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The role of date palm pollen grains extract in fertility improving

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ABSTRACT

The impact of the ethanol extract of date palm pollen grains (DPP) was examined in the fertility enhancement of female rats exposed to oxidative stress by sodium nitrite. forty female mature rats assessing 150- 200 g were grouped into five groups. First group were received distilled water save as control group, The second group was administered 100 mg/kg of crude DPP extract, third group received 100 mg/kg of crude DPP extract combined with 100 mg/kg body weight of sodium nitrite, forth group received 100mg/kg B.W of sodium nitrite, while fifth group was drenched 100mg/kg B.W of sodium nitrite for 28 days then 100mg/kg of crude DPP extract for another 14 days. Then we added the same number of mature male rats to determination the ability of DPP extract for fertility enhancement. the Animals were kept until the parturition occurred then determination the pregnancy index, fertility index, and viability index. The DPP extract caused clear changes in percentage of the parameters of pregnancy, viability and fertility indexes compared to the groups exposed to sodium nitrite, and also following the treatment of animals with DPP extract after exposure to sodium nitrite showed improvement of fertility and pregnancy indexes. The best enhancement activity of DPP extract was clarified in the result of long term treatment (fourth group). Conclusions: The study showed the ability of palm pollen grain extract to improve fertility and protective effects and treatments the harmful effects of sodium nitrite.

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1- INTRODUCTION

Food and Agriculture Organization (FAO), Ward health organization(WHO) and Expert Committee on Food Additives(JECFA) has been reviewed the sodium nitrite, [1]. Many researchers have found that exposure to high concentrations of sodium nitrite or nitrite increases the incidence of many dangerous diseases such as cancers, brain tumors, leukemia, and other tumors [2].

One of the dangers of exposure to sodium nitrite is that its interactions in living bodies lead to a series of free radical reactions [3], and caused maternal anemia , increased the happening of abortion , fetal death, an increase in pup mortality, reduction in pre-weanling body weights, and alterations in lung function i.e. pneumoconiosis; [4].

Zaki *et al.* [5] Male rats exposed to nitrate in their drinking water showed a dose-dependent increase in thyroid gland weight. At nitrate concentrations of 150 and 500 mg/l, there was a noted decrease in triiodothyronine (T3) levels, and at 500 mg/l, a decrease in thyroxine (T4) was also observed. Additionally, humans living in areas with high nitrate concentrations in their drinking water have reported increased thyroid volume. [6].

Since ancient times, herbal medicines have been utilized for both the prevention and treatment of various diseases. Recently, herbal remedies have become increasingly popular as a form of primary health care options worldwide due to their minimal side effects. [7].

Various parts of Phoenix dactylifera, including its leaves, bark, pits, fruits, and pollen, possess a wide range of medicinal properties. These properties include including properties such as anticancer, antioxidant, hepatoprotective, antidiabetic, antihypertensive, antiulcer, anti-inflammatory, antiproliferative, antimutagenic, antidiarrheal, antibacterial, antifungal, and antiviral effects. [8]. DPP has a long history of use in traditional herbal medicine for addressing male and female infertility and impotence. It is rich in natural antioxidants and offers significant health benefits and nutritional value. Research indicates that DPP may enhance spermatogenesis, increase sperm count, and elevate levels of testosterone, FSH, and LH. [9].

Traditionally, this plant has been used to enhance sexual desire and address sexual dysfunction [10]. Various parts of Phoenix dactylifera have been widely used in traditional medicine to treat a range of conditions, including memory issues, fever, inflammation, paralysis, and nervous disorders [11]. Therefore, this study aimed to evaluate the potential protective effects of DPP against the harmful impacts of sodium nitrite and to assess the role of DPP extract on the fertility of female rats.

2- MATERIAL AND METHOD

Date palm (Phoenix dactylifera L.) pollen grains were collected from the Alzubaidyia district, situated 90 km east of Baghdad in the Wasit governorate of Iraq. The collection occurred from late March through April. The pollen grains were air-dried in the dark and then stored frozen until further use.

Preparation of ethanol extract of DPP grains (*Phoenix Dactylifera*) [12].

Experimental design

There were two control groups and three experimental groups, each consisting of eight mature female albino rats. The treatment protocol was as follows:

The first group (GI) was administered 0.5 ml of distilled water (DW), followed by another 0.5 ml of DW after 45 minutes.

The second group (GII) received 0.5 ml of DW, followed by 100 mg/kg of DPP (date palm pollen) after 45 minutes.

The third group (GIII) received daily doses of 100 mg/kg body weight of crude ethanolic extract of DPP, followed by 100 mg/kg body weight of sodium nitrite after 45 minutes.

The fourth group (GIV) was given 0.5 ml of DW, followed by 100 mg/kg body weight of sodium nitrite after 45 minutes.

The fifth group (GV) received 0.5 ml of DW, followed by daily doses of 100 mg/kg body weight of sodium nitrite for twenty-eight days. Subsequently, they were given 0.5 ml of DW, followed by 100 mg/kg body weight of DPP for fourteen days.

All treatments were administered orally using a gavage needle.

3- RESULTS

The effect of DPP extract and sodium nitrite on pregnancy, viability and fertility Indexes are listed in the tables, 1, 2 and 3 respectively. The data illustrated that DPP extract caused clear changes in percentage in these parameters compared to the groups exposed to sodium nitrite, as well as the effects of treating animals with DPP extract after exposure to sodium nitrite showed improvement of fertility and pregnancy indexes. The results did not record a difference between the animals of the group number one, that is, the controller group, and the second group that was dosed with the alcoholic extract of palm pollen in all three indicators, pregnancy, viability and fertility. The results recorded that the lowest viability index was in the percentage of the fourth group that was given sodium nitrite only, followed by the fifth group that was treated with palm pollen extract for fourteen days after taking sodium nitrite for twenty-eight days, they recorded the lowest percentage in the number of live births, and therefore the vitality index was the lowest in this group.

Table (1)The Effect of Ethanolic extract derived from date palm pollen grains on Pregnancy index(%) in treated and non-treated female rats

Group / Parameter	GI	G II	GIII	G IV	GV
No. of Pregnant rats	8	8	8	8	8
No. of pregnant rats give life babies	8	8	7	5	6
Pregnancy Index	%100	%100	%87.5	%62.5	%75

n=8

Table (2) The Ethanolic extract derived from date palm pollen grains on Viability index(%) in treated and non-treated female rats n=8

Group / Parameters	GI	G II	GIII	G IV	GV
No. of total babies	36	56	40	30	42
No. of a live babies	36	56	38	0	2
No. of Dade babies	0	0	2	30	40
Viability Index	100%	100%	95%	0%	5%

n=8

Table (3) The Effect of Ethanolic extract derived from date palm pollen grains on Fertility index(%) in treated and non-treated female rats

Group / Parameters	GI	G II	GIII	G IV	GV
No. of mated successfully	8	8	8	8	8
No. of pregnant rats	8	8	7	5	6
Fertility Index	100%	100%	87.5%	62.5%	75%

n=8

4- DISCUSSION

The results of fertility, pregnancy and viability indexes revealed that treatment of animals with effective dose of DPP extract leads to an elevation of these indexes , these outcomes may be because of change of conceptive hormones like gonadotropins that have capacity through an arrangement of positive and negative input to administer the estrous cycle, FSH and LH have a conspicuous part in ovarian follicle advancement.

The FSH and LH are crucial for follicular maturation and the development of mature follicles. Additionally, they play a key role in stimulating gonadal gametogenesis and steroidogenesis [13]. On reproduction and fertility,these results agree with an others previous research by, [14] who record the role of DPP in the improvement and enhancement of reproductive function and fertility of females rats. DPP enhances fertility index 68% when given combination with carbofuran while the fertility index in the rats treated with carbofuran only was 53%.[15].

In 2014 Arafat *et al* [16] Evidence suggests that DPP may enhance reproductive activity in rats, as noted by Elberry *et al*. [17] in women, which may be because of the presence of gonadotropin like substances, DPP has gonadal stimulating potency and improving fertility.

Pollen of the date palm due to its phytochemical compositions like estrone, flavonoids triterpenoidal saponins, *α*-amirin, and a crude gonadotrophic substance has been used for improving male and female fertility, change of fundamental exercises and expanded the hormonal center in rats [18,19].

The improving fertility effect of DPP may be related to the presence of estrogenic compound [20]. DPP fertility improvement effect is attributed to its gonadotrphic activity as noticed by [21]. While [22] attributed the fertility improvement by DPP grain extract to its contain of estrogenic material as a gonad-stimulating compound.

On the other hand, sodium nitrite caused a reduction in these indexes, and these effects may be related to the passive role of nitrite as toxic materials, Sodium nitrite caused a decrement of LH and FSH hormones so that the fertility decreased [23].

The protective and therapeutic role of DPP extract against sodium nitrite revealed the antioxidant role of this extract which contains different antioxidants like flavonoids, vitamin C, alkaloids, tannins, and saponins [24].

Changed pituitary cell number, Dysfunction, which is a significant contributor to endocrine diseases, is one of the primary causes.

Reproductive disorders lead to infertility in both males and females [25].

Hypersecretion of prolactin causes fertility disorders. [26].

Environmental pollutants are triggering oxidative states, possibly contributing to female infertility. [27].

5- CONCLUSION

The results of the experiment showed the negative effect of sodium nitrite on female fertility and the vitality of fetuses. The results also showed the ability of the alcoholic extract of palm pollen to improve fertility in animals exposed to sodium nitrite and to maintain the viability of embryos in animals that took the palm pollen extract.

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دور مستخلص حبوب لقاح النخيل في تحسين الخصوبة

الخلاصة

تمت دراسة تأثير مستخلص إيثانول حبوب لقاح نخيل التمر (DPP) في تحسين خصوبة إناث الجرذان المعرضة للإجهاد التأكسدي بواسطة نتريت الصوديوم. تم تجميع أربعين فأرًا ناضجة بوزن 150-200 غرام في خمس مجموعات. تلقت المجموعة الأولى الماء المقطر وأعتبرت مجموعة سيطرة، تلقت المجموعة الثانية 100 ملغم / كغم من مستخلص DPP الخام، تلقت المجموعة الثالثة 100 ملغم / كغم من مستخلص DPP الخام بالإضافة إلى 100 ملغم / كغم من وزن الجسم من نتريت الصوديوم، تلقت المجموعة الرابعة 100 ملغم / كغم من وزن الجسم من نتريت الصوديوم, بينما تم غمر المجموعة الخامسة بـ 100 ملغم/كغم من وزن الجسم من نتريت الصوديوم لمدة 28 يوماً ثم غمرت بـ 100 ملغم/كغم من مستخلص DPP الخام لمدة 14 يوماً أخرى. وتم إضافة نفس العدد من ذكور الجرذان الناضجة لتحديد قدرة مستخلص DPP على تعزيز الخصوبة. تم الاحتفاظ بالحيوانات حتى حدوث الولادة وتم تحديد مؤشر الحمل، ومؤشر الخصوبة، ومؤشر الحيوية.

أحدث مستخلص DPP تغيرات واضحة في النسبة المئوية لمؤشرات الحمل والقدرة الحيوية والخصوبة مقارنة بالمجموعات التي تعرضت لنتريت الصوديوم، كما أظهرت معاملة الحيوانات بمستخلص DPP بعد التعرض لنتريت الصوديوم تحسنا في مؤشرات الخصوبة والحمل. كما إتضح أن أفضل نشاط تعزيز لمستخلص DPP يتم نتيجة المعاملة طويلة الأمد (المجموعة الرابعة).

الإستنتاجات: أظهرت الدراسة قدرة مستخلص حبوب لقاح نخيل التمر على تحسين الخصوبة والتأثيرات الوقائية وعلاج الآثار الضارة لنتريت الصوديوم.