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Abstract

The current study aims to identify the effect of consuming hypericum perforatum powder and extract in improving symptoms of hormonal disorders in elderly female rats, The study was conducted on Twenty-eight female Sprague Dawley rats, classified into four groups (7 rats each) seven young adult female rats, three month-old and weighting 200± 15g as negative control rat group and twenty-one aged female rats (18- 20-month-old, 300 ± 15g) were divided into three groups positive control group fed on basal diet only , group which consumed hypericum perforatum powder (HPP) as 15% mixed into basal diet and group administered hypericum perforatum water extract (HPE) at a dose of 1300 mg/kg body weight daily via oral gavage. The experiment period was 60 days. The obtained Chemical results of phenolic compounds analysis of hypericum perforatum, showed that it the highest amount of e-vanillic, pyrogallol, iso-ferulic and epi-catechin their content were 1198.19, 444.11, 275.73, and 215.89 ppm respectively. The biological study showed that consumption of HPP or HPE Proved that the significant increase in body weight gain (BWG), feed efficiency ratio (FER), serum high density lipoprotein cholesterol, (HDL-c), follicle stimulating hormone (FSH), luteinizing hormone (LH), estradiol (E2) and progesterone(P4) on the other hand a significant decrease in total cholesterol (TC), triglycerides (TG), low density lipoprotein cholesterol (LDL-c) and very low density lipoprotein cholesterol (VLDL-c) and testosterone hormone compared to positive control rat groups. It concluded that consumption of hypericum perforatum has a best treatment to improve hormonal disorders symptoms in aged

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menopausal female rats, should be placed within their diet plan for aged female, to protect their health from hormonal imbalances resulting from aging.

Keywords: Hypericum perforatum , Antioxidant activities , Menopause – Phytoestrogens., Hormonal imbalance –aged female rats.

INTRODUCTION:

Hormonal disorders is characterized by the co-occurrence of metabolic disorders, as osteoporosis, obesity, insulin resistance, hyperglycemia, hypertension and dyslipidemia,while comparing pre- and postmenopausal women, the postmenopausal women have greater hormonal disorders, which leads to imbalance in calcium metabolism in the bones than premenopausal women **(Reaven. 2011)** .Menopause is a natural biological process that all women experience during their lifetime. It marks the end of a woman's reproductive years. This transition typically occurs between the ages of 45 and 55. The process is primarily due to the decline in ovarian follicular function and a subsequent decrease in circulating estrogen and progesterone levels **(De Graeve, and De Vuyst 2022).** The menopause is a normal stage of life and does not inherently require medical treatment, the associated hormonal changes can lead to various symptoms. Common symptoms include hot flashes, night sweats, mood swings, sleep disturbances, and vaginal dryness. These symptoms result from the body's adjustment to fluctuating hormone levels during the menopausal transition **(Demunter and Bauwens 2023).**The most common disease during menopause is Osteoporosis witch defined as a reduction in bone strength, which leads to decreased bone quality; the bone tissue undergoes continuous remodeling through a balance of resorption and deposition of calcium a process that becomes disrupted in women after menopause, resulting in accelerated bone loss. World Health Organization 2020 defined osteoporosis as a condition characterized by reduced bone mineral density (BMD), low bone mass, and deterioration of bone tissue, ultimately leading to increased bone fragility, Osteoporosis is, classified a metabolic disorder affecting bone and mineral metabolism. Bone density increases from birth and peaks between the ages of 30 and 40 The rate of bone calcium formation decreases

with age., initiating the progression of osteoporosis **(Dunlop et al., 2011, Pinto et al., 2017. Song et al., 2018 and Valenzuela., 2023)**

The use of postmenopausal hormone replacement therapy has been associated with attenuation of body composition and fat distribution changes associated with menopause and hormone replacement therapy are associated with increased risk of heart disease and breast and endometrial cancers. Therefore, research efforts on phytoestrogens are being directed toward determining whether phytoestrogens can provide protective effect on the systems affected by menopause without exerting the adverse effects on the breast and uterus encountered with hormonal therapy **(Gallo et al., 2005).**

Hypericum perforatum L. is one of the most widely recognized and traditionally used medicinal plants; H. perforatum is broadly distributed across temperate regions of the world, this plant is rich in pharmacologically active constituents such as flavonoids, tannins, and essential oils **(Elbostany, et al. 2013,Dugoua et al., 2020 and Brenner et al., 2022),**

St. John's Wort (Hypericum perforatum) is an herbaceous perennial plant long known for its putative medical properties. St. John's Wort (Hypericum perforatum) extract (HPE) has been used for the treatment of neuralgia, fibrosis, depression and anxiety as an alternative to classic antidepressant"mild to moderate " , HPE contains different groups of compounds such as hypericin, hyperforin and flavonoides. Hypericin and hyperforin. In addition to the protective effect herbs Hypericum perforatum which could play a positive role in reducing development of osteoporosis induced by menopause in female rats and their effect on bone tissues **(Silva et al., 2021 and Sõuk and Kalle 2023)**. Accordingly, this study aimed to assess the possible effects of hypericum perforatum in mitigating hormonal disorders symptoms induced by aging in female rats.

Material and Methods

Materials:

Herbs: Hypericum Perforatum (Hypericum perforatum L) was Purchased from Agricultural Seeds, Medicinal Plants and Herbs Company, Cairo, Egypt.

Biochemical kits. All kits for biochemical analysis of serum lipids patterns, Thyroid profile and Sexual hormonal were purchased from Kamiya Biomedical Company, Cairo, Egypt.

Experimental animals: 28 female rats , young adult (3 month old, n=7) and aged (18-20 month old, n=21) female Sprague Dawley rats, weighing about 200g ± 5 and 300g ± 5.At the beginning the experiments were purchased from the Agricultural Research Center, Giza, Egypt. The basal diet raw materials were purchased from Al-Gomhouria Company according to **NRC (1995)**

Methods:

Chemical methods

A. Preparation of hypericum perforatum powder and extract: after Hypericum Perforatum materials were milled in a mixer to give a powder and kept in dusky stoppered glass bottles in a dark dry location till use, according to Russo, (2001) who reported that hypericum perforatum is best kept in a dry and dark location to reduce oxidation of their contents.

B.Hypericum perforatum was extracted seven times with 10 volumes of distilled water at 40oC for 8 h followed by cooling. The aqueous extract was combined, and then concentrated twice under vacuum at 40 0C..

C. Analysis of polyphenols**:** High-performance liquid chromatography (HPLC) analysis of extracts was performed using an Agilent 1200 chromatograph it was selected for detection of polyphenol and flavonoids as described by the method of (**Goupy et al. 1999**).

Biological methods:

The experiment was applied on 28 female Sprague Dawley rats. 21 aged female rats (18 to 20 month old, weight 300g ± 5 act as model of menopausal rats and seven young female rats (3 month-young with weight 200g ± 5) act as model of young female negative control rat group . The animals were housed in cages at12-h light/ dark cycle in a temperature and

humidity controlled room. Rats allowed free access to feed on basal diet (BD), water ad- libitum. After adaptation for one week, rats were divided into two main groups

- Group (1) Normal young group of rats fed on basal diet and consider as negative control group Twenty-one menopausal rats divided into three groups the following
- Group (2): Aged group of rats fed on basal diet as positive control group.
- Group (3): Rats fed on basal diet (BD) and hypericum perforatum powder (HPP) at 15 g /100g /in (BD) daily replacement of fiber in basal diet.
- Group (4): Rats fed on BD and orally dosed of hypericum perforatum extract (HPE) at dose 1300mg/kg b.w daily by stomach tube. The experimental period was 60 days. Rats were subjected daily to physical examination for observation of healthy condition such as external appearance, color of hair, body condition and activity of rats. Rats' body weight gain was measured using a Triple Beam Balance twice weekly and food intake was recorded daily. Feed efficiency ratio was calculated at the end of experiment as follows: Feed efficiency ratio=Body weight gain (g)/ food intake (g/d) according to the method described by **Chapman *et al*., (1959)**. All biological experimental procedures were conducted in accordance with internationally accepted ethical guidelines for the care and use of laboratory animals. Approval for the experiment was obtained from the Research Ethics Committee at the Faculty of Specific Education, Mansoura University.

Laboratory Analysis

Blood samples were collected by puncture of retro-orbital plexus of veins in the inner canthus of the eye using micro capillary tubs and withdrawn into dry plastic centrifuge tubes. The samples were kept at room temperature for 15 minutes to clot then centrifuged at 5000 rpm for 10 min. The separated serum was kept frozen in a refrigerator at – 18^{O}C till used for biochemical analysis **(Young, 2001).** Estimation of serum total cholesterol, triglyceride (TG), high density lipoprotein cholesterol (HDLc) were estimated by using the spin react enzymatic kits according to **Cohn et al.,**

(1988), Foster and Dumns, (1973) and Young, (1995).respectively but Serum Low density lipoprotein cholesterol (LDL-c) and very low density lipoprotein cholesterol (VLDL-c) were calculated by the aquation described by **Friedwald et al. (1972).** Serum level of Thyroid profile as tetraiodothyronine-thyroxine (T4) and triodothyronine (T3) were analyzed according to **Larsen, (1972) and Schuurs and Van weeman, (1977).** Assay of serum sexual hormonal profile levels as follicle stimulating hormone (FSH),estradiol (E2), progesterone (P4) and testosterone were measured according to **Wilke & Utley (1987) Ballester et al. (2004), Orczyk *et al.*, (1974)**. and **Zanato *et al.*,(1994)** respectively while Luteinizing hormone (LH) was measured by radioimmunoassay according to **Schams and Karg, (1970)**

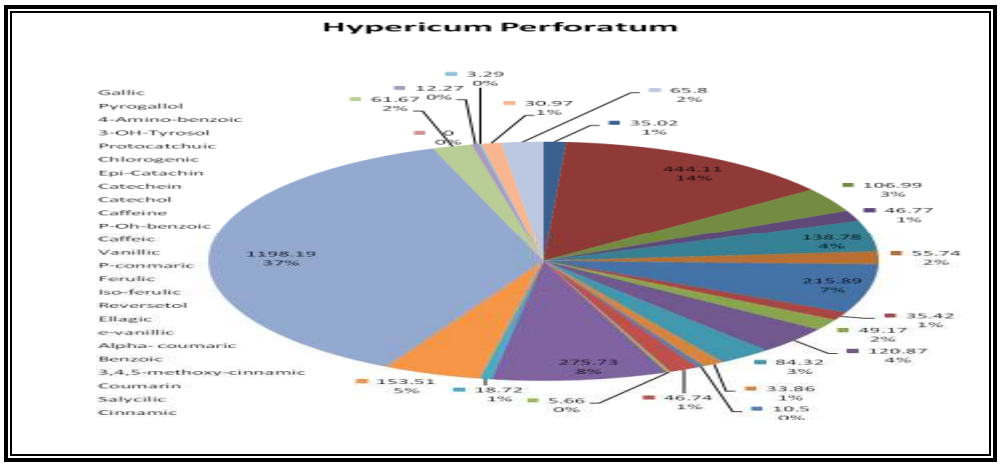
Statistical analysis: The obtained data were statistically analyzed by SPSS computer software expressed as mean ± SD. Effects of different treatments analyzed by one-way (ANOVA) followed by Duncan's multiple range tests. Differences were considered significant at $P < 0.05$ according to **Snedecor and Cochran (1986).**

Results and Discussion

The hypericum perforatum employed in this study contained considerable amount of phenolic compounds with an average from 3.29 to 1198.19 ppm in Fig (1). The highest amount of e-vanillic, pyrogallol, iso-ferulic and epi-catachin thier content were 1198.19, 444.11, 275.73, and 215.89 ppm respectively. While the lowest amount of phenolic compounds in hypericum perforatum coumarin, ferulic, vanillic and 3,4,5-methoxy-cinnamic their content were 3.29, 5.66, 10.50 and 12.27 ppm respectively. These results agreed with the results of **Zhang et al. (2020)** who recommended that, in the hypericum species studied ten phenolic acids gallic, protocatechuic, p-hydroxybenzoic, caffeic, chlorogenic, syringic, p-coumaric, ferulic and cinnamic acids. **Han, et al. (2007); Moresco et al. (2008) and Anusuya and Manian, (2013)** illustrated that, flavonoids such as chlorogenic acid and caffeic acid are antioxidants and plays an important role in many diseases such as cardiovascular diseases, aging, cancer and inflammatory disorders. **Fresco, et al. (2006)** reported that, cinnamic acid

and rosmarinic acid analogs possess phenolic acids effect of anti-inflammatory and enhance immune function.

Fig. (1): Levels of phenolic compounds in hypericum perforatum



Data in Table (1) showed the body weight gain, food intake and feed efficiency ratio (FER) of negative control group and postmenopausal rats treated with of HPP and HPE. The positive control group of postmenopausal were 66.89 ± 6.11 g, 14.55 ± 2.55 g and 0.072 ± 0.003 showing a decreased in body weight gain, food intake and FER at $P < 0.001$ compared to the negative control group which were 115.77 ± 8.11 g, 15.32 ± 2.14 g and 0.125 ± 0.001 respectively. The positive control group showed a significant decreased in body weight gain, food intake and FER at $P < 0.05$ compared to all treated female rat groups by HP powder and extract. The treated rat groups by HPP and HPE showed no significant in body weight gain and FER when compared to negative control group. The present result was confirmed by **Elbostany, et al. (2016) and Yari, et al. (2022)** who indicated that, there was significant reduction in body weight when compared to postmenopausal group and premenopausal group and increased body weight gain when treated with flaxseed. **Elbostany, et al. (2016) and Abd El Ghany, et al. (2018)** suggested that, the weights gain of the animals increased significantly when treated with hypericum perforatum.

Table (1): Effect of herbs hypericum perforatum powder and extract on some Nutritional Parameters of young rat groups and aged menopausal rat groups during experimental period

Groups Variables	Young rat (-ve) Control	Aged menopausal female rats groups		
		(+ve) Control	HP	HPE
Initial weight (g)	b 202.31 ±5.45	a 300.24 ± 11.55	a 302.11 ± 11.50	a 302.35 ±11.50
Body weight gain (g)	a 115.77 ±8.11	b 66.89 ± 6.11	a 107.12 ± 9.13	a 107.22 ±9.11
Food intake g/d	a 15.32 ± 2.14	ab 14.55 ± 2.55	a 15.70 ± 2.15	a 15.60 ±2.55
FER	a 0.125 ±0.001	b 0.072 ±0.003	a 0.111 ± 0.002	a 0.112 ±0.002

Mean values ±SD in each row having different superscript (a, b, c, d) are significantly different control ,HP:

Hypericum perforatum powder . HPE: Hypericum perforatum extract

Table (2) showed that the positive control group of postmenopausal female rat, showed the mean values of serum total cholesterol, triglyceride (TG), Low density lipoprotein cholesterol (LDLc) and Very l ow density lipoprotein cholesterol (VLDLc) levels which were 55.57 ± 1.03 mg/dl, 63.49 ± 1.03 mg/dl, 32.85 ± 0.79 mg/dl and 12.44 ± 0.22 mg/dl respectively, the previous levels significantly increased at $p<0.01\&0.05$ compared to negative control group. While the positive control group (12.02 ± 0.66 mg/dl) showed a significant decreased in high density lipoprotein cholesterol (HDLc), at $p<0.001$ compared to negative control group (15.56 ± 1.12 mg/dl). The highest mean value of TC level was recorded for positive control (+ve) group 55.57 ±1.03 mg/dl. The obtained results indicated that TC of the female rate group significantly affected by all treatments. The results were observed in HPP group having a decreased in TC, TG, LDLc and VLDLc levels which were 50.90 ± 0.46 mg/dl, 49.46 ± 0.44 mg/dl, 28.01 ± 0.27 mg/dl and 9.89 ± 0.09 mg/dl, respectively. While increase in HDL to 13.00 ± 0.24 mg/dl. On the other hand, HPE group having a decreased in TC, TG, LDLc and VLDLc levels which were 49.78 ± 0.35

mg/dl, 50.29 ± 0.25 mg/dl, 26.85 ± 0.24 mg/dl and 10.06 ± 0.05 mg/dl, respectively. While increase in HDL to 12.87 ± 0.20 mg/dl. Our results showed that hypericum perforatum was reduce cholesterol, triglyceride, LDL and VLDLc, which is in agreement with the majority of previous studies. **Moghaddam et al. (2016)** reported that, the proanthocyanidin content of hypericum perforatum was able to reduce TG levels. **Santos-Gallego and Badimón (2022)** proved that, an inverse relationship between low concentration of HDL-C and an increased risk for cardiovascular diseases (CVD). **Arts et al. (2021)** found that, there was a strong inverse association between the intake of catechin and coronary heart disease death, this inverse association was most pronounced in postmenopausal women at low risk of coronary heart disease.

Table 3: Effect of herbs hypericum perforatum powder and extract on serum total cholesterol, triglyceride (TG), high density lipoprotein cholesterol (HDLc), Low density lipoprotein cholesterol (LDLc) and Very l ow density lipoprotein cholesterol (VLDLc) of young rat and aged menopausal rat groups at the end of study.

Groups / Variables	Young rat (-ve) Control	Aged menopausal female rats groups		
		(+ve) Control	HP	HPE
TC (mg/dl)	b 50.06 ± 1.28	a 55.57 ± 1.03	b 50.90 ± 0.46	c 49.78 ± 0.35
TG (mg/dl)	b 52.21±1.68	a 63.49±1.03	cd 49.46±0.44	bc 50.29±0.25
HDLc (mg/dl)	a 15.56±1.12	bc 12.02±0.66	b 13.00±0.24	bc 12.87±0.20
LDLc (mg/dl)	d 22.06±1.12	a 32.85±0.79	b 28.01±0.27	bc 26.85±0.24
VLDLc (mg/dl)	b 10.70±0.33	a 12.44±0.22	bc 9.89±0.09	bc 10.06±0.05

Mean values ±SD in each row having different superscript (a, b, c, d) are significantly different control . HP: Hypericum perforatum powder .HPE: Hypericum perforatum extract.

Effect of hypericum perforatum powder and extract on thyroid hormone levels (ng/ mI) of control and treated female rat groups at the end of experimental period. Table (4) Showed the mean value and (± SD) of Tetraiodothyronine-Thyroxine T4 and Triodothyronine T3 of negative control, and female rat groups treated with HPP and HPE. The positive control group, showed serum T4 (ng/ mI) which was 0.39 ± 0.02 was non-significant increased as compared with negative control group which was 0.40 ± 0.01.On the other hand the recorded results indicated that non-significant different between tested treatments compared with negative control and positive control in T4. In the study, serum parathyroid hormone T4 was no significant difference in postmenopausal women than in pre-menopausal women while serum T3 level was significantly higher in hyperthyroid premenopausal.

The best results of T3 observed in HPP and HPE group, their values were 0.91 ± 0.02, 0.84 ± 0.03, respectively. These results were agreed with **Mohanty et al. (2014) and Saran et al. (2016)** reported that, in postmenopausal hypothyroid females and low serum T3 and T4 levels. Decreased serum T3 may be result of decreased conversion of T4 to T3. **Rosario, (2008)** studied that, bone and heart abnormalities of hyperthyroidism in postmenopausal.

These results were agreed with **Lee et al. (2010)** who mentioned that, thyroxine (T4) level blunted by high testosterone level. **Farasat et al. (2010)** and **Górnaś et al. (2025)** observed that, negative correlation between TSH, T3, TSH, and T4, whereas positive correlation was observed between T3 and T4. Thyroid dysfunction can lead to menstrual irregularities.

Table 4 Effect of herbs hypericum powder and extract on some thyroid hormonal levels of young rat and aged menopausal rat groups at the end of study.

Groups / Variables	Young rat (-ve) Control	Aged menopausal female rats groups		
		(+ve) Control	HPP	HPE
T4 (ng/ml)	**a 0.40±0.01**	**a 0.39±0.02**	**a 0.39±0.02**	**a 0.39±0.02**
T3 (ng/ml)	**a 0.92±0.03**	**c 0.73±0.03**	**a** 0.91± 0.02	b 0.84± 0.03

Mean values ± SD in each row having different superscript (a, b, c, d and …) are significantly different

HPP: Hypericum perforatum powder HPE: Hypericum perforatum extract.

T4: Tetraiodothyronine-Thyroxine, T3: Triodothyronine.

Results presented in Table (5) illustrated the mean value (± SD) of serum follicle stimulating hormone (FSH), luteinizing hormone (LH), estradiol (E2), progesterone and testosterone of negative & positive control and female rat groups treated with hypericum. In case of the positive control (+ve) group, the results showed a significant decrease in follicle stimulating hormone (FSH), luteinizing hormone (LH), estradiol (E2) and progesterone at levels (3.62 ± 0.07, 2.33 ± 0.07 and 11.74 ± 0.79) respectively. Progesterone, Testosterone were significantly decreased to 0.27 at $p<0.05$& $p<0.01$ compared with values of the negative control (-ve) group. The group of negative control (-ve) recorded the lowest mean values of testosterone being 0.11 ± 0.02. Analysis of variance (ANOVA) showed significant difference in (FSH), (LH), (E2) and (P4) at ($p<0.001$) compared with negative control, positive control group and other tested treatments. The HPP and HPE groups gave the lowest in (FSH) and (LH) respectively. On the other hand the HPP and HPE groups gave the lowest in testosterone.

In the present study, through studying the effect of the HPP and HPE groups on some female sex hormones and evaluated in virgin female albino rats during postmenopausal by increased level of progesterone, (FSH), (LH) and (E2) hormone compared to the positive control It was

effect of enhancement postmenopausal symptoms by increase female sex hormones and increase fertility. The best results observed in the HPP and HPE groups observed increase in follicle stimulating hormone (FSH), luteinizing hormone (LH), estradiol (E2) and progesterone (P4) and decrease in testosterone to 0.19 ± 0.01. Luteinizing hormone is a hormone produced in the anterior pituitary gland, which stimulates the release of sex hormones by the ovaries and testes. The reduction in LH and FSH are due to adverse effect on hypothalamic pituitary **Hutchins et al. (2019).** These results are in agreement with those **of Hall, (2013) , Abd El Ghany, et al. (2017) and Montoya-Arroyo et al. (2022)** the studies showed that, Hypericum perforatum has been shown to reduce the efficacy of estrogen-containing contraceptives, lead to breakthrough bleeding and risk of contraceptive failure.

Table 5: Effect of herbs hypericum powder and extract on some sexual hormonal levels of young rat and aged menopausal rat groups at the end of study.

Groups / Variables	Young rat	Aged menopausal female rats groups		
	(-ve) Control	(+ve) Control	HPP	MPE
FSH (ng/ml)	**a 5.04±0.16**	**bc 3.62±0.07**	b **3.66±0.04**	**bc 3.59±0.06**
LH (ng/ml)	**a 3.21±0.25**	**c 2.33±0.07**	**b 2.62±0.03**	**bc 2.51±0.03**
E2 (ng/ml)	**a 23.05±0.80**	**c 11.74±0.79**	**b 17.99±0.66**	**b 17.20±0.45**
Progesterone (P4) (ng/ml)	**a 0.88±0.06**	**d 0.27±0.02**	**b 0.55±0.03**	**bc 0.50±0.03**
Testosterone (ng/ml)	**d 0.11 ±0.02**	**a 0.27±0.04**	**bc 0.17±0.01**	**b 0.19±0.01**

Mean values ± SD in each row having different superscript (a, b, c, d) are significantly different.

HPP: Hypericum perforatum powder HPE: Hypericum perforatum extract .FSH: Follicle-stimulating hormone, LH: Luteinizing hormone, (E2): estradiol

Conclusion :The findings of this study demonstrate that both the powder and extract forms of Hypericum perforatum effectively mitigated postmenopausal-like symptoms in elderly female rats. Specifically, the treatment led to reductions in body weight and fat accumulation, as well as improvements in lipid metabolism—without inducing uterine hypertrophy or cellular proliferation. These outcomes suggest that Hypericum perforatum may offer a promising and safer nutraceutical alternative to conventional estrogen therapy for managing metabolic and hormonal disturbances associated with menopause. It concluded that consumption of hypericum perforatum has a best treatment to improve hormonal disorders symptoms in aged menopausal female rats, should be placed within their diet plan for aged female, to protect their health from hormonal imbalances resulting from aging.

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التأثيرات العلاجية الغذائية لاستهلاك مسحوق ومستخلص حشيشة القلب لتحسين أعراض الاضطرابات الهرمونية لدى إناث الفئران المسنة

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الملخص العربي

تهدف الدراسة الحالية إلى تحديد تأثير تناول عشبة حشيشة القلب ومستخلصها في تحسين أعراض الاضطرابات الهرمونية في إناث الفئران المسنة، اجريت الدرسة علي ثمانية وعشرين من إناث الفئران من فصيلة سبراغ داولي حيث قسمت الي أربع مجموعات (٧ فئران لكل مجموعة) سبع فئران إناث بالغة صغيرة السن، عمرها ثلاثة أشهر ووزنها ٢٠٠ ± ١٥ جم كمجموعة تحكم سلبية وواحد وعشرون من اينات الفئران المسنة عمرها يتراوح بين (١٨- ٢٠ شهرًا، وزنها ٣٠٠ ± ١٥ جم) وتم تقسيمهم إلى ثلاث مجموعات: المجموعة الضابطة الموجبة والتي تتغذى على النظام الغذائي الأساسي فقط، والمجموعة التي تغذت علي مسحوق عشبة حشيشة القلب (HPP) بنسبة ١٥٪ مخلوطًا في النظام الغذائي الأساسي والمجموعة التي تناولت المستخلص المائي لعشبة حشيشة القلب (HPE)بجرعة ١٣٠٠ مجم / كجم من وزن الجسم يوميًا عن طريق التغذية الأنبوبية بالفم واستمرت فترة التجربة ٦٠ يومًا. أظهرت النتائج الكيميائية التي تم الحصول عليها من تحليل المركبات الفينولية لعشبة حشيشة القلب أنها تحتوي على كمية من مركبات الفانيليك والبيروجالول والإيزوفيرولیک والإبي كاتشين وكانت ١١٩٨.١٩ و٤٤٤.١١ و٢٧٥.٧٣ و٢١٥.٨٩ جزء في المليون على التوالي. كما أظهرت الدراسة البيولوجية أن استهلاك HPP أو HPE أثبت أن هناك زيادة معنوية في زيادة وزن الجسم (BWG) ونسبة كفاءة التغذية (FER) ووالليبوبروتينات عالية الكثافة (HDLc)وهرمون تحفيز الجريبات (FSH) وهرمون الملوتن (LH) والإستراديول (E2) والبروجسترون (P4) وعلي الجانب الاخر اثبتت انخفاض معنوي في الكوليسترول الكلي (TC) والدهون الثلاثية (TG) والليبوبروتينات منخفضة الكثافة (LDLc) والليبوبروتينات منخفضة الكثافة جدًا (VLDLc) وهرمون التستوستيرون وذلک بالمقارنة بالمجموعة الضابطة الموجبة . وخلصت الدراسة إلى أن تناول مسحوق او مستخلص عشبة حشيشة القلب هو أفضل علاج لتحسين أعراض الاضطرابات الهرمونية لدى اينات الفئران في سن اليأس، ويجب وضعها ضمن خطة النظام الغذائي للإناث المسنة، لحماية صحتهن من الاختلالات الهرمونية الناتجة عن الشيخوخة.

الكلمات المفتاحية: عشبة حشيشة القلب- الأنشطة المضادة للأكسدة - أعراض انقطاع الطمث - فيتويستروجين.- الخلل الهرموني – اينات الفران المسنة

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