BENHA UNIVERSITY
FACULTY OF VETERINARY MEDICINE

BENHA VETERINARY MEDICAL JOURNAL

BIOCHEMICAL EFFECT OF SOME HERBAL MEDICINE IN EXPERIMENTALLY INDUCED POLY CYSTIC OVARIES

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A B S T R A C T

In the present study, the effect of herbal medicine on serum glucose, lipid profile, progestrone, LH and FSH hormones in experimentally induced poly cystic ovaries in female rats have been evaluated. This study was carried out in vitro on 84 female rats (21-days old). The rats were divided into main two groups. Group I: (Control group): include twelve female rats and kept as control, and Group II: (induced PCOS group): include seventy two female rats were injected subcutaneously (S/C) by testosterone propionate by a dose of 1 mg/100 gm body weight daily and still for 35 days. The later was divided into six sub groups each contain twelve females rats. Sub group 1: (control PCOS): did not receive any herbal medication and sub group 2 :(induced PCOS *Salvia officinalis* treated group). Sub group 3: (induced PCOS *Origanum vulgare* treated group) and sub group 4: (induced PCOS *Adiantum capillus–veneris* treated group). Sub group 5: (induced PCOS *Equisetum arvense* treated group) and sub group 6: (induced PCOS treated group with mix of the mentioned herbs). The study also carried out in vivo on ten women with PCOS and ten healthy women kept as control. Blood samples for serum separation were collected from all animals groups three times after 10, 20 and 30 days from the onset of herbal treatment begin after induction of the syndrome, and from women at the 2nd day of menstruation. All sera were processed directly for determination of glucose, total cholesterol, triacylglycerols, HDL–C, LDL-C, VLDL-C, progestrone, LH and FSH hormones. The obtained results revealed that there was a similarity in the biochemical changes of both PCOS women and experimentally induced PCOS female rats, which reported as a significant increase in the mean values of serum glucose, total cholesterol, triacylglycerols, LDL-C, VLDL-C, HDL-C and LH hormone while a significant decrease in the mean values of serum HDL-C and progestrone concentration was observed. From the obtained results of the present study it could be concluded that administration of *S. officinalis*, *O. vulgare* and the herbal mix in women with PCOS are very essential and should be used with therapeutic dose level which may improve the progression of the disease and attenuate the undesirable effect of dangerous metabolic and hormonal changes in women with PCOS.

KEY WORDS: Herbal medicine, Hormones, Lipid profile, Polycystic ovary, Rats

(BVMJ-23 [1]:61-71, 2012**)**

1. INTRODUCTION

Polycystic ovary syndrome (PCOS), is a common female endocrine disorder of uncertain etiology, affects between 6 and 10% of women of the reproductive age. The heterogeneity of both the ovarian morphology and clinical findings in PCOS women has been well recognized since [28] first report and gradually led to the establishment of the term polycystic ovary syndrome. This syndrome can be broadly divided into three categories: clinical, endocrine and metabolic. The clinical features include menstrual abnormalities, hirsutism, acne, alopecia, anovulatory infertility and recurrent miscarriages. The endocrine features include elevated

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androgens, luteinizing hormone, estrogen and prolactin levels. The metabolic aspects of this syndrome include insulin resistance, obesity, lipid abnormalities and an increased risk for impaired glucose tolerance and (type 2 DM) [31].

The best known treatment for (PCOS) at present is by using allopathic medicine such as clomiphene citrate, metformin, letrozole, tamoxifene and troglitazone. All these allophathic medicines have mild to sever side effects including hot flushes, arthritis, joint or muscle pain and physiological side effects such as irritability, mood swings, depression and bloating. Due to the adverse side effects caused by the allopathic medicine, alternative medicine are gaining importance, acupuncture, naturopathy and herbal medicines are some worth mentioning [25].

The most important advantage of herbal medicine is the minimal side effects, and relatively low cost compared to the synthetic medicines. Many conventional drugs originate from plant sources: a century ago, most of the few effective drugs were plant based. The development of drugs from plants continues, with drug companies engaged in large scale pharmacological screening of herbs [15].

The present study was designed to follow up the biochemical changes in blood sugar, lipid profile and some hormones in vitro, experimentally induced PCOS in female rats, in Vivo, Women with PCOS. The possible herbal treatment with certain plants which include *Salvia officinalis, Origanum vulgare, Adiantum capillus–veneris and Equisetum arvense* in the experimental group.

2. MATERIALS AND METHODS

2.1. In vitro:

2.1.1. Animals

Eighty four clinically normal healthy immature female albino rats (21-days-old), were used throughout this experiment. They were housed in a special laboratory animal's room. They kept at constant environmental and nutritional conditions supplied with basal diet, dry bread and given tap water to drink.

2.1.2. *Herbal plants used*:

Salvia officinalis, Origanum vulgare, Adiantum capillus–veneris and Equisetum arvense

2.1.2.1. *Preparation of herbs*

Freshly prepared by take calculated amount of the dried herbal plant and pour 1-cup water over the herb. Boil water with herbs for about 10 min. Then in a kettle, strain it and let cool.

2.2. *Experimental Deign*:

The rats were randomly divided into main two groups:

Control group: They comprise 12 female rats maintained on basal diet and not received any thing and get free access to water and food.

PCOS induced group: To induce PCOS, seventy two rats were injected subcutaneously (S/C) by testosterone propionate by a dose of 1 mg/100 gm body weight daily and still for 35day consequently according to Belooseskey *et al*., 2004 [4] The experimentally PCO Induced rats were divided into six subgroups each comprise 12 rats.

Sub group (1): Control PCOS group consists of 12 female rats, did not received any herbal medication.

Sub group (2): Consists of 12 rats received (*Salvia officinalis*) in a dose of 900 mg/ kg.b.w.) once daily for 30 days.

Sub group (3): Consists of 12 rats received (*Origanum vulgare*) in a dose of 540 mg/ kg.b.w.) once daily for 30 days.

Sub group (4): Consists of 12 rats received (*Adiantum capillus–veneris*) in a dose of 450 mg/kg.body weight) once daily for 30 days.

Sub group (5): Consists of 12 rats received (*Equisetum arvense*) in a dose of 900 mg/ kg.b.w.) once daily for 30 days.
Sub group (6): Consists of 12 rats received amixture of (*Salvia officinalis + Origanum vulgare + Adiantum capillus – veneris + Equisetum arvense)* at a ratio of (4:5:1:2), respectively in a dose of 900 mg/kg.b.w. of the total mix once daily for 30 days.

2.3. *In vivo*:

This study had also been done on ten healthy women and ten women suffered from PCOS**,** blood samples of them were collected from October 2010 to October 2011 at the Amal center for in vitro fertilization – Asafra - Alexandria.

2.4. *Blood Sampling*:
A. Blood samples were collected from rats of each group at 10, 20 and 30 days of the herbal treatment. samples were taken in the early morning after 18 hours fasting period from the median Canthus of the eyes by using hepariniezed microhematocrite tubes, then serum was carefully separated and kept in a deep freeze until used for subsequent biochemical analysis that performed except glucose was estimated as soon as possible.
B. Blood samples from women were taken at the 2^{nd} day and on the 21^{st} day of menstrual cycle and serum was separated.
The collected serum were subjected for determination of the following Biochemical analysis:

- Serum glucose was determined according to Caraway and Watts [8].
- Total cholesterol was determined according to Ellefson and Caraway [12].
- Triacylglycerols was determined according to Bucolo and David [6].
- HDL–cholesterol was determined according to National Cholesterol Education program [21].
- LDL-cholesterol was determined according to Friedewald *et al*, [13].
- VLDL- cholesterol was determined according to Bauer [3].
- Progesterone hormone was determined according to Radwanska *et al*, [23]
- LH hormone was determined according to Knobil [17].
- FSH hormone was determined according to according to Ohlsson *et al*. [20]

2.5. *Statistical analysis*:

One-way single factor ANOVA was used to compare more than two groups followed by student test (SPSS ver.19 software) to detect differences between groups. For all test, $P<0.05$ was considered statistically significant. All results are expressed as mean± S.E. **[29].**

3. RESULTS

The recorded data demonstrated in Tables, (1, 2, 3 and 4) revealed that, there were a significant increase in serum glucose, total cholesterol, triglycerides, low density lipoprotein-cholesterol (LDL-C), very low density lipoprotein-cholesterol (VLDL-C) and LH hormone level, and a significant decrease in serum high density lipoprotein-cholesterol (HDL-C) and in Progesterone hormone level in both in vitro experimentally induced PCOS female rats and in vivo PCOS women.
The results reported suggested that, administration of *Salvia officinalis* to experimentally induced PCOS in female rats showed significant decrease in the mean values of serum glucose, total cholesterol, triglycerids, low density lipoprotein-cholesterol (LDL-C) and very low density lipoprotein-cholesterol (VLDL-C) and revealed non significant decrease in the mean value of LH and FSH hormone. On the other hand, administration of *Salvia officinalis* revealed a significant increase in high density lipoprotein-cholesterol (HDL-C), progestrone hormone level.

The obtained result recorded that, administration of *Origanum vulgare* to experimentally induced PCOS in female rats revealed a significant decrease in the mean values of serum glucose, total cholesterol, triglycerids, low density lipoprotein-cholesterol (LDL-C), very low density lipoprotein -cholesterol (VLDL-C) and revealed non-significant decrease in the mean value of LH and FSH hormone On the other hand, *Origanum vulgare* administration revealed a significant increase in progesterone hormone level and non-significant increase in high density lipoprotein-cholesterol (HDL-C) While, the administration of both *Adiantum capillus–veneris and Equisetum arvense* showed non-significant changes on the mean values of estimated parameter all over the periods of experiment.

Table 1 Serum total cholesterol, triglyceride, HDL-C, LDL-C and VLDL-C level (mg/dl) in healthy and experimentally induced PCOS non treated and herbal treated groups of female rats.

Component	Days	Control	C.PCOS	Herbal treated groups				
				S.o	O.v	A.c	E.a	Herbal mix
cholesterol	10	79.5^{a}± 4.38	92.2^{a}± 4.28	86.51^{a}± 6.48	81.7^{a}± 4.81	91.1^{a}± 4.17	90.8^{a}± 4.58	88.5^{a}± 3.65
	20	75.3^{b}± 3.68	94.76^{a}± 4.21	87.61^{ab}± 4.27	82.76^{ab}± 4.86	87.7^{ab}± 3.66	93.64^{a}± 5.27	85.93^{ab}± 3.93
	30	78.67^{b}± 5.04	99.11^{a}± 4.02	80.47^{b}± 4.41	79.33^{b}± 3.52	90.44^{ab}±3.21	92.74^{ab}±4.18	81.46^{b}± 5.86
Triacyl-glycerides	10	75.23^{b}± 4.04	89.9^{a}± 3.37	86.93^{a}± 3.11	85.64^{ab}± 3.14	88.76^{a}± 3.41	87.31^{a}± 3.17	85.3^{ab}± 4.35
	20	77.76^{c}± 3.00	93.16^{a}± 3.20	87.13^{abc}± .51	79.96^{bc}± 4.31	86.43^{abc}±4.49	90^{ab}± 3.15	84.90^{abc}± 3.18
	30	74.29^{c}± 2.64	94.39^{a}± 3.26	78.8^{bc}± 5.38	81.17^{abc}±5.23	87.8^{abc}± 3.38	90.69^{ab}±4.86	83.34^{abc}± 4.53
HDL-C	10	47.81^{ab}± .82	39.6^{b}± 2.50	41.3^{ab}± 2.50	43.54^{ab}± 2.72	42.46^{ab}± 3.31	39.29^{b}± 2.46	49.73^{a}± 4.20
	20	48.45^{a}± 3.24	40.53^{ab}±2.58	43.14^{ab}± .13	46^{ab}± 2.44	44.5^{ab}± 2.48	38.61^{b}± 3.03	43.24^{ab}± 2.43
	30	52.2^{a}± 3.00	40.5^{b}± 2.57	51.32^{a}± 4.83	45.05^{ab}± 3.18	45.92^{ab}± 3.02	42.52^{ab}±2.42	47.8^{ab}3.14
LDL-C	10	16.66^{b}± 5.84	34.62^{a}± 4.07	27.82^{ab}±5.61	21.03^{ab}± 4.96	30.89^{ab}±4.47	34.04^{a}± 5.15	21.71^{ab}± 4.06
	20	11.30^{c}±3.04	35.59^{a}±3.54	27.05^{ab}±5.81	20.76^{bc}±5.46	25.91^{ab}±3.16	37.03^{a}±4.45	25.72^{ab}±3.09
	30	11.61^{d}±2.99	39.72^{a}±3.19	13.39^{d}±2.85	18.04^{cd}±3.97	26.83^{bc}±5.46	32.08^{ab}±2.20	16.99^{cd}±6.69
VLDL-C	10	15.05^{b}±0 .81	17.98^{a}±0 .67	17.38^{a}± 0.62	17.13^{ab}± 0.63	17.75^{a}± 0.88	17.46^{a}± 0.63	17.06^{ab}± 0.87
	20	15.55^{c}±0 .56	18.63^{a}± 0.64	17.43^{abc}±0.90	15.99^{bc}±0 .86	17.29^{abc}±0.90	18^{ab}± 0.63	16.98^{abc}± 0.64
	30	14.86^{c}±0.527	18.88^{a}± 0.65	15.76^{bc}±1.07	16.23^{abc}±1.05	17.68^{ab}± 0.7	18.14 ^{b}±0.97	16.67^{abc}±0 .91

Values (Mean±S.E) with different superscript letters within the same raw were significantly different at P<0.05.

Table 2 Serum glucose (mg/dl), progesterone (ng/ml), (LH and FSH (mlU/ml)) hormones level in healthy and experimentally induced PCOS non-treated and herbal treated groups of female rats.

Component	Days	Control	C.PCOS	Herbal treated groups				
				S.o	O.v	A.c	E.a	Herbal mix
Glucose	10	57.79^{b}±3.57	80.6^{a}± .73	75.07^{a}± .79	73^{a}± 2.85	75.65^{a}±2.65	77.93^{a}± .49	77.6^{a}±2.62
	20	63.14^{c}±2.62	84.07^{a}±3.19	73.5^{abc}±2.33	68 ^{bc}± 3.15	77.64^{ab}±4.59	74.71^{abc}±5.37	79.0^{ab}±4.04
	30	60.5^{c}± 3.01	79.71^{a}±3.01	66.86^{bc}±4.20	63.2^{bc}± 4.17	74^{ab}± 2.79	71.36^{abc}±3.42	71.29^{abc}±3.26
Progesterone	10	6.93^{a}±0.630	3.74^{b}±0.572	5.9^{a}± 0.797	5.34^{ab}±0 .782	3.67^{b}± 0.462	3.91^{b}± 0.542	4.96^{ab}± 0.645
	20	7.36^{a}± 1.10	4.48^{b}±0.645	5.57^{ab}± .760	6.31^{ab}± 0.836	4.75^{ab}±0.760	4.35^{b}± 0.690	6.13^{ab}± 1.22
	30	8.19^{a}± 1.07	3.86^{c}±0.744	6.91^{ab}±0.904	7.32^{ab}± 1.07	4.13^{c}± 0.847	4.74^{bc}± 0.693	7.18^{ab}± 0.811
LH hormone	10	0.42^{b}±0.084	0.85^{a}±0.141	0.72^{ab}±0.135	0.68^{ab}± 0.110	0.75^{ab}±0.119	0.83^{a}± 0.127	0.86^{a}± 0.080
	20	0.51^{a}±0.099	0.80^{a}±0.146	0.66^{a}±0.087	0.60^{a}± 0.118	0.76^{a}± 0.112	0.81^{a}± 0.119	0.68^{a}± 0.088
	30	0.48^{c}±0.088	0.91^{a}±0.098	0.64^{abc}±0.097	0.58^{abc}± .113	0.84^{ab}±0.141	0.86^{ab}± 0.095	0.54^{bc}± 0.123
FSH hormone	10	0.31^{a}±0.052	0.45^{a}±0.092	0.40^{a}±0.065	0.35^{a}± 0.067	0.43^{a}± 0.088	0.5^{a}± 0.084	0.42^{a}± 0.126
	20	0.25^{a}±0.040	0.51^{a}±0.118	0.37^{a}±0.084	0.41^{a}± 0.101	0.52^{a}± 0.157	0.47^{a}± 0.146	0.35^{a}± 0.103
	30	0.33^{a}±0.068	0.54^{a}±0.114	0.39^{a}± 0.105	0.36^{a}± 0.110	0.49^{a}± 0.124	0.46^{a}± 0.115	0.43^{a}± 0.111

Values (Mean±S.E) with different superscript letters within the same raw were significantly different at P<0.05.

Table 3 Serum total cholesterol, triacylglycerides, HDL-C, LDL- C and VLDL-C level (mg/dl) in healthy and women with PCOS.

	Total cholesterol	Triglycerides	HDL	LDL	VLDL
Control	131.39±5.25[a]	55.99±2.07[a]	42.29±1.32[b]	79.94±3.3[a]	11.15±0.42[a]
PCOS	185.89±7.09[b]	98.57±4.04[b]	32.43±1.31[a]	140.09±4.44[b]	20.00±0.82[b]
LSD	19.21	9.90	4.06	12.06	2.00

Table 4 Serum progesterone (ng/ml), LH and FSH (mlU/ml) hormones level in healthy and omen with PCOS

	Progesterone	LH	FSH
Control	1.57±0.3[b]	5.58±0.56[a]	10.51±0.55[a]
PCOS	0.51±0.11[a]	14.19±1.49[b]	18.56±2.63[b]
LSD	0.70	3.48	5.85

But, the administration of the herbal mix to experimentally induced PCOS in female rats showed significant decrease in the mean value of serum total cholesterol, low density lipoprotein-cholesterol (LDL-C), and LH hormone and revealed non-significant decrease in the mean value of serum glucose, triglycerides, very low density lipoprotein -cholesterol (VLDL-C) and FSH hormone. On the other hand, administration of herbal mix revealed a significant increase in high density lipoprotein-cholesterol (HDL-C) and progesterone hormone level.

4. DISCUSSION

Polycystic ovary syndrome (PCOS) is a prevalent and frequently encountered endocrine disorder, It has been suggested that this condition occurs in as many as 4-10 percent of women of reproductive age, with onset manifesting as early as puberty. It is primarily characterized by hyperandrogenism, insulin resistance, and chronic anovulation [33].

The recorded data demonstrated in the present study showed, a significant increase in the mean value of serum glucose level in experimentally induced PCOS female rats allover the periods of the experiments. The recorded data came in accordance with the result of [10] who observed that the prevalence of non-insulin-dependent diabetes mellitus (NIDDM) was higher in the women with PCOS when compared with control group.

The recorded increased value of serum glucose may be attributed to insulin resistance as suggested by [24] who reported an excess of insulin floating around the circulation of the body may lead to insulin resistance, as the body's tissues get more accustomed to excess insulin being produced. If this is not treated in time this can result in impaired glucose tolerance, and late, to Type II Diabetes Mellitus.

Our data revealed that treatment with *S. officinalis* resulted in a significant decrease in the mean value of serum glucose level in experimentally induced PCOS after 30 days of herbal treatment when compared with control PCOS group. Our data were in a good agreement with [14] who demonstrated that, the oral administration of aqueous extract of *S. officinalis* caused marked amelioration of serum glucose concentration of alloxan induced diabetic rat beside elevation insulin concentration.

Moreover, [11] showed that a sage methanolic extract given intraperitoneal

significantly reduced serum glucose in fasted streptozotocin induced diabetic rats without change in insulin level.

The recorded decreased glucose level after administration of sage may be related to the increased ability of liver to take up glucose as confirmed by [1] who stated that Sage may also lower blood glucose levels, via two ways by increasing the ability of liver cells to take up sugar and by decreasing the body's ability to convert fats and proteins from food into sugar. As well as, prolonged treatment with sage may increase the number of insulin-producing cells in the pancreas.

Our data revealed that treatment with *Origanum vulgare* showed significant decrease in mean value of serum glucose level in experimentally induced PCOS female rats after 20 and 30 days of herbal treatment when compared with control PCOS group. This decrease may be related to improving insulin sensitivity as confirmed by [30] who indicated that an oral administration of a combination of essential oils including cinnamon, cumin, fennel, oregano, myrtle besides others, was able to enhance insulin sensitivity in type 2 diabetes, in addition to lowering circulating glucose in the tolerance testing in rats.

Our obtained results revealed a significant increase in serum TG, LDL-C and VLDL-C allover the periods of treatment and revealed a significant increase in serum TC mean value in experimentally induced PCOS female rats after 20 and 30 days of herbal treatment when compared with normal control group

Also, our data revealed significant decrease in serum high density lipoprotein cholesterol (HDL-C) concentration which was observed in experimentally induced PCOS female rats after 30 days of herbal treatment when compared with normal control group.

The present data showed that the mean values of serum total cholesterol, triglycerides, LDL-C and VLDL-C level were significantly increased in women with PCOS on comparison with healthy control group. While, the mean value of serum HDL-C level was significantly decreased in women with PCOS on comparison with healthy control group.

Our recorded data both in vitro and in vivo were in a good agreement with [32] who performed several studies that have examined the association between PCOS and dyslipidemia, showing that PCOS patients have an atherogenic lipid profile with increased serum LDL-C and triglycerides and decreased HDL-C levels on comparison with controls, PCOS patients had serum levels of triglycerides twice as high and mean HDL-C levels 26% lower. The recorded increased value of serum triglycerides and decreased value of serum HDL-C may be attributed to the inhibition of lipolysis by hyperinsulinemia as mentioned by [26] who revealed that Insulin resistance is associated with an unfavorable lipid profile with low HDL-C and high triglyceride levels, and this unfavorable effect may be related to hyperinsulinemia which inhibits lipolysis with a consequent increase in levels of non-esterified fatty acids. High levels of non-esterified fatty acids led to increased triglyceride levels and reduced HDL-C levels. Furthermore, [7] showed that a single neonatal dose of testosterone cause insulin resistance, increase in intra abdominal adipose tissue and adipocyte size, and dyslipidemia in adult female rats, Testosterone-treated rats had increased concentrations of TC, LDL-C, and TG and a higher atherogenic index.

In the present study it was found that treatment with *S. officinalis* resulted in significant decrease in the mean value of serum total cholesterol and triglyceride level in vitro after 30 days of herbal treatment, at the same time it cause significant increase in the mean value of serum (HDL-C) level after 30 days of herbal treatment when compared with control PCOS group.

Our data are in a good agreement with [14] who found that treatments of alloxan

diabetic rats with sage produced marked decreases of serum triglycerides, total cholesterol concentrations; and also elevated HDL/cholesterol and reduced LDL/HDL ratios to reach normal values. The recorded decreased serum TG and TC concentrations after administration of sage may be related to inhibition of cholesterol biosynthesis as confirmed by [14] who indicated that the hypocholesterolemic action of the tested plant is attributed to the ability to suppress cholesterol biosynthesis. Furthermore, [9] stated that extracts from some sage species have been shown to be effective in the prevention of cardiovascular diseases due to prevention of LDL-C oxidation

Our obtained data revealed that Treatment with *O. vulgare* resulted in, significant decrease in the mean value of serum TC,TG, (LDL-C) and (VLDL-C) level in vitro after herbal treatment when compared with control PCOS group.

The recorded data are in a good agreement with the result of Srihari *et al.* [27] who reported that Oregano supplementation (40 mg/kg) had a modulatory role on tissue lipid peroxidation and antioxidant profile in colon cancer-bearing rats, which suggested a possible anti-cancer property of oregano.

Treatment with mix group resulted in significant decrease in the mean values of serum TC and (LDL-C) level in which may be related to the antihyperlipidemic effect of flavonoids as confirmed by [19] who revealed that flavonoids present in some plants and spices has lipid lowering activity, through inhibition of lipid peroxidation. Also, Treatment with herbal mix resulted in significant increase in (HDL-C) level in experimentally induced PCOS in female rats after 10 days of herbal treatment when compared with control PCOS group.

The recorded increased HDL-C mean value after administration of herbal mix could be attributed to presence of alkaloids, nicotinic acid in the herbal mix which has the ability to increase HDL-C level as confirmed by [1] who stated that Fenugreek seed contains the alkaloid trigonella, nicotinic acid and coumarins which has the ability to increase HDL-C level and pancreatic function.

The obtained results demonstrated showed that a significant decrease in serum progestrone was observed in experimentally induced PCOS in female rats all over the treatment periods of the experiment when compared with normal control group.

The recorded data presented revealed that the mean value of serum progesterone level was significantly decreased in PCOS women when compared with healthy control group.

The obtained results both in vitro and in vivo were in a good agreement with [4] who reported that at 42 days of age puberty in control animals was evident by the appearance of corpora lutea. On contrast, in treated animals no corpora lutea formation was seen even at the age of 56 days. Progesterone in the control animals was elevated at the age of 42 days in contrast with the T treated animals in which progesterone remained low (20% of control).

Treatment with *S. officinalis* resulted in significant increase in the serum progestrone level in PCOS induced female rats after 10 and 30 of herbal treatment in experimentally induced female rats when compared with control PCOS group.

In this respect Ohlsson *et al.* [22] stated that flavonoids are endocrine disruptors, acting both at receptor level and by interfering with steroid hormone synthesis. An equimolar mixture of the flavonoids caused inhibition of cortisol, aldosterone and testosterone secretion in an additive manner

The obtained results demonstrated revealed that a significant increase in serum LH hormone concentration was observed in experimentally induced PCOS female rats after 10 days and after 30 days of herbal treatment when compared with normal control group.

Our data revealed that the mean values of serum LH and FSH hormones level were significantly increased in PCOS females on comparison with healthy control group.
In this study the results obtained both in vitro and in vivo are came in accordance with [2] who stated that insulin has been demonstrated to modulate pituitary activity in vitro also insulin was shown to stimulate both basal and GnRH-stimulated release of LH and FSH in rat pituitary cells.
While, Kalro *et al.* [16] reported that in women with PCOS, 55–75% have a high LH to FSH ratio due to more increased levels of LH than low levels of FSH.
Treatment with *S. officinalis* resulted in non significant decrease in the serum LH and FSH in experimentally induced PCOS female rats all over the periods of herbal treatment of experiment when compared with control PCOS group.
The recorded decrease in the mean values of serum LH and FSH after administration of *S. officinalis* could be attributed to its estrogenic influence as mentioned by Brinker [5] who showed that Plants with estrogenic property can directly Influence pituitary action by peripheral modulation of LH and FSH, decreasing secretion of these hormones and blocking ovulation.
Treatment with herbal mix group resulted in significant decrease after 30 days of herbal treatment in experimentally induced PCOS female rats when compared with control PCOS group.
The recorded decreased LH value after administration of herbal mix may be attributed to the propereties of Alkaloids and flavonoids as confirmed by [18] who found that Alkaloids and flavonoids have been shown to reduce plasma concentrations of LH, estradiol and FSH.

5. CONCLUSION

From the obtained results of the present study it could be concluded that, the experimental induction of PCOS in female rats revealed:

1. A significant increase in serum glucose, total cholesterol, triglycerides, low density lipoprotein -cholesterol (LDL-C), very low density lipoprotein-cholesterol (VLDL-C) and LH hormone level.
2. A significant decrease in serum high density lipoprotein -cholesterol (HDL-C) and in Progesterone hormone level

Therefore, it was recommended that administration of *Salvia officinalis*, *Origanum vulgare* and the herbal mix in women with PCOS are very essential and should be used with therapeutic dose level which may improve the progression of the disease and attenuate the undesirable effect of dangerous metabolic and hormonal changes in women with PCOS.

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مجلة بنها للعلوم الطبية البيطرية
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التأثير الكيميائى الحيوي لبعض الأعشاب الطبية فى تكيس المبايض المحدث تجريبيا

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الملخص العربى

تم إجراء هذا البحث لدراسة التأثير الكيميائى لبعض الأعشاب الطبية على مرض تكيس المبايض المحدث تجريبيا فى إناث الفئران وهذه الأعشاب تضمنت المرمرية والبردقوش وكزبرة البئر وأيضا عشب ذنب الخيل. فلقد أجريت هذه الدراسة على 84 من إناث الفئران البالغة من العمر 21 يوم تم تقسيمهم الى سبع مجموعات تضمنت كل مجموعة 12 من إناث الفئران. المجموعة الأولى :(المجموعة الضابطة) تحتوى على 12 فأرا لم تتلقى أى أدوية واستخدمت كمجموعة ضابطة للمجموعات الأخرى. والمجموعة التجريبية: تشتمل على 72 فأرا تم إحداث تكيس المبايض فيهم تجريبيا عن طريق حقنهم بمادة التستسترون بروبيونات الذائب في البروبيلين جليكول تحت الجلد بجرعة مقدارها 1 ملى/ 100جم من وزن الجسم لمدة 35 يوم وقد تم تقسيمهم الى ستة مجموعات تحتوى كل مجموعة على 12 فأرا. المجموعة الثانية: تحتوى على 12 فأرا استخدمت كمجموعة مرضية ضابطة لم تتعاطى أى عقار طوال فترة التجربة. أما باقى المجموعات فقد أعطيت المستخلص المائى للأعشاب السابقة عن طريق الفم يوميا لمدة 30 يوم وذلك بعد إحداث المرض كما سبق ذكره. وتم جمع عينات الدم من الجيب الوريدي خلف العين من حيوانات كل مجموعة بعد10 ، 20، 30 يوما من بداية العلاج. كما أجريت الدراسة أيضا على 10 من سيدات تعانين من مرض تكيس المبايض وتم تجميع 10 عينات أخرى من سيدات صحيحات كمجموعة ضابطة. هذا وقد استخدم مصل الدم لقياس كل من الجلوكوز,الكولستيرول الكلي، الدهون الثلاثية والكوليسترول عالي الكثافة والكوليسترول منخفض الكثافة وأيضا الكوليسترول منخفض الكثافة جدا وهرمون البروجيسترون,والهرمون الليوتينى (ال اتش) وأيضا الهرمون الجريبي.هذا وقد أسفرت هذه الدراسة التي أجريت على كل من إناث الفئران البيضاء التي أحدث فيها مرض تكيس المبايض تجريبياً والنساء اللواتى يعانين من مرض تكيس المبايض عن حدوث تغيرات واضحة في عملية التمثيل الغذائي و في نسب الهرمونات وكان ذلك واضحاً من زيادة تركيز كل من الجلوكوز والكولستيرول الكلي والدهون الثلاثية والكوليسترول منخفض الكثافة والكوليسترول منخفض الكثافة جداً وهرمون ال اتش زيادة معنوية ومن الجانب الأخر حدث نقص معنوي في تركيز الكوليسترول عالي الكثافة في مصل الدم وهرمون البروجيسترون. وقد أوضحت الدراسة أن إعطاء المستخلص المائي لنبات الميرمية للفئران المحدث بها مرض تكيس المبايض تجريبياً يسبب نقص معنوي في تركيز كل من جلوكوز الدم والكولستيرول الكلي والدهون الثلاثية والكوليسترول منخفض الكثافة والكوليسترول منخفض الكثافة جداً مع زيادة معنوية في تركيز كل من الكوليسترول عالي الكثافة والبروجيسترون. أما المستخلص المائي لنبات البردقوش تسبب فى نقص معنوي في تركيز كل من جلوكوز الدم و الكولستيرول الكلي والدهون الثلاثية والكوليسترول منخفض الكثافة والكوليسترول منخفض الكثافة جداً مع وجود زيادة معنوية في تركيزالبروجيسترون ولقد بينت الدراسة أيضا أن إعطاء المستخلص المائي لخليط الأعشاب السابق ذكره للفئران المحدث بها مرض تكيس المبايض تجريبياً تسبب فى وجود نقص معنوي في تركيز كل من الكولستيرول الكلي والدهون منخفضة الكثافة وهرمون ال اتش مع زيادة معنوية في تركيز كل من الدهون عالية الكثافة والبروجيسترون. لذلك تنصح الدراسة باستخدام المرمرية والبردقوش أو خليط الأعشاب السابق للسيدات اللاتى تعانين من مرض تكيس المبايض بالجرعة المسموح بها وذلك للإقلال من تقدم المرض ومضاعفاته.

(مجلة بنها للعلوم الطبية البيطرية: عدد 23 (1)، يونيو2012: 61-71)