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Evaluation of the effective role of natural antioxidants against the reproductive toxicity of furan in male albino rats

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Abstract:

Furan is related to a group of dioxins (polychlorinated dibenzo-furans) that are formed within the thermal degradation of natural food products. Furan is a lipophilic organic compound which is used as an intermediate in several chemical processes. It is observed in heat-processed foods such as instante coffee, canned meats, and jarred baby food. The present study elucidated the effect of oral furan administration for 30 days at a dose of (8 mg/kg body weight/day) on the testes of male albino rats. Furan administration signified histological alterations supported by histopathological changes in the testes tissue, which were clarified by Periodic Acid Schiff, Bromophenol blue and Feulgen stains. These stains exhibited a significant decrease in the intensity of carbohydrate content, protein content and deoxyribo-nucleic acid respectively, in rats treated with Furan. Oral treatment of Furan intoxicated rats either by Propolis (100 mg/kg body weight/day) or *Spirulina platensis* (300 mg/kg body weight/day) for 30 days illustrated significant histological and histopathological amelioration in testes tissue compared to the Furan group. In conclusion, Propolis and *Spirulina platensis* may have potential health benefits to be used as therapies extracted from natural compounds due to their antioxidants, phenolic and flavonoid contents which counteract the deleterious effects on testicular tissue caused by Furan toxicity.

Keywords: Furan; Propolis; Spirulina; Testes.

1. Introduction

Furan (C_4H_4O) is a colorless, highly volatile, aromatic heterocyclic organic chemical with lipophilic and aromatic properties [1]. Furan is belonging to dioxins, is a polychlorinated dibenzo-furan that is produced during the thermal degradation of natural food. Furan is formed in baked or fried products, coffee, canned foods and infant food [2]. Furan exposure may cause male reproductive dysfunction and testicular injury [3]. Furthermore, Furan can decrease daily sperm production and cause testicular atrophy.

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Oxidative stress is a mediator of Furan reproductive toxicity, causing a decrease in semen quantity and quality, which affects male infertility. Elevated levels of reactive oxygen species accelerate oxidative stress, which is dangerous to the process of spermatogenesis[4].

Propolis is a bee glue and resinous substance that is considered a natural beekeeping outcome whose content may vary depending upon the source of the plant. Moreover, Propolis has many beneficial effects due to its components of aromatic oils, pollen, esters, flavonoids, beta-steroids, terpenes and aromatic aldehydes. These compounds possess antioxidant, antibacterial, anti-inflammatory, analgesic and tissue regenerative effects [5]. In addition, Propolis shows a critical role in protecting the genitals from toxic exposure to Furan thus preventing testicular tissue damage with improved testicular histological and histopathological changes accordingly, preserving fertility [6].

Another studied antioxidant here in this study is *Spirulina platensis*. *Spirulina platensis* is a blue-green algae, one of the cyanobacteria that has been commonly used as a nutritional therapeutic and health supplement. It is considered a beneficial source of proteins, vitamins, macronutrients and micronutrients. It also possesses amino acids, gamma linolenic acid, carotenoids, especially β-carotene, α-linolenic acid, phycocyanin and phycocyanobilin, chlorophyll, and xanthophyll phytopigments [7]. *Spirulina platensis* has protective and defensive effects against male reproductive toxicity and testicular [2].

The present study aims to investigate the testicular toxicity of Furan administration for 30 days and the possible ameliorative role of either Propolis or *Spirulina platensis* on the testis tissue of male albino rats histologically and histochemically.

2. Material and Methods

2.1. Experimental Animals:

The present study was achieved on male albino rats of the strain CBA Albino Swiss rats that were purchased from the Central Animal House of the Medical Research Centre, Faculty of Medicine, Ain Shams University. They weighed 150 ± 10 gm. The animals were kept in wire mesh laboratory animal cages in the vivarium of the Medicine Ain Shams Research Institute- Animal Facility (MASRI), Faculty of Medicine, Ain Shams University. Animals were allowed 7 days as a pre-experimental period to adapt to the laboratory conditions.

- **Ethical approval:** The study took place and all the performed procedures were approved by the committee of animal research ethics care, Faculty of Medicine Ain Shams University. The ethical approval number is (Sci132230900).

2.2. Experimental chemicals and drugs:

a. Furan:

Furan (C_4H_4O) is a colorless toxic organic compound, was administered to rats by oral gavage at a dose of 8 mg/kg body weight/day dissolved in corn oil according to Owumia *et al* [8] for 30 consecutive days. Furan ≥ 99 % was purchased from Sigma Aldrich Company, USA.

b. Propolis:

Propolis is a natural bee glue, purchased as a grinded powder formulation from Jasmine apiaries, Gharbia, Egypt. It was dissolved in distilled water and administrated by oral gavage to rats at a dose of 100 mg/kg body weight /day for 30 consecutive days according to Seven *et al* [5].

c. **Spirulina *platensis:***

Spirulina platensis (Spirulina) is a multicellular filamentous blue green alga (Cyanobacterium). Spirulina was purchased as a powder from Alga Biotechnology Unit, National Research Centre, Dokki-Cairo, Egypt. *Spirulina* platensis was prepared according to El-Baz *et al* [10]. *Spirulina platensis* was dissolved in distilled water and given oral gavage to rats at a dose of 300 mg/kg body weight/day for 30 consecutive days, according to Abd El-Hakim *et al* [٢].

2.3. Experimental Design:

In the present investigation, a total number of 60 male albino rats of approximately similar sizes and body weights (150-160 ± l0 g) were used. Rats were divided into six groups. Each experimental group consisted of 10 rats. The first group served as the normal control group, the second group represented the Furan group which received 8 mg/kg body weight/day, the third group represented the Propolis group, that received 100 mg/kg body weight /day, the fourth group represented the *Spirulina platensis* group, which received 300 mg/kg body weight/day. The fifth group received both doses of Furan 8 mg/kg body and Propolis 100 mg/kg (F+P). The sixth group received both doses of Furan 8 mg/kg body and *Spirulina platensis* 300 mg/kg (F+SP). Rats were subjected to different experimental regimens for 30 days. Eight animals from each group were

dissected after 30 days. Autopsies were performed through sodium barbital (Sigma, USA) inhalation anesthesia, after which animals were carefully dissected.

2.4. Histological and histochemical investigation:

For histological and histochemical examination, the testis of each rat in each group was placed in 10% buffered formalin [11]. Dehydration of fixed tissues was performed using ascending grades of ethyl alcohol, and then cleared with xylene. Infiltration with paraffin wax at 60°C was followed by embedding. Paraffin blocks were cut at 6 microns, using a Cambridge Rocking Microtome, then fixed to slides. For general histological investigation, sections were stained as a routine in Harris's alum Haematoxylin and Eosin (H&E) [12] modified by Bancroft and Cook [13]. In addition, for the demonstration of particular histochemical features, the following staining techniques were employed:

1. Periodic acid Schiff reaction (P.A.S) was done for the demonstration of total carbohydrates [14].
2. Bromophenol blue stain for the manifestation of sites of protein content [15].
3. Feulgen reaction for the demonstration of deoxyribo-nucleic acid [16].

3. Results

3.1. Histological Investigation

The typical histological pattern of the testis of the normal control group is represented in (Fig. 1a). It shows a normal arrangement of spermatogenic cells, spermatogonia type A and B, spermatocytes, different stages of spermatids, spermatozoa, and Sertoli cells. Interstitial cells of Leydig and thin connective tissue were seen in between tubules.

The histological features of testicular tissue sections after 30 days of either Propolis (100 mg/kg body weight/day) (Fig. 1b) or *Spirulina* platensis (300 mg/kg body weight/day) (Fig. 1c) treatments showed normal structural changes of the testicular tissue compared to the normal control group.

During the experimental period of 30 days, testes of all animals injected with 8 mg/kg body weight/day of Furan showed seriously affected spermatogenic cells on histological examination. The pathological lesions after 30 days of Furan treatment showed marked distortion of the

seminiferous tubules with irregular outlines and degenerated leydig cells. Several seminiferous tubules confirmed shrunken features with smaller diameters and obliterated lumina. The germinal epithelium presented marked disorganization. A depletion of the germinal cells was discerned, mainly at the spermatid and spermatocyte stages of spermatogenesis, so that the lumina of the tubules appeared wide as compared with normal control. The majority of the spermatogenic cells in some tubules became necrotic except for a few normal germ cells lining the seminiferous tubules. Some of the seminiferous tubules were completely deteriorated and contained remnants of damaged spermatogenic cells. Some Sertoli cells suffered degeneration Likewise, the number of germ cells in some tubules was drastically reduced and the spermatozoa as well as spermatids had partially disappeared. (Fig. 1d).

Histological examination of the testicular tissue after 30 days of Propolis administration to furan intoxicated rats in F+P group clarified wide range of improvement in histopathological features of testicular tissue with some deviations from normality. Testicular lesions were still confirmed 30 days post treatment. This was accompanied by an arrest of spermatogenesis that could be observed in a few of the seminiferous tubules. Sheers of spermatogonial tissue became shed in the tubular cavities. Also, a marked regular outline of some of the seminiferous tubules and slight vascular congestion in interstitial tissue were manifested (Fig. 1e). Nevertheless, many normal tubules were observed.

Similarly, testis tissue of furan intoxicated rats treated with spirulina for 30 days in the F+SP group demonstrated ameliorative seminiferous tubules but still with some testicular lesions. Also, vascular blood congestion with sheds of spermatogonial tissue appeared in the tubular cavities and absence of leydig cells were frequently noticed (Fig. 1f).

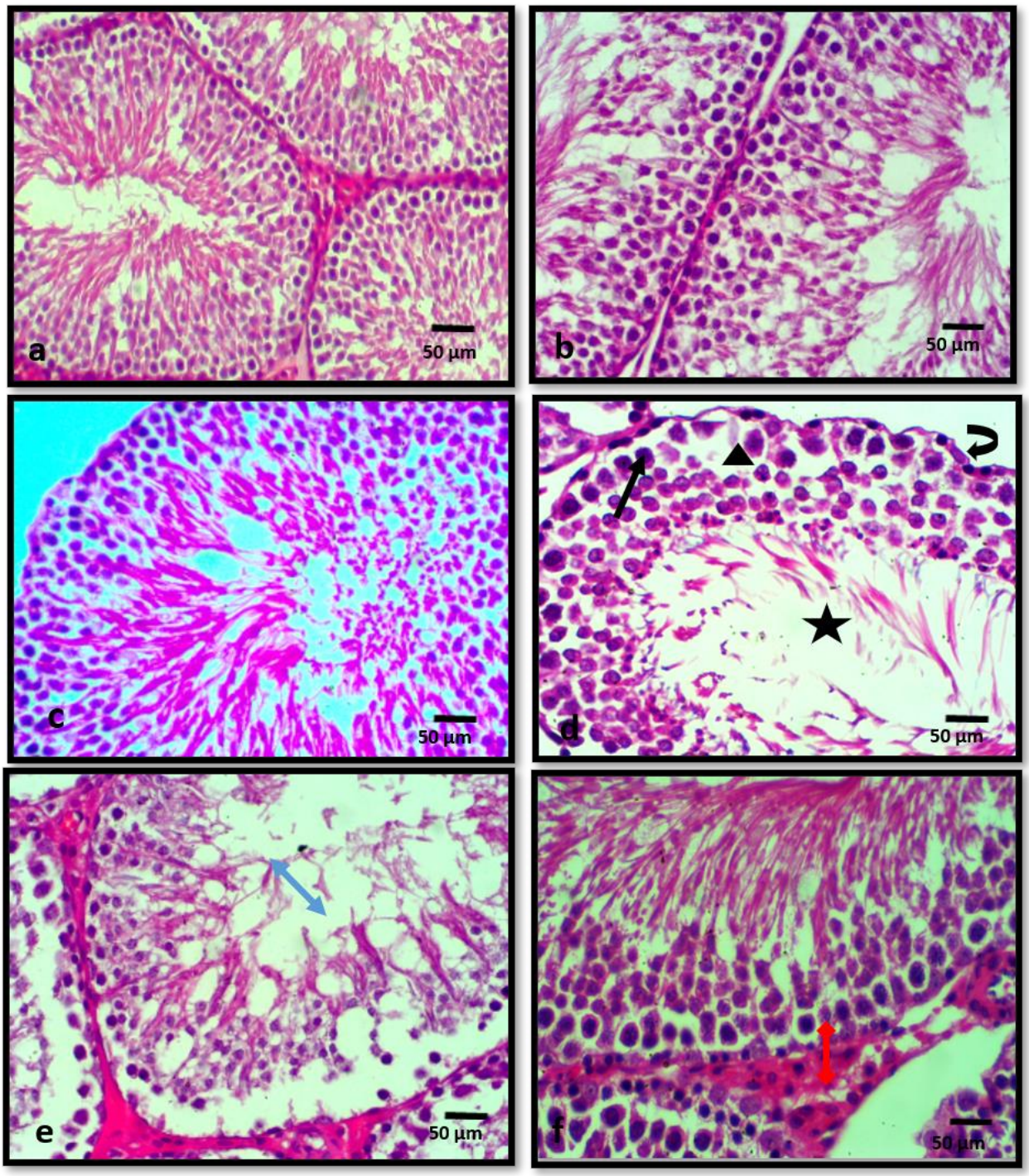

Fig 1. A photomicrograph of a transverse section of the testes after 30 days (H&E: X400) from different experimental groups showing:

a. Normal Control rats: normal seminiferous tubules lined with complete spermatogenic layers.
b. Propolis treated rats: normal structural of the testicular tissue.
c. *Spirulina platensis* treated rats: normal structural of the testicular tissue

d. Furan treated rats: wide lumen (✦) with irregular outlines of the seminiferous tubule (▲), pyknotic nuclei of germ cells (↻) and degeneration in sertoli cells (↙).
e. F+P treated rats: shed in spermatogonial tissue became in the tubular cavities (↕)
f. F+SP treated rats: congestion in vascular blood (↘) and loosely packed interstitial tissue around the seminiferous tubules had appeared.

3.2.Histochemical Investigation:

According to the previous description for histological, it was necessary to perform the for-coming histochemical stains such as Periodic Schiff reagent (PAS) for the detection of total carbohydrate content, Bromophenol Blue for the detection of protein sites and Feulgen-reaction the demonstration of deoxyribo-nucleic acid.

3.2.1. Total carbohydrate content:

In normal control group, each tubule in testicular tissue sections was found to be lined by several layers of spermatogenic cells, resting on a distinct thin regular basement membrane. PAS stained the acrosomic system of the spermatids at the late stages of spermatogenesis up to the mature sperms (Fig. 2a).

In a group of rats treated with Propolis or *Spirulina platensis* treated rats showed thickened testicular capsules, interstitial cells between the interstitial tissue and around blood vessels supply, gave normal and a positive reaction with PAS stain. This appeared to be farther obvious in sections of testes of rats treated with Propolis or *Spirulina platensis* compared to normal control rats (Fig. 2b) and (Fig. 2c).

In the experimental group treated with Furan for 30 days, testicular sections showed a pronounced decrease in carbohydrates content except for the boundary tissue of few spermatogonia and spermatocytes. PAS stain did not show the acrosomic system in most of the tubules, indicating the absence of the mature stage of the spermatids and spermatozoa. The interstitial tissue and degenerative areas contained a marked content of translucent of PAS stain positive material. The staining affinity with PAS stain decreased after 30 days of furan administration. The cessation of spermatogenesis evidenced histologically led to the lesser staining quality. Yet the hyaline material filling the interstitial tissue gave positive reactions with the stain (Fig.2d).

On staining testes sections with the PAS stain method, animals treated with F+P revealed a slight increase in the carbohydrate content of spermatogenic cells. Also, thick hyaline masses were also present in the interstitial areas between interstitial tissue. These gave a positive reaction with PAS stain (Fig.2e). The staining affinity with PAS stain increased after 30 days of Propolis treatment to Furan intoxicated rats.

In the experimental group treated with F+SP, an amplified intensity of PAS stain reaction in the interstitial tissue and around the walls of blood vessels was commonly detected after 30 days of *Spirulina platensis* administration (Fig.2f). Also, intense coloration appeared in the boundary tissue of interstitial tissue. Meanwhile, the acrosomal regions of spermatids were detected and showed moderate staining compared with a group of animals treated with Furan.

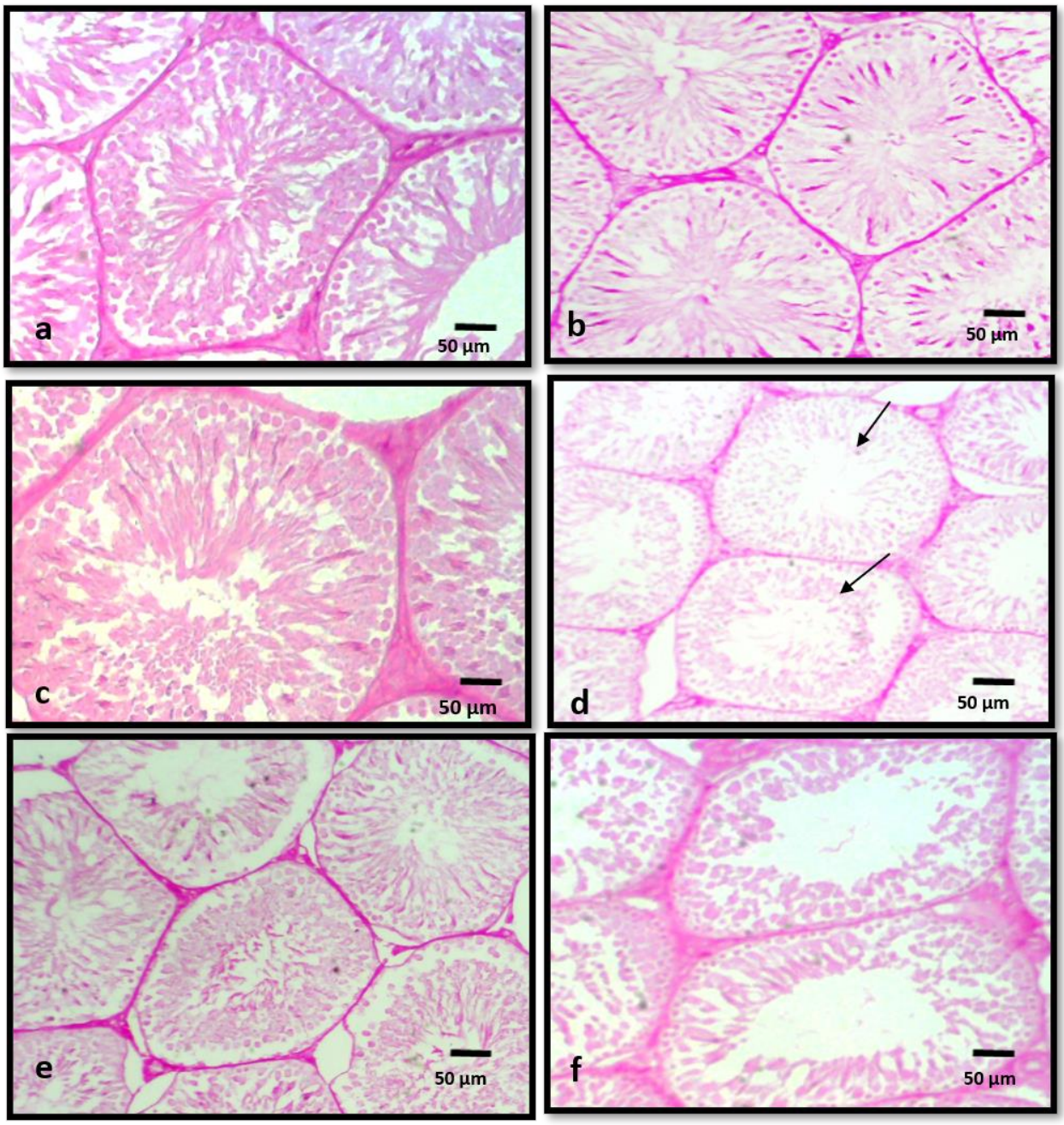

Fig 2. A photomicrograph of a transverse section of rat testes after 30 days showing the distribution of carbohydrate content (PAS; x 400):

a. Normal control rats: demonstrating normal distribution of carbohydrate content.
b. Propolis-treated rats: demonstrating normal distribution of carbohydrate content.
c. *Spirulina platensis* -treated rats: demonstrating more or less normal distribution of carbohydrate content.

d. Furan treated rats: demonstrating depletion of carbohydrate content in the spermatogenic cells with faint PAS stain intensity (↙).
e. F+P treated rats: demonstrating a slight elevation in carbohydrates stainability by PAS stain
f. F+SP treated rats**:** a slight increase in color intensity of PAS stain in the interstitial areas and around the walls of blood vessels.

3.2.2. Total protein content:

A section of normal control testes manifested intense staining quality of total proteins primarily identified in the basal lumina of the seminiferous tubules, nuclei of germ cells, as well as the acrosomes of the spermatozoa and their flagellae (Fig. 3a).

Propolis and *Spirulina platensis* groups exhibited an ordinary distribution of total protein content, which as shown in the testes section stained with bromophenol blue (Fig. 3b) and (Fig. 3c)

In the experimental group treated with Furan, the seminiferous tubules showed marked depletion of total proteins, especially in the nuclei of the spermatogenic cells, after 30 days post furan treatment (Fig.3d).

Alternatively, sections of testis of animals treated with F+P manifested ameliorated protein content. with mild increase of color coinciding with the progress of spermatogenesis under Propolis treatment compared with Furan treated rats (Fig.3e).

Then again, rats treated with F+SP exhibited unaltered tubules in testes sections with almost normal stainability, while affected ones manifested a moderate disruption of staining in the spermatogenic layer (Fig. 3f). A few spermatogenic cells manifested densely stained nuclei, especially spermatogonia. Amelioration of the color intensity of bromophenol blue stain appeared in germinal epithelium and cytoplasm of the intact germ cells compared with a group of animals treated with Furan (Fig.3e).

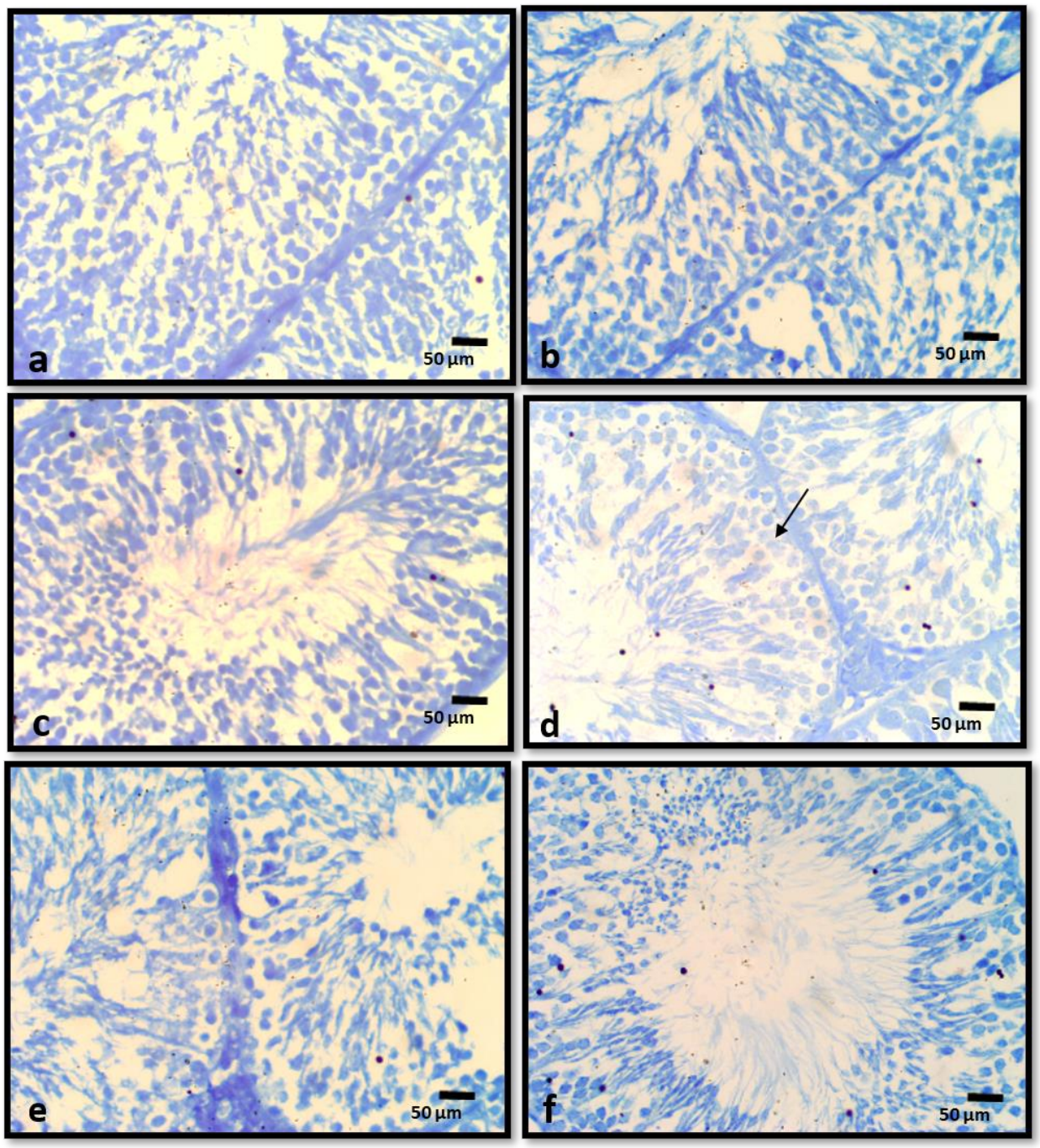

Fig 3. A photomicrograph of a transverse section of rat testis showing distribution of the total protein content (Bromophenol blue; x 400) showed:

a. Normal control rats: normal distribution of total protein content.
b. Propolis treated rats: positive normal distribution of total protein content in the testicular tissue.
c. *Spirulina platensis* treated rats: positive normal distribution of total protein content in the spermatogenic cells.

d. Furan treated rats: depletion of total protein in the spermatogenic layers (↙).

e. F+P treated rats: ameliorated protein content with mild increase of color intensity.

f. F+SP treated rats: amelioration of the color intensity of bromophenol blue stain appeared in germinal epithelium and cytoplasm.

3.2.3. Deoxyribonucleic acid (DNA) Content:

Normal distribution of nuclei acids is shown in (Fig.4a), (Fig.4b) and (Fig.4c) which was demonstrated in testes tissue sections of normal control, Propolis and *Spirulina platensis* testes as deep magenta-colored particles in nuclei of basal lumina of seminiferous tubules and spermatogenic layers.

Histochemical study of sections of nuclei acid testes from Furan treated animals manifested gradual inhibition of color coinciding with the suppression of spermatogenesis (Fig.4d).

Instead, staining sections of rat testes from a group of animals treated with F+P showed a gradual increase in staining of nucleic acid quality paralleling the progress of spermatogenesis under propolis treatment (Fig.4e). The distribution of DNA positive material was prominent in seminiferous tubules showing better spermatogenesis compared with group animals treated with Furan.

In group of rats injected with F+SP, the testicular tissue sections manifested a gradual elevation in the staining of nuclei acid throughout 30 days of experimental study (Fig. 4f). Yet, many tubules remained normal in their affinity to Feulgen stain. On the other hand, a gradual improvement in DNA on staining sections for nucleic acid was noticed to coincide with normal spermatogenesis, most of the tubules realized signs of meiotic activity after 30 days of study period. This picture proved to be true improvement through Feulgen staining compared with a group of animals treated with Furan.

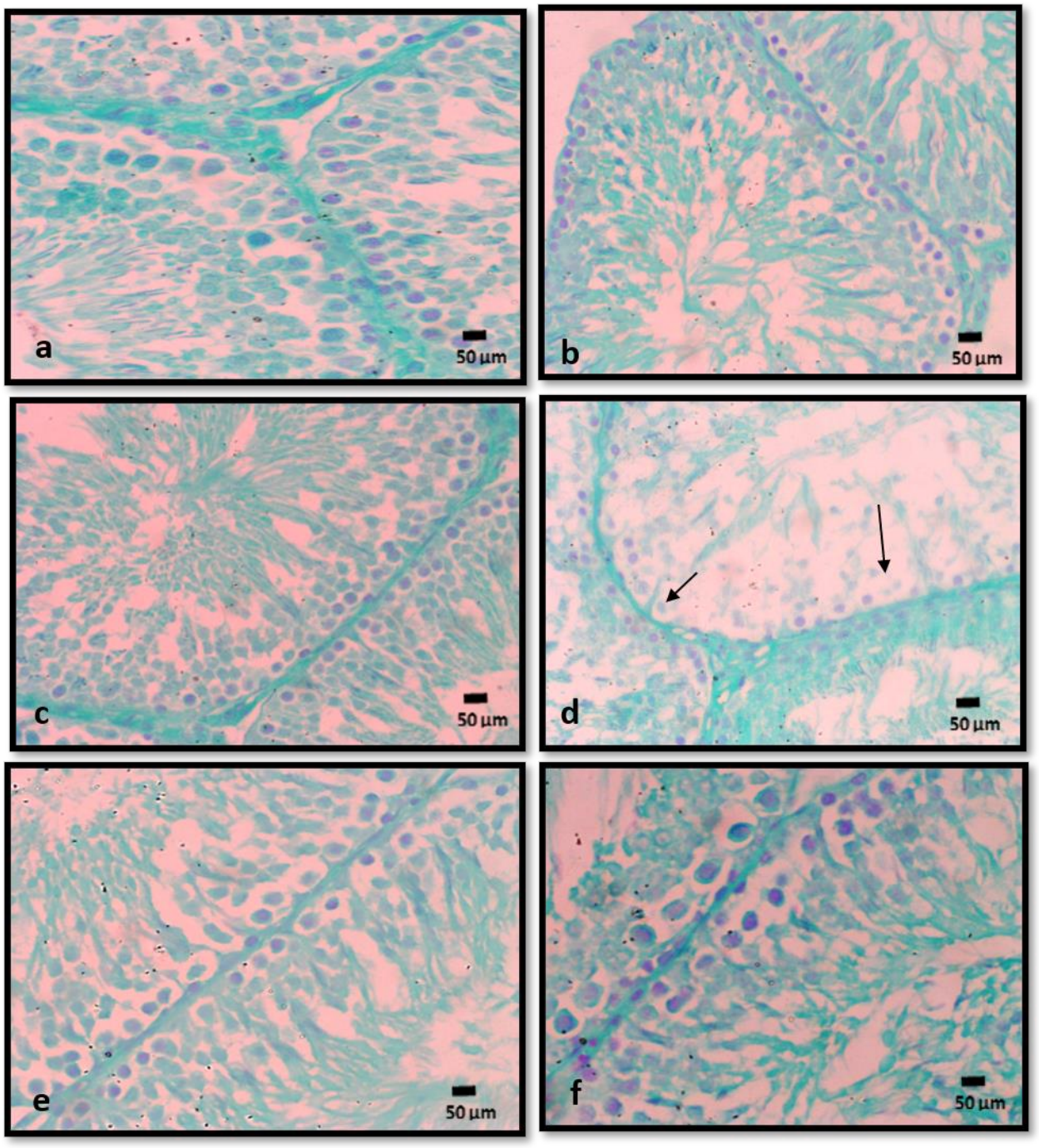

Fig 4. A photomicrograph of a transverse section of rat testis showing the distribution of deoxyribonucleic acid (Feulgen-reaction; x 400):

a. Normal Control rats: normal distribution of nuclei acids.
b. Propolis treated rats: normal distribution of nuclei acids.
c. *Spirulina platensis* treated rats: normal distribution of DNA.

d. Furan treated rats: a marked reduction of magenta-colored particles in nuclei of basal lumina of seminiferous tubules (↙).
e. F+P treated rats: mild increase of color intensity in nuclear stain with signs of meiotic activity of some spermatogenic cells.
f. F+SP treated rats: mild increase of color intensity in nuclear stain with signs of meiotic activity of some spermatogenic cells.

4. Discussion:

Furan is a lipophilic organic product used as an intermediate in many chemical processes [17]. The results of this study confirmed that furan supplementation showed marked histological distortion of the seminiferous tubules, interstitial hypoplasia and degenerated leydig cells. Several seminiferous tubules also showed shrunken and obliterated lumina. The germinal epithelium presented marked disorganization and depletion of the germinal cells. The majority of the spermatogenic cells in some tubules became necrotic with the exception of a few normal germ cells lining the seminiferous tubules. Some of the seminiferous tubules were completely deteriorated and contained remnants of damaged spermatogenic cells. In addition, sertoli cells suffered from degenerative changes. Besides, several histochemical stains elucidated a decrease in the intensity of carbohydrate content by PAS stain, protein content by bromophenol blue stain, and nucleic acid DNA content by Feulgen stain in testicular tissues and cells. Furthermore, apoptosis in germ cells and Leydig cells was increased after Furan exposure. This may be related to the lower testosterone levels that arguably resulted in lower sperm number and quality [18]. Most of the pathological changes that were observed after Furan supplementation may be related to the severe coagulative necrosis and congestion, disorganization and degeneration of germ cells, leading to the leakage of their contents to the outside of cells. More to the point Furan's composition affects germinal cell plasma membrane proteins, increasing the permeability of the cells causing the leakage of their enzymes [2]. Furthermore, Furan caused severe histopathological impairments in testicular tissues, reduced height as well as diameter of seminiferous tubules, along with reduced tunica propria width, reduced count of primary-secondary spermatocytes, spermatogonia, along with spermatids. Spermatogenesis is an androgen-dependent cascade. So, in the spermatogenic cycle, the low generation of testosterone leads to morphological anomalies. Additionally, furan has toxic active metabolites, which directly damage the germ cells *via* binding with spermatid protamine that led to cell damage and death [4]. Moreover, Ali *et al* [19] explained that Furan has a variety of abnormalities due to its oxidative damage action on the testes, which may increase germ cell death,

lower sperm count, and damage the integrity and function of the gonads. These findings were also in agreement with Wdowiak *et al* [20] who showed a reduced volume of the testicles, histopathologic changes in the structure of the testicles, reduced diameter of sperm forming tubules and the content of immature Sertoli cells. All these alterations may be related to the reproductive impairment caused by concurrent furan supplementation for 30 days [21].

Presently, sections of testes of animals treated with F+P and F+SP manifested improvement in the histological and histochemical testicular tissues according to the protective role and antioxidant properties of either Propolis or *Spirulina platensis*. Too, histochemical stains displayed improvement in the intensity of the carbohydrate content by PAS stain, protein content by bromophenol blue stain and nucleic acid DNA contents by Feulgen stain in the testes tissue.

Propolis, one of the antioxidants which, is a bee glue waxy natural resinous substance [22]. Another antioxidant that is used in this study is *Spirulina platenesis*. It is one of the most famous unicellular cyanobacteria, which has a wide variety of medicinal purposes and rich nutritional value [23]. The present study verified that histological sections of rats' testes that were treated with either Propolis or Spirulina for 30 days showed normal structural changes of the testicular tissue compared to the normal control, confirming their protective action. Additionally, histochemical stains showed normal distribution in the carbohydrate content by PAS stain, protein content by bromophenol blue stain and nucleic acid DNA content by Feulgen stain. Similar to our findings, it was reported that Propolis supplementation decreased histological and histopathological changes in testes tissue, and most of the seminiferous tubules showed normal histo-architecture. The reason for this may be owing to the strong antioxidant properties of Propolis [5]. In addition, Nna *et al* [24] demonstrated significant increases in testicular weight and seminiferous tubular diameter in rats treated with Propolis and that concurrent Propolis supplementation attenuated negative changes in the testes and epididymis by counteracting oxidative stress and increasing antioxidant enzymes in the testes, thus activating spermatogenesis, increasing testosterone levels, and decreasing oxidant levels [27]. Alamoudi [25] proved that Propolis ameliorates testicular damage due to its major compounds, such as caffeic acid phenethyl esters, which are responsible for the regulation of the antioxidant enzymes and the inhibition of lipid peroxidation. Propolis supplementation provides high antioxidant efficacy due to the presence of numerous phenolic compounds, including flavonoids, flavans, hydroxybenzene, hydroxycinnamic acid, and stylbene acids [26]. Propolis has a protective effect against testicular injury due to its high content of flavines

acting as free radical scavengers that protect against oxidative pressure and metabolic disorders [6].

The other nutritional antioxidant that was tested in this study is *Spirulina platensis*. *Spirulina platensis* is a blue-green algae that possesses nutritional therapeutic and health action [7].

Spirulina platensis supplementation for 30 days to furan intoxicated rats reduced the histological changes in spermatogenic cells. This might be attributed to its antioxidant activity and its content of various vitamins, phycocyanin, selenium and polyunsaturated fatty acids that prevented oxidative stress and DNA damage through scavenging free radicals and increasing antioxidant enzymes [28]. In addition, *Spirulina platensis* has anti-inflammatory and cytoprotective activity owning to its high phycocyanin content. [2]. Also, Elkelany and Kashef [29] reported that *Spirulina platensis* plays a protective role in the treatment of testicular damage as it ameliorates most of the histological alterations because of its anti-inflammatory and anti-histaminic properties [30]. Moreover, the protective effect of *Spirulina platensis* may be related to its superoxide and hydroxyl free radical scavenging action. This prevents DNA damage, lipid peroxidation and reduces reactive oxygen species [31] Additionally, the *Spirulina platensis* content of multiple bioactive substances such as phycocyanin, polyunsaturated fatty acids, polysaccharides, phenolic compounds, vitamins, carotenoids and minerals [32] confirms its protective role in restoring the testicular tissue to its normal appearance and improving the histological architecture of testicular tissue [33]. Similarly, *Spirulina* platensis has antiapoptotic properties that improve cell injuries, enhance the oxidation process, and can up-regulate immune-expression [34]. Furthermore, it restores steroidogenesis in Leydig cells and TS-mediated spermatogenesis [35].

5. Conclusion:

Propolis and *Spirulina platensis* may have potential health benefits to be used as therapies extracted from natural compounds due to their antioxidants, phenolic and flavonoid contents, which counteract the deleterious effects on testicular tissue caused by Furan toxicity.

6. Acknowledgement

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Department of Zoology, Faculty of Women College for Arts, Science and Education, Ain shams University.

7. Conflict of interest

All authors declare that there is no conflict of interest.

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الملخص العربي

تقييم الدور الفعال لمضادات الأكسدة الطبيعية ضد السمية التناسلية للفيوران لذكور الجرذان البيضاء

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الملخص العربى :

تهدف الدراسة الي تأثير البروبليس (١٠٠ ملجم/ كجم من وزن الجسم) أوالسبيرولينا (٣٠٠ ملجم/ كجم من وزن الجسم) كمواد طبيعيه مضاده للأكسده على التأثير الضار لمادة الفيوران (٨ ملجم/ كجم من وزن الجسم) علي أنسجه الخصيه لذكور الجرذان البيضاء بعد ٣٠ يومًا من المعالجه. وقد تبين من الفحص حدوث تغيرات في أنسجه الخصيه بعد تناول الفيوران. وأظهرت الدراسه الهستوكيميائيه نقص فس المحتوي الخلوي للكربوهيدرات و البروتينات و الحمض النووي اللاأكسجيني. كما أوضحت الدراسه حدوث تحسن ملحوظ في أنسجه الخصيه لمجموعه الجرذان المعامله سواء بالفيوران مع البروبوليس أو الفيوران مع السبيرولينا لمده ٣٠ يوم مقارنه بمجموعه الفئران التي تناولت ماده الفيوران فقط. تشتمل الدراسه علي أن البروبوليس و السبيرولينا قد يكون لهما فوائد صحيه ويستخدمان كمضادات أكسده طبيعيه بسبب محتواهم من الفينول و الفلافونويد التي تتصدي الأثار الضاره الناجمه عن سميه الفيوران.