دور مستخلصي حبة البركة و العرق سوس علي تكيسات المبايض في فئران التجارب

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Polycystic ovarian syndrome (PCOS) is a compounded disorder characterized by elevated androgen levels, menstrual irregularities and cysts on either one or both ovaries. PCOS is believed to be a genetically complex endocrine disorder of undetermined etiology with a complicated pathophysiology (**Jada et al., 2023**). PCOS is considered a multifactorial health issue. Hormonal imbalance, family history, stress, obesity and use of contraceptive drugs are the main factors leading to syndrome induction. Furthermore, PCOS is also considered genetic in nature (**Barrea et al., 2019**).

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PCOS causes fibrosis of ovarian tissues leading to a degeneration of ovarian cells which progressively initiates various ovulation disorders. The process of ovarian fibrosis is stimulated by the action of transforming growth factor-β (TGF-β), Cytokines which is directly related to the stimulation of fibrosis in ovarian tissues (**Tanwar et al., 2022**). PCOS symptoms include, excessive body hair, especially on the back, stomach, and chest, gaining weight, especially around the midsection, greasy skin, acne baldness with a male pattern, small bits of extra skin around the neck or under the armpits, spots of thick or dark skin (**Soni et al., 2022**).Using various herbal remedies as natural antioxidants is suggested for improving all clinical features of PCOS to recover the menstrual cycle and normal serum hormone levels. Therefore, antioxidant supplementation is known to be effective in reducing testosterone, polycystic ovaries, and improving reproductive cycles (**Lee and Jo , 2021**).**Nigella sativa** belongs to Ranunculaceae also ,commonly known as black seed. Nigella Sativa a highly valued nutraceutical herb with a wide array of health benefits, has attracted growing interest from health-conscious individuals, the scientific community, and pharmaceutical industries. The pleiotropic pharmacological effects of black cumin, and its main bioactive component thymoquinone , have been manifested by their ability to attenuate oxidative stress and inflammation, and to promote immunity, cell survival, and energy metabolism, which underlie diverse health benefits, including protection against metabolic, cardiovascular, digestive, hepatic, renal, respiratory, reproductive, neurological disorders and cancer(**Hannan et al ., 2021**). **Nigella Sativa** seeds are largely attributed to their wide array of medicinal properties, including antioxidant, anti-inflammatory, immunomodulatory,

anticancer, neuroprotective, antimicrobial, antihypertensive, cardioprotective, antidiabetic, gastroprotective, nephroprotective and hepatoprotective properties (**yimer et al., 2019**). Nigella Sativa seed, particularly its essential oil, contains thymoquinone , thymohydroquinone, thymol, carvacrol, nigellidine, nigellicine, and heder in, which are mostly responsible for its pharmacological effects and therapeutic benefits (**kooti et al., 2021**). The food value of black cumin, although less focused on in scientific literature, is by no means low, because it contains an adequate quantity of protein and fat, and an appreciable amount of essential fatty acids, amino acids, vitamins, and minerals (**kabir et al ., 2019**).**Anjum et al., (2020)** showed that the Nigella Stevia contains 4.5 % ash 8.4% fiber, and protein 40.6%. **Licorice** is scientifically known as Glycyrrhiza glabra and belongs to the Leguminosae family. G. glabra is an ayurvedic herb that is frequently utilized is one of the most used herbal plants in foods, in medicinal forms, and substantially researched on a worldwide scale. It was used as traditional and complementary medicine against innumerable ailments including allergies, liver toxicity, gastric ulcer, lung diseases, skin disorders, oral health problems including tooth decay, and inflammation. The constituents of licorice include various essential oils, sugars, inorganic salts, resins, amino acids, and nucleic acids. Biological activity has been observed to be portrayed by active compounds of licorice including triterpene, flavonoids, saponins, and contain estrogenic components that might, in principle, provide a spectrum of beneficial effects with reduced stimulation of the breast and uterus compared with that of the endogenous hormone estradiol (E2) or the pharmaceutical estrogens used in hormone replacement therapy. (**Yujin et al ., 2020**).(**Badr et al ., 2020**) reported that the

licorice contains 3-4 % ash, 20-25 fiber and 19-25% protein. Licorice are a good source of minerals especially calcium , phosphorous , magnesium , potassium and very low amount of sodium (**Adeleke et al., 2021**) .This study aims to show the impact of feeding with the role of nigella sativa and licorice extracts on polycystic ovaries in experimental rats.

Materials and methods

Materials

Plant materials

Herbals Nigella sativa and Licorice (**Glycyrrhiza glabra**) were obtained from Agricultural Research Center, Giza, Egypt.

Chemicals

Estradiol® drug, olive oil, ethanol and Glucophage were purchased from United Company for drugs, Assuit, Egypt.

Methods

Preparation of Nigella Sativa and Licorice extracts

The ethanolic extract of **Nigella Sativa** dry powdered seeds was carried out according to the modified method of **Cochrane et al., (2015);** 800 g of powder was soaked in 2000 ml absolute ethanol at room temperature for 24 h under continuous stirring; then the mixture was filtered through sterile filter paper (Whatman number 42, England). The solvent was evaporated using a rotary evaporator, and then the extract was stored at −20°C until further use. Extractions were performed in triplicate. According to the method of **Hashem et al., (2017).** The aqueous extraction process of **Licorice** was carried out 8 g of the powdered herb material were placed in a 100 ml round-bottom quick fit-flask, and 400 ml distilled water were

added; the mixture was left for 24 hours and filtered through qualitative Whatman filter paper No.1 (Whatman International Ltd, Maidstone, England). In Aroma and Flavoring Department, National Research Center, the filtrates were subjected to lypholyzation process through freeze drier (Snijders Scientific– tilburg, Holland) under pressure (0.1 to 0.5 mbar) and temperature (−35 to −41°C) conditions. The dry extract was stored at −20°C until further investigation as fast as possible.

Chemical methods

Determination of the gross chemical composition of Nigella sativa and Licorice

Moisture, ash, protein, crude fat and crude fiber were determined according to the method outlined by (**A.O.A.C., 2010**).

Carbohydrate content

The total carbohydrate content of the studied Nigella Sativa and Licorice extract sample was calculated by difference 100 – (moisture +ash + protein+ fat + fiber) according to the method described in (**A.O.A.C., 2010**). The caloric value was calculated according to the methods of **Seleet, (2010)**

Determination of minerals content of Nigella Sativa and Licorice

The total content of minerals was carried out using a mixture of perchloric acid/ nitric acids ($HClO_4$/ HNO_3) according to (Inductivelv Coupled Plasma Emission Spectrometry) the minerals, Calcium (Ca) and Potassium (P) were determined using the ICP (ICAP6200) according to (**Isaac and Johnson, 2002**). Sodium (Na) content was estimated using flame photometry (jenway PFP_7) according to the reported by (**A.O.A.C., 2010**).

The antioxidant of Nigella Sativa and Licorice extract

Determination of total phenolic content (TPC)

The content of total phenolic compounds in the extracts was estimated according to **Jayaprakasha et al., (2003).**

Determination of Nigella Sativa and Licorice extract radical scavenging activity (RSA)

The capacity of antioxidants in the extracts to quench DPPH radical was determined using the method of **Nogala-Kalucka et al., (2005).**

Experimental design

seventy adult female Wistar albino rats (Rattus norvegicus), weighing (160±10) g were obtained from the Animal Colony, National Research Centre, Giza, Egypt; the rats were kept in suitable plastic cages and maintained on free access to food and water for a week before starting the experiment for acclimatization; they received human care in compliance with the standard institution's criteria for the care and use of experimental rats according to the ethical committee of Faculty of Science, Al-Azhar University, Assuit, Egypt; however, this study was approved by the same ethical committee. After the rats being acclimatized with experimental room conditions, they were divided randomly into seven groups (10 rats each). The groups of rats were divided **as follow**: group (1): comprised of normal healthy rats as control negative groups, group (2): comprised of rats those were subjected to oral administration of Nigella stevia ethanolic extract (NEE) (150 mg/kg/day), group (3): comprised of rats those were subjected to oral administration of licorice aqueous extract (LAE) (100 mg/kg/day), group (4): comprised of rats those were subjected to injection intramuscularly at adose of (0.2 mg/kg weekly) of Estradiol ® as a appositive control, group (5): comprise of Estradiol®-induced

polycystic ovary rats those were treated with oral of (150 mg/kg/day) NEE , group (6): comprised Estradiol®–induced polycystic ovary rats those were treated with oral of (100 mg/kg/day) LAE and group (7): comprise of Estradiol®–induced polycystic ovary rats those were treated with oral of (50 mg/kg/day) reference drug (Glucophge®).

Biochemical determinations

Serum triglycerides, total cholesterol, HDL–c , LDL–c and serum glucose were determined according to (**Cole et al., 1997 ; Artiss and Zak, 1997 ; Lopes–Virella et al.,1977 ; Wieland and Seidel , 1983 and**) ; respectively. Serum ALT , AST , ALP were determined according to **Schumann & Klauke, (2003) ; Moss and Henderson (1999)) and IFCC, (1983)**;respectively.Serum urea, creatinine and uric acid were determined according to the method described by (**Husdan and Rupoport, 1969 ; Trinder, 1969 ; and Chaney et al., 1960**) ; respectively.

Histopathological study

For hestopathological examination, selected parts of the ovary of different groups were removed and fixed in 10% buffer neutral formalin saline. 5µm thick paraffin sections were microtomed and stained with haematoxylin and eosin as well as investigated by light microscope***(Bozzol and Russell, 1991)***

Statistical analysis :Statistical analysis was carried out according to Steel and Torrie, (1960).

Results and discussion

Gross chemical composition and caloric value of Nigella Stevia and Licorice on a dry weight basis

Table (1): Gross chemical composition and caloric value of Nigella Stevia and Licorice on dry weight basis(g/100g)

Samples	Moisture%	Ash %	Protein%	Crude fiber%	Crude fat%	Total. Carbohydrate %	Caloric values k. cal./100g
Nigella Stevia powder	15.24±1.5	0.78±.04	13.56±2.01	2.1±0.19	0.97±0.03	67.37±2.25	332.37±3.57
Licorice powder	4.93±0.54	9.13±0.2	8.62±1.51	46.08±1.5	2.62±0.1	71.38±5.9	343.58±2.57

- Carbohydrates were calculated by difference. - Mean of three replicates

The data in Table (1) revealed that moisture and protein were recorded the higher percentage in Nigella Stevia than Licorice powders. And the lower percentage was for ash, crude fiber , fat and total carbohydrates recorded (0.78%, 2.1% , 0.97% and 67.37%); respectively when compared with Licorice powder. The caloric value of Nigella Stevia and licorice were recorded (332.37 and 343.58) k. cal./100g. Our results are similar to those obtained by (Anjum et al., 2020) who found that nigella stevia had a high percentage of protein (13.7%). Gamal et al ., (2020) they reported that moisture , ash , protein and fat content were (4.11 % , 8.61% , 7.19 % and 2.21%) ; respectively in Licorice , and disagreement with(Takruri and Dameh ,2018) they reported that Nigella Stevia contains moisture (3.8%), ash (4.5%) , crude protein (2.6%), fat (40,6%) , crude fiber (8.4%). Badr

et al ., (2020) obtained that proximate analysis of Licorice was carbohydrate (47.11%), fiber (24.48%), protein (19.15%), and fat content (0.53%). Variations in moisture contents, ash, protein, crude fiber, crude fat and carbohydrate due to several factors such as climate and growing and postharvest management and processing conditions.

Minerals content of Nigella Stevia and Licorice on A dry weight basis

100g) /Table (2) minerals content of Nigella Stevia and Licorice (mg

Samples	Ca (mg/100g)	Na (mg/100g)	P (mg/100g)
Nigella stevia powder	571.5 ± 32.5	22.88 ± 2.95	704.5 ± 18.0
Licorice powder	191.1±19.5	3.64±0.59	277.5±22.8

The data given in Table (2) revealed that minerals content of 22.88, Nigella Stevia recorded an increase in Ca , Na , P (571.5 , 100g ; respectively, than that of Licorice (191.1 ,3.64 and /704.5) mg 100g ; respectively. These results agree with (Ghanya et /277.5) mg al., 2019) they reported that Ca, Na and P were (564.00 mg/100g), (23.00 mg/100g) and (706.00 mg/100g) in Nigella Stevia. Licorice data in this study are disagreement with those obtained by (Chopra et al., 2019) who reported calcium (187.00 mg/100 g) phosphorous (298.06 mg/100 g) and sodium(4.1 mg/100 g). Ali, (2018) stated that the mineral content of Licorice, revealed relatively high amounts of calcium and phosphorus concentration in raw Licorice extract was reported to be (1720 and 78)mg/100 ; respectively.

Antioxidants of Nigella Sativa extract and Licorice extract

Nigella Sativa and Licorice extracts yield (%), total phenolic compounds (TPC) and radical scavenging activity (RSA)

Table (3): Nigella Sativa ethanolic extract and Licorice aqueous extract yield (%), total phenolic content (TPC) and radical scavenging activity (RSA)

Parameters / Extracts	Yield (%)	TPC(mg/g)	RSA (%)
Nigella ethanolic extract (NEE)	3.2±0.31	8.6 ±0.51	72.5 ±7.3
Licorice aqueous extract (LAE)	±0.47٤,١	12.5 ±1.13	66.7 ±4.6

The yield (3.2% and 4.1%) , total phenolic content (TPC) (8.6 and 12.5) mg/g and radical scavenging activity (RSA) (72.5% and 66.7%) of the Nigella ethanolic extract (NEE) and Licorice aqueous extract (LAE). These results agree with Gamal et al., (2020) who showed that (NEE) exhibited an appreciable amount of total phenolics 7.88 (mg/g) while radical scavenging activity (RSA) was 80% . Also (Senevirathne , 2018) reported that a significantly high of total phenolic content was exhibited by Nigella Stevia seeds with a 8.95 mg and radical scavenging activity with a value of 72.2%.(Younes et al ., 2021) reported that contain a good amount of phenolic compounds (12.4mg /g). Phenolic compounds donate a hydrogen atom and serve up as significant antioxidants because of their donating ability in order to form stable radical intermediates. Hence, phenolic compounds help in preventing the oxidation of different biological molecules.

Body weight gain

Table (4): Nigella Sativa extract (NEE) & Licorice aqueous extract (LAE) extract on body weight gain in female experimental rats(g/100g)

Parameters / Groups	Body weight gain (g/100g)
Group (1)Control(−)	104 ±5.9E
Group (2)NEE (150 mg/kg)	108.6 ±1.5E
Group (3)LAE (100 mg/kg)	106.6 ±2.3E
Group(4)Estradiol®(+)(0.2mg/kg)	161.2 ±10.8D
Group(5)Estradiol®+NEE(150mg/kg)	116 ±3.6C
Group(6)Estradiol®+LAE(150mg/kg)	131.6 ±4.3C
Group (7)Estradiol®+Glucophge® (50mg /kg)	129 ±9.4C

The same column, means with different superscript letters are significantly different **at ($p \leq 0.05$)**.

The effect of Estradiol®, Nigella sativa ethanolic extract (NEE) & Licorice aqueous extract (LAE) on the rats' body weight is shown in Table (4) , the results showed that rats treated with Estradiol® for the study had a significant increase in body weight gain, while rats treated with Nigella sativa ethanolic extract & Licorice aqueous extract alone showed non− a significant change in body weight gain when all were compared with the rats of the control group(−). In addition, when rats treated with Estradiol® companied with Nigella sativa ethanolic extract (NEE) & Licorice aqueous extract (LAE) showed a significant decrease in body weight when compared with the rat group treated

with Estradiol. The increase in body weight gain, due to eugenol that improvement the body weight gain . (Halder et al., 2011).

Effect of Nigella Stevia and Licorice extract of lipids profile and serum glucose

Table (5) Effect of Nigella Stevia and Licorice extract of serum (T.C), (TG.), (HDL-c) and (LDL-c) and glucose in rats

Parameters / Groups	T.C (mg/dl)	T.G (mg/dl)	HDL–c (mg/dl)	LDL–c (mg/dl)	Glucose (mg/dl)
Group(1)Control (–)	65.8±4.4A	157.2±13.5 A	46.2±1.3A	26.1±091C	106±2.15A
Group (2) NEE (150 mg/kg)	66.3±2.8A	152.8±11.1 A	45.5±0.70A	27.4±0.95C	103.4±3.39A
Group (3) LAE (100mg/kg)	66.3±4.9A	150.6±17.6 A	46.5±1.2A	26.2±1.02C	100.3±7.36A
Group (4) Estradiol®(+)(0.2mg/kg)	189±10.1 D	235.2±10.0 D	34.2±0.91D	88.2±5.39D	181.7±36D
Group (5) Estradiol®+NEE (150mg/kg)	118±7.74 E	185±6.87E	41.5±1.58E	61.9±3.11E	129.4±15.7E
Group (6) Estradiol®+LAE(100mg/kg)	124.6±4.2 E	167.3±6.5E	41±1.08E	55.07±1.8E	105.0±7.6E
Group (7) Estradiol®+Glucophge®(50mg /kg)	120.5±4.8 E	163±4.18E	40.5±1.08E	61.75±2.9E	105.0±9.4E

The same column, means with different superscript letters are significantly different **at ($p \leq 0.05$)**.

The obtained data showed that rats orally treated in groups(2 ,3) NEE & LAE (150 &100 mg /kg) for six weeks illustrated the non-significant change in serum (T.C), (TG.), (HDL-c) and (LDL-c) and glucose levels ; respectively. Our results are in keeping with those of Inayat et al. (2009), who reported that oral treatment with N. sativa powder in hypercholesterolemic patients at the dose of 1 g daily for two months was found to reduce TC, LDL and TG, .In contrast, in the group (4) the rats intoxicated with Estradiol® (0.2 mg/kg/weekly) only for a similar period showed a significant ($p \leq 0.05$) increase (T.C), (TG.) and (LDL-c) and glucose matched with significant decreased of (HDL-c), when all were compared to normal rats. On the other hand, the rats treated with Estradiol® in combination with NEE and LAE(group 5, 6) showed a significant decrease in serum (T.C), (TG.) , (LDL-c) and glucose when both were compared to the group with Estradiol®(+). These results were in accordance with the previous findings reported by (saher et al., 2023) Phytochemicals significantly reduced the serum levels of (TG.) ,(HDL-c) ,(LDL-c) and glucose. Furthermore, phytochemicals supplementation increased the levels of high-density lipoprotein cholesterol in the investigated groups treatment with Nigella Stevia and Licorice extract. The protective effect of Nigella Stevia and Licorice has been attributed to its strong antioxidant properties, which are related to its ability to scavenge various reactive oxygen species , block lipid peroxidation as well as enhance antioxidant enzymes (Al Wafai ,2019) .

Liver function:

Effect of Nigella Stevia and Licorice extract on serum liver enzymes

Table (6):Effect of Nigella Stevia and Licorice extract on serum ALT, AST and ALP(U/L) in female experimental rats

Parameters / Groups	ALT U/L	AST U/L	ALP U/L
Group (1)Control(−)	54.4±4.2A	136.2±4.1A	6.94±1.1A
Group (2)NEE (150mg/kg)	65.5±3.4A	131±15.5A	6.82±0.9A
Group (3)LAE (100mg/kg)	64.7±8.4A	132.6±5.2A	6.54±0.42A
Group(4)Estradiol®(+)(0.2mg/kg)	146.3±16.6D	212±15.0D	14.94±0.68D
Group(5)Estradiol®+NEE(150mg/kg)	87.05±9.3E	140.8±12.3E	9.16±0.87E
Group(6)Estradiol®+LAE(100mg/kg)	78.9±3.7E	139.1±10.5E	9.43±0.68E
Group (7)Estradiol®+Glucophge® (50mg /kg)	88.9±8.2E	145.08±16.4E	8.86±1.28E

The same column, means with different superscript letters are significantly different **at ($p \leq 0.05$)**.

The data showed that rats orally treated with the NEE and LAE (150 & 100) mg/kg for six weeks recorded non-significant changes in serum ALT, AST and ALP activities. In contrast, the rats intoxicated with Estradiol® (0.2 mg/kg/weekly) only for a similar period showed a significant increase, when all were compared to normal rats. (Abo-Samaha et al ., 2022) they reported that in comparison to control values, supplementation with two Licorice (0.4 and 0.8) g/L treatments induced a significant reduction in serum ALT, AST, ALP activity, confirming the hepato protective effect of licorice. Furthermore, treatment with licorice 0.8 g/L substantially reduces ALT .Many researchers report that plant extract contains chemical components that can interred with the metabolism process and reported the role of certain flavonoids, triterpenoids and steroids in

hepato-protection against hepatotoxins. The presence of these certain compounds in Nigella Stevia and Licorice is the reason for the protective effects of rat's liver (Hannan, et al., 2021).

Effect of Nigella Stevia and Licorice extract on kidney function

Table (7): Effect of Nigella Stevia and Licorice extract on urea, creatinine and uric acid (mg/dl) in female experimental rats.

Parameters / Groups	Urea (mg/dl)	Creatinine (mg/dl)	Uric acid (mg/dl)
Group (1)Control(-)	33.5±2.07A	0.52±0.0645A	3.11±0.163A
Group (2)NEE (150 mg/kg)	34.7±0.98A	0.51±0.556A	3.12±0.413A
Group (3)LAE (100mg/kg)	33.925±2.43A	0.54±0.041A	3.23±0.3657A
Group (4) Estradiol®(+)(0.2mg/kg)	51.75±1.13C	1.37±0.0579C	5.61±0.243C
Group (5) Estradiol®+NEE(150mg/kg)	42.9±2.35D	٠.84±0.0949D	3.63±0.45D
Group (6) Estradiol®+LAE(100mg/kg)	42.73±2.46D	٠.9±0.121D	3.56±0.352D
Group (7) Estradiol®+Glucophge® (50mg /kg)	42.05±1.32D	٠.863±0.067D	3.47±0.185D

The same column, means with different superscript letters are significantly different **at ($p \leq 0.05$)**.

The result of this study showed that rats orally treated with the NEE & LAE for six weeks recorded a non-significant change in serum urea, creatinine and uric acid. In contrast, the rats intoxicated with Estradiol® (0.2 mg/kg/weekly) only for a similar period showed a

significant ($p \leq 0.05$) increase in kidney function, when all were compared to normal rats. In addition, the rats treated with Estradiol® in combination with NEE and LAE showed asignificant decrease in serum creatinine, urea and uric acid when both were compared to that combination with Estradiol® only. (Nurten et al ., 2012) they found that defined a significant decrease in plasma urea, uric acid, and creatinine levels, in the licorice treatment groups . The protective and therapeutic effects of licorice against GM-induced nephrotoxicity appear to be associated with its antioxidative effects. The current results clearly indicated that nigella and licorice treatment with induce significant decreased in kidney markers (urea, uric acid and creatinine) compared with estradiol group. Moreover, it succeeded to induce an improvement in kidney function. Our results are in agreement with previous data reporting that N. sativa and licorice have a wide margin of safety (EL-Kholy et al., 2009 , AL Ameen et al., 2011).

Effect of Nigella stevia and Licorice extract on histological characteristics of Ovary in rats..

Light microscopic examination of ovarian sections of the control group stained with hematoxylin and eosin showed the normal histological structure of the ovary with normal cortical and medullary regions, including primary and secondary follicles (Fig. 1). Both herbal extract (1) and (2) groups appeared similar to those of normal control group with almost same findings (Fig. 2, 3).Estradiol induced polycystic ovary (PCO) group showed large cystic ovarian follicles, ovarian follicles with thin granulosa layer and cell debris within the follicular cavity and atretic degenerated follicles (Fig. 4). Both estradiol induced PCO and treated with herbal extract (1 and 2) showed remarkable improvement in the histological structure of the ovaries, where various stages of ovarian follicles were noticed with advantage for the herbal extract (2) which was nearly similar to control group (Fig. 5,6).These results are in accordance with (Shamsi et al., 2020)

who reported that licorice extract had a significant decrease in the number of atretic follicles.Estradiol induced PCO and reference drug treated group showed histological structure similar to that seen in the PCO group (Fig.2).These results are in agreement with (Zhang et al., 2019) and (Sherafatmanesh et al., 2020) they reported administration of thymoquinone could improve symptoms of PCOS and restore normal folliculogenesis in ovaries in a similar way to control rats. PCOS has been linked to an increase in oxidative stress and the generation of ROS. Furthermore, the ROS plays a pivotal role in the increase in the number of ovarian atretic follicles, the pathogenesis of ovarian cysts and the reduction in the volume of the corpus luteum . Since PCOS exhibits a marked number of cysts in ovarian tissue, therefore, beneficial effects of thymoquinone on PCOS may be due to its antioxidant or antiapoptotic properties. Oxidative stress increases the activity of ovarian steroid-producing enzymes and induces androgen synthesis, whereas antioxidant compounds prevent their activity . A previous study indicated that thylakoid and caraway extracts with antioxidant properties increased the volume of the corpus luteum, and the number of unilaminar, multilaminar, antral and graffian follicles, and decreased the number of atretic follicles.

These results are in agreement with (Amooee et al ., 2020) reported that the histopathological evaluation of ovarian tissues showed damaging changes in PCOS rats. A slight decrease was observed in the mean number of primordial and primary follicles of the PCOS group in comparison to the control group. The mean number of secondary and graffian follicles were decreased in the PCOS rats ($p \leq 0.001$). However, a clear increase in cystic ($p \leq 0.001$) and atretic follicles and a decrease in corpus luteum ($p \leq 0.001$) was perceived in

the PCOS-induced rats. Treatment with metformin and N. sativa seed extract, to some extent, improved the pathological changes.

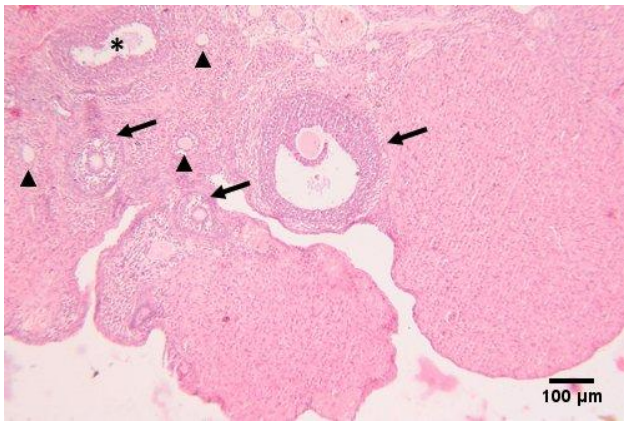

Fig. 1. Photomicrograph of an ovarian section of adult female albino rat of the control group showing normal histological structure of the ovary, consisting of outer cortex and inner medulla, primary follicles (arrow head), secondary follicles at different stages of growth including Graafian follicle (arrow), and atretic follicle (*).

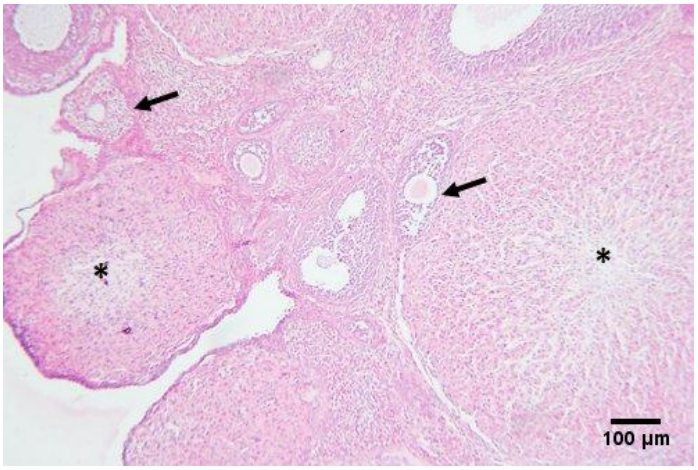

Fig. 2. Photomicrograph of an ovarian section of adult female albino rat of the herbal extract (1) group showing normal histological structure of the ovary, including growing follicles (arrow), and corpus luteum (*).

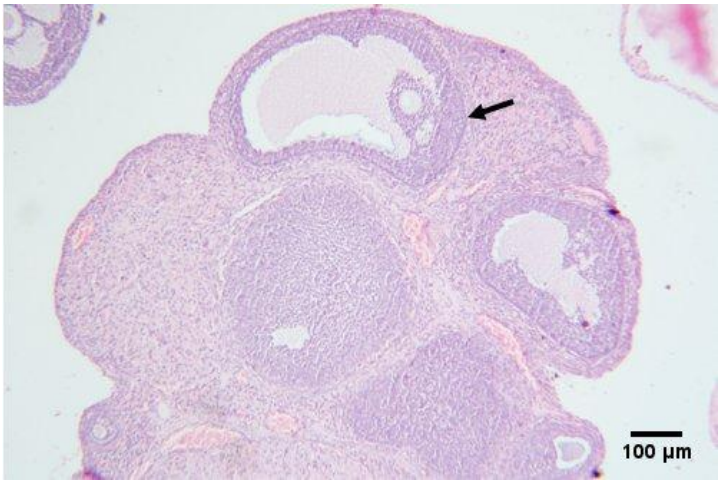

Fig. 3. Photomicrograph of an ovarian section of adult female albino rat of the herbal extract (1) group showing regular histological architecture of the ovary, including growing secondary follicle (arrow), and corpus luteum.

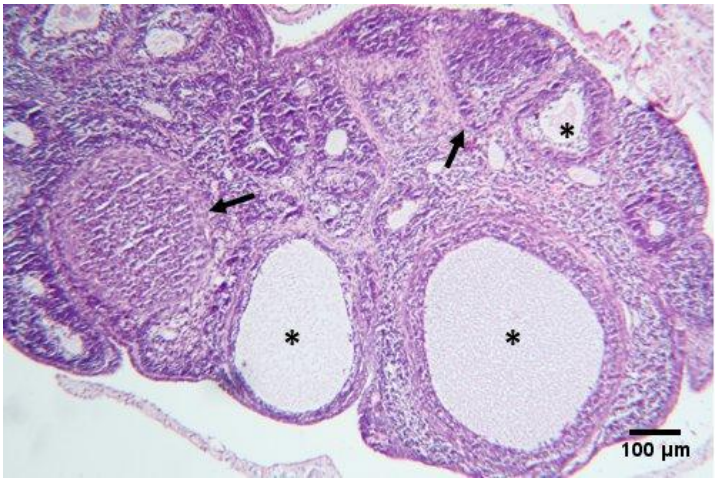

Fig. 4. Photomicrograph of an ovarian section of adult female albino rat of the estradiol induced PCO group showing atypical histological structure of the ovary, including atretic degenerating follicles (arrow), and cystic follicles (*).

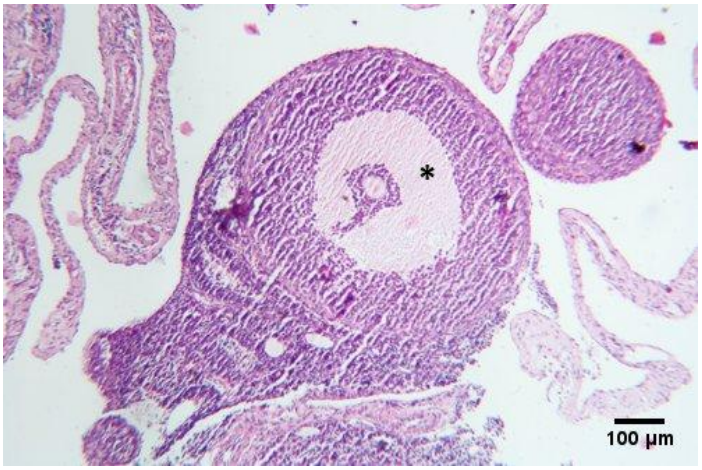

Fig. 5. Photomicrograph of an ovarian section of adult female albino rat of the estradiol induced PCO and herbal extract (1) treated group showing significant reduced atretic degenerating follicles (arrow), and showing presence of growing secondary follicles (*).

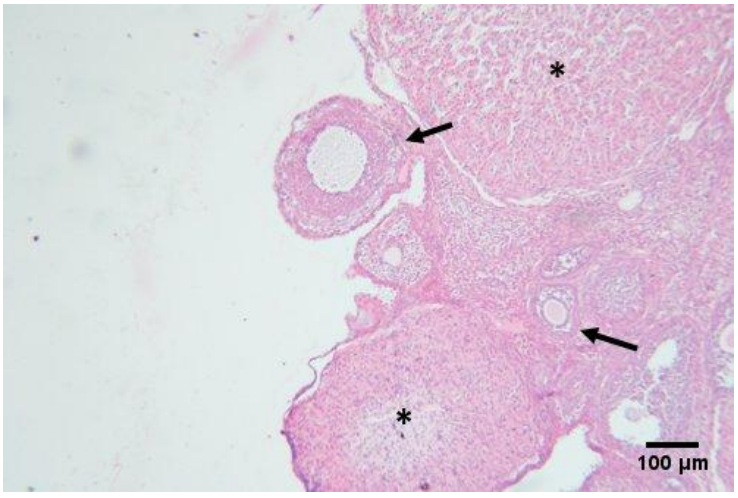

Fig. 6. Photomicrograph of an ovarian section of adult female albino rat of the estradiol induced PCO and herbal extract (2) treated group showing remarkable improvement of the histological structure of the ovary, including reduced atretic degenerating follicles, and improved growing follicles (arrow), and corpus luteum (*).

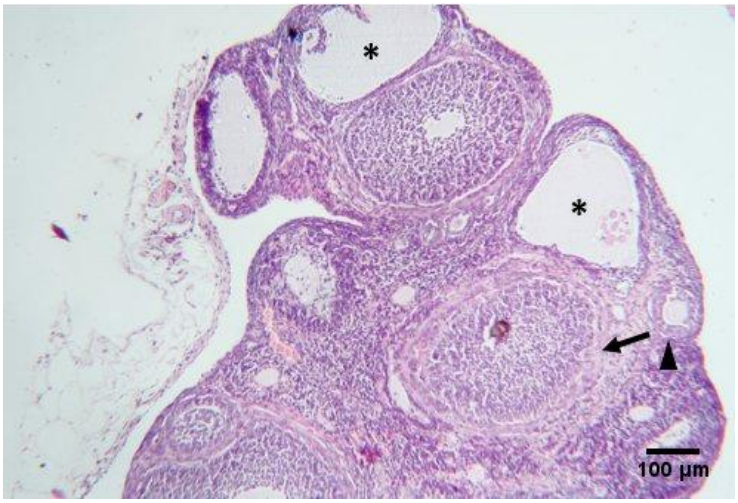

Fig.7. Photomicrograph of an ovarian section of adult female albino rat of the estradiol induced PCO and reference drug treated group showing approximately similar histological structure of the estradiol treated group with multiple atretic degenerating follicles (arrow), and cystic follicles (*).

Conclusion

In conclusion, this study demonstrates that the effect of Nigella Sativa and Licorice extracts on serum glucose, lipids profile, liver enzyme activities and kidney functions of rats feeding on Nigella Sativa and Licorice extracts was investigated. The obtained results observed that (Nigella sativa and Licorice extract) caused a reduction in serum glucose levels and significantly decreased serum lipids profile. Treatment with Nigella Sativa and Licorice extracts at different levels caused improvement in liver and kidney enzymes activities compared with control group. Therefore, it is recommended to take it daily.

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تأثير مستخلصي حبة البركة و العرق سوس علي تكيسات المبايض في فئران التجارب

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الملخص

تحدث متلازمة المبيض المتعدد التكيسات (PCOS) بسبب الإنتاج غير الطبيعي للأندروجينات مما يؤدي إلى تكوين أكياس صغيرة مملوءة بالسوائل في المبايض. تهدف هذه الدراسة إلي إستخلاص حبه البركة والعرق سوس ومعرفه تأثيرهما ضد تكيس المبايض في إناث الفئران. تم تقسيم إناث الفئران ويستر البيضاء البالغة (160±10) جم بشكل عشوائي إلى سبع مجموعات (١٠ فئران لكل مجموعه) على النحو التالي: مجموعة (١) فئران طبيعية تعمل كمجموعة ضابطه ، مجموعة (٢) فئران تتناول عن طريق الفم مستخلص حبة البركة جرعة (١٥٠ مجم / كجم/ يوم) ، المجموعة (٣) فئران تتناول عن طريق الفم مستخلص العرق سوس بجرعة (١٠٠ مجم / كجم/ يوم) ، المجموعة (٤) فئران تعرضت للحقن بالعضل

بجرعه (2.0مجم / كجم مرتين أسبوعياً) من الإستراديول ، المجموعة (٥) فئران مصابة بتكيس المبيض بالإستراديول وعولجت عن طريق الفم (١٥٠ مجم / كجم / يوم) من مستخلص حبة البركة ، ومجموعة (٦) فئران مصابة بتكيس المبيض إوعولجت عن طريق الفم بمستخلص العرق سوس (١٠٠ مجم / كجم / يوم). ومجموعة (٧) فئران مصابة بتكيس المبيض بالإستراديول وعولجت بالفم بالجلوكوفاج®. (٥٠ مجم / كجم / يوم) .أظهرت النتائج أن مستخلص حبة البركة نجح في تقليل تكيسات المبيض ؛ تم إثبات ذلك من خلال الانخفاض الكبير في انزيمات الكبد واليوريا والكرياتينين والكوليسترول الكلي والدهون الثلاثية و الكولسترول منخفض الكثافة والجلوكوز كما أوضحت الدراسة حدوث تغيرات هستولوجية في أنسجة المبيض لفئران التجارب. لذا توصي الدراسة باستخدام حبة البركة والعرق سوس في الغذاء لما له من فوائد عديدة.

الكلمات المفتاحية

حبة البركة ،العرق سوس ، مضادات الأكسدة ، وظائف الكبد والكلي ، دهون الدم، الفئران.

Impact of Nigella Sativa and Licorice Extracts on Polycystic Ovaries in Experimental Rats

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Abstract

Polycystic ovarian syndrome (PCOS) is caused by abnormal production of androgens resulting in the formation of small fluid-filled sacs in the ovaries. This study aims to show the role of Nigella sativa and Licorice extracts on polycystic ovaries in famale rats. seventy

adult female Wistar albino rats , weighing (160±10) g were randomly divided into seven groups (10 rats each) as follows: group (1): normal rats act as control negative groups, group (2): rats those were subjected to oral administration of Nigella stevia ethanolic extract (NEE) at a dose (150 mg/kg/day), group (3): rats those were subjected to oral administration of licorice aqueous extract (LAE) at a dose (100 mg/kg/day),group (4): rats those were subjected to injection intramuscularly of at a dose (0.2 mg/kg weekly) of Estradiol ® as an appositive control, group (5): rats Estradiol®–induced polycystic ovary those were treated with oral of NEE (150 mg/kg/day), group (6): rats Estradiol®–induced polycystic ovary rats those were treated with oral of LAE (100 mg/kg/day) and group (7): rats Estradiol®–induced polycystic ovary those were treated with oral of (50 mg/kg/day) reference drug (Glucophge®) for six weeks . The results revealed that (NEE, LAE)succeeded to decline the Polycystic Ovaries –induced by E®; there was evidenced by the significant reduction of Liver enzymes, urea, creatinine, total cholesterol, triglycerides, LDL and glucose coupled with marked improvement. Histopathological changes were also recorded in the ovaries of experimental rat. So this study recommended using Nigella Stevia and Licorice in diets for it's many benefits.

Keywords Nigella Sativa, Licorice, Antioxidant, Liver and kidney Functions, Lipids profile, Rats.