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Comparative Study On Some Medicinal Plants Against – Cisplatin Induced Infertility In Male Rats

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Abstract

This study was conducted to investigate the effect of some medicinal plants against cisplatin induced infertility in experimental male rats. Thirty mature albino rats weighing 180-220g. Rats used in this study divided into 6 equal groups, one was kept as a control –ve group, while the other 5 groups were injected intraperitoneally(IP) with a single dose of cisplatin (CP) (7ml / kg B.Wt.). After induction, one group was kept as (+ve) control group, while others given administration of medicinal plants [ethanolic extract of *Psidium guajava* leaves (EEPGL) and ethanolic extract of *Moringa oleifera* leaves (EEMOL) (100 and 200 mg/kg)] orally for six weeks. Biological evaluation including feed intake (FI), body weight gain % (BWG %) and feed efficiency ratio (FER) was carried. Sperm count, Sperm motility and sperm head abnormality were calculated. Serum (Testosterone, luteinizing (LH) and follicle stimulating (FSH) hormones were measured. Serum antioxidant enzymes (Super Oxide Dismutase (SOD), Glutathione Peroxidase (GPX), Catalase (CAT), level of Malondialdehyde (MDA) and nitric oxide (No) were estimated. Also histopathological changes for testis, were examined. The obtained results concluded that using EEPGL and EEMOL improved FI, BWG % and FER, sperm count, Sperm motility, sperm

abnormality, serum hormones and antioxidant enzymes. The best results found by using high doses (200mg / kg) of EEPGL and EEMOL. According to the results, EEPGL and EEMOL could be used for improved sexual functions and protection from infertility,in male rats

Introduction

Male infertility is a major health issue with an estimated predominance of 4.2% of male infertility worldwide ***(Jiang et al., 2018)***. The increased male infertility is concerned globally in recent years. Male infertility may be caused by hazardous chemicals, nutritional deficiencies, environmental factors, socioeconomic causes or other unknown causes ***(Ahmed et al., 2016).*** Cisplatin is an effective drug that is used for treatment some types of cancer in the clinic. One of the most side effects of cisplatin is infertility ***(Mercantepe et al., 2018).***

Guava (Psidium guajava L.) is a tree with nutritional values and has phytochemical compounds which contains alkaloids, carotenoids anthocyanins, vitamin-C, and triterpenes ***(Jayachandran et al., 2018).*** Guava leaves are widely used for medicinal purposes which documented its safe without any side effects. Guava has been documented as antioxidant and possess spermato protective properties. Guava leaf extracts are believed to improve sperm parameters and boost male fertility ***(Ekaluo et al., 2016).***

Moringa oleifera Lam. (M. oleifera) has nutritional value which high in proteins, vitamin A, minerals, essential amino acids, antioxidants, flavonoids, and isothiocyanates. M.oleifera extracts

have pharmacological activities including anti-inflammatory, antioxidant, anti-cancer, hepatoprotective, neuroprotective and hypoglycemic activity ***(Kou et al., 2018).*** Dried leaves of M. oleifera contain polyphenol: total flavonoid concentration reached to 12.16 mg/g of dried extract. Infusion of M. oleifera leaves in alcohol is used for the treatment of benign prostate hyperplasia ***(Ishola et al., 2018).***

Previous studies reported the ability of *M. oleifera* ethanolic extract to improve sperm quality, sexual activity, testosterone level and physiological responsesin ***(El-Desoky et al., 2017).***

Therefore, this study aimed to investigate the potential effects of ethanolic extract of Psidium guajava leaves (**EEPGL**) and ethanolic extract of Moringa oleifera leaves (EEMOL) against cisplatin – induced infertility in male rats.

Materials and Methods

Plant Material

Dried leaves of Moringa oleifera and pesiduim guajava were purchased from the local company for medicinal plants and herbs, Cairo Governorate, Egypt.

Extraction of Plant Material

The dried leaves were ground using a milling machine to obtain fine powder. The active ingredients were extracted by using 95% ethanol. Briefly, 100 g of each leaf powder was added to 900 ml of 95% ethanol. The mixture was covered and shaken every 30 min for 6 h, and then allowed to stand for 48 h for extraction. The mixture was then separated by passing through Whatman's No 1 filter paper,

after which the filtrate was evaporated to dryness under air pressure. The dried crude extracts were stored in the refrigerator (at 40 °C) under aseptic conditions for subsequent use ***(Eze et al., 2013).***

Drug and dose

Cisplatin, [cis-PtCl2 (NH3)2], was obtained from Pharmacy in Tanta City (0.5 mg/ml cisplatin in 0.9% sodium chloride).Cisplatin was injected as single dose 7 mg/kg of body weight intraperitoneally (IP).

Animals:

Thirty male albino rats of Sprague Dawley strain (180-220 g) were obtained from the animal colony, Helwan farm, Vaccine and Immunity Organization, Ministry of Health, Cairo Governorate, Egypt.

Experimental Design

A total of 30 matured male rats weighing between 180-220g were housed in clean metabolic cages. The rats adaption for one week before the begining of the experiment. The rats fed on basel diet according to ***Reeves et al., (1993)*** and divdied into 6 groups each

group contain 5 rats as follows:

- Group 1: fed on basel diet (B.D) as a control (- ve) group
- Group 2: fed on B.D. and treated with cisplatin and used as control (+ ve) group
- Group 3 and 4: as a group (2) and treated daily with (100 and 200 mg/kg b.w) EEMOL, respectively
- Group 5 and 6: as a group (2) and treated daily with(100 and 200 mg/kg b.w) EEPGL, respectively

Biological evaluation

Body weight, food consumption were measured twice a week and total food intake of the experimental period (6 weeks) was calculated according to ***(Chapman et al., 1959).*** The feed efficiency ratio was calculated according to the following equation as mentioned by ***Hosoya, (1980).***

Sperm parametrs

Sperm count, Sperm motility and sperm head abnormality were calculated according to the methods of ***(Ekaluo et al. 2005; Ekaluo et al., 2013 and Ekaluo et al. 2009)*** respectivley**.**

Hormonal assays

The levels of hormones were measured in serum according to the principle highlighted by ***Tietz (1995)*** for testosterone while the method of ***Uotila et al., (1981)*** was used for luteinizing and follicle stimulating hormones**.**

Antioxidant enzymes

Glutathione peroxidase (GPx), Malondialdehyde (MDA), (Super Oxide Dismutase (SOD), Catalase (CAT), and nitric oxide (No) were determined acoording to th methods of **(Paglia and *Valentine, 1967 ; Ohkawa et al., 1979; Nishikimi et al., 1972; Aebi, 1984 and Montgomery and Dymock, 1961).***

Histopathology analysis

Testis in each rat was preserved in 5% formaldehyde passed through xylene and embedded in paraffin wax. The tissue were sectioned at the thickness of 5 µm and stained with haematoxylin and eosin. The spermatogenesis was observed in testis at 100X ***(Nithya and Elango, 2016).***

Statistical analysis

Statistical analysis was carried out using one way analysis of variance (ANOVA) test followed by Duncan test through the programme of statistical packages for the social science (SPSS) version 16. Results were expressed as mean± SD. The differences among means at $p < 0.05$ are considered significant ***(Snedecor and Cochran, 1989).***

Results

Table 1 shows that changes in feed intake, body weight gain % and feed efficiency ratio in control and experimental groups of rats. This parameters decreased in cisplatin (+ control) while improved in treatment groups specially high dose. The highest improvement recorded for the group which treated with 200 mg/kg b.wt. EEMOL followed by the group treated with 200 mg /kg b.wt. EEPGL, respectively.

Table 2 shows that non- significant changes in relative testis weight and prostate in the positive control group, as compared to the negative control group . Treated groups with the two dosage from EEMOL and EEPGL showed non- significant differences in testis, as compared to (+ve) control group, expect group of rats which treated with 200mg / kg EEPGL. On the other hand, treated rats with low dosage from EEMOL and EEPGL showed significant decrease in prostate, as compared to other treated groups.

Table 3 observes the sperm motility and sperm count were decreased in cisplatin (+ control). While, sperm abnormality was increased in cisplatin (+ control). However, treated groups with high doses improved these parametrs and were closed to normal control.

Table 4 observes the Testosterone, FSH and LH hormones were decreased in cisplatin (+ control). While, E2 hormone was increased in cisplatin (+ control). However, treated groups with high doses from EEMOL and EEPGL improved these parameters and were closed to normal control.

Table 5 shows that SOD, GPX and CAT enzymes were decreased in cisplatin (+ control). While, MDA and NO levels were increased in cisplatin (+ control). However, all treated groups improved these parameters as compared cisplatin (+ control). The best result was found in treated group with EEMOL (200 mg/kg) and were closed to normal control.

The results obtained from histological sections of testis illustrated in Fig.18. Testis, shows normal histological picture of seminiferous tubules in Normal (-control) group **(A).** However, testes from Cisplatin (+control) group showed interstitial edema (arrows) and marked vacuolation of spermatocytes (stars) **(B)** , tubular necrosis (arrows) with leukocytic cells infiltration in interstitium (arrowhead) **(C)**, higher magnification to show leukocytic cells infiltration in interstitium (arrowhead) and desquamation of necrotic spermatocytes in lumen of a seminiferous tubule (star) **(D),** and congested blood vessel (thick arrow) **(E),** while hyalinization of tubular epithelium (arrows) observed in Cisplatin + EEMOL(100mg/kg) group **(F)**, retained normal histological picture of seminiferous tubules in Cisplatin + EEMOL (200 mg/kg) group **(G)**. While, mild vacuolation in spermatocytes (arrows) observed in Cisplatin +EEPGL (100 mg/Kg) and Cisplatin + EEPGL (200 mg/kg) groups**(H&I) .** H&E

Discussion

Cisplatin is effective chemotherapy widely used for treatment many types of cancers. Although it is restricted due to its side effects especially on testis. It caused testicular toxicity ***(Awadalla, 2012 and Amin et al., 2012)***[a]. In the present study, we demonstrated that cisplatin leading to a decrease in appetite and subsequently to weight loss acording to ***(Hesketh, 2003).*** These results supported by **Garcia *et al., (2013)*** who reported that cisplatin-induced appetite, body weight and feeding efficiency decreases. Also**, *Malik et al.,(2006)*** reported that cisplatin-induced anorexia ,gastrointestinal tract disorders including vomiting, nausea, stomach distension, and gastric stasis may result in decreased food intake**.** In harmony with these findings, ***Yamamoto et al., (2007)*** observed that anorexia nervosa is one of the most common gastrointestinal side-effects associated with cisplatin and is, therefore, used as an index of patient quality of life. ***Cabezos et al., (2008)*** demonstrated that cisplatin has highly emetic effect**.** Cisplatin led to a decrease gastric motility ***(Gong et al., 2017).***

Medicinal plants have been used in traditional medicine due to their antioxidant activities. In the present study, the body weight of adult male rats treated with *Moringa oleifera* leaf extract improved as compared to cisplatin group due to this extract enhancing growth according to ***(Akudu et al., 2014).*** In contrast to ***Adedapo et al., (2009)*** suggested that supplementation of *moringa* extract at 200mg/kg and 400mg/kg are capable of preventing body weight gain. It is may be dependent on dose of extract it mean that, in high doses decrease the body weight. This findings agree with ***Bernadier,(2004)*** who suggested that *moringa* extract may affect some regulation signals of food intake and metabolism of the animals. In

our study treatment with *pesiduim guajava* extract lead to improvement in FI, BWG% as compared to positive group, the results agree with ***Amer,(2014)*** revealed that diet supplemented with *pesiduim guajava* extract showed significantly increased in feed intake and body weight gain % as compared to the positive group. On the other hand *pesiduim guajava* extract reduce body weight according to ***(Houmard et al., 2011).***

Our results indicated to there are no significant differences in relative weight of testis and prostate among all groups. However, low dose of plant extracts reduced weight of prostate this results explained by the weight of organ is not enough to induce testicular damage histological examination and antioxidant levels in testis tissue are the importance.

In the current study cisplatin group was decreased in sperm count and sperm motility this results matching with ***Boekelheide, (2005)*** who reported that exposure to cisplatin results in impaired spermatogenesis, permanent infertility in male patient's and apoptosis to testicular germ cells and Sertoli cells. This results consistent with **(*Adejuwon et al., 2015 and Amin et al., 2012)*[b]** they investigated that CIS caused degeneration of seminiferous tubules with disruption of spermatogenesis, sperm dysfunction, damages testicular tissue and reduces sperm production through increasing oxidative stress.

Administration of ethanol extract *Moringa oleifera* and *pesiduim guajava* leav at high doses, significantly caused an increase in sperm count and sperm motility, this results were reported by ***(Akunna et al., 2012 and Dafalla et al., 2015). Kujo, (2004)*** explained an increase in sperm cell concentration as a result

of Potent antioxidants as vitamin C, flavonoids in *Moringa oleifera* which prevent oxidant and increase sperm synthesize. Sexual hormone directly stimulates spermatogenesis therefore, a significant increase in these hormones lead to increased sperm cell count and motility as observed in this study. Similar findings were reported by ***(Gauthaman and Adaikan, 2008; Prabsattroo et al; 2015 Harrison et al., 2016; Nithya and Elango, 2016 ; Chatterjee et al., 2017 and Dafaalla et al ., 2017)*** Moringa oleifera leaves contain antioxidants, Saponins have been reported to boost testosterone levels.

Similar finding to our results suggested by ***Akinola et al ., (2007)[a]*** who reported that guava leaf extract have spermatogenic effects particularly in high dose which caused an increase in sperm count, sperm viability, sperm motility Psidium guajava leaf extract stimulate some chemical agents to increase reproductive functions in male rats ***(Uboh et al., 2010).*** Our results are agree with ***Ferdinand et al., (2014)*** who reported that administration of *Psidium guajava* leaf induced a significant increase in testicular testosterone. Due to antioxidant action and essential oil which may stimulate the synthesis of testosterone by acting on the hypothalamic-pituitary-testicular axis. ***Jagruthi and Ddvikay, (2015)*** found that *Psidium guajava* has positive effect on spermatogenesis and enhance fertility.

The major finding of the present study was effective role of high-doses ethanolic extract of Psidium *guajava* leaves (EEPGL) and ethanolic extract of *Moringa oleifera* leaves (EEMOL) to improve levels of Testosterone, FSH and LH hormones against cisplatin – induced infertility in male rats. Serum levels of FSH, LH and testosterone were significantly decreased in cisplatin (+ control) as compared to control groups. The decreased levels of serum testosterone with cisplatin could be due to suppression of

testosterone production by the testis. The decrease in serum LH and FSH may result from impairment in their production and secretion. Cisplatin caused plasma oxidative stress in testes and decreased levels of t estosterone according to ***Atessahin et al.,(2006).***

The present study indicated that EEPGL have strong potency for stimulation secretion of sex hormones. Our results agree with ***Uboh et al., (2010)*** who recommended with Aqueous extract of Psidium *guajava* leaves for males with different reproductive dysfunction. The possible mechanism of these findings that alkaloids from the *P.guajava* leaves will adversely affect the process of reproduction of concentration of testosterone which the suppression of gonadotropin that consequently produced the concentration of testosterone accompanied by the androgendeprivation effects on the testicular and spermatogenic activities according to ***Jagruthi and Devika (2015)*** who reported the efficacy of aqueous leaf extract of *Psidium guajava* has positive effect for enhancing fertility.

Also, EEMOL has ability to enhance libido is the presence of flavonoids in this plant extract which has been implicated for altering androgen levels and may also has a role for the boosting male sexual behavior according to **(*Padashetty and Mishra, 2007).***In this respect the results were agree with ***khudhair (2016)*** who studied the effect of *Moringa oleifera* leaf extracts on fertility of male albino mice. The results showed that a significant increase ($p \leq 0.05$) Serum testosterone in mice treated with 100 and 200 mg/kg when compared with controls and with other group treated with plant extract at dose of 300 mg/kg. Moreover, ***Dafaalla et al., (2017)*** documented oral administration of ethanol extract at doses of 100, 200 and 400 mg/kg were significantly increased serum Testosterone,

Follicle-stimulating hormone (FSH) and Luteinizing hormone (LH) compared to the control group in experimental animals study.

On the other hand, the current investigation revealed that a significant ($p<0.05$) decrease in of SOD, GPX, Catalase while increase in MDA and NO levels in cisplatin (+ control) compared to the normal control group. The decreased levels of SOD, GPX, CAT and increased levels of MDA and NO in testis imply that the CP may be a turning point in clearing away excessive free radicals. Our results corresponding to ***Liu et al., (2015)*** indicated that the inhibited enzymes, oxidative stress, and the down-regulation of Sertoli cell function-related proteins play essential roles in CP-induced testicular damage. In the present study, all treated groups improved previous parameters as compared cisplatin (+ control).

The best result was found in treated group with EEMOL (200 mg/kg). Our results agree with ***Nayak et al., (2016)*** who demonstrated that administration of *Moringa oleifera* leaf extract (MOE) prior to CP significantly elevated the level of superoxide dismutase and catalase with concomitant decrease in lipid peroxidation in the testicular tissue. A lower MDA and No levels and increased activity of SOD, GPX and CAT clearly suggest that EEMOL helps in scavenging the free radicals generated by CP. To support this observation, previous studies have reported that *Moringa oleifera leaf extract* possesses excellent potency to neutralize oxidative stress by increasing the level of potent antioxidants such as GSH, SOD, CAT and glutathione peroxidase (***Fakurazi et al., 2008; Luqman et al., 2012; Sadek, 2013 and Sutalangka et al., 2013). Moreover, Tousson et al., (2016)*** indicated that testicular tissue of treated groups with *Moringa oleifera* leaf extract were significantly

decreased in MDA and nitric oxide level while SOD and GPX were increased.

Also, our results observed the importance of ethanolic extract of *Psidium guajava* in reducing lipid peroxidation through decrease the levels of MDA and nitric oxide while increasing antioxidant enzymes such as SOD, GPX and CAT. These results can be attributed to the antioxidant properties of the *Psidium guajava* leaves essential oil. In fact, the sperm membrane is rich in polyunsaturated fatty acids, making them especially susceptible to reactive oxygen species (ROS) derived from oxygen metabolism. In addition to an action on lipids, the ROS may also damage DNA and proteins ***(Grignard, 2005)*** . However, the essential oil from the leaves of *guava* contains a number of compounds (phenolic compounds) which confer antioxidant properties, and which would act as scavengers of free radicals ***(Chen and Yen, 2007 and Metwally et al., 2010),*** thus limiting their negative consequences on sperm and testis. The inhibition of MDA and nitric oxide may occur due to guava's antioxidant activity from ascorbic acid and phenolic compounds According to ***Soares et al. (2007).***

This findings Showed agreement with ***Obode et al., (2015)*** who reported the improvement in testicular antioxidant activities and sperm qualities by single and double doses of the *Psidium guajava* in formulation , suggesting its protective potential against testicular toxicity in diabetic rats.

We examined the effects of cisplatin on tesis tissues using histological examination. Our results indicate that, cisplatin caused edema, marked vacuolation of spermatocytes, tubular necrosis with leukocytic cells infiltration in interstitium, desquamation of necrotic

spermatocytes in lumen of a seminiferous tubule and congested blood vessel. This results agree with ***Coşkun et al., (2013)*** when they found cisplatin caused edema (asterisk), Seminiferous tubules show severe degeneration and desquamation of germ cells in the peripheral region.

The study demonstrated by ***Ahmed et al., (2016)*** was similar to our results the pervious study showed CIS group sever congestion in blood vessels, infiltrationin in the interstitial. ***Fallahzadeh et al.,(2017)*** reported that cisplatin increased space between the seminiferous tubules caused by the tissue edema, vascular congestion. ***Gevrek and Erdemir (2018)*** demonstrated that testes are more frequently effected by many oxidative agents as cisplatin duo to formation of reactive oxygen species which cause cellular injury and impairment histology.

Effect of treatment with *Moringa oleifera* was clear, enhances seminiferous tubule and closed to normal control. ***Chandrasekar et al., (2006)*** indicated that *Moringa oleifera* has antioxidant properties as terpenoids, steroids, and phenolic compounds such as tannins, coumarins, and flavonoids. Our results agree with ***Saalu et al., (2011)*** who reported that improvement in testicular germ cell morphology. M. oleifera possess antioxidant properties that decrease the deleterious effect testes toxicity ***(Bassey et al., 2013).***On the other hand treatment with *Psidium guajava* improved testis histology as compared to cisplatin group duo to antioxidant activity and scavenger of free radical as reported by ***(Akinola et al., 2007)b.***

Conclusion

Cisplatin has side effects on body organs specially testis, sperm which contain lipids which are precursors of peroxidation and formation free radicals. According to the results, EEPGL and EEMOL could be used for improved sexual functions and protection from infertility.

Table (1): Effects of ethanolic extracts of MOL and PGL on feed intake, body weight gain and feed efficiency ratio in rats induced cisplatin (mean ± SD, n=5).

Groups	FI (g)	BWG (%)	FER
Normal (- control)	929±6.72 [a]	5.14±1.19[a]	0.01±0.003[a]
Cisplatin (+ control)	495±3.00[f]	-35.30±2.22[c]	-0.17±0.009[d]
Cisplatin + EEMOL(100mg/kg)	772±1.82[d]	-33.47±4.15[c]	-0.11±0.007[c]
Cisplatin + EEMOL (200 mg/kg)	827±2.30[b]	-19.01±2.89[b]	-0.05±0.006[b]
Cisplatin +EEPGL (100 mg/Kg)	738±2.70[e]	-32.91±5.13[c]	-0.10±0.014[c]
Cisplatin + EEPGL (200 mg/kg)	792 ± 4.15[c]	-23.44± 5.77[b]	-0.07± 0.013[b]

Means in the same column with completely different letters are significantly different at $p<0.05$.

Table (2): Effects of ethanolic extracts of MOL and PGL on relative organs weight in rats induced cisplatin (mean ± SD, n=5).

Groups	Relative organs weight (g/100 g. B.Wt.)	
	Testes	Prostata
Normal (- control)	1.10 ± 0.09^{c}	0.19±0.04^{a}
Cisplatin (+ control)	1.35 ±0.39^{bc}	0.16±0.02^{a}
Cisplatin + EEMOL (100mg/kg)	1.42±0.21^{ab}	0.09±0.02^{b}
Cisplatin + EEMOL (200 mg/kg)	1.46±0.04 ^{ab}	0.16±0.31^{a}
Cisplatin +EEPGL (100 mg/Kg)	1.59±0.26 ^{ab}	0.12±0.23^{b}
Cisplatin + EEPGL (200 mg/kg)	1.66±0.11 ^{a}	0.15±0.03^{a}

Means in the same column with completely different letters are significantly different at $p<0.05$.

Table (3): Effects of ethanolic extracts of MOL and PGL on sperm motility, sperm abnormality and sperm count in rats induced cisplatin (mean±SD, n=5).

Groups	Sperm motility (%)	Sperm abnormalty (%)	sperm count (10^6 /ml)
Normal (- control)	88.24±7.04[a]	3.20±0.84[d]	198.36±12.31[a]
Cisplatin (+ control)	51.60±8.20[c]	9.80±1.48[a]	72.42±13.49[d]
Cisplatin + EEMOL (100mg/kg)	74.20±3.77[b]	5.80±0.84[c]	144.54±11.42 [b]
Cisplatin + EEMOL (200 mg/kg)	87.00±3.46[a]	3.80±0.84[d]	185.02±14.59 [a]
Cisplatin +EEPGL (100 mg/Kg)	69.20±5.93[b]	7.40±1.14[b]	126.28±16.43[c]
Cisplatin + EEPGL (200 mg/kg)	82.60±4.88[a]	4.40±1.14[d]	185.86±11.16 [a]

Means in the same column with completely different letters are significantly different at $p<0.05$.

Table (4): Effects of ethanolic extracts of MOL and PGL on Testesterone, FSH, LH and E2 in rats induced cisplatin (mean±SD, n=5).

Groups	Testosteron (ng/ml)	FSH (MIU/ml)	LH (ng/ml)	E2 (pg/ml)
Normal (- control)	3.06±0.23^{a}	3.48±0.35^{a}	3.80±0.66^{a}	12.70±0.57^{e}
Cisplatin (+ control)	1.47±0.19^{e}	1.27±0.12^{e}	1.67±0.16^{c}	18.61±0.72^{a}
Cisplatin + EEMOL (100mg/kg)	1.98±0.11^{d}	2.41±0.25^{c}	2.46±0.30^{b}	14.55±0.51^{c}
Cisplatin + EEMOL (200 mg/kg)	2.77±0.30^{b}	3.13±0.33^{b}	3.65±0.32^{a}	13.52±0.47^{d}
Cisplatin +EEPGL (100 mg/Kg)	1.78±0.11^{d}	1.87±0.20^{d}	1.95±0.17^{c}	15.81±0.98^{b}
Cisplatin + EEPGL (200 mg/kg)	2.29±0.29^{c}	2.93±0.21^{b}	2.88±0.34^{b}	13.95±0.22^{cd}

Means in the same column with completely different letters are significantly different at $p<0.05$.

Table (5): Effects of ethanolic extracts of MOL and PGL on antioxidant levels in testis tissues of rats induced cisplatin.

Groups	SOD (U/gT)	GPX (U/gT)	CAT (U/g)	MDA (nmol /gT)	NO (Mmol/L)
Normal (- control)	21.55±0.88^{a}	46.5±1.27^{a}	0.49±0.007^{a}	7.15±0.25^{e}	2.01±0.14^{e}
Cisplatin (+ control)	10.05±0.18^{f}	29.85±1.03^{e}	0.34±0.007^{d}	14.2±0.57^{a}	3.09±0.08^{a}
Cisplatin + EEMOL (100mg/kg)	16.15±0.88^{d}	38.45±1.94^{c}	0.44±0.011^{b}	8.55±0.39^{c}	2.55±0.04^{c}
Cisplatin + EEMOL (200 mg/kg)	20.15±0.39^{b}	42.55±0.74^{b}	0.48±0.008^{a}	7.35±0.04^{e}	2.21±0.06^{d}
Cisplatin +EEPGL (10 mg/Kg)	12.9±0.21^{e}	34.95±0.88^{d}	0.43±0.009^{c}	10.5±0.49^{b}	2.71±0.02^{b}
Cisplatin + EEPGL (200 mg/kg)	17.65±0.81^{c}	39.6±0.49^{c}	0.45±0.013^{b}	8.05±0.18^{d}	2.50±0.05^{c}

Means in the same column with completely different letters are significantly different at $p<0.05$.

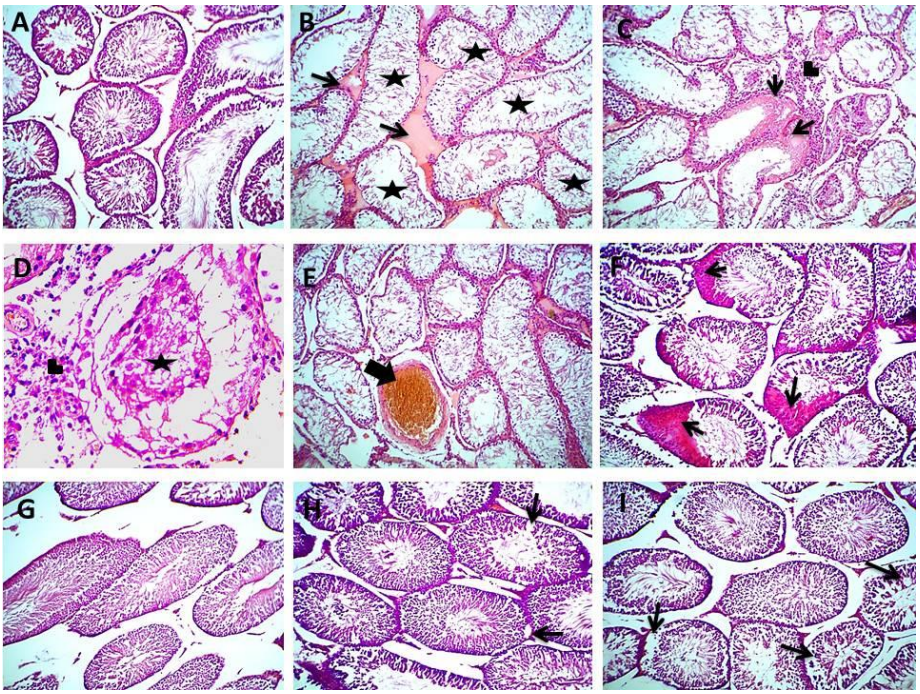

Figure (1): Microscopic images hematoxylin and eosin (H & E)-. (A) Normal (- control). (B, C, D, E) Cisplatin (+ control). Rats treated by CDDP and PTX (150 mg/kg). (F) Cisplatin + EEMOL(100mg/kg) (G) Cisplatin + EEMOL (200 mg/kg) , (H) Cisplatin +EEPGL (100 mg/Kg) (I) Cisplatin + EEPGL (200 mg/kg).

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دراسة مقارنة على بعض النباتات الطبية ضد السيسبلاتين المحدث لعدم الخصوبة في الفئران الذكور

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الملخص العربى

هذه الدراسة أجريت لمعرفة تأثير بعض النباتات الطبية ضد السيسبلاتين المحدث لعدم الخصوبة في الفئران الذكور . أجريت الدراسة باستخدام ثلاثون من ذكور فئران الألبينو البالغة تبلغ أوزانهم (١٨٠ – ٢٢٠ جم) وتم تقسيمهم عشوائيا إلى ست مجموعات متساوية احداهما هي المجموعة الضابطة السليمة، بينما الخمس مجموعات الأخرى تم حقنهم مرة واحدة بمادة السيسبلاتين بجرعة (٧ ملجم / كجم من وزن الجسم). بعد احداث الاصابة بقيت احدي المجموعات كمجموعة ضابطة موجبة بينما المجموعات الأخرى تم اعطائهم عن طريق الفم النباتات الطبية (المستخلص الايثانولي لأوراق الجوافة والمورينجا) بجرعتين هما ١٠٠ و٢٠٠ مجم / كجم من وزن الجسم. استمرت التجربة لمدة ست اسابيع. تم اجراء التقييم البيولوجي ويشمل النسبة المئوية لوزن الجسم المكتسب , المأخوذ الغذائي و معدل الاستفادة من كفاءة الغذاء . تم حساب عدد الحيوانات المنوية وحركتها وحساب نسبة التشوهات فيها. تم قياس مستوى هرمونات التستسترون ، الهرمون المنبه لافراز الحيوانات المنوية (FSH), الهرمون المنبه لافراز التستسترون (LH) والاستيراديول ،(E2) ، تم تقدير الانزيمات المضادة للأكسدة في انسجة الخصية (سوبر أكسيد ديسميوتيز, جلوتاثيون بيروكسيديز والكتاليز) وقياس مؤشرات حدوث الأكسدة (المالون داى الدهيد, اكسيد النيتريك). وكذلك التغيرات الهستوباثولوجية في الخصية تم فحصها, ووجدت افضل النتائج في المجموعات المعالجة بالجرعات العالية لكلا المستخلصات النباتية (الجوافة والمورينجا) وفقا لهذه النتائج يمكن استخدام المستخلصات الايثانولية لأوراق الجوافة والمورينجا في تحسين الوظائف الجنسية وكذلك تحسين عدم الخصوبة في ذكور الفئران .