

Effect of Using Some levels of Thyme and Marjoram Powder on Obese Patients

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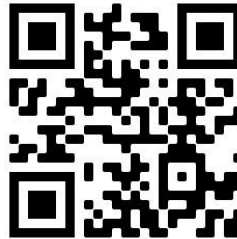
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Abstract

This study was conducted to investigate the effects of using some levels of thyme (*Thymus Vulgaris*) and marjoram (*Origanum Majorana*) powder on obese patients. The study included 120 adult females' obese patients. Ages between 20 to 45 years and body mass index (BMI) > 30 k/m², they were divided into 6 groups. Each group consists of 20 obese patients. The groups were divided as follows: group (1): fed on usual diet only as a control group, group (2): fed on usual diet with 200 mg thyme. group (3): fed on usual diet with 400 mg thyme, group(4): fed on usual diet with 200 mg marjoram, group (5): fed on usual diet with 400 mg marjoram, group (6): fed on usual diet with a mixture of (200 mg thyme and 200 mg marjoram) for 6 months. Anthropometric measurements including body weight, height, body mass index (BMI), waist and hip circumference. Also, the chemical composition and minerals content of thyme and marjoram were measured. Blood samples were collected for determined total cholesterol (TC), triglyceride (TG), high density lipoprotein (HDL), low density lipoprotein (LDL) and hemoglobin A1c (HBA1c). The obtained results revealed that a decrease in body weight, body mass index (BMI), waist and hip circumference, the blood analysis results revealed that decrease in both TC, TG, HBA1c and increased in HDL-c especially in the group (6) (33.37mg/dl), so it recommended using thyme and marjoram herbs in daily foods to decrease body weight.

Keywords

Obesity herbs, body mass index, chemical composition, minerals

Introduction

Obesity is a medical condition in which excess body fat has accumulated to an extent that it may have a negative effect on health (WHO, 2015). Obesity, also called corpulence or fatness, excessive accumulation of body fat, usually caused by the consumption of more calories than the body can use. The excess calories are then stored as fat, or adipose tissue. Overweight, if moderate, is not necessarily obesity particularly in muscular or large-boned individuals. (American Obesity Association, 2015) defines obesity as a complex, multifactorial chronic disease involving environmental (social and cultural), genetic, physiologic, metabolic, behavioral, and psychological components.

Globally, the number of obese patients is increasing every year WHO,(2016) reported that worldwide, obesity has more than doubled since 1980; more than 1.9 billion adults 18 years and older were overweight in 2014, over 600 million were obese, and 39% of adults aged 18 years and over were overweight, and 13% were obese. Most of the world's populations live in countries where overweight and obesity kill more people compared with underweight.

In Egypt, the obesity prevalence rates among males reach the second rank (18.2%) of the lower income countries after Iraq (26.2%). Among females, the highest rate among the high income countries was noted in Saudi Arabia (43.8%) and Kuwait (40.8%), probably related to cultural preferences of plumpness among females, followed by Egypt (39.5%) and Iraq (38.2%) of lower economic standing (WHO, 2015).

There are many measures for obese patients, BMI is considered the most important measure for evaluating obese patients. **WHO, (2016)** also recommends BMI as the most useful population level measure of overweight and obesity, and is used as the same for both sexes and in all ages of adults. So BMI of $>25 \text{ kg/m}^2$ and $>30 \text{ kg/m}^2$ is considered to be overweight and obese in adults irrespective of gender and age. (**Lee and Nieman, 2007**) definite body fat as the percentage of total body mass or percent body fat (PBF), and a variety of methods exist for its assessment, cadaver studies being the only direct method. Waist circumference is considered an indicator of abdominal fat (**Button et al., 2007**).

Herbal medicine plays a major role in treating obese patients.

Barnes et al., (2004) reported that herbs are considered one of the most common alternative therapies for weight loss worldwide. Also herbs have a multifarious role such as food flavorings, preservatives and as medicinal ingredients. Various herbs are documented for their therapeutic properties viz., ant oxidative, antihypertensive, anti-inflammatory, anti-diabetic and anti microbial (**Hasani - Ranjbar et al., 2009**).

The genus thymus includes about 350 species worldwide and is distributed widely in temperate zones (**Grigore et al., 2010**). Thyme is the common name of *thymus vulgaris L.* It is belongs to Family Lamiaceae (*Labiatae*) or mint family. thyme plant is a gray dwarf perennial shrub rarely exceeds 40 cm height. It is native to Europe and the Mediterranean region. The stems are quadrangular erect, numerous, hard, branched, and usually from 20 to 30 cm high. Leaves are small oval, rolled margin and downy under surface, narrow and elliptical, greenish-grey in color, reflexed

at the margins, and set in pairs upon very small foot-stalks. The flowers terminate the branches in whorls, small white or pink and arranged in a corymbs. The seeds are roundish and very small they retain their germinating power for three years (Amarowicz *et al.*, 2010).

Thymus vulgaris L. (*T. vulgaris*) a significant aromatic plant with around 100 species in the world is widely used for medicinal purposes as well as in culinary dishes (Dauqan and Abdullah, 2017)

Marjoram (*Origanum majoranum* L.) belonging to the Lamiaceae family, is a tender perennial herb native to North Africa and southwest Asia and naturalized in southern Europe. Formerly classified as *Majorana hortensis* Moench and also sweet or knotted marjoram, the plant reaches a height of 0.5 meters and has small, gray-green, ovate leaves, pink or purple flowers, and erect, glabrous to tomentose stems. marjoram is cultivated for its aromatic leaves, either green or dry, for culinary purposes; the tops are cut as the plants begin to flower and are dried slowly in the shade. It is often used in herb combinations. (Lamiaa *et al.*, 2009). The flowering leaves and tops of marjoram are steam-distilled to produce an essential oil that is yellowish in color (darkening to brown as it ages). It has many chemical components, some of which are borneol , camphor, and pinene.

(Abdel-Wahab, 2019).

The present study was designed to investigate the effect of using some levels of thyme and marjoram powder on weight reduction in obese patients and overweight humans. The trail aiming also to study the effect of thyme and marjoram powder on levels TC, TG, HDL, LDL andHBA1c in the human blood.

MATERIALS AND METHODS

Materials

60 kg of both thyme (*Thymus Vulgaris*) and marjoram (*Origanum Majorana*) were obtained from the Agricultural Research Center, Giza, Egypt .

preparation of thyme and marjoram

Dirt and dust were removed from thyme and marjoram then milled with a German- electric mill (JB3115 w H), to get the Powder form to pass through a 40 mesh screen. Then, the ground samples were stored in polyethylene bag at 5c⁰ until required for analysis.

Methods

Experimental design

The study included 120 obese adult female, their ages ranged between 20 - 45 years, and their body mass index was greater than 30 Kg /m².

They were divided into 6 equal groups as follows: group (1): fed on usual diet only as a control group, group (2): fed on usual diet with 200 mg thyme, group (3): fed on usual diet with 400 mg thyme, group (4): fed on usual diet with 200 mg marjoram, group (5): fed on usual diet with 400 mg marjoram, group (6): fed on usual diet with a mixture of (200 mg thyme and 200 mg marjoram).The experiment period was took 6 months . Blood samples were collected and centrifuged at 3000 rpm for 10 minutes to separate blood serum , and then kept in a deep freezer till using.

Height

Height was measured to the nearest 0, 5 cm while the subjects advised to stand up straight with the head, their feet together, shoulder, in the horizontal plane and the backs rest on the wall (Yanfei Liu *et al.*, 2017).

Weight

Weight was measured before and after application the dietary using an electronic digital scale with a capacity of 200 kg and precision of 50g (Beurer Diagnostic Scale - BF105-Germany) (**Feliciano et al.,2014 and Ying et al., 2010**).

Body weight was measured in the fasted state. Subjects wore light clothing and without shoes prior to the measurements. Weight was assessed to the nearest 0.1kg (**Zhang et al., 2016**). For calculating the ideal weight for women according to the following equation:

$$\text{Ideal weight} = \text{Height} - 100 \quad (\text{Sanchez et al., 2018})$$

Body mass index (BMI)

BMI was calculated according to the following Equation: $\text{BMI} = \text{Weight (kg)} / \text{Height (m)}^2$ (**Dudek, 1997 and Cicekli, 2019**)

Waist circumference (WC)

Waist circumferences were measured to the nearest 0.5 cm using a stretch resistant tape at the end of normal expiration. Waist circumference was measured at the midpoint between the lower margin of the least palpable rib and top of the iliac crest (**Youssef, 2019**). The World Health Organization (WHO) classifies adults have abdominal obesity when waist circumference (WC) > 94 cm for men and >80 cm for women (**Raouf et al., 2016**).

Hip circumference (HC)

Hip circumferences are measured to the nearest 0.1 cm using a flexible narrow Non-stretch tape in adults wearing minimal clothing,

standing straight but not pulling in their stomachs (**Vandewater et al., 2018**).

Waist-to-Hip Ratio (WHR)

The WHR is obtained by dividing the WC by the hip circumference (HC) using the same units of measurements for both (**Youssef, 2019**). The World Health Organization (WHO) classifies adults have abdominal obesity when Waist-to-Hip Ratio (WHR) of > 0.90 in men and > 0.85 in women (**Raouf et al., 2016**)

Biochemical analysis

Determination of moisture, ash, fiber, protein, and fat were determined according to the method outlined by (**A.O.A.C., 2010**). Total carbohydrates were calculated by deference and caloric value was calculated according to the method of (**Select, 2010**). Also, minerals content were determined by (**Isaac and Johnson, 2012**)

Determination of serum total cholesterol (TC), serum triglycerides(TG), serum high-density lipoproteins (HDL), serum low-density lipoproteins (LDL)and serum hemoglobin A1c (H b A1c) were determined according to the method described by (**Linsel and Tall, 2004; Fukuyama et al., 2008; Rader and Hobbs, 2008 and American Obesity Association, 2015**).

Ethics research

All subjects included in this study provided written informed consent, and the protocol of this study was approved by the Ethics Committee of the Medicine faculty of Assiut University.

Statistical Analysis

All obtained data were subjected to statistical analysis of variance and treatment means were compared for significant differences using the Least Significant Difference's "LSD" at $p=0.05$ and $p= 0.01$ according to the MSTAT- C Statistical software (*Russell, 2013*). A computer program was used to perform all the analysis of variance in agreement with the procedure outlined by (*Duncan, 2015*).

RESULTS AND DISCUSSION

Gross chemical composition and caloric value of thyme and marjoram powder

The obtained data presented in Table (1) showed highly significantly differences of chemical composition and caloric value of thyme and marjoram powder g/100 g (on dry weight basis.*).

Ash contents between thyme and marjoram powder are not significant. It is known that the smaller the t-value, the more similarity exists between the two sample sets. So, data indicated that the contents of protein, fat and fiber in both thyme and marjoram powder are different. While , moisture, total carbohydrates and Caloric value are similar.

It is clear to notice that the lowest values of ash and total carbohydrates recorded for thyme powder which were 4.97 and 47.28 g/100 g ; respectively. While the highest values recorded for protein , fat, fiber which were 11.20, 3.70 and 29.10g /100g ; respectively. The results recorded highly significant differences of chemical composition and caloric value contents between thyme and

marjoram powder. thyme powder contains highly protein, fat and fiber, Mean while , marjoram powder contains highly carbohydrates contents. The increase in fiber content of both thyme and marjoram powder have several healthy benefits as it will aid digestion in the colon and reduce constipation often associated with products this results agree with (Soltan and Abdel Wahab, 2006 and Ereifeji *et al.*, 2010). The results proved that marjoram powder contains more Caloric value (274.4) compared to thyme powder (267.2).

Table (1): Gross chemical composition and caloric value of thyme and marjoram powder g /100 g (on dry weight basis.*)

Samples	Thyme powder	Marjoram powder	T- test
Moisture	3.75±0.07	4.23±0.02	-3.25**
Ash	4.97±0.32	5.18±0.38	-1.65
Protein	11.20±0.83	9.30±0.79	11.26**
Fat	3.70±0.08	2.97±0.06	8.16**
Fiber	29.10±1.60	25.70±2.13	14.15**
Total carbohydrates	47.28±1.89	52.62±2.36	-8.15**
Caloric value (K.Cal)	267.20±6.18	274.40±8.12	-9.65**

Mean of three replicates ±Std. deviation
n.s = > 0.05 , * = P 0.05 , ** = P 0.01

Minerals content of thyme and marjoram powder (mg/Kg) on dry weight basis.

Results in Table (2) recorded highly significant differences of minerals content between thyme and marjoram. marjoram powder contains highly concentration of Na (77.13), Mg (346.2), Cu (4.50) and Mn (5.40) mg/kg when compared with thyme powder. While, lowest values of marjoram powder which were K (1522.0), Fe (82.70) and Ca (1990.0) mg/kg .

Lee and Nieman, (2007) stated that marjoram powder contains highly concentration of phosphorous (304.3) mg/kg , potassium (1500.4) mg/kg and magnesium (340.4) mg/kg . thyme herb has one of the highest antioxidant levels among herbs. Its leaves are one of the richest sources of potassium, iron, calcium, manganese, magnesium and selenium.

Soltan and Abdel Wahab (2006) . found that concentrations of minerals in plant leaves differ from region to other, which depends also on soil, water and climate. Our results dis agree with (**Wahby et al., 2015**) who found that mineral concentration of powdered thyme as approximately 1856 mg/kg K, 279 .mg/ kg P, 299.87 mg/kg Mg, 1998. mg/kg Ca, and 2.238 mg/ kg Cu.

Table (2): Minerals content of thyme and marjoram powder (mg/kg) on dry weight basis.*

Samples	Thyme powder	Marjoram powder	T- test
Na	63.40±3.21	77.13±4.26	-7.95**
K	1713.0±9.88	1522.0±10.2	16.25**
Mg	317.5±3.25	346.2±9.78	-6.15**
Cu	3.60±0.06	4.50±0.05	-6.982**
Fe	93.90±2.87	82.70±3.22	5.28**
Ca	2057.0±11.25	1990.0±10.24	7.89**
Mn	4.30±0.03	5.40±0.05	-9.26**
P	299.1±6.27	306.8±5.34	-1.25

Mean of three replicates ±Std. deviation

n.s = > 0.05 , *=P 0.05 ,** =P 0.01

Effect of thyme and marjoram powder on anthropometric measurements

Data tabulated in Table (3) showed the effect of thyme and marjoram powder on height, body weight (kg), body mass index (kg/m^2). Data in Table (3) recorded a significant reduction in both body weight (kg) and body mass index (kg/m^2) compared with control group (G1), The most highly reduction in body weight and body mass index were observed in (G6) fed on usual diet with mixture of (200 mg thyme and 200 mg marjoram) which were 89.58 (kg) and 32.22 (kg/m^2). Many studies have confirmed that herbal medicine is effective in the treatment of obesity, but the mechanisms are not clear.

Doaa *et al.*, (2017) found a significant reduction on body weight after one month of consuming marjoram. They concluded and recommended that marjoram has effective herb on weight reduction. The results were in agreement with(Ying *et al.*, 2010).

Table (3): Effect of thyme and marjoram powder on anthropometric measurements

Treatments.	Height (cm)	Body weight (kg)	Body mass index(kg/m^2)
Group1: Control (Obese patients fed on diet only)	165.5 ^a ±2.1	93.67 ^a ±1.1	34.40 ^a ±0.1
Group2 (200 mg thyme)	167.0 ^a ±1.8	92.87 ^{ab} ±1.2	33.16 ^{bc} ±0.4
Group3 (400 mg thyme)	166.0 ^a ±1.3	89.98 ^{bc} ±0.9	32.43 ^{bc} ±0.2
Group4 (200 mg marjoram)	165.5 ^a ±1.6	93.17 ^{ab} ±0.6	33.57 ^{ab} ±0.3
Group5 (400 mg marjoram)	163.5 ^a ±1.7	90.27 ^{bc} ±0.5	32.82 ^{bc} ±0.3
Group6 (200 mg thyme + 200 mg marjoram)	165.5 ^a ±1.6	89.58 ^{bc} ±0.7	32.22 ^c ±0.2
T test	2.35 n.s**	14.2**	11.12**

Effect of thyme and marjoram powder on body circumferences

All the results showed significantly reduction in all obesity patients properties under the study including Waist circumference (cm) and Hip circumference (cm) as a results of consuming either thyme or marjoram or a mixture of (200 mg of thyme and 200 mg of marjoram powder). The maximum reduction in anthropometric measurements and body circumferences was recorded as results of treating obese patients with a mixture of (200 mg thyme and 200 mg marjoram for 6 months).

Muhammad *et al.*, (2018) found that a significant reduction on body weight after one month of consuming marjoram. Similar results were obtained by (**Mohamed *et al.*, 2013** and **Ibrahiem, 2016** and **Doaa *et al.*, 2017**).

Treating obesity patient among feeding a mixture of (200 mg thyme and 200 mg marjoram for 6 months) could be attributed to increasing antioxidant compounds. methanol extracts of thyme had higher phenolic composition (**Gedikoglu, 2019**). Body fat and fat blood analysis of the obese patients were significantly affected by feeding with thyme and marjoram powder. Treating obese patients with a mixture of (200 mg thyme and 200 mg marjoram for 6 months) gave the heist response. The data in Table (4) showed the significant effect of thyme and marjoram on body circumferences. Obese patients (G6) fed on diet with mixture of (200 mg thyme and 200 mg marjoram for 6 months) recorded maximum reduction in body circumferences compared to control group (G1). The reduction

percentage in Waist and Hip circumference compared to the control reached (0.9065 % and 0.9121 %); respectively.

Table (4): Effect of thyme and marjoram powder on body circumferences

Treatments.	Waist circumference (cm)	Hip circumference (cm)	Waist-to-Hip ratio (%)
Group1: Control (Obese patients fed on diet only)	114.37 ^a ±3.7	125.71 ^a ±2.4	0.9121 ^{ab} ±1.4
Group2 (200 mg thyme)	110.8 ^b ±2.8	121.8 ^b ±2.0	0.9197 ^b ±1.7
Group3 (400 mg thyme)	107.6 ^c ±3.2	117.8 ^c ±1.9	0.9134 ^a ±2.1
Group4 (200mgmarjoram)	114.1 ^a ±3.6	125.1 ^a ±2.3	0.9113 ^{ab} ±1.3
Group5 (400mgmarjoram)	110.5 ^b ±2.6	121.5 ^b ±2.7	0.9095 ^b ±0.95
Group6 (200 mg thyme + 200 mg marjoram)	106.7 ^c ±3.1	117.7 ^c ±1.5	0.9065 ^c ±1.2

Mean of three replicates ±Std. deviation

n.s > 0.05 , * = P 0.05 , ** = P 0.01

Values followed by the same superscript letters within the same column were not significantly different.

Effect of thyme and marjoram powder on blood lipids profile and HBA1c

The presented data in Table (5) showed a significant difference in fat blood analysis between obese patients of each groups under the study. The minimum values of total cholesterol (184.2 mg/dl, triglycerides (166.0 mg/dl) and LDL (93.47 mg/dl) were recorded in (G6) compared to the maximum values (198.1, 189.6 and 105.0 mg/dl) in control group (G1) in the contrary of this results, the maximum value of HDL was recorded in (G6) due to feeding obese patients with a mixture of (200 mg thyme and 200

mg marjoram for 6 months). Many studies were published from 2007 to 2017 on different herbal type by Yanfei Liu *et al.*, (2017) concluded the effect of herbel ranged between significant change in body weight, Significant decrease BMI, Significant decrease Waist or hip circumference and food intake. Such data agree with (Nathan *et al.*, (2019).

Table (5): Effect of thyme and marjoram powder on blood lipids profile and HBA1c

Treatments.	Total cholesterol mg/dl	HDL-C mg/dl	LDL-C mg/dl	Triglycerides mg/dl	Hemoglobin Alc %
Group1: Control (Obese patients fed on diet only)	198.1 ^a ±3.1	26.67 ^c ±0.8	105.0 ^a ±1.3	189.6 ^a ±2.1	6.960 ^a ±0.02
Group2 (200mg thyme)	195.2 ^a ±1.7	29.57 ^b ±0.6	98.73 ^b ±0.9	180.2 ^b ±2.6	5.895 ^b ±0.04
Group3 (400mg thyme)	184.6 ^c ±1.5	31.82 ^a ±0.5	94.07 ^{cd} ±0.8	166.9 ^c ±2.7	5.348 ^d ±0.03
Group4 (200mgmarjoram)	198.1 ^a ±2.4	27.42 ^c ±0.7	103.5 ^a ±1.2	182.8 ^b ±3.2	6.048 ^b ±0.05
Group5 (400mgmarjoram)	190.2 ^b ±2.8	30.13 ^b ±0.4	97.65 ^{bc} ±1.3	179.3 ^b ±1.6	5.603 ^{bc} ±0.03
Group6 (200 mg thyme + 200 mg marjoram)	184.2 ^c ±2.6	33.37 ^a ±0.9	93.47 ^d ±0.8	166.0 ^c ±1.9	5.320 ^d ±0.03
F_test	13.4**	21.18**	15.16**	13.14*	12.28**

Mean of three replicates ±Std. deviation

n.s > 0.05 , *=P 0.05 , ** =P 0.01

Values followed by the same superscript letters within the same column were not significantly different.

The mean of dietary diet intake composition of obese patients

The data in Table (6-A) showed that the mean of dietary intake from carbohydrates recorded 223 gm, while the mean of dietary intake from protein recorded 90.27 gm and fat recorded 58.18 gm. The mean of dietary intake from energy, fiber and ash recorded 1786.9 kcal, 20.5 gm and 11.35gm., respectively. The data in Table (6-B) showed that the mean of dietary intake from calcium recorded 774.23mg, iron recorded 23.53mg. Mean while, sodium, potassium, phosphor recorded 598.17mg, 875.93mg and 753mg, respectively. Table (6-C) showed the mean of dietary intake from vitamin C recorded 78.53 mcg and vitamin A recorded 810 ug, riboflavin recorded 5.5mg, thiamine and niacin recorded 3.21mg and 3.5 mg respectively; The results were in agreement with(**Recommended Dietary Allowances, 1989 and Food composition tables for Egypt 2006**)

Table 6 A: The mean of dietary diet intake composition of obese patients

Nutritional elements	Water	Energy	Protein	Fat	Carbohydrate	Ash	Fiber
unit	gm	K. cal	gm	gm	Gm	gm	gm
Average	757.9±4.8	1786.9±9.2	90.27±1.5	58.18±1.2	223.0±7.5	11.35±0.5	20.5±0.8

Mean of three replicates ±Std. deviation

Table 6 B: The mean of dietary diet intake composition of obese patients

Nutritional elements	Thiamine	Riboflavin	Niacin	Folic Acid	Vitamin B12	Vitamin C	Vitamin A	Vitamin E	Vitamin D
unit	mg	mg	mg	mcg	mcg	Mcg	ug	ug	ug
Average	3.21±0.2	5.5±0.4	3.5±0.2	95.33±1.2	30.0±0.92	78.53±2.3	810.0±7.5	401.6±4.3	350.7±4.5

Mean of three replicates ±Std. deviation

Table 6 C: The mean of dietary diet intake composition of obese patients

Nutritional elements	Sodium	Calcium	Phosphorus	Magnesium	Iron	Zinc	potassium
unit	mg	mg	mg	mg	mg	mg	mg
Average	598.2±4.8	774.2±6.6	753.0±8.6	23.00±0.92	23.53±1.2	1.98±0.04	875.9±8.9

Mean of three replicates ±Std. deviation

Conclusion

The present study found that thyme and marjoram have a good effect on weight loss and decrease in (BMI), waist and hip circumference, TC, TG, LDL-c , HBA1c and a significant increased HDL- c , because these herbs contain fiber, minerals that they have a significant role in reducing body weight. The best results was in group (6): fed on usual diet with a mixture of (200 mg thyme and 200 mg marjoram) . So it recommended using thyme and marjoram herbs in daily food .

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تأثير استخدام بعض مستويات من مسحوق الزعتر والبردقوش على مرضى السمنة .

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الملخص العربي

يهدف البحث الحالي إلى دراسة تأثير استخدام بعض مستويات من مسحوق الزعتر والبردقوش على مرضى السمنة. واشتملت الدراسة على 120 أنثى بالغة مصابة بالسمنة تتراوح أعمارهن ما بين 20-45 عام، ومؤشر كتلة الجسم لديهم أكبر من 30 كجم/م². تم تقسيمهن إلى 6 مجموعات متساوية على النحو التالي : مجموعة (1) : تتغذى على الوجبة الغذائية الأساسية فقط (المجموعة الضابطة) ، مجموعة (2) : تتغذى على الوجبة الغذائية الأساسية +200 ملجم مسحوق الزعتر ، مجموعة (3) : تتغذى على الوجبة الغذائية الأساسية +400 ملجم مسحوق الزعتر ، مجموعة (4) : تتغذى على الوجبة الغذائية الأساسية +200 ملجم مسحوق البردقوش ، مجموعة (5) : تتغذى على الوجبة الغذائية الأساسية +400 ملجم مسحوق البردقوش ، مجموعة (6) : تتغذى على الوجبة الغذائية الأساسية بالإضافة إلى خليط من (200 ملجم مسحوق الزعتر+200 ملجم مسحوق البردقوش) لمدة 6 أشهر وقد تم قياس وزن الجسم لهن ومؤشر كتلة الجسم ومحيط الخصر والأرداف ونسبة محيط الخصر إلى الأرداف وكذلك تقدير التركيب الكيميائي والمعدني للزعتر والبردقوش . كما تم سحب عينات الدم وذلك لقياس الكوليسترول الكلي والدهون الثلاثية والبروتينات الدهنية المرتفعة والمنخفضة الكثافة وكذلك قياس مستوى السكر التراكمي (HbA1c). وقد أظهرت النتائج انخفاض ملحوظ في وزن الجسم ، مؤشر كتلة الجسم ، و محيطي الخصر والأرداف . وأظهرت نتائج تحليل الدم انخفاض معنوي في كلا من الكوليسترول الكلي والدهون الثلاثية الهيموجلوبين السكري (HbA1c) ، وزيادة ملحوظة في البروتينات الدهنية مرتفعة الكثافة وخاصة في مجموعة (6) 33.37 ملجم/ديسيلتر . وعلى هذا توصي الدراسة بفاعلية استخدام أعشاب الزعتر والبردقوش في الأطعمة اليومية لما لها من تأثير على وزن الجسم .

الكلمات المفتاحية : الأعشاب ، مؤشر كتلة الجسم ، التركيب الكيميائي ، العناصر المعدنية .