

Effect of Egyptian purslane in Weight Management and Lipid Profile for Overweight / Obese Women

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Abstract

According to the World Health Organization in 2016; 39% of adults aged 18 years and over were overweight, and about 13% of the world's adult population were obese. women make up roughly 60% of the total. this study aims to investigate the effects of dietary intervention with purslane powder on blood lipids, blood glucose and body weight loss in overweight / obese women. A total of 50 overweight / obese women, body mass index ranged (25- 35 kg/m²) aged 30 - 55 years, were participate in the study. dietary intervention for all participants was to consume purslane powder added to lunch (5g) and dinner (5g) daily for 8 weeks period. Height, weight and the BMI for all sample were measured and calculated. Serum Blood glucose, total-cholesterol (TC), HDL-c, LDL-c, VLDL-c and triglyceride (TG) were evaluated pre and post- intervention. Results of the present study indicated that dietary intervention with purslane was effective in weight losing, decrement serum blood glucose, and improving lipid profile of overweight/obese women. also, there were a statistically significant differences founded in weight, (BMI), serum blood glucose, TC, HDL-c, LDL-c, VLDL-c and TG between pre and post- intervention (P<0.05).

Conclusion: the purslane powder could be useful in the weight management for obese people.

Key words: purslane, overweight/obese, weight loss, blood glucose, lipid profile, dietary intervention

Evidences which supported that consumption of herbs are effective strategy for obesity control and weight management. for centuries people across the countries have been using natural products as plant based dietary supplements for weight control (*Gosh, 2009*).

Many herbal supplements are currently present for the management of obesity; 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 (*Park et al., 2011*).

herbs with a long history of use and other natural substances are less likely to produce severe toxicity, might be effective in reducing appetite and promoting significant weight loss (*Amin and Nagy., 2009*).

Portulaca oleracea (purslane), is a member of the *Portulacaceae* family with more than 120 different species. The use of this plant as a vegetable, spice and medicine has been known since the times of the ancient Egyptians and was popular in England during the Middle Ages (*Okafor Izuchukwu et al. 2014*).

The common names in Arabic: Rigla; Rashad; Hurfa; Baqlet el-hamqa, Farfah (*Dweck, 2001*). The plant purslane, in Arabic 'Rigla' grows in the Arabian areas including, Egypt, United Arab Emirates and Oman. (*Hyam & Pankhurst, 1995*) it has been ranked as the eighth most common plant in the world and is listed in the WHO as one of the most used medicinal plants and has been given the term "Global Panacea" (*Samy et al. 2004*).

Purslane (*Portulaca oleracea*) is a nutritious vegetable used for human consumption, it was mentioned in Egyptian texts from the time of the Pharaohs and is eaten raw as a salad and cooked as a sauce in soups or as greens. (*Dkhil et al. 2011*). And consumed as vegetable, especially in the Mediterranean region. The stems and leaves are

succulent and edible with a salty and acidic taste like spinach (Liu et al., 2000). it is also consumed as a vegetable in some provinces of China (Chan et al., 2000; Hu, et al., 2003). And has been reported to be the richest vegetable source of omega-3 fatty acids yet examined (Simopoulos, 1987). it contains high levels of vitamins E, C, and beta carotene (Simopoulos, 1991) and is reported to be rich in α linolenic acid and β -carotene also used as a health food for patients with cardiovascular diseases (Liu et al., 2000). It contains several types of vitamins and minerals (Mohammad, et al., 2004), fatty acids, amino acids glutathione, glutamic acid, and aspartic acid (Xin et al., 2008) also contains trace amount of copper (Cu) an essential trace element for humans and animals. (Nielsen et al. 1999) Purslane has been described as a 'power Food' because of its high nutritive and anti-oxidant properties (Al-Howiriny, 2008). it provides a rich plant source of nutritional benefits with high antioxidant properties (Omara et al. 1991).

The objective of this study was to investigate the effects of dietary intervention with purslane powder in blood lipids, serum blood glucose and body weight loss in overweight / obese women.

MATERIALS AND METHODS

Plant material and preparation of purslane powder:

Purslane was obtained from the local performer field of el-Menoufia Government, Egypt, in the period of September and October 2017. Plants were cleaned from dust and foreign matters, washed with tap water and cut to 3cm length pieces, then dried in a hot air oven maintained at (60°C) over night, milled and kept in polyethylene bags until used.

Chemical composition of Purslane planet:

Moisture of fresh plant, protein, fat, fiber and ash contents of samples were determined according to the methods of **A.O.A.C (2000)**. Total carbohydrates were calculated by the differences. All proximate composition experiments were performed in triplicate and expressed as g/100 g of samples on dry basis Mineral contents (calcium, potassium, magnesium, iron, zinc, sodium, manganese and copper) were determined using a Pye Unicam SP1900 Atomic Absorption Spectroscopy instrument as described by **A.O.A.C (2000)**

Study Sample:

A total of 50 overweight / obese women (BMI) ranged (25- 35 kg/m²) aged 30 - 55 years and don't have any medicals or nutritional support for weight loss were recruited in the present study and given structures to spend their daily life without lifestyle changing including their diet.

Anthropometric Measurements:

The subjects were weighted with minimal clothing and barefoot by a digital scale to the nearest 0.1 kg. A tape measure was used to assess the height in a standard position and barefoot.

Body mass index was calculated by using the equation:

$$(BMI = \text{body weight kg.} \div \text{height m}^2) \text{ (Dwyer, 2006)}$$

Biochemical Analyzes:

Serum Blood Glucose:

Blood samples were immediately collected from all subjects in sitting position from the brachial vein at 9-11 AM, pre and post intervention, the blood samples were collected in EDTA-containing test tubes, serum was separated at 3000 rpm for 10 min using a centrifuge. serum obtained was kept at -20°C.

Lipid profile:

blood sample (5 mL) was collected after 10-12 hours of fasting in sitting position from the brachial vein at 9-11 AM, pre and post intervention the blood samples were collected in EDTA-containing test

tubes, serum was separated at 3000 rpm for 10 min using a centrifuge. serum obtained was kept at -20°C . Serum triglyceride (TG) was determined according to the method of (Koditscheck & Umdreit, 1969). serum total-cholesterol (TC) was determined according to the method of (Richmond, 1973). Serum LDL-cholesterol was determined according to the method of (Levy, 1981), while Serum HDL-cholesterol was determined according to the method of (Burstein, 1970) and serum VLDL-cholesterol was determined according to the modification of the method of (Wieland and Seidel, 1983).

Dietary Intervention with Purslane powder

dietary intervention for all participants was to consume purslane powder added to lunch (5g) and dinner (5g) daily for 8 weeks period.

Statistical analysis

The data are expressed as means \pm SD and statistical analysis was performed using Student's t-test with $p < 0.05$ being considered as statistically significant.

Results and Discussion

Chemical composition of Purslane planet:

The content of moisture, protein, crude fiber, ash and carbohydrate of purslane, are shown in Table (1).

Table (1): Chemical composition of Purslane planet (g/100g dry sample).

content	Moisture	Protein	fat	Fiber	Ash	T.C*
Purslane	11.3	17.85	4.54	19.9	22.15	45.03

T.C*= Total carbohydrates calculated by difference

As shown in table (1) The moisture content of purslane was (11.3%). which agree with the result of *Michael et al.* (1999), *Lee et al.* (2011)

and Syed and Rajeev (2012) who reported that the moisture content of purslane powder was (5.14%).

While, the value of protein was recorded (17.85%) and carbohydrates were (45.03). This result agrees with *Lee et al.* (2011), *Ezekwe et al.* (1994), *Obied et al.* (2003) and *Besong et al.* (2011); who found that the protein of purslane was ranged from (17.9% to 26.7%) according to *EL-Hadidy et al.* (2013) The chemical compositions of purslane leaves can be considered as rich source for crude protein 23% and the total carbohydrates were 52.86%.The fat content was (4.54%). It agrees with the findings of *Michael et al.* (1999) and *Lee et al.* (2011), who reported that fat content of purslane powder was 4.9%. The contained of crude fiber was (19.9%) this result is in line with *Obied et al.* (2003), who showed that the crude fiber content of purslane was 20.3% and *EL-Hadidy et al.* (2013) who reported that crude fibers was (10%). The value of ash in the present study was (22.15%) which were less than recorded by *Obied et al.* (2003), who mentioned that ash content of purslane was 32.5%. On the other hand, *EL-Hadidy et al.* (2013) mentioned that ash was recorded 17.80 %.

Minerals content of Purslane:

Table (2) showed calcium, potassium, magnesium, iron, zinc, sodium, manganese and copper contents in purslane.

Table (2): Minerals content of Purslane (mg/100g dry sample):

Minerals	Ca	K	Mg	Fe	Zn	Na	Mn	Cu
Purslane	65.5	45.2	86.6	4.5	4.3	5.8	8.4	2.2

The results revealed that purslane have high values of Mg, Ca, K, Na, Mn, Fe, and Zn. These results agreed with *EL-Hadidy et al.* (2013) who reported that the purslane leaves are rich in Potassium (5.6%) and contained high concentration of iron (0.225 %) and contain considerable amounts of zinc, manganese and chromium, and agreed

with *Uddin et al.* (2012) he was found that potassium(K) content was the highest among all minerals followed by nitrogen (N), sodium (Na), magnesium (Mg), calcium (Ca), iron (Fe), zinc (Zn), and manganese (Mn) respectively. Several reports have indicated that purslane plants contain the maximum amount of potassium (K). While disagree with *EL-Hadidy et al.* (2013), who mentioned that Minerals content of purslane leaves appear to be poor in calcium and contain considerable amounts of magnesium (0.53%).

Purslane and weight loss:

the effect of dietary intervention with purslane powder (added to lunch (5g) and dinner (5g) daily for 8 weeks period) on body weight and BMI of all participants (n=50) is showed in **Table (3)**. There was a statistically significant decline in weight (kg) and BMI (kg/m²) after dietary intervention with purslane (p < 0.01).

Table (3): the effect of dietary intervention with purslane on weight loss for overweight / obese women (n=50).

		Mean ± SD.	t	Sig.
Weight (kg)	Pre	76.92 ± 4.911	29.093	0.000
	Post	71.54± 4.999		
BMI (kg/m ²)	Pre	30.63± 2.24	29.591	0.000
	Post	28.49±2.28		

As shown in **Table (3)** there was a significant decrease in body weight and BMI for subject, which agreed with *Esmailzadeh et al.*, (2015) who reported that purslane consumption for 5 weeks led to a significant reduction in weight, BMI, and a significant decreased of serum triglyceride. The study of *Manal and Sahar*, (2012) showed that supplying diet of hypercholestroemic mice with purslane and celery (fresh and seeds) led to a significant decrease in body weight.

purslane and Serum Blood Glucose:

the effect of dietary intervention with purslane powder (added to lunch (5g) and dinner (5g) daily for 8 weeks period) on serum blood glucose of all participants (n=50) is showed in **Table (4)**. There was a statistically significant decline in blood glucose after dietary intervention with purslane ($p < 0.01$).

Table (4): the effect of dietary intervention with purslane on serum Blood Glucose for overweight / obese women (n=50).

		Mean ± SD.	t	Sig.
Serum Blood glucose (mg/dl)	Pre	128.48 ±11.422	6.969	0.000
	Post	123.80 ±8.792		

As shown in **Table (4)** serum glucose was significantly decreased it was agreed with *El-Sherbiny et al., (2005)* who found that oral administration of PE to diabetic rats showed a significant reduction in the level of glucose associated with significant improvement in the level of insulin as compared to untreated diabetic rats. *An et al., (2012)* had reported the anti-diabetic activity in aqueous extract of purslane in diabetic mice. she was found that the immune reactivity of the pancreatic islets remarkably increased in treated diabetic mice compared with untreated diabetic mice. Thus, they concluded that Purslane suppresses the hyperglycemia and diabetic vascular inflammation and prevents the development of diabetic endothelial dysfunction for the development of diabetes and its vascular complications.

Purslane and Lipid profile:

the effect of dietary intervention with purslane powder (added to lunch (5g) and dinner (5g) daily for 8 weeks period) on TG, LDL-c, VLDL-c, TC, and HDL-c for all participants (n=50) are presented in **Table (5)**.

There was a statistically significant decline in TG, LDL-c, VLDL-c and TC. And a statistically significant increase in HDL-c after dietary intervention with purslane ($p < 0.01$).

Table (5): the effect of dietary intervention with purslane on lipid profile for overweight / obese women (n=50).

		Mean \pm SD.	t	Sig.
TG (mg/dl)	Pre	137.36 \pm 4.270	41.765	0.000
	Post	85.72 \pm 8.182		
LDL-c (mg/dl)	Pre	128.04 \pm 5.696	47.691	0.000
	Post	95.10 \pm 8.117		
V LDL-c (mg/dl)	Pre	27.50 \pm 2.873	23.548	0.000
	Post	17.14 \pm 2.878		
TC (mg/dl)	Pre	184.26 \pm 12.675	48.877	0.000
	Post	156.76 \pm 11.720		
HDL-c (mg/dl)	Pre	39.08 \pm 4.681	8.556	0.000
	Post	44.52 \pm 6.513		

As shown in Table (5) Lipid profile was significantly improved after intervention, this agreed with the result of *Besong et al., (2011)* who indicated that consumption of 6 g/day purslane leaves in hypercholesterolemic subjects for 4 weeks led to improvement of total cholesterol levels, while it didn't influence serum triglycerides. Also, findings of *El-Sayed, (2011)* reported that consumption of purslane seeds was associated with decreased levels of serum triglycerides, LDL-c, and total cholesterol levels in human. according to *Movahedian et al., (2007)* The serum total cholesterol decreased in the rabbit groups treated with purslane extract, the distribution of cholesterol between lipoproteins were changed, so LDL-c decreased significantly. *Sankar et*

al., (2012) revealed that the ethanolic extract of purslane showed good anti-hyperlipidemic activity. The study of *Manal and Sahar, (2012)* showed that supplying diet of hypercholestroemic mice with purslane and celery (fresh and seeds) led to a significant decrease in, TC, TG (in serum and liver), LDL-c, and increment in HDL-c. 20% purslane and purslane seed were the most effective to reduced TC, TG, LDL, and increased HDL-c levels.

Results of the present study indicated that dietary intervention with purslane was effective in weight loss, decrement of serum blood glucose, and improvement of lipid profile for overweight / obese women.

Many of experimental studies showed that using of purslane in various ways (water extract, aqueous, ethanolic extract of seeds or levees) was beneficial for a variety of conditions that include headache, stomach ache, painful urination, and in postpartum bleeding also used as an antibacterial and anti-viral agent and in the treatment of hepatitis and diabetes.

the related studies results showed that using purslane extract on experimental animals have an effective role in managing weight, blood glucose, and blood lipids in animals, and didn't investigate about its benefits for human or its therapeutic effects for them.

In this study, consumption of purslane led to a significant decline in body weight, BMI, TG, TC, LDL-c, and VLDL-c. also a significant increase in HDL-c in overweight / obese women. this finding refers to the purslane high content of nutrients, especially antioxidants (vitamins A and C, α -tocopherol, β -carotene, glutathione), omega-3 fatty acids, polyphenols, flavonoids, anthocyanin, and melatonin. beside its high contain of soluble fiber. It seems that reduced levels of lipids after dietary intervention with purslane refers to the significant decrease in body weight and BMI.

Conclusion

the purslane powder could be useful in the weight management for obese people.

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الملخص

" تأثير نبات الرجلة المصري على ادارة الوزن وصورة دهون الدم فى النساء زائدات
الوزن والبدينات"

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مدرس التغذية وعلوم الاطعمة (تربية خاصة) قسم الاقتصاد المنزلى كلية التربية النوعية –
جامعة عين شمس

وفقاً لمنظمة الصحة العالمية (WHO) عام ٢٠١٦ ، كان ٣٩٪ من البالغين الذين تبلغ أعمارهم ١٨ عامًا فأكثر يعانون من زيادة الوزن ، وكان حوالي ١٣٪ من سكان العالم البالغين يعانون من السمنة. كما تشكل النساء ما يقرب من ٦٠٪ من المجموع. تهدف هذه الدراسة إلى التحقق من آثار التدخل الغذائي بمسحوق الرجلة على نسبة الدهون في الدم وجلوكوز الدم وفقدان الوزن لدى النساء زائدات الوزن / البدينات. شارك في الدراسة عدد (٥٠) من النساء زائدات الوزن / البدينات مؤشر كتله الجسم لهن يتراوح بين 25 – 35 كجم / م ٢ وتتراوح أعمارهن بين ٣٠-٥٥ سنة . التدخل الغذائي لجميع المشاركين عن طريق استهلاك مسحوق الرجلة المضافة إلى وجبة الغداء ٥ جم ووجبة العشاء ٥ جم يوميا لمدة ٨ أسابيع. تم قياس وحساب الطول والوزن ومؤشر كتلة الجسم (BMI) لجميع المشاركين . تم تقييم كل من جلوكوز الدم ، الكوليسترول الكلي ، الكوليسترول عالى الكثافة ، الكوليسترول المنخفض الكثافة ، الكوليسترول المنخفض الكثافة جدا و الدهون الثلاثية الكلية قبل وبعد التدخل. أشارت نتائج الدراسة الحالية إلى أن التدخل الغذائي بالرجلة كان فعالا في إنقاص الوزن ، وانخفاض مستوى السكر في الدم ، وتحسين صورة للدهون فى الدم لدى النساء زائدات الوزن / البدينات ، كما وجد أن هناك فروق ذات دلالة إحصائية في الوزن (BMI)،

جلوكوز الدم ، الكوليسترول الكلي ، الكوليسترول عالى الكثافة ، الكوليسترول المنخفض
الكثافة ، الكوليسترول المنخفض الكثافة جدا و الدهون الثلاثية الكلية بين ما قبل وبعد
التدخل. $P < 0.05$

الخلاصة: مسحوق الرجله قد يكون مفيد فى ادارة الوزن عند الاشخاص المصابين بالبدانة .

الكلمات المفتاحية: الرجله ، زيادة الوزن / البدانة ، فقدان الوزن ، جلوكوز الدم ، صورة
للدهون فى الدم ، التدخل الغذائى.