971). Effects of a high fat diet on thyroid activity, with special reference to thyroidal responses to cold. Int. J. Biometeorol., 15: 55-64.

Lairon, D. (1996). Dietary fibers: effects on lipid metabolism and mechanisms of action. Eur. J. Clin. Nutr., 50: 125-133.

Lane Peter, W. and A.E.G. Pearson (1997). Dietary requirements in the Laboratory: Animal Principles and Practice. Acad . Press, London and New York, pp: 142.

Lebovitz, H.E. (2001). Diagnosis, classification are pathogenesis of diabetes mellitus. J. Clin. Psychiatry, 62 (Suppl) 27: 5-9.

Li, C., M. Li, W. Chang and B. Guo (2008). Purification and characterization of a novel cholesterol-lowering protein from the seeds of Senna obtusifolia. Sci China C Life Sci.;51(11):1020-4.

Mitra, S.K., M.V. Venkataranganna, S. Gopumadhavn, S.D. Anturlikar, S. Seshadri and U.V. Udupa (2001). The protective effect of HD-03 in CCL4-induced hepatic encephalopathy in rats. Phytotherp. Res., 15: 493-496.

Ninfali, M., G. Mea, S. Giogini, M. Rocchi and Bacchiocca (2005). Anti-oxidant capacity of Nutr., 50: 125-133.

Patrono, C. and B.A. Peskar (1987). Radioimmunoassay in basic and clinical pharmacology. handbook of experimental pharmacology, springer-verlag, Berlin, Germany.

Perez, C. R. Dominguez, J.M. Romiro, J.E. Campillo and M.d. Torres (1996). A study on the glycemic balance in streptozotocin diabetic rats treated with an aqueous extract of Ficus carica leaves. Phytother. Res., 10: 82-86.

Rang, H.P. and M.M. Dale (1991). Pharmacology, 2nd Edn., Ch. 15, pp: 376.

Reeves, P.G., F.H. Nielson and G.C. Fahey (1993). AIN- 93 purified diets for laboratory rodents: Final report of the American Institute of Nutrition adhoc writing committee on the reformulation of the AIN-76A rodent diet. J. Nutr., 123: 1939-1951.

Roesochlau, P., E. Bernt and W.J. Gruber (1974). Kinetics of the cholesterol-sulfuric acid reaction. A fast kinetic method for serum cholesterol. Clin. Chem. Clin. Biochem., 12: 403-408.

Rossetto, M., A. Lante, P. Vanzani, M. Spettoli, Scarpa and A. Rigo (2005). Red chicory as potent scavenger of highly reactive radicals. A study on their phenolics composition and peroxyl radical trapping capacity and Efficiency. J. Agric. Food Chem., 53: 8169-8175.

Sarawathy, S.D. and C.S. Devi (2001). Modulating effect of an ayurvedic formulation on antituberculosis druginduced alterations in rat liver microsomes. Phytotherp. Res., 15: 501-505.

Scartezzini, P. and E. Sproni (2000). Review on some plants of Indian traditional medicine with antioxidant activity. J. Ethnopharmacol., 71: 23-43.

Smolenski, I. J., H. Silinis and N. R. Farnsworth (1975). Alkaloid screening. VI. Lloydia 38:225-230.

Stevens, W. D., U. C. Ulloa, A. Pool and O. H. Monitel (2001). Flora de Nicaragua.Monographs of Systematic Botany, St. Louis, MO: Missouri Botanical Garden Press85: 940-943.

Torres, NI.D., R. Dominguez, J.M. Romiro, J.E. Campillo and C. Perez (1993). Hypoglycemic are nypoiipidemic activity of an aqueous extract from *Ficus carica* in streptozotocin diabetic rats (Abstract) Diabetologia, 36 (Suppl. 1) A-181-189.

Trinder, P. (1969). Enzmatic determination of serum blood glucose. Ann Clin. Biochem., 6: 24-27.

Urias-Silvas, J.E., P.D. Cani, E. Delmee, A. Neyrinck, M.G. Lopez and M.N. Delzenne (2007). Physiological effects of dietary fructans extracted from *Agaves tequilana* and *Dasylirion* spp. Br. J. Nutr., 99: 254- 261.

Uwajima, T., V. Shimizu and O. Ferda (1984). Glycerol oxidase, a novel copper hemoprotein from *Aspergillus japonicus*. J. BioL Chem., 259: 2748-2753.

Vági, E., E. Rapavi, M. Hadolin, K. Vásárhelyiné-Perédi, A. Balázs, A. Blázovics and B. Simándi (2005). Phenolic and triterpenoid antioxidants from *origanum majorana* L. herb and extracts obtained with different solvents. J. Agri. Food Chem., 53: 17- 21.

Wight, W.A. and J.V. Niekerk (1983). Determination of reducing sugars, sucrose and insulin. J. Agric. And Food Chem., 31: 282-285.

Yassin, M.N., I.S. Ashoush and E.M. El-Hadidy (2007). Antioxidants content of chicory leaves extract and its effect as hypolipidemic agent in experimental rats. Ann. Agric. Sci. ,52: 177-186.

Zafar, R. and A.S. Mujahid (1998). Antihepatotoxic effects of roots of *Cichorium intybus* L., J. Ethnopharmacol., 63: 227-231.

Zhu, N., S. Sheng, S. Sang and R.T. Rosen (2003). Isolation and characterization of several aromatic sesquiterpenes from *Commiphora myrrha*. Flavour Fragr. J. 18,282 285.

دراسات تكنولوجية وكيميائية وبيولوجية علي المخبوزات المدعمة بالأعشاب لعلاج السمنة

ثريا مسلم حسن ، نهاد رشاد الطحان ، عبير أحمد خضر ، عفاف عبد الستار طه زيدان

قسم التغذية وعلوم الأطعمة – كلية الاقتصاد المنزلي جامعة المنوفية

الملخص العربى

تاخذ الادوية الطبيعية من النباتات الطبية التى تستخدم بواسطة ٦٠ % من سكان العالم ويركز هذا البحث على الشيكوريا والمر والسنا نباتات مجففة ونباتات مستخدمة فى علاج بعض الامراض فى مصر . تعتبر السمنة مرض قديم والدليل على ذلك وجود السمنة فى المحويات المصرية والتماثيل اليونانية . واجريت دراسات كثيرة فى مصر اشرت الى ان السمنة اصبحت مشكلة مضرة بالصحة العامة وتؤثر على مختلف الطبقات الاجتماعية والاقتصادية بالاضافة الى المجموعات المختلفة من الاعمار ، على الرغم من ان هناك كثير من الاساليب العديدة لتقليل اعراض مرض السمنة ونتائجة والمكونات العشبية كاغذية وظيفية يتم تفضيلها بسبب اثارها الجانبية الضئيلة وتكلفتها البسيطة . احد العوامل التى تسبب زيادة السمنة يكون هو التلف الناتج عن الاصول الحرة وتساعد مضادات الاكسدة ومضادات السكر التى تحتوى عليها هذة الاعشاب ونتيجة لذلك فان العلم باثار مضادات الاكسدة الماخوذة من هذة النباتات الطبية يتم تضمينها والبحث عنها . وتعتبر السمنة مرض مزمن يتميز بزيادة الكربوهيدرات والدهون والبروتنات والتحذير المتزايد لتوابعها العديدة. ويكون تاثيربودر الكيك المحتوى على الشيكوريا والسنا والمر بنسبة ٢.٥% ، ٥% ، للشيكوريا والسنا وبنسبة ١% للمر فى فئران السمنة التى تم دراستها وعدد الفئران ٤٠ فأر ووزنهم ٢١٠± ٥ تم تقسمها الى ٩ مجموعات وكل مجموعة على حدة اخذت الشيكوريا والسنا والمر يوميا لمدة ٢٨ يوم. وعينات الدم مأخوذة من كل فأر وتم اختبار الكوليسترول الكلى(LDL, VLD, LDL)) الجليسريدات الثلاثية ونشاط انزيمات الكبد للفئران السمينة ونشاط انزيمات الكبد (ALT, AST) التى تم زيادتهم بطريقة ملحوظة بينما HDL تم تقليلة مع الفئران فى المجموعات السالبة الضابطة.

وبمعالجة الفئران السمينة بنسبة (٥% ، ٢.٥ %) من الشيكوريا والسنا و (١% ، ١.٥ %) من كيك المر تسبب زيادة ملحوظة فى مقايس البيوكيميائية والنتائج الافضل تم الوصول اليها عن طريق استخدام ٥ % من الشيكوريا لانها غنية بالنتروفلافونات ومركبات الاكسدة التى تعمل على تحسين وظائف الكبد ومساعدة الصفراء على إستحلاب الدهون وسهولة الإمتصاص وعدم تحويلها لدهون جسمانية والسنا ١.٥ % من كيك المر يلية ٢.٥% من الشيكوريا والسنا و ١ % من كيك المر ومن هذة النتائج يتضح لنا ان كيك السنا والشيكوريا والمر كانت غنية بالفينولات والالياف .

ونامل ان هذة الدراسة قد تؤدى الى بناء بعض المجموعات التى يمكن ان تستخدم لتكوين ادوية طبيعية مصنعة من الاعشاب الطبيعية.

الكلمات الافتتاحية: الفئران السمينة وظائف الكلية والوزن الزائد