



Possibility of Using Fresh Purslane in the Treatment of the Obese Experimental Rats

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ABSTRACT:

The current study aims to evaluate the possibility of using fresh purslane in the treatment of obesity, and for this purpose, five food products (salad, rice, Molokai, meat kofta and cabbage stuffed) were prepared by adding different levels of fresh purslane (10%, 15% and 20%) replacement respectively with studying sensory properties for these products. Thirty female albino rats Of Sprague Dawley strain (weighting 170±5g) were divided into five groups (6rats each). Six rats served as negative control (-ve) group and 24 rats were fed on the high fat diet contents for five weeks to induce obesity. Then, rats reclassified into positive control (+ve) group and 3 treated rat groups which fed , fresh purslane at levels of 10%, 15 % and 20%, in diet respectively .The treatment period was designed for 4 weeks. The results of the sensory tests of food products which supplemented with fresh Purslane (10%, 15% and 20%) showed a high degree of good acceptance of these fortified products. The results Of biochemical changes revealed that, there was a significant decrease($p \leq 0.05$) in weight gain%, cholesterol(TC), low density lipoprotein cholesterol(LDL-c),alkaline phosphatase(ALP) and urea in all treated rat groups compared with positivecontrol(+ve) group. The biochemical results were accompanied with histopathological alterations in liver tissue. The best treatments were consumption of 20% of fresh purslane which had the best nutritional and biochemical results and improved the induced degenerative histopathological changes ,This study concluded that administration of fresh purslane showed effect in improvement side effects of obesity on healthy status and liver tissue .It can be recommends that, adding fresh purslane into diet for their individuals who are suffering from obesity cause its effective impact on the improvement of obesity status and reducing their risk.

Key words: Purslane, sensory properties, lipid profile, liver enzymes, kidney functions, rats.

INTRODUCTION

Obesity becomes a global health problem. The occurrence of obesity is associated with genetic factors, endocrine disorders, metabolic abnormalities and nutritional imbalance (Zhu *et al.*,2019).World Health Organization declared more than 1.9 billion adults worldwide are obese , 50% people are overweight in all over the world (Mopuri and Islam, 2017). Obesity is leading to non-communicable illnesses such as type 2diabetes, cardiovascular diseases, musculoskeletal disorders and some cancers (An *et al.*, 2019).



Medicinal Plants have a wide important role in the elimination on effects that caused by exposure to environmental contaminants (Seif *et al.*, 2019). Purslane is a common, herbaceous succulent annual plant. It is distributed extensively in temperate and tropical regions worldwide (Badawy *et al.*, 2018 and Petroplous *et al.*, 2019). In Egypt it's commonly known as "Rejlah" (El-Gindy, 2017). It has been used as a food and medicinal plant for thousands of years in China. In current years, it has been re-evaluated as a potential "New Crop" for its positive properties which distinguish as one of the best vegetable sources of omega-3 fatty acids (linolenic acid) and for its great crude protein and water-soluble polysaccharide contents. (Badawy *et al.*, 2018 and Petroplous *et al.*, 2019). It has been informed to possess various pharmacological activities; it has been used throughout history for several different medicinal purposes. Due to its important pharmacological properties are presented as antioxidant activity ,anticancer, neuroprotective, anti-inflammatory, anti-thermogenic, immune modulator, antiulcer genic, antidiabetic, cardiac problems, hypercholesteremic, uterine bleeding control, antifungal, anti-arthritic, use in cosmetics(anti-inflammatory and wound healing) and ant hyperlipidemia (Syed *et al.*,2016 and Chugh *et al.*,2019). It is rich in antioxidant, vitamins, phenols, flavonoids, radical scavenging activity and omega-3 fatty acids, high content of beta-carotene, ascorbic acid and alpha linolenic acid (Gamal *et al.*, 2018). Moreover, it's a rich source of important nutrients such as fibers, ash, protein, carbohydrates, energy, minerals as calcium, copper, potassium, zinc, phosphorus, manganese, iron, and sodium, also it contains vitamins such as A, C, E and B complex. (Badawy *et al.*, 2018). Purslane leaves contain high amounts of polyunsaturated fatty acids (omega-3 and omega-6). Also, fresh Purslane leaves (100 g) contain 300–400mg of alpha-linolenic acid. The total fatty acid content ranged from 1.5 to 2.5mg/g of fresh mass in leaves and 0.6 to 0.9 mg/g in stems. A additionally to α -Linolenic acid accounted for around 40% and 60% of the total fatty acid content in leaves (El - Gindy,2017).

The present study was designed to investigate the effects of consumption fresh purslane in food products as the salad, rice, Molokai, meat kofta and cabbage stuffed by different levels "10%,15% ,20% " on risk factor of high fat diet to induced obesity in experimental rats.



MATERIAL AND METHODS.

Materials:

-Fresh Purslane (*Portulaca oleracea*) was obtained Sinbelawain, Dakahlia, Egypt. Summer (2019).

-Ingredients of foods products (rice, meat, Molokai, cabbage, onion, tomatoes, spices, cucumber, parsley, carrot, beetroot, lemon, soup, salt and vinegar) obtained from local market, Mansoura City, Egypt.

-Minerals, vitamins, choline chloride, cellulose, casein, corn oil, corn starch, all chemicals and diagnostic kits were purchased from EL-Gomhoriya Company for Trading, Chemicals and Medical instruments, Cairo, Egypt.

-Bile Salts were obtained from EL-Gomhoriya Company for Trading, Chemicals and Medical instruments, Cairo, Egypt.

-Danni fats were obtained from local market, Mansoura.

-Thirty female albino rats female (Sprague Dawley strain) weighing (170±5g) were being obtained from the Medical Experimental Research Center, Faculty of Medicine, Mansoura University.

-Kits used to all determination were obtained from EL-Gomhoriya Company for Trading, Chemicals and Medical instruments, Cairo, Egypt.

METHODS:

Preparing of fresh Purslane: cleaned, washed well, cutting into small pieces.

Preparing of Food Products:

Food Products (salad, rice, Molokai, meat kofta and cabbage stuffed) were prepared according to the method of **Khalifa, (2014)** with fresh purslane at levels 10%, 15% and 20% replacement, respectively.

Sensory evaluation:

Foods products were evaluated for, smell, taste, texture, color, overall acceptability and total score by (10) specialists from home economics dept., faculty of specific education., Damietta university., the evaluation was carried out according to the method of **Sammak, (2016)** with some modification.



Basal Diet:

The basal diet consists of 14% casein (Protein > 80%), corn oil 4%, cellulose 5%, vitamin mixture 1%, salt mixture 4%, choline chloride 0.25% and the remainder is corn starch (Reeves *et al.*, 1993).

Experimental design:

The biological study was conducted in accordance with the regulations of the Laboratory Animal Welfare Ethics Act. Rats were housed under standard conditions for one week to adaptation before experimental study, during this period; rats were fed on basal diet according to Reeves *et al.*, (1993). After the period of adaptation on a basal diet only (one week), the rats were divided into two groups as follows:

-The first main group (6 rats): were fed on basal diet (control negative group).

-The second (24 rats): were fed on high food in fat (20% Danni fat and 0.25% Bile salts) for (5 weeks) to induced obesity according to Shanshan and EL Bushuty, (2012) then it was divided into four groups each group contain (6) rats as the following.

The second group: Which were fed on high fat diet (control positive).

The third group: Which were fed on high fat diet + 10% fresh Purslane.

The Fourth group: Which were fed on high fat diet + 15% fresh Purslane.

The Fifth group: Which were fed on high fat diet + 20% fresh Purslane.

Biological determination:

During the experimental period the quantities of diet, which were consumed and or wasted, were recorded every day. In addition rats weight were recorded weekly, to determine body weight gain%, food intake and feed efficiency ratio according to the method of Chapman *et al.*, (1959), rats were fasted over night before sacrificing. Liver and kidney were removed from each rat, cleaned from adhesive matter then were weighting and stored in formalin solution 10% according to method mentioned by Drury and Wallington, (1980). Blood was collected and centrifuged. Serum was separated for analysis. Serum was carefully aspirate, transferred into clean cuvette tubes, and stored frozen at -20°C for analysis.

Determination of some of serum biochemical parameters:

Estimation of serum total cholesterol (TC), triglyceride (TG), high density lipoprotein cholesterol (HDLc) and Low density lipoprotein cholesterol (LDLc) were determined according to Monnet *et al.*, (1968), VanHandel and Zilversmit, (1976) and Fruchart, (1982), respectively Alanine and aspartate aminotransferase enzymes activity (ALT & AST)



,serum alkaline phosphatase (ALP), creatinine, urea nitrogen. Uric acid and urine oxalate were performed according to the method of **Bergmeyer and Horder,(1980)**, **Bergmeyer and Wahlefeld ,(1978)**, **Belfield and Goldberg (1972)**, **Brod and Sirota,(1948)**, **Reiss *et al.*,(1965)**, **Caraway, (1963)** and **Baadenhuijsen and jansen,(1975)** respectively.

Histopathological Examination:

The liver and kidney were irrigated several times by saline via a syringe introduced through thoracic aorta to wash blood. The liver and kidney were dissected and put into 10% formalin solution and used for the preparation of 6 μ m thick paraffin embedded slices for histopathological examination According to the method described by **Titford, (2005)**.

Statistical Analysis:

The data obtained were statistically analyzed by using computer using MSTAT VERSION 4(2002), The results were expressed as mean \pm standard deviation "SD" and tested for significance using one way analysis of variance" ANOVA" test, according to Duncan's multiple range test at ($P \leq 0.05$) probability According to the method described by **Duncan, (1995)**.

RESULT AND DISCUSSION:

Sensory evaluation of foods Products fortified with fresh Purslane (10%, 15% and 20%).

Tables (1 -5) showed the sensory evaluation (smell, taste, texture color, overall acceptability and total score) of foods products (salad, rice, Molokai, meat kofta and cabbage stuffed) supplemented with different levels of fresh Purslane (10%, 15% and 20%), replacement respectively.

The results obtained from the sensory tests indicated that, sensory evaluation was decreased gradually with increasing the levels of fresh purslane. Generally, sensory evaluation showed an acceptance of supplemented food products with 10%, 15%, 20% fresh Purslane, respectively.

According to **Almasoud and Salem, (2014)** indicated that, the fortification with 5% purslane showed the most sensory preferable crackers fortified sample.

On the other hand **El Gindy,(2017)** reported that, pan bread containing up to 4% purslane leaves powder was acceptable.

Additionally to **Badawy *et al.*, (2018)** reported that, Fortification of biscuits using purslane powder (3, 6 and 9%) led to improvement of the sensory characteristics of product.

The data are agreement with **Nouri *et al.*, (2020)** showed that, sensory evaluation of breads enriched by Purslane powder 10%, 15% showed, Combination of purslane in bread is feasible and the optimum percentage of the purslane powder is 10% for the best acceptance in sensory evaluation.

Table (1): Sensory evaluation of the salad fortified with different of fresh Purslane (10%, 15% and 20%).

Treatment	Smell (20 score)	Taste (20 score)	Texture (20 score)	Color (20)	Acceptability (20 score)	Total Score
Control	19.90 ±0.63 ^a	19.90 ±0.78	19.90±0.37 ^a	19.90	20.00 ±1.61 ^a	99.60 ±2.39
10% P	19.50±0.65 ^{ab}	19.40±0.77	19.90±0.32 ^a	19.80	19.70 ±0.94 ^{ab}	98.70 ±2.54
15% P	19.40±0.79 ^{ab}	19.10±0.71	19.90± 0.31	19.80	19.40 ±0.98 ^{ab}	97.60±2.39
20% P	18.90 ±0.97 ^b	18.60 ±0.85	19.80± 0.33	19.60	18.80 ±0.99 ^b	95.80 ±2.54

P, fresh purslane; Values are expressed as mean ± SD; Means in the same column with different superscript letters are statistically significant at $P \leq 0.05$.

Table (2): Sensory evaluation of the rice fortified with different levels of fresh Purslane (10%, 15% and 20%).

Treatment	Smell (20 score)	Taste (20 score)	Texture (20 score)	Color (20 score)	Acceptability (20 score)	Total Score (100 score)
Control	19.90	19.90±0.98	19.80 ±0.87	19.80 ±1.87	19.50 ±1.61	98.90
10% P	18.90	19.20±0.98	19.13±0.85 ^{ab}	19.00±1.95 ^{ab}	19.00	95.23
15% P	18.10±0.9	18.20±0.91	18.70 ± 0.87	18.50±1.21 ^b	18.40 ±1.37	91.90±3.98
20% P	17.40	17.40±0.95	18.27 ± 0.85	18.10 ±1.38	18.10 ±1.99	89.17

P, fresh purslane; Values are expressed as mean ± SD; Means in the same column with different superscript letters are statistically significant at $P \leq 0.05$.

Table (3): Sensory evaluation of the Molokai fortified with different levels of fresh Purslane (10% 15 % and 20%).

Treatment	Smell (20 score)	Taste (20 score)	Texture (20 score)	Color (20 score)	Acceptability (20 score)	Total Score (100 score)
Control	19.60 ±0.67 ^a	19.90 ±0.68 ^a	19.80 ±0.75 ^a	19.90 ±0.87 ^a	19.90 ±0.81 ^a	99.50 ±2.99 ^a
10% P	19.63 ±0.65 ^a	19.30 ±0.68 ^a	19.50 ±0.74 ^a	19.50±0.95 ^{ab}	19.70 ±0.85 ^{ab}	97.63 ±2.58 ^{ab}
15% P	19.63 ±0.69 ^a	18.50 ±0.97 ^b	19.20 ± 0.78 ^a	19.40±0.99 ^{ab}	19.50 ±0.97 ^{ab}	96.23±2.54 ^{bc}
20% P	19.50 ±0.69 ^a	18.40 ±0.85 ^b	19.10 ± 0.75 ^a	19.00 ±0.88 ^b	18.90 ±0.99 ^b	94.90 ±2.15 ^c

P, fresh purslane; Values are expressed as mean ± SD; Means in the same column with different superscript letters are statistically significant at $P \leq 0.05$.

Table (4): Sensory evaluation of the meat kofta fortified with different levels of fresh Purslane (10%, 15% and 20%).

Treatment	Smell (20 score)	Taste (20 score)	Texture (20 score)	Color (20 score)	Acceptability (20 score)	Total Score (100 score)
Control	19.50±0.67 ^a	19.60 ±0.88 ^a	19.60 ±2.46 ^a	19.30±0.85 ^a	19.40 ±0.73 ^a	97.40 ±0.99
10% P	19.50±0.65 ^a	19.60 ±0.86 ^a	19.60 ±4.00 ^a	19.10±0.95 ^a	19.30 ±0.86 ^a	97.10±0.99
15% P	18.85±0.69 ^a	18.95±0.99 ^{ab}	19.15 ± 2.94 ^{ab}	18.65±0.99 ^{ab}	18.85 ±0.97 ^{ab}	94.40 ±0.99
20% P	17.80±0.69 ^b	18.10 ±0.85 ^b	18.60 ± 2.69 ^b	17.70±0.69 ^b	18.20 ±0.79 ^b	90.40 ±0.96

P, fresh purslane; Values are expressed as mean ± SD; Means in the same column with different superscript letters are statistically significant at $P \leq 0.05$.

Table (5): Sensory evaluation of the cabbage stuffed fortified with different levels of fresh Purslane (10%, 15% and 20%).

Treatment	Smell (20 score)	Taste (20 score)	Texture (20 score)	Color (20 score)	Acceptability (20 score)	Total Score (100 score)
Control	19.87	19.87	19.87±0.	19.88±0.	19.78±2.14 ^a	99.27 ±2.97
10% P	19.55±0.	19.75±0.	19.75±0.	19.55±0.	19.65±2.64 ^a	98.55 ±2.15
15% P	19.00±0.	19.50±0.	19.40±0.	19.30±0.	19.40±2.29 ^{ab}	96.60±2.63 ^a
20% P	18.40	18.90	19.00±	18.70±0.	18.90±1.81 ^b	92.90±2.83

P, fresh purslane; Values are expressed as mean ± SD; Means in the same column with different superscript letters are statistically significant at $P \leq 0.05$.

Effect of fresh Purslane on body weight gain%, food intake and feed efficiency of obese rats

The effect of fresh Purslane (10%, 15% and 20%) on the body weight gain (BWG %), food intake and feed efficiency ratio (FER) of obese rats are summarized in Table (6). showed a significant decrease ($P \leq 0.05$) in body weight gain(%) between the positive control group and groups fresh purslane (10, 15 and 20 %) 109.23 ± 4.00 , 45.23 ± 2.94 , 38.01 ± 2.69 and $22.83 \pm 1.41\%$, respectively, and also this data showed a significant increase ($P \leq 0.05$) in food intake between the positive control group and groups fresh purslane (15% ,20%) 13.39 ± 2.64 , 16.13 ± 1.81 and 18.00 ± 2.16 g/day/rat, respectively .As well as, feed efficiency also declared decrease in groups fresh purslane (10%,15% ,20%) by comparison, the positive control group 0.5023,0.1887,0.1457 and 0.0776, respectively.

On the other hand, **Hussein, (2010)** indicated that, purslane extract groups showed significantly reduced in the body weights, despite a larger increase in food intake compared to the high fat diet control group. Feed efficiency of the purslane ethanoic extract fed groups, was lower than the high fat diet control group. That's High content of flavonoids, phenolic compounds; melatonin and

omega-3 fatty acids found in ethanoic extract may be responsible for these effects.

According to , **EL-Serwy and Abd El –Hamid,(2012)** showed that, treating rats which were suffering from obesity with purslane and resulted in decreased body weight gain and improved feed intake. That’s attributed to the presence of dietary fibers, phenolic compounds, plant protein and polyunsaturated fatty acids as functional food ingredients.

As said by, **El-Newary, (2016)** showed that, Purslane stem preparations decreased both of daily body weight gain of hyperlipidemia rats. Due to owing, *Portulaca oleracea* stem at any form have a good reducing hypolipidemic.

The Purslane leaves powder substitution of wheat flour for making pan bread had a powerful antioxidant activity and weight loss effects .indicating that purslane extract has the potential to control body weight gain despite increased food intake (**El- Gindy, 2017**).

In this respect, **Ramadan et al., (2017)** showed a significant decrease in the body weight in control rats which received purslane extract, also, a significant increase of food intake as compared with the control group. Purslane could be exhibited through its bioactive components with multiple pharmacological and medical properties

Table (6): Effect of fresh purslane on body weight gain%, food intake and feed efficiency of negative control and obese rats.

P,

Parameters Groups	B W G (%)	Food intake (g/day/rat)	FER
control (-)	64.42±2.46 ^b	21.30±2.14 ^a	0.1844
control (+)	109.23±4.00 ^a	13.39 ±2.64 ^d	0.5023
10% P	45.23 ± 2.94 ^c	14.82±2.29 ^{cd}	0.1887
15% P	38.01± 2.69 ^d	16.13±1.81 ^{bc}	0.1457
20% P	22.83 ± 1.41 ^e	18.00 ±2.16 ^b	0.0776

fresh purslane; Values are expressed as mean ± SD; Means in the same column with different superscript letters are statistically significant at P≤0.05.

Effect of fresh Purslane on lipid profiles (TC, TG, HDL-c and LDL-c) of obese rats.

The effect of fresh Purslane (10,15and 20%) on serum Cholesterol (TC), Triglyceride (TG), High Density Lipoprotein (HDL-c) and Low Density Lipoprotein (LDL-c) of obese rats are summarized in Table (7).

Data in Table (7) showed a significant decrease ($P \leq 0.05$) between the positive control group and group purslane 15 % in TC and LDL-c were TC, 119.90 ± 6.89 , 95.38 ± 10.70 , LDL-c, and 59.92 ± 3.76 mg/dl , respectively. Also 20% fresh purslane showed a significant decrease ($P \leq 0.05$) between the positive control group and group of 20 % purslane in TC, TG and LDL-c were TC, 119.90 ± 6.89 , 93.82 ± 5.72 , mg/dl, respectively. TG, was 98.05 ± 13.99 , 84.65 ± 1.43 mg/dl respectively, LDL-c, 59.92 ± 3.76 , 43.07 ± 4.30 mg/dl, respectively.

In contrast, data in also showed no- significant decrease ($P \leq 0.05$) between the positive control group and group purslane (10%) in TC was 119.90 ± 6.89 and 100.37 ± 5.81 mg/dl, respectively, LDL-c, 59.92 ± 3.76 51.48 ± 4.07 mg /dl, respectively, TG was $98.05 \pm 97.25 \pm 8.16$ mg/dl, respectively. Meanwhile, there was significant increase ($P \leq 0.05$) between the positive control group and groups purslane (15% and 20%) in HDL-C were 33.70 ± 2.27 , 41.15 ± 3.20 and 46.32 ± 4.20 mg/dl, respectively, but non- significant increase between 10% purslane and the positive control group in HDL-c was 33.70 ± 2.27 , 37.10 ± 1.67 mg/dl, respectively.

On the other hand, **Lakshmi et al., (2018)** reported that, purslane components of (ω -3 and ω -6) led to decrease Lipid profile.

In this respect, The results revealed a significant ($P \leq 0.05$) reduction in serum TC, TG and LDL-c, also an increase in serum HDL-c level observed in aqueous extract of purslane fed rats as compared to control group (**Chugh et al., 2019**).

Table (7): Effect of fresh Purslane on serum (TC, TG, HDL-c and LDL-c) of negative control and obese rats

Variables Group	(TC)	(TG)	HDL-c	LDL-c
	mg/dl			
control (-)	67.42 ± 5.94^c	77.08 ± 6.35^c	55.85 ± 4.87^a	35.32 ± 2.67^c
control (+)	119.90 ± 6.89^a	98.05 ± 13.99^a	33.70 ± 2.27^c	59.92 ± 3.76^a
10 % P	100.37 ± 5.81^{ab}	97.25 ± 8.16^a	37.10 ± 1.76^c	51.48 ± 4.07^{ab}
15 % P	95.38 ± 10.70^b	89.07 ± 6.39^{ab}	41.15 ± 3.20^b	46.27 ± 2.75^b
20%P	93.82 ± 5.72^b	84.65 ± 1.43^b	46.32 ± 4.20^b	43.07 ± 4.30^b

P, fresh purslane; Values are expressed as mean \pm SD; Means in the same column with different superscript letters are statistically significant at $P \leq 0.05$.

Effect of fresh Purslane on liver enzymes (ALT, AST and ALP) of obese rats.

The effect of fresh purslane (10%, 15% and 20%) on serum Alanine Amine Transferase ALT (U/dl), Aspartate Amine Transferase AST (U/dl) and alkaline phosphatase ALP (U/dl) of obese rats are summarized in Table (8). Data showed significant decrease ($P \leq 0.05$) between the positive control group and group's purslane (10%, 15%, 20%) on ALT 36.38 ± 3.30 , 32.57 ± 2.82 , 30.03 ± 2.57 and 24.60 ± 2.77 (U/dl), respectively. Data showed no-significant decrease ($P \leq 0.05$) between the positive control group and groups purslane (10%, 15%) on AST 90.60 ± 15.67 , 87.47 ± 7.03 , and 86.32 ± 2.33 (U/dl), respectively, also significant decrease ($P \leq 0.05$) between the positive control group and group purslane 20% 90.60 ± 15.67 and 80.68 ± 4.01 (U/dl). In addition to, Table (8) showed a significant decrease ($P \leq 0.05$) between the positive control group and groups purslane (10%, 15% and 20%) on ALP, 363.57 ± 31.81 , 292.8 ± 0.41 , 258.83 ± 19.36 and 247.48 ± 9.11 (U/dl), respectively.

According to, **EL-Serwy and Abd El –Hamid, (2012)** showed, Treating rats which were suffering from obesity with (*Portulaca olercea*) resulted that, decreased in (AST) and (ALT) in all treated groups compared to the positive control group. In conclusion, purslane showed the best effect on liver function of obese rats fed on high fat diet.

In this respect with, **Chugh et al., (2019)** investigated that purslane (200 and 400 mg/kg) treatment has showed significant reduction ($p \leq 0.05$) in levels of AST, ALT and ALP enzymes, improve liver function comparison to cholesterol induced hyperlipidemia control group.

On the other hand, **El-Zawahry et al., (2019)** revealed that, treatment of the obese-rats group with purslane aqueous extract resulted in, significant improvements in the activity of ALT, AST, and ALP in compare to obesity-rats .

Table (8): Effect of fresh purslane on liver enzymes (ALT, AST and ALP) of negative control and obese rats.

Group	Variables	ALT	AST	ALP
		(U/dl)		
control (-)		21.35 ± 1.95^d	73.15 ± 3.93^c	197.47 ± 8.34^d
control (+)		36.38 ± 3.30^a	90.60 ± 15.67^a	363.57 ± 31.81^a
10 % P		32.57 ± 2.82^b	87.47 ± 7.03^{ab}	292.83 ± 8.41^b
15 % P		30.03 ± 2.57^b	86.32 ± 2.33^{ab}	258.83 ± 19.36^c
20%P		24.60 ± 2.77^c	80.68 ± 4.01^{bc}	247.48 ± 9.11^c



P, fresh purslane; Values are expressed as mean \pm SD; Means in the same column with different superscript letters are statistically significant at $P \leq 0.05$.

Effect of fresh Purslane on kidney functions (Urea, Uric acid and creatinine) of obese rats.

The effect of fresh Purslane (10%, 15% and 20%) on urea, uric acid and creatinine (mg/dl) in obese rats are summarized in Table (9).

Data in Table (9) showed a significant decrease ($P \leq 0.05$) between the positive control group and group's purslane (10%, 15 % and 20%) on urea 84.68 ± 4.66 , 77.05 ± 2.46 , 75.04 ± 3.28 and 57.75 ± 2.72 (mg/dl), respectively. In addition to, showed no- significant decrease between the positive control group and groups purslane (10%, 15% and 20 %) on uric acid 1.55 ± 0.15 , 1.52 ± 0.10 , 1.50 ± 0.06 and 1.48 ± 0.12 (mg/dl), respectively. Meanwhile, showed no-significant difference ($P \leq 0.05$) between the positive control group and groups purslane (10%, 15% and 20 %) on creatinine 0.40 ± 0.02 , 0.39 ± 0.02 , 0.39 ± 0.03 and 0.39 ± 0.04 (mg/dl), respectively.

According to **El-Newary, (2016)** indicated that ,as for the uric acid and urea levels, purslane stems (POS) treatments had significant effect on these rats, which administrated hyperlipidemia diet. POS-infusion recorded the highest influence on uric acid and urea, compared with each hyperlipidemic control. POS-ethanoic 70% recorded the highest decrease on uric acid followed by POS-powder 10% with respect to hyperlipidemia control. All POS preparations decreased uric acid more than those of untreated control. Both of high fat diet - POS-powder 10% and high fat diet - POS-infusion recorded the highest decrease on urea levels respectively.

On the other hand, **Seif et al., (2019)** observed that treating rats on Egyptian Purslane extract against Cadmium Toxicity for 30 consecutive days. Results showed significant. Significant ($P \leq 0.05$), increase in serum urea and creatinine in Cadmium Toxicity -treated group were noticed. Daily administration of *P.oleracea* efficiently maintained the normal serum urea and creatinine levels. The combination between *P. oleracea* and Cadmium Toxicity caused significantly restored serum creatinine levels to normal as compared to Cadmium Toxicity alone but serum urea had no significant difference from Cadmium Toxicity group.

Table (9): Effect of fresh Purslane on kidney function of negative control and obese rats.

Group	Variables	Urea	Uric acid	Creatinine
		mg/dl		
control (-)		50.68±5.42 ^c	1.43±0.21 ^a	0.39±0.03 ^a
control (+)		84.68±4.66 ^a	1.55±0.15 ^a	0.40±0.02 ^a
10 % P		77.05±2.64 ^b	1.52±0.10 ^a	0.39±0.02 ^a
15 % P		75.40±3.28 ^b	1.50±0.06 ^a	0.39±0.03 ^a
20%P		57.75±2.72 ^c	1.48±0.12 ^a	0.39±0.04 ^a

P, fresh purslane; Values are expressed as mean ± SD; Means in the same column with different superscript letters are statistically significant at P≤0.05.

Effect of fresh Purslane on Urine oxalate of obese rats.

The effect of fresh Purslane (10%.15% and 20%) on Urine oxalate on obese rats is summarized in Table (10).

Data in Table (10) showed there were no- significant differences between the positive control group and group's purslane (10%, 15% and 20%) on urine oxalate 0.31±0.01, 0.30±0.02, 0.30±0.03 and 0.30 ± 0.01nmol/l respectively.

Table (10): Effect of fresh purslane on Urine oxalate of negative control and obese rats.

Group	Variables	Urine Oxalate (nmol/l)
control (-)		0.31±0.02 ^a
control (+)		0.31±0.01 ^a
10 % P		0.30±0.02 ^a
15 % P		0.30±0.03 ^a
20%P		0.30±0.01 ^a

P, fresh purslane; Values are expressed as mean ± SD; Means in the same column with different superscript letters are statistically significant at P≤0.05.

Effect of fresh Purslane on histopathological of liver.

Microscopically, Pictures of liver sections of rats from control negative group revealed histological changes (Pict1).while; liver of rats from



control positive group (Pict 2) revealed that, mild microvascular stenosis. Meanwhile, (Pictures 3 and 4) Liver of obese rats fed on diet containing Purslane 10% and 15% showed mild microvascular stenosis. However, examined section of obese rats which fed on diet containing 20% Purslane showed recovery of fatty liver compared to other treated groups (Pict 5).

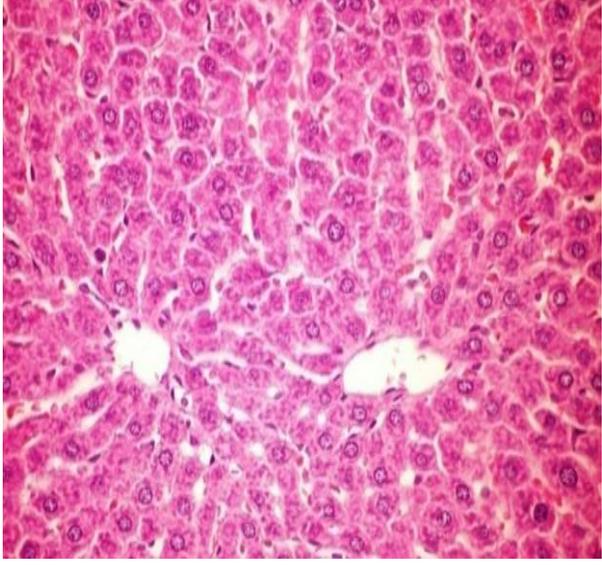
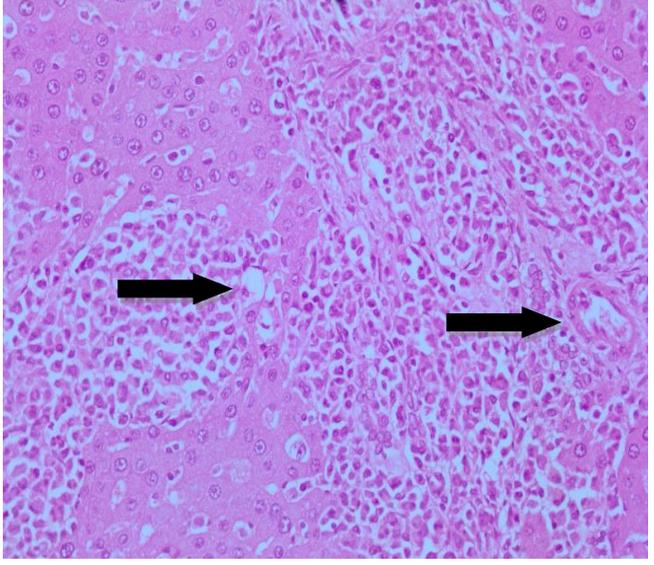
In this respect, the histopathological examination of liver showed that Purslane reduced the incidence of liver lesions signs of hepatic toxicity and substantiates its use in various liver disorders as hepato protection (**Abd El-Aziz et al., 2014**).

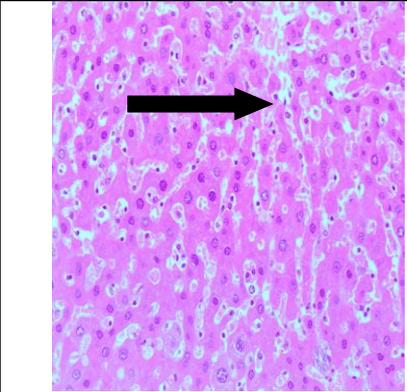
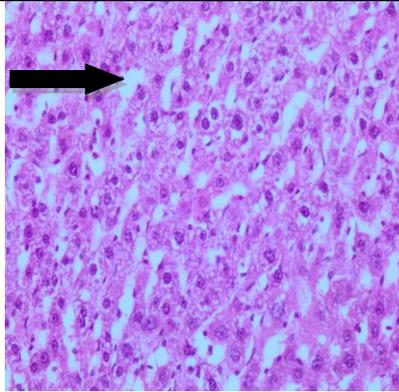
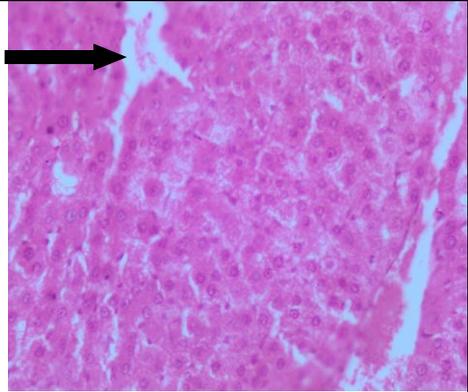
In this respect, although feeding on hyperlipidemia diet, Purslane stem administration at any form protected liver against fatty liver (**El-Newary, 2016**).

According to, **Shalaby et al., (2018)** reported that, the study of the effect of (*Portulaca oleracea*) water extract on alloxan induced diabetes rat. The results were supported by histopathological examination of liver tissue as sections showed an improvement in inflammatory cells and vacuolated cells and become less similar to control group (normal control group treated with normal saline). The improvement was clear in *Portulaca* sections.

On the other hand, **Seif et al., (2019)** showed, Hepato-Renal protective effects of Egyptian Purslane extract against experimental cadmium Toxicity in rats with special emphasis on the Histopathological Changes that, Liver in the first group (were received normal saline and served as a negative control.) showed complete normal architectures. Group which treated only with *P. Oleracea* ethanoic extract, the hepatic and renal tissues do not exhibit any signs of toxicity either hemorrhages or tissue damages. Group which treated with *P. oleracea* ethanoic extract showed that, Liver exhibited recovery of the hemorrhagic and inflammatory condition and the hepatic tissue return to normal. The renal tissue became completely normal.

In this respect, **Chugh et al., (2019)** indicated that, the abnormalities, which were shown on liver status of hyperlipidemic rats, were ameliorated by administration of (*Portulaca oleracea stem*) POS preparations significantly. Liver histology showed significant improvement after treating hyperlipidemia rats by *Portulaca oleracea* stem form compared with hyperlipidemia control.

	
<p>Pict (1): liver of rats fed on basal diet (control negative group) showing histological changes (H&E x200).</p>	<p>Pict (2): Liver of rats fed on high fat diet (Positive control group) showing mild microvascular stenosis (H and E x200).</p>

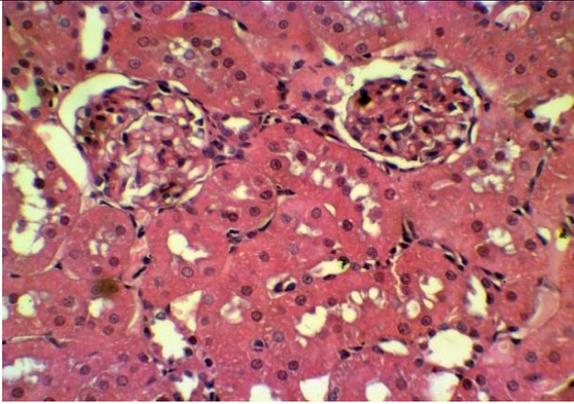
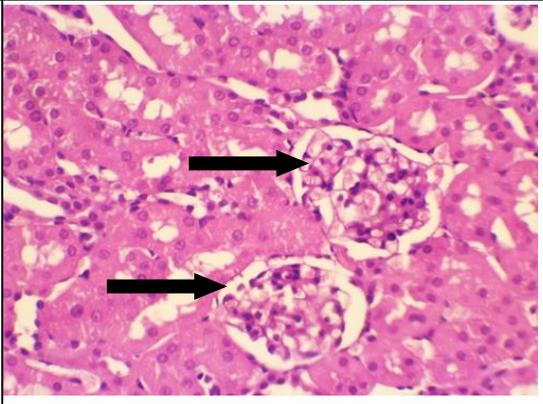
		
<p>Pict (3): Liver of obese rats fed on diet contenting 10% Purslane showing mild microvascular stenosis (H and E x200).</p>	<p>Pict(4): Liver of obsess rats fed on diet contenting 15% Purslane showing mild microvascular stenosis (H and E x200).</p>	<p>Pict (5): Liver of obsess rats fed on diet contenting 20% Purslane showing relative recovery of fatty liver (H and E x200).</p>

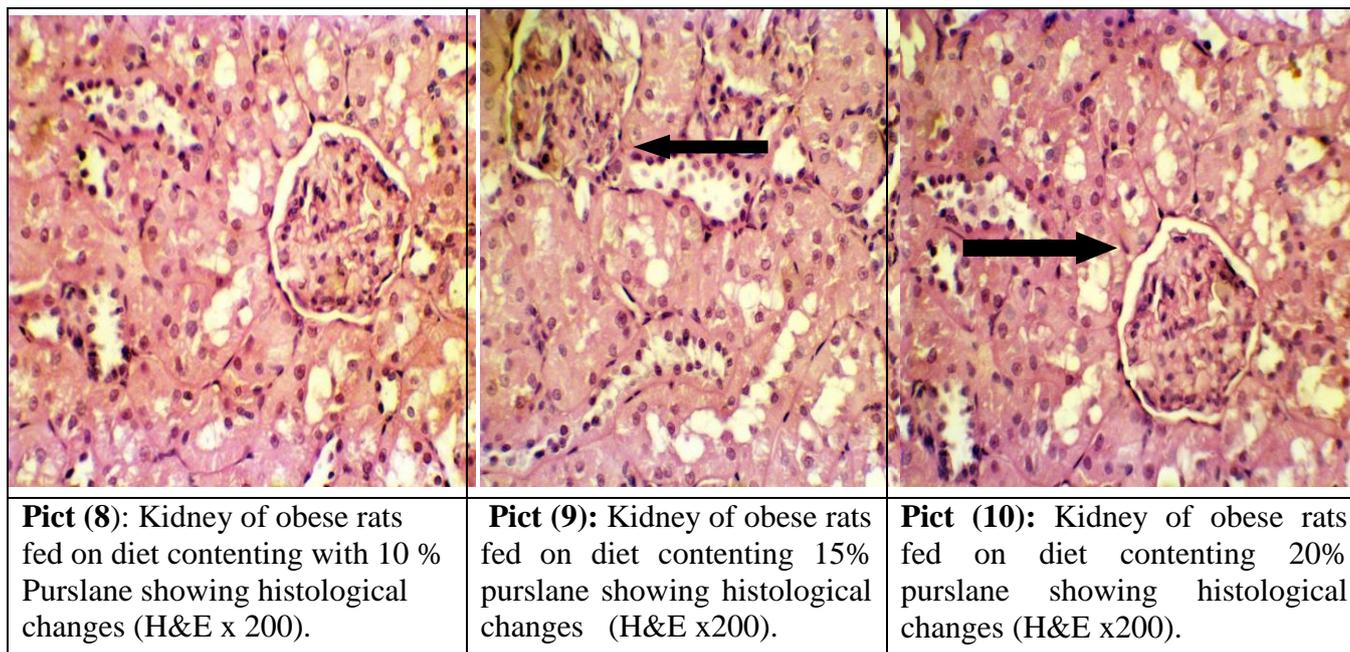
Histopathological examination of kidney:

Microscopically, Pictures of kidney sections of negative control group showed histological changes , normal histological structure (Pict 6).As well as, kidney of rats from the positive group (rats fed on high fat diet) revealed no pathological changes structure in (Pict 7). Examined sections of obese rats which fed on diet containing 10%, 15% and 20% Purslane showed histological changes in (Pictures 8, 9 and10).

According to, **Ganiyu *et al.*, (2015)** the histopathological examination of kidney showed that, Purslane is useful in controlling kidney injury in drug induced nephrotoxicity.

Additionally to, **Ghara and Ghadi, (2018)** indicated that, the results of cross-sections of kidney tissues from different groups of treated rats. Kidney showed normal glomerular structure. The kidney failure was also associated with marked hypertrophy, glomerular basement histological changes, such as glomerulosclerosis, tubular epithelial membrane wrinkling, and dilation of the urinary space, which were revealed in the copper-treated animals. In the group which treated with aqueous extract of purslane, the symptoms improved to some extent, so that the lower urinary tract, increased glomerular diameter, and normal tubules were observed.

	
<p>Pict (6): Kidney of rats fed on basal diet (control normal group) showing histological changes (H&Ex200).</p>	<p>Pict (7): Kidney of rat fed on high fat diet (control positive group) showing histological changes (H & Ex200).</p>



In conclusion:

Fresh Purslane (leaves and stems) can give a sense of satiety after eating it, its decrease the body weight and improve Lipid profiles and liver enzymes. It can be eaten as a healthy supplement foods, it could play a beneficial role in a treatment of obesity and its disorders.

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إمكانية استخدام الرحلة الطازجة في علاج فئران التجارب المصابة بالسمنة

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الملخص

تهدف الدراسة إلى تقييم استهلاك الرحلة الطازجة في علاج السمنة ، حيث تم تحضير خمسة اصناف غذائية (سلطة وأرز والملوخية وكفتة لحم و محشي الكرنب) مع مستويات مختلفة من الرحلة الطازجة 10% و 15% و 20% على التوالي ، وتم دراسة الخصائص الحسية لهذه المنتجات. واجريت الدراسة البيولوجية على ثلاثين من ايناث الفئران البيضاء من سلالة اسروجي دولي وزن 170 ± 5 جم وتم تقسيمهم إلى خمس مجموعات (6فئران لكل مجموعة) حيث استخدمت ستة فئران كمجموعة ضابطة سالبة بينما تم تغذية اربعة وعشرون من الفئران على نظام غذائي عالي الدهون لمدة خمسة أسابيع للاصابة بالسمنة و بعد ذلك تم إعادة تقسيم الفئران إلى اربع مجموعات وهي المجموعة الضابطة الموجبة و ثلاث مجموعات من الفئران تمت معالجتها بالتغذية على الرحلة الطازجة بمستويات 10% و 15% و 20% في النظام الغذائي على التوالي. وأظهرت نتائج التقييم الحسي للمنتجات الغذائية المضاف إليها الرحلة الطازجة بمستويات 10% و 15% و 20% درجة عالية من القبول الجيد كما أظهرت النتائج البيوكيميائية وجود انخفاض معنوي ($p \leq 0.05$) في زييادة الوزن والكوليسترول والليبوبروتينات منخفضة الكثافة (LDL-c) وانزيم الكبد الفوسفاتيز القلوي (ALP) واليوريبا في جميع مجموعات الفئران المصابة بالسمنة و تغذت على الرحلة بالمقارنة مع المجموعة الضابطة الموجبة. وكانت النتائج البيوكيميائية متفقه مع التغيرات النسيجية في أنسجة الكبد. وكانت أفضل المعالجات عند استهلاك 20% من الرحلة الذي كان له أفضل النتائج الغذائية والبيوكيميائية وتحسن في التغيرات النسيجية ونستخلص من الدراسة إلى أن تناول الرحلة الطازج لها تأثير فعال في تحسين الآثار الجانبية للسمنة وذلك على الحالة الصحية وأنسجة الكبد. ويمكن التوصية بإضافة الرحلة إلى النظام الغذائي للأفراد الذين يعانون من السمنة لمالها من تأثير في تقليل مخاطر السمنة.

الكلمات المفتاحية: نبات الرحلة ، الخواص الحسية ،دهون الدم، إنزيمات الكبد،وظائف الكلى ،الفئران.