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**BIOLOGICAL STUDY ON THE EFFECT OF PUMPKIN  
SEEDS AND ZINC ON REPRODUCTIVE POTENTIAL  
OF MALE RATS**

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### **Abstract**

The present study was designed to investigate some chemical composition of pumpkin seeds and also determine the effect of pumpkin seeds and / or zinc on the nutritional and sexual healthy status. Forty-nine adult albino male rats Sprague –Dawley strain were classified into control negative (-ve) group and six rat groups which administered 50 mg of lead/kg body weight per day as testicular toxicant and classified into control positive (+ve), pumpkin extract, pumpkin oil, zinc, pumpkin extract with zinc and pumpkin oil with zinc groups. The study was assigned for three month.

The results revealed that, the control (+ve) group showed a significant decrease in weight gain; feed efficiency ratio; serum LH, FSH& testosterone; blood GPX & SOD and testis SOD, catalase, GPX, zinc& copper but a significant increase in testis LPX compared with control (- ve) group. The pumpkin extract rat group showed a significant decrease in weight gain; feed efficiency ratio; blood GPX & SOD and testis copper while the pumpkin oil rat group showed a significant decrease in weight gain; feed efficiency ratio ,blood GPX & SOD and testis copper but significant increase in testis LPX compared with control (- ve) group.

Zinc rat group showed a significant decrease in weight gain ,feed efficiency ratio and blood GPX & SOD but significant increase in testis LPX while the pumpkin extract with zinc and pumpkin oil with zinc groups showed a significant decrease in weight gain and feed efficiency ratio but a significant increase in serum LH compared with control (- ve) group.

The histopathological results showed that pumpkin extract, pumpkin oil and zinc rat groups had lower changes of testis but pumpkin extract with zinc and pumpkin oil with zinc rat groups showed normal structure of testis.

In conclusion, the administration of pumpkin seeds and zinc can lower the side effects of a lead testicular toxicant and improve the healthy status of testis with increase of reproductive potential. Pumpkin seeds can be considered as one of aphrodisiacs.

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### **INTRODUCTION**

Reproductive ability in the male comprises the production of semen containing normal spermatozoa in the adequate number, together with the desire and ability to mate (Oyeyemi et al., 2008). For many years, people have searched for ways to achieve sexual desire, sexual health and sexual techniques as aphrodisiacs. An aphrodisiac may be food, drug, scent or device that enhances sex drive and/or sexual pleasure (Rosen and Ashton, 1993). The use of alternative medicine has increased considerably in the last 10 years. Some of the reasons for this trend include limited efficacy of existing treatments, perceived reduction in side effects with alternative treatments, patient's desire to maintain control over their treatment and a desire for a more "natural" treatment (Shoskes, 2002).

Lead is a common environmental and industrial pollutant that is detected in many phases of environment and biological systems. The most important sources of lead exposure are industrial emissions, soils, car exhaust gases and contaminated foods. Vegetables with a relatively large leaf area, such as spinach and cabbage can contain high levels when grown near lead sources (Gama et al., 2006). Lead is known to disrupt the pro-oxidant/antioxidant balance of tissues, which leads to biochemical and physiological dysfunction. Exposure to lead causes various toxicological effects as a result of their distribution in various tissues and organs, including the stomach, intestines, kidney, liver, spleen, heart, bone, and nervous and reproductive systems (Adnan and AL-Safi, 2005). Lead is well documented as a testicular toxicant and has been shown to perturb reproductive capability. Lead may inhibit spermatogenesis and decrease in the young spermatids; pachytene spermatocytes and mature spermatids (Kaushal et al., 1996).

Pumpkin (*Cucurbita pepo* L.) seed and seed oil have macro- and micro-constituent composition. They are a rich natural source of proteins, phytosterols

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polyunsaturated fatty acids, antioxidant vitamins, such as carotenoids and tocopherol and trace elements, such as zinc. Pumpkin seed extract contain high levels of natural potent phytochemicals sterols with great promise for immunomodulation, reproductive health, and therapeutic advantage over a wide range of disease conditions. The intake of a whole extract of pumpkin seeds is correlated to reduced benign prostate hyperplasia-associated symptoms (**Glew et al., 2006, Fruhwirth and Hermetter, 2007 and Stevenson et al., 2007**). Pumpkin seeds have been used for many years to improve sexual stimulation and improvement of sexual performance in terms of intromissions and ejaculatory latency which also improved sexual sensation and coupulatory efficiency (**Gundidza et al., 2009**).

Zinc is an essential mineral, important in prostate gland function and the growth of the reproductive organs. Zinc is found more in male reproductive fluid than anywhere else in the body. It is required for protein synthesis and collagen formation, promotes a healthy immune system, the healing of wounds and synthesis of DNA and RNA. Zinc is an important fertility nutrient for both sexes. Zinc deficiency is also linked to men's infertility. Zinc will normalize deficient sperm counts and sperm motility. Even marginal zinc deficiency can cause sperm counts to drop below the point of technical sterility (**Feng et al., 2002**).

Therefore, the present study was designed to investigate some chemical composition of pumpkin seeds and also determine the effect of pumpkin seeds and / or zinc on the nutritional and sexual healthy status.

## **MATERIALS AND METHODS**

### **A – Materials**

#### **1- Lead acetate, zinc and pumpkin seed oil:**

Lead acetate is a white powder odorless, with a chemical structure  $(\text{CH}_3\text{COO})_2\text{Pb}_3\text{H}_2\text{O}$  and was purchased from El-Gomhoria Co., El-Mansoura city, Egypt. The dose of lead acetate was 50 mg of lead/kg body weight per day according to previous studies as that recorded by **Batra et al., (2004)**. Zinc was obtained from October Pharma Co., October city, Egypt as Octazone capsules. Each capsule contains 110 mg zinc sulphate equivalent to 25 mg zinc .The human therapeutic dose of zinc was 25 mg Zn daily which converted to animal dose (4.5 mg/kg) according to **Paget and Barnes, (1964)**. Pumpkin seed oil was obtained from Arab Company for Pharmaceutical and Medicinal Plants, MEPACO",Egypt . The human therapeutic dose was 320 mg /day. The equivalent rat dose was of 288 mg/kg b.wt (**Hongji and Jongro-gu, 2009**)

## **2- Pumpkin seeds:**

Pumpkin fruits were obtained from a private farm in Minufia governorate. Pumpkin seeds called pepitas, are the flat, green or white seeds found inside pumpkins and obtained manually. The outer core of the pumpkin seed was removed by hand milling and sieving. Pumpkin seeds were subjected to dry freezing, then crushed to powder for ethanol extraction.

## **3 -Experimental animals:**

Forty-nine adult albino male rats Sprague –Dawley strain were purchased from Helwan Farm of Laboratory Animals. The average weight was  $154 \pm 7$  g. The animals were kept under observation for five days before experiment and fed on standard diet according to **NRC, (1995)** and water ad libitum. The standard diet comprised of casein (200g/kg), corn starch (497g/kg), sucrose (100g/kg), cellulose (30 g/kg), corn oil (50g/kg), mineral mixture (100g/kg), vitamins mixture (20g/kg) and DL-methionine (3g/kg).

## **B- Methods:**

### **1-Determination of the gross chemical composition and minerals of pumpkin seeds:**

Protein, fat, ash, and moisture and some minerals as zinc, iron calcium, magnesium and sodium of pumpkin seeds were determined according to the methods of the **A.O.A.C, (2000)**. The total carbohydrates were calculated as following:

Carbohydrates % =  $100 - (\text{moisture \%} + \text{protein \%} + \text{fat \%} + \text{ash \%})$ .

### **2- Preparation of the pumpkin seeds 80% ethanolic extract:**

100 g of air-dried, powdered pumpkin seeds were soaked in 500 ml of 80% ethanol with frequent agitation. Clarification was then carried out using vacuum filtration through filter paper watman number 2. The resultant extract was concentrated to dryness in a rotary evaporator under reduced pressure at a temperature of 40°C. The rate dose of pumpkin seeds extract was 40 mg/kg b.wt according to **Marianna et al., (2009)**.

### **3- Grouping of rats and experimental design:**

The rats were randomly classified into seven groups (7 rats each) and fed on the standard diet. The rats classified into control negative (–ve) group and six rat groups which administered lead acetate and reclassified into untreated control positive (+ve), and treated groups which were pumpkin extract, pumpkin oil, zinc, pumpkin extract with zinc and pumpkin oil with zinc groups.

All treatments were given in a 1ml volume from stock solution by stomach tube all over the period of the experiment. The study was assigned for three month. The food intake was calculated daily and the body weight gain was recorded weekly. Feed efficiency ratio was determined according to the method of **Chapman et al., (1950)**.

#### 4- Collection of blood and testis samples:

At the end of the experiment, the rats were sacrificed to obtain blood samples. Part of blood was heparinized while the rest part of blood was left to coagulate then centrifuged at 3000 rpm for 15 minutes to obtain serum for each individual sample and then stored at -20 °C for some laboratory analyses. Testis of male rats was rapidly removed. The right testis was homogenized with 15 volumes of 0.58% K CL solution at 4 °C. The homogenate was centrifuged at 1000g for 10 min. The supernatant was used for the assay of some laboratory analyses.

#### 5- Determination of some blood and testis biochemical parameters:

Blood glutathione peroxidase (GPX) and superoxide dismutase (SOD) were estimated according to **Beuther et al., (1987)** and **Beuchamp and Fridovich, (1971)**, respectively. Serum luteinizing hormone, follicle stimulating hormone and testosterone hormone were estimated according to **Loraine and Bell, (1976)**, **McCann and Kirkish, (1985)** and **Bee and Kah, (2003)**, respectively. Testis superoxide dismutase (SOD), catalase, glutathione peroxidase (GPX) and lipidperoxide (LPX) were estimated according to **Kono, (1978)**, **Aebi, (1974)**, **Lawrence and Burk, (1976)** and **Placer et al., (1966)**, respectively. Testis zinc and copper were also estimated according to **Versiek, (1984)**.

#### 6-Histopathological examination of the testis:

The left testis was fixed in 10% neutral buffered formaldehyde solution at pH 7.5 and cleared in xylol and embedded in paraffin. 4-5 µm thick section were prepared and stained with Hematoxylin and Eosin (H&E) for subsequent histopathological examination according to **Bancroft et al, (1996)**.

#### C-Statistical analysis

All the obtained data were statistically analyzed by SPSS computer software. The calculated occurred by analysis of variance ANOVA and follow up test LSD by SPSS ver.11 according to **Armitage and Berry (1987)**.

## **RESULTS**

### **1- The chemical composition of pumpkin seeds results:**

The statistical data in table (1) denoted that the percentage values of protein, fat, ash, fiber, moisture, and carbohydrate (CHO) in pumpkin seeds were 31.57, 29.01, 3.89, 6.36, 5.11 and 24.06 %. The values of zinc, iron, calcium, magnesium and sodium were 7.99, 9.76, 78.18, 90.69 and 20.56 mg/100g.

### **2-Nutritional results:**

Data in table (2) illustrated that, the control (+ ve) group had a significant lower values of the body weight gain and feed efficiency ratio ( $p < 0.01$ ) compared to control (- ve) group. The pumpkin extract, pumpkin oil, zinc, pumpkin extract with zinc and pumpkin oil with zinc groups showed a significant lower values of the body weight gain and feed efficiency ratio ( $p < 0.05$ ) but a non significant difference in final body weight and food intake compared to control (- ve) group.

Analysis of variance ANOVA and LSD tests revealed that, the pumpkin extract, pumpkin oil, zinc, pumpkin extract with zinc and pumpkin oil with zinc groups showed a significant higher values of the body weight gain and feed efficiency ratio but a non significant difference in final body weight and food intake compared to control (+ ve) group.

### **3-Biochemical results:**

The results in table (3) recorded that control (+ ve) group showed a significant decrease in serum luteinizing hormone, follicle stimulating hormone and testosterone hormone ( $p < 0.05$  &  $0.001$ ) compared to control (- ve) group. The pumpkin extract, pumpkin oil, zinc, and pumpkin extract with zinc groups showed non significant difference in serum luteinizing hormone, follicle stimulating hormone and testosterone hormone ( $p > 0.05$ ) but pumpkin oil with zinc group showed a significant increase in serum luteinizing hormone ( $p < 0.05$ ) and non significant difference in serum follicle stimulating hormone and testosterone compared to control (-ve) group.

Analysis of variance ANOVA and LSD tests revealed a significant higher values of serum luteinizing hormone, follicle stimulating hormone and testosterone hormone in the pumpkin extract, pumpkin oil, zinc, pumpkin extract with zinc and pumpkin oil with zinc groups compared to control (+ ve) group.

Data in table (4) illustrated that, the control (+ ve) group showed a significant lower values of blood glutathione peroxidase and superoxide dismutase ( $p < 0.01$  &  $0.001$ ) compared to control (- ve) group. The pumpkin extract, pumpkin oil and zinc groups also showed a significant lower values ( $p < 0.05$  &  $0.01$ ) but pumpkin extract with zinc and pumpkin oil with zinc groups showed non significant differenc in blood glutathione peroxidase and superoxide dismutase compared to control (- ve) .

Analysis of variance ANOVA and LSD tests revealed a significant higher values of blood glutathione peroxidase and superoxide dismutase in compared to control (+ ve) group.

The results in table (5) recorded that control (+ ve) group showed a significant decrease in testis superoxid dismutase, catalase and glutathione peroxidase and significant increase in lipid peroxide (LPX) ( $p < 0.001$ ) but the pumpkin extract, pumpkin oil, zinc, pumpkin extract with zinc and pumpkin oil with zinc groups showed non significant difference in superoxid dismutase, catalase and glutathione peroxidase compared to control (- ve) group. The pumpkin oil and zinc groups showed a significant increase in lipid peroxide ( $p < 0.05$ ) compared to control (- ve) group.

Analysis of variance ANOVA and LSD tests revealed significant higher values of testis superoxid dismutase, catalase and glutathione peroxidase and significant decrease in lipid peroxide in pumpkin extract, pumpkin oil, zinc, pumpkin extract with zinc and pumpkin oil with zinc groups compared to control (+ve) group.

Data in table (6) illustrated that, the control (+ ve) group showed a significant lower values of testis zinc and copper ( $p < 0.01$  &  $0.001$ ) but the pumpkin extract and pumpkin oil groups showed a significant lower values of testis copper only ( $p < 0.05$ ) compared to control (- ve) group. The zinc, pumpkin extract with zinc and pumpkin oil with zinc groups showed non significant difference in values of testis zinc and copper compared to control (- ve) group.

Analysis of variance ANOVA and LSD tests revealed significant higher values of testis zinc and copper of the pumpkin extract, pumpkin oil, and zinc, pumpkin extract with zinc and pumpkin oil with zinc groups compared to control (+ve) group.

#### 4-Histopathological results:

The obtained results are confirmed by the histopathological changes. Macroscopically examination of the testis of rat from the control (- ve) group revealed normal semineferous tubules (Pict.1). Meanwhile, the testis of rat from

the control (+ve) group revealed orchitis with infiltration of intraluminal leucocytic cells and spermatide giant cells normal seminiferous tubules (Pict.2). Testis of rat from pumpkin extract group showed slight degeneration of spermatogoneal cells (Pict.3).The testis of rats from pumpkin oil showed mild interstitial edema (Pict. 4). The testis of rats from zinc group showed slight degeneration of spermatogoneal cells lining seminiferous tubules (Pict. 5). The testis of rat from pumpkin extract with zinc and pumpkin oil with zinc groups showed normal structure of seminiferous tubules (Pict. 6 and 7).

## **DISCUSSION**

The obtained results of the chemical composition of seeds were varied than the previous results that may be due to different cultivars. **Aboul-Nasr et al., (1997)** recorded that the chemical composition of pumpkin seeds were 40.27 % protein, 34.59% crude oil, 13.79% crude fiber and 4.45% ash. **Bombardelli and Morazzoni, (1997) and Nakiae, et al., (2006)** found that the nutritional value of pumpkin seeds is based on high protein content (25–51%) and high percentage of oil that ranging from 40% to 60%, up to 60.8%, of the oil is from the fatty acids oleic (up to 46.9%), linolenic (up to 40.5%), palmitic and stearic up to 17.4%. There are approximately 4–5% minerals including selenium, zinc, calcium, copper, iron, manganese, phosphorous and potassium; approximately 30% pectin .

The occupational or experimental exposure to lead is associated with increased oxidative reaction, which might be responsible, at least in part, for lead-induced toxic effects. The heavy metals not only affect the nutritive values of fruits and vegetables but also have deleterious effect on consumer of these food items. Lead can depress the growth which is associated with the dose and duration of lead (**Lawton and Donaldson, 1991**). Lead exposure causes a significant increase in lipid peroxidation due to the high affinity of lead for sulfhydryl groups or metal cofactors in these enzymes and substrate molecules. The increase in the lipid peroxidation is accompanying with inhibition in the antioxidant enzymes activities such as SOD and catalase because lead induces copper deficiency and copper plays a catalytic role in this enzyme. Catalase also works in close association of SOD. Lead interferes with absorption of iron resulting in inhibition of hem biosynthesis that decreases in catalase activity. Lead also can change in the concentrations and distribution of essential elements in an organism as copper and zinc (**Gasiorowski et al., 1987 and Patra and Swarup ,2000**). Lead exposure shifts in the pro-oxidant/antioxidant balance resulting in increased free-radical generation, lipid peroxidation, and, consequently, oxidant stress (**Adonalyo and Oteiza, 1999 and Patra et al., 2001**).The presence of free radicals in various organs including the testis is a

normal physiological event; however, the alterations in their synthesis stimulate the oxidation and DNA damage of cells. The plasma membrane of sperms contains a high amount of unsaturated fatty acids so it is particularly susceptible to peroxidative damage. The lipid peroxidation destroys the structure of the lipid matrix in the membranes of spermatozoa, and it is associated with loss of motility and the defects of membrane integrity. Exposure to stress causes a fall of the testosterone level in peripheral blood of man and various species of animals. Changes in the testosterone concentration are associated with depression of the secretory activity of the testes, and changes in peripheral metabolism (**Katsiya et al., 1989 and Abd El-Ghany, 2007**). Luteinizing hormone is a hormone produced in the anterior pituitary gland, which stimulates the release of sex hormones by the ovaries and testes. In men it induces secretion of testosterone by the interstitial cells of the testes. The reduction in LH and FSH in lead exposure due to adverse effect on hypothalamic pituitary testicular hormonal axis and also impair of a negative feedback control of testosterone by pituitary LH synthesis and or of hypothalamic LH releasing hormone secretion (**Gorbel et al., 2002**). The reduction in FSH in lead exposure could be due to impairment of some sertoli cell protein secretion (**Rotten, 1991**).

Glutathione, glutathione peroxides, catalase, superoxide-dismutase are biological antioxidants, which suppress or scavenge of free radical that is likely to improve sperm function (**Sanocka and Kurpysz, 2004 and Henkel, 2005**). Pumpkin seeds promote prostate and urological health and help to reverse the age-related decline in the health of the prostate gland. Pumpkin seeds are also an excellent source of magnesium, phosphorus, manganese, copper and iron in healthy amounts in addition to zinc which is a nutrient vital to healthy functioning of the male reproductive system (**Alan, 2006**). Pumpkin seeds are rich in unsaturated fatty acids such as omega 3, 6 and 9 as well as its high protein therefore the rats which fed diets rich in monounsaturated fats had greater –dehydrogenase activity which is a key enzyme in the testosterone synthesis pathway in the male rat and plasma androgen concentrations compared to rats fed diets rich in saturated and polyunsaturated fats (**Nagata, et al., 2000**). Pumpkin seed inhibit the conversion of testosterone into dihydrotestosterone in cultures of human fibroblasts. Men's health products commonly contain pumpkin seeds because pumpkin seeds are a rich source of zinc which is thought to promote prostate health and to improve bone mineral density (**Bach, 2000 and Liu et al., 2007**). The elevated levels of serum testosterone may be one of the mechanisms underlying the effect of squalene in pumpkin seeds on improvement in libido and semen quality and the reduction in serum leptin (**Banks, et al., 2004 and Bjorbaek and Kahn, 2004**).

Pumpkin seed oil is rich in many potent antioxidants and beneficial nutritional supplements such as essential fatty acids including linoleic and linolenic, ,carotenes, lutein, gamma and P-tocopherols, phytosterols, chlorophyll , selenium and zinc, (Lee, 2006 and Gossell-Williams et al., 2006). Essential fatty acids are required constituents of every membrane in the body, playing a crucial role in maintaining the health of every living cell in the body. They maintain the fluidity of cellular membranes, aid in producing and balancing hormones, and play an essential role in managing healthy fluid levels. The body metabolizes these fatty acids into a group of components known as prostaglandins. Prostaglandins regulate every organ system in the body. Pumpkin seed oil is reported to protect older men's urinary tracts from the aging effects of testosterone (Jayaprakasam, et al., 2003 and Fu et al., 2006). The testosterone, LH and FSH concentration were close to normal with treatment with pumpkin extract, oil and zinc due to all the steroid hormone receptors require zinc ion to maintain their secondary structure and function. Availability of more zinc might reactivate the normal functioning of receptors (Bataneh et al., 2002).

Zinc is found in high concentrations in the human prostate gland for a normal function. Zinc plays an important role in the structure of proteins and cell membranes and protect against damage so plays important roles in growth and development of the immune response, neurological function and reproduction (Bataneh et al., 2002 and Vartsky et al., 2003). A deficiency in zinc, blocks the essential rate-limiting enzyme Delta- 6-desaturase in the transformation of essential fatty acids into the important prostaglandins. Zinc is a cofactor for proper functioning, as carbonic anhydrase, alkaline phosphatase, and superoxide dismutase. Loss of zinc from biological membranes increases their susceptibility to oxidative damage and impairs their function. Zinc acts as an antioxidant by protection of proteins and enzymes against free radical attack or oxidation and prevention of free radical formation. The enzymes involved in testosterone synthesis rely on zinc supplements could stimulate testosterone production and consequently the number of sperm, (Takeda et al., 2005 and Osaretin and Gabriel 2008).

The results of this study refocused on the importance of pumpkin seeds either extract or oil and or zinc in improving reproductive potential of male rats. So, it is advised to consume pumpkin seeds and zinc rich diet daily to decrease the undesirable side effect of lead contaminants and improve the sexual health status.

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Table (1): Some major and minor composition in pumpkin seeds

Protein%	Fat%	Ash %	Fiber%	Moisture%	CHO%
31.57	29.01	3.89	6.36	5.11	24.06
Zinc (mg/100g)	Iron (mg/100g)	Calcium (mg/100g)	Magnesium (mg/100g)	Sodium (mg/100g)	
7.99	9.76	78.18	90.69	20.56	

Table (2): Mean values ± SD of body weight gain, food intake and feed efficiency ratio (FER) of the experimental rats groups.

Groups Variable	Control (-ve)	Control (+ve)	pumpkin extract	pumpkin oil	Zinc	pumpkin extract with zinc	pumpkin oil with zinc
Initial weight (g)	152.41 ± 5.17 <sup>a</sup>	153.51 ± 5.22 <sup>a</sup>	153.71 ± 5.81 <sup>a</sup>	154.01 ± 5.31 <sup>a</sup>	153.25 ± 6.11 <sup>a</sup>	152.77 ± 6.14 <sup>a</sup>	154.75 ± 6.32 <sup>a</sup>
Final weight (g)	223.27 ± 10.24 <sup>a</sup>	198.22 ± 9.17 <sup>a</sup>	207.22 ± 10.11 <sup>a</sup>	209.24 ± 11.11 <sup>a</sup>	207.41 ± 11.13 <sup>a</sup>	212.75 ± 12.31 <sup>a</sup>	213.64 ± 10.88 <sup>a</sup>
Weight gain (g)	70.88 ± 7.33 <sup>a</sup>	44.71 ± 2.17 <sup>c**</sup>	53.51 ± 3.25 <sup>b*</sup>	55.23 ± 3.71 <sup>b*</sup>	54.15 ± 3.41 <sup>b*</sup>	59.98 ± 3.21 <sup>b*</sup>	58.89 ± 4.01 <sup>b*</sup>
Food intake (g/d)	18.88 ± 1.22 <sup>a</sup>	17.99 ± 1.41 <sup>a</sup>	18.46 ± 1.61 <sup>a</sup>	17.98 ± 1.51 <sup>a</sup>	18.33 ± 1.32 <sup>a</sup>	18.32 ± 1.24 <sup>a</sup>	17.58 ± 1.33 <sup>a</sup>
FER	0.062 ± 0.001 <sup>a</sup>	0.041 ± 0.002 <sup>c**</sup>	0.048 ± 0.001 <sup>b*</sup>	0.051 ± 0.003 <sup>b*</sup>	0.049 ± 0.002 <sup>b*</sup>	0.054 ± 0.002 <sup>b*</sup>	0.054 ± 0.003 <sup>b*</sup>

Significant with control (-ve) group \* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Mean values in each raw having different superscript (a, b, c) denote significant difference.

**Table (3): Mean values ± SD of serum luteinizing hormone (LH), follicle stimulating hormone (FSH) and testosterone hormone of the experimental rats groups.**

Groups Variable	Control (-ve)	Control (+ve)	pumpkin extract	pumpkin oil	Zinc	pumpkin extract with zinc	pumpkin oil with zinc
LH (ng/ml)	0.91 ± 0.01 <sup>a</sup>	0.44 ± 0.03 <sup>c**</sup>	0.85 ± 0.02 <sup>a</sup>	0.89 ± 0.01 <sup>a</sup>	0.81 ± 0.04 <sup>a</sup>	0.92 ± 0.03 <sup>a</sup>	1.01 ± 0.11 <sup>b*</sup>
FSH (ng/ml)	6.68 ± 1.71 <sup>a</sup>	4.01 ± 1.10 <sup>b*</sup>	5.71 ± 1.01 <sup>a</sup>	5.91 ± 1.20 <sup>a</sup>	4.99 ± 1.03 <sup>a</sup>	6.01 ± 1.21 <sup>a</sup>	6.96 ± 1.34 <sup>a</sup>
Testosterone (ng/ml)	4.65 ± 0.81 <sup>a</sup>	2.11 ± 0.30 <sup>b**</sup>	3.67 ± 0.71 <sup>a</sup>	3.98 ± 0.04 <sup>a</sup>	3.44 ± 0.11 <sup>a</sup>	4.11 ± 0.13 <sup>a</sup>	5.01 ± 0.15 <sup>a</sup>

Significant with control (-ve) group \* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Mean values in each row having different superscript (a, b, c) denote significant difference.

**Table (4): Mean values ± SD of blood glutathione peroxidase (GPX) and superoxide dismutase (SOD) of the experimental rats groups.**

Groups Variable	Control (-ve)	Control (+ve)	pumpkin extract	pumpkin oil	Zinc	pumpkin extract with zinc	pumpkin oil with zinc
GPX (ng/ml)	7.13 ± 1.51 <sup>a</sup>	3.15 ± 0.51 <sup>c***</sup>	5.18 ± 1.34 <sup>b*</sup>	5.31 ± 1.43 <sup>b*</sup>	5.61 ± 1.22 <sup>b*</sup>	5.99 ± 1.41 <sup>a b</sup>	6.11 ± 1.13 <sup>a b</sup>
SOD (ng/ml)	21.51 ± 3.22 <sup>a</sup>	10.21 ± 2.14 <sup>c**</sup>	14.20 ± 4.11 <sup>b**</sup>	14.71 ± 3.21 <sup>b**</sup>	15.53 ± 3.41 <sup>b**</sup>	17.11 ± 2.55 <sup>a b</sup>	18.32 ± 3.11 <sup>a b</sup>

Significant with control (-ve) group \* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Mean values in each row having different superscript (a, b, c) denote significant difference.

Table (5): Mean values ± SD of testis superoxid dismutase(SOD), catalase, glutathione peroxidase (GPX) and lipid peroxide (LPX) of the experimental rats groups.

Groups Variable	Control (-ve)	Control (+ve)	pumpkin extract	pumpkin oil	Zinc	pumpkin extract with zinc	pumpkin oil with zinc
SOD (µ/mg protein)	7.52 ± 1.41 <sup>a</sup>	3.44 ± 0.59 <sup>b***</sup>	6.49 ± 1.20 <sup>a</sup>	6.31 ± 1.51 <sup>a</sup>	6.59 ± 1.31 <sup>a</sup>	7.01 ± 1.61 <sup>a</sup>	6.99 ± 1.03 <sup>a</sup>
Catalase (µ/mg protein)	16.81 ± 1.99 <sup>a</sup>	7.11 ± 1.31 <sup>b***</sup>	14.01 ± 2.61 <sup>a</sup>	13.25 ± 3.11 <sup>a</sup>	14.43 ± 2.61 <sup>a</sup>	14.51 ± 2.11 <sup>a</sup>	14.61 ± 2.35 <sup>a</sup>
GPX (nmol)	2.33 ± 0.60 <sup>a</sup>	0.65 ± 0.01 <sup>b***</sup>	2.01 ± 0.31 <sup>a</sup>	2.11 ± 0.22 <sup>a</sup>	1.99 ± 0.11 <sup>a</sup>	2.23 ± 0.40 <sup>a</sup>	2.14 ± 0.31 <sup>a</sup>
LPX (nmol)	4.33 ± 0.41 <sup>c</sup>	13.51 ± 2.17 <sup>a***</sup>	5.58 ± 0.35 <sup>bc</sup>	6.61 ± 0.40 <sup>b*</sup>	6.13 ± 0.81 <sup>b*</sup>	5.41 ± 0.99 <sup>bc</sup>	5.32 ± 0.15 <sup>bc</sup>

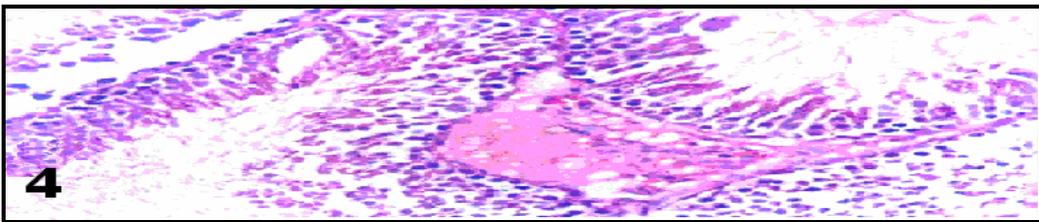
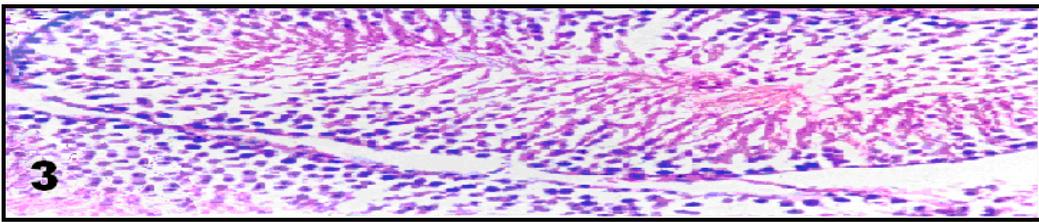
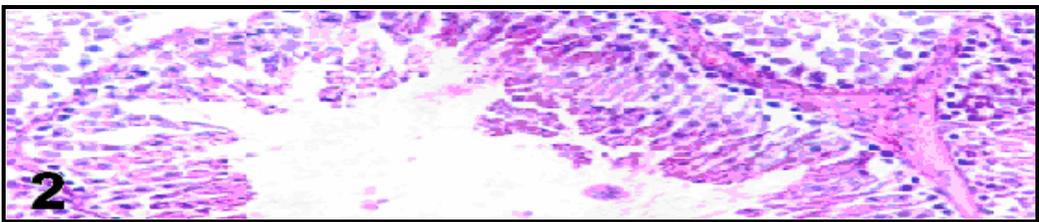
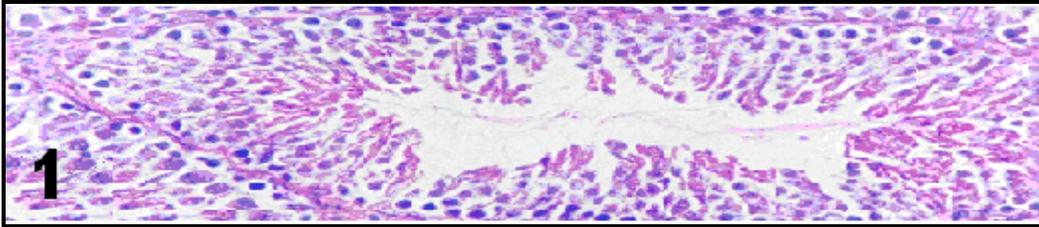
Significant with control (-ve) group \* P<0.05 \*\* P<0.01 \*\*\* P<0.001  
Mean values in each row having different superscript (a, b, c) denote significant difference.

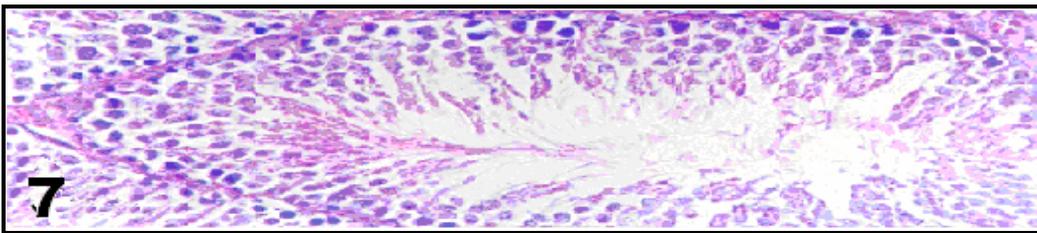
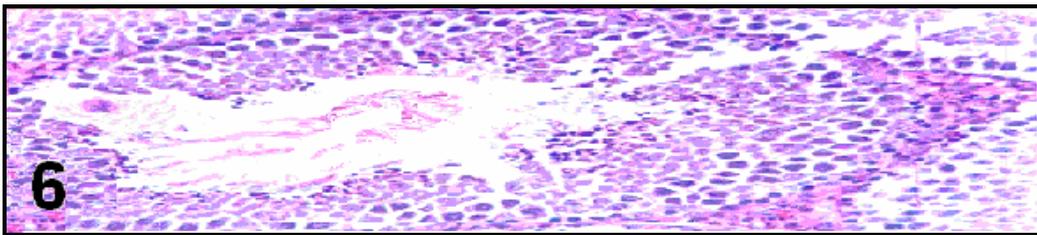
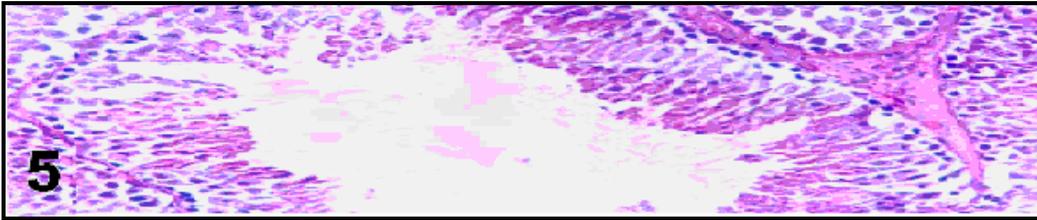
Table (6): Mean values ± SD of testis zinc and copper of the experimental rats groups.

Groups Variable	Control (-ve)	Control (+ve)	pumpkin extract	pumpkin oil	Zinc	pumpkin extract with zinc	pumpkin oil with zinc
Zinc (µ/mg)	25.69 ± 4.21 <sup>a</sup>	17.32 ± 3.12 <sup>b**</sup>	22.32 ± 3.45 <sup>a</sup>	21.11 ± 5.30 <sup>a</sup>	26.69 ± 5.43 <sup>a</sup>	26.11 ± 4.89 <sup>a</sup>	25.71 ± 4.25 <sup>a</sup>
Copper (µ/mg)	3.03 ± 0.45 <sup>a</sup>	1.63 ± 0.11 <sup>c***</sup>	2.17 ± 0.30 <sup>b*</sup>	2.01 ± 0.25 <sup>b*</sup>	2.69 ± 0.28 <sup>a b</sup>	2.43 ± 0.14 <sup>a b</sup>	2.55 ± 0.31 <sup>a b</sup>

Significant with control (-ve) group \* P<0.05 \*\* P<0.01 \*\*\* P<0.001  
Mean values in each row having different superscript (a, b, c) denote significant difference.

*Histopathological Examination of Testis*





## دراسة بيولوجية على تأثير بذور القرع العسلي والزنك على القوة التناسلية في ذكور الفئران

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### الملخص العربي

استهدف البحث دراسة التركيب الكيميائي لبذور القرع العسلي ومعرفة تأثير بذور القرع العسلي مع أو بدون الزنك على القوة التناسلية في ذكور الفئران . وقد أجري البحث على ٤٩ من ذكور فئران التجارب البيضاء من سلالة اسبريجوداوللى ؛ حيث قسمت إلى مجموعة ضابطه سالبة (-ve) وست مجاميع من الفئران المتناولة ٥٠ مجم من الرصاص لكل كجم يوميا والمجموعات هي الضابطة الموجبة (+ ve) ومستخلص القرع وزيت القرع والزنك ومستخلص القرع مع الزنك وزيت القرع مع الزنك. وقد استمرت الدراسة ثلاث شهور .

### وقد أظهرت النتائج ما يلي :

أن المجموعة الضابطة الموجبة (+ ve) أظهرت انخفاض معنوي في الوزن المكتسب ومعامل كفاءة الطعام و هرمونات LH, FSH& testosterone في السيرم والإنزيمات المضادة للأكسدة GPX & SOD في الدم وأيضا SOD, catalase, GPX والزنك والنحاس في الخصية، وارتفاع معنوي في LPX في الخصية بالمقارنة بالمجموعة الضابطة (-ve) .

أن مجموعة مستخلص القرع أظهرت انخفاض معنوي في الوزن المكتسب ومعامل كفاءة الطعام و GPX & SOD في الدم والنحاس في الخصية بينما أظهرت مجموعة زيت القرع انخفاض معنوي في الوزن المكتسب ومعامل كفاءة الطعام والنحاس في الخصية و GPX & SOD في الدم وارتفاع معنوي في LPX في الخصية بالمقارنة بالمجموعة الضابطة (-ve) .

ان مجموعة الزنك أظهرت انخفاض معنوي في الوزن المكتسب ومعامل كفاءة الطعام و GPX & SOD في الدم وارتفاع معنوي في LPX في الخصية بينما أظهرت مجموعتا مستخلص القرع مع الزنك وزيت القرع مع الزنك انخفاض معنوي في الوزن المكتسب ومعامل كفاءة الطعام وارتفاع معنوي في LH في السيرم بالمقارنة بالمجموعة الضابطة (-ve) .

أظهرت النتائج الباثولوجية انخفاض التغيرات المرضية في خلايا الخصية في مجموعات مستخلص القرع وزيت القرع والزنك واختفاء التغيرات المرضية في مجموعتا مستخلص القرع مع الزنك وزيت القرع مع الزنك.

ونسنتج من ذلك أن تناول بذور القرع و الزنك له القدرة على خفض الآثار الجانبية في الخصية الناتجة من الملوثات مثل الرصاص كما انه يحسن من كفاءة الخصية مع المحافظة علي مستوى الهرمونات الذكورية والإنزيمات المضادة للأكسدة لزيادة القوة الجنسية.

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