



Spermatogenesis and Sperm Parameters of Mice induced by Coriander

Mohammed .S.Alessia¹; Amr .A, Shalaby^{1,2}; Nasir,A. Ibrahim¹; & Alhader. M.S³

¹Department of Biology, Faculty of Science, Ha'il University, King Saudi Arabia.

²Department of Zoology, Faculty of Science, Zagazig University, Egypt.

³King Abdulaziz City for Science and Technology.

Abstract

The present study aims was evaluated the effect of aqueous seed extract of coriander on spermatogenesis and sperm parameters of mice. Mice divided into three groups; each one included 10 mice: group-1 represents control; group-2 orally received 50ml/kg/BW; group-3 received 100 ml/kg/BW. Obtained data showed that the average of testis weight insignificantly ($p>0.05$) decreased compared with control. Sperm concentration, motility and viability were significantly ($p<0.05$) increased compared with control. Histology results showed that sperm numbers significantly ($p<0.05$) increased in the luminal spermatozoa in both concentrations of coriander compared with control.

Key words: Aqueous, coriander, Spermatogenesis, histology, Mice.

Introduction

Coriander spices and herbs are common dietary adjuncts that contribute to the flavor of foods. They are also known to exert beneficial physiological effects (Srinivasan, 2005). *Coriandrum sativum*, commonly known as coriander or Chinese parsley, has been used as a foodstuff since at least the 10th century (Uchibayashi, 2001). Coriander is a glabrous, aromatic, herbaceous annual plant, which is well known for its use in jaundice. Essential oil, flavonoids, fatty acids, and sterols have been isolated from different parts of Coriander. The plant has a very effective antioxidant profile showing 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity, lipoxygenase inhibition, phospholipid peroxidation inhibition, iron chelating activity, hydroxyl radical scavenging activity, superoxide dismutation, glutathione reduction and antilipid peroxidation due to its high total phenolic content with the presence of constituents like pyrogallol, caffeic acid, glycitin (Panda *et al.*, 2009; Pandey *et al.*, 2011). *Coriandrum sativum* that belongs to family Umbelliferae. In Iranian traditional medicine, dill seed has been indicated for a number of medical problems such as flatulence, indigestion, stomachache, colic (Ames and Duck, 2002 and Al-Said *et al.*, 1987). coriander (*Coriandrum sativum*) has been reported to have a number of possible medicinal attributes including antispasmodic, carminative and stomachic properties (Alison and Peter, 1999). Several physiological and medical benefits have been reported for the spice. In Iranian folk medicine, aqueous extract of *Coriandrum sativum* seed has been recommended for relief of anxiety and insomnia, and may have potential sedative, hypotensive and muscle relaxant effects (Medhin, 1986 and Emamghoreishi *et al.*, 2005). Additionally, coriander has been advocated as an anti-diabetic remedy.

Material and Method

Normal SWR/J male mice, 8-10 weeks old and weighing 28 ± 3 g were used throughout the study. Animals were maintained and reared under standard laboratory at a temperature of $24\pm 1^\circ\text{C}$, a relative humidity of $45\pm 5\%$ and photoperiod cycle of 10/14 h. Mouse food (commercially available in Saudi Arabia) and water were offered ad libitum. A total of 30 males were used and divided into 3 groups, with each group containing 10 males. Group-1 (G.1) was received 8 ml distilled water daily as a negative control. Group-2 (G.2) was received 50 ml /kg/ BW of coriander dissolved in water Group-3 (G.3) was received 100 ml /kg/ BW of coriander each group treated for a period of 21 consecutive days in water). The daily intake of water was monitored at least one week prior to start of treatments in order to determine the amount of water needed per experimental animal.

Epididymis sperm count, viability and motility

Sperms from the cauda epididymis were released by cutting into 2ml of medium containing 0.5% bovine serum albumin. After 5 minutes of incubation at 37°C (with 5% CO_2), sperm reserves and motile was determined by microscope (Olympus IX70) at 20 field and reported as mean of motile sperm according to WHO method Sperm vitality was assessed as soon as possible after liquefaction of the semen sample, Vitality test using eosin, preferably at 30 minutes, to prevent observation of deleterious effects of dehydration or of changes in temperature on vitality. Sperm concentration mixed semen and prepared dilutions with fixative by loaded the haemocytometer chamber and allowed spermatozoa to settle in a humid chamber. Assessed the samples within 10–15 minutes counted at least 200 spermatozoa per replicate. The concentration of spermatozoa in semen is their number (N) divided by the volume in which they were found (WHO).

Histology

Testis were fixed in 10% formalin and embedded in paraffin. Alcohols were used as remove fixative and water from the tissue (dehydrating fluid). Paraffin wax was pouted in oven at 63°C . Tissues were hardened by replacing water with paraffin. The tissue was then cut in the microtome at thicknesses 5 micrometers thick. And stained with Hematoxylin and Eosin (H&E). Specimens were examined under Olympus/3H light microscope-Japan.

Statistical analysis

Statistical comparisons were made using the ANOVA test for comparison of data in the control group and the experimental groups. The results were expressed as mean \pm S.E. Significant difference was written in parentheses.

Results

Spermatogenesis and Sperm Parameters:

Effects of coriander on Spermatogenesis and Sperm Parameters summarized in table.1. the obtained data shows that no effect on body weight, but the testis weight was insignificantly ($p>0.05$) decreased compared with control. Sperm concentration (10^6), motility and viability were significantly ($p>0.05$) increased compared with control. The effect of coriander was increased with doses.

Histology investigations

Histological observations regular seminiferous tubule with normal germinal epithelium morphology in control sections (Figure.1. A and B). Treated mice showed regular seminiferous tubule with normal germinal epithelium morphology. Sperm presence in lumen and was significantly increase in the luminal spermatozoa at 50 mg/ kg/BW and 100 mg/ kg/BW concentration of coriander (Figure. 2.C and D).

Discussion

Spices, including vegetables, fruits, and medicinal herbs, are known to possess a variety of antioxidant effects and other biological activities. Phenolic compounds in these plant materials are closely associated with their antioxidant activity. They are also known to exert beneficial physiological effects (Srinivasan K. 2005; Rubio *et al.*, 2013). Determination of sperm concentration, motility and normal morphology is a major tool in the evaluation of male fertility. However, at present, it is known that these parameters have significant increase as fertility indicators (Nallella *et al.* 2006, A. Isidori *et al.* 2005, Hess, 1999, Bidwai and Wangoo, 1988, Collins *et al.*, 1983) Zaneveld and Jeyendran (1992). The average body weight of the studied mice was insignificantly different in all treated groups, and there were statistically highly significant differences in testis weight, sperm counts, sperm motility and viability in all treated groups, compared with the control group. This result was not similar with the result shown by Al Suhaimi E.A. (2009), who found that the traditional herbal medicine, *Coriandrum sativum*, does not appear to exert negative effects on reproduction in rabbits. In case of male mice treated with Coriander daily for 21 days the lumen of the seminiferous tubules showed a significant increase in the luminal spermatozoa. This result was consistent with the result shown by Al Suhaimi E.A. (2009) who reported that no histopathological changes were observed in the epididymis, testis interstitial tissue, or seminiferous tubules.

Conclusion

The obtained data in this study was revealed that spermatogenesis and sperm parameters significantly changes during treatment with Coriander. Since these parameters are strongly influenced as a result of treatment, this study therefore suggests inducing fertility of experimental animals. Also, more investigations are needed to prove the Coriander is useful for fertility of other species. There was improving reproductive parameters without effect of the active component histology of the testes of male adult mice.

Acknowledgement

This work was kindly sponsored by University of Hail. The authors would like to express their gratitude to the Department of biology, Faculty of Science, University of hail.

References

- Alison, M. Gray and Peter R. Flatt .Insulin releasing and insulin activity of the traditional anti diabetic plant *Coriandrum sativum*. Brit. J. Nut., 1999. 81, 203-209.
- Al-Said MS, Al-Khamis KI, Islam MW, Parmar NS, Tariq M, Ageel AM. Post-coital antifertility activity of the seeds of *Coriandrum sativum* in rats. J Ethnopharmacol. 1987 (2):165-73.
- A. Isidori, Maurizio .LAND Francesco .R. Treatment of male infertility. Contraception 2005;72 : 314 – 318.
- Bidwai, P.P. and D. Wangoo,. Antispennatogenic action of *Celastrus pemiculatus* seed extract on the testes of albino rats. Ioterapia, 1988 59: 377-382.
- Collins, J.A, W. Wrixon, L.S. Janes and EH. Wilson,. Treatment Independent pregnancy among infertile couples. New Eng. J. Med,1983 :309: 1201-1206.
- Al Suhaimi E.A. Effect of *Coriandrum sativum*, a common herbal medicine, on endocrine and reproductive organ structure and function. The Internet Journal of Alternative 2009.
- Emamghoreishi M, Khasaki M and Aazam MF. *Coriandrum sativum*: evaluation of its anxiolytic effect in the elevated plus-maze. J Ethnopharmacol. 2005: 15;96(3):365–70
- Hess, RA.. Spermatogenesis, Overview. Encyclopedia Reprod., 1999:45: 39-545.
- Hume, C.W. The UFAW Handbook on the Care and Management of Laboratory Animals. Edinburgh / London: Churchill Livingstone. 1972.
- Kametani T, Furuyama H .Synthesis of vitamin D3 and related compounds. Med Res Rev.; . 1987. 7 (2): 147–171.
- Medhin DG, Hadhazy, Bakos P, Verzar-Petri G. Hypotensive effects of *Lupinus termis* and *Coriandrum sativum* in Anaesthetized Rats. A preliminary study. Acta Pharm Hung. 1986 56(2):59–63.

Momin H., Sawapnil S. Acharya and Amit V. Gajjar .Coriandrum Sativum- Review Of Advances In Phytopharmacology., IJPSR., Vol. .2012: 3(5): 1233-123.

Kiran P. Nallella, M.D., Rakesh K. Sharma, Ph.D., Nabil Aziz, M.D.,and Ashok Agarwal, Ph.D., H.C.L.D. Significance of sperm characteristics in the evaluation of male infertility. Fertility and Sterility; Vol. . 2006:85, No. 3, March

Panda S, Jafri M, Kar A, Meheta BK. Thyroid inhibitory, antiperoxidative and hypoglycemic effects of stigmasterol isolated from Butea monosperma. Fitoterapia.; 2009.:80 (2): 123–126.

Pandey, A., Bigoniya, P., Raj, V. and Patel, K. K. Pharmacological screening of Coriandrum sativum Linn. for hepatoprotective activity. J Pharm Bioallied Sci. 2011 : 3(3): 435–441.

Rubio, L., Motilva, M-J. and Romero, M-P. Recent Advances in Biologically Active Compounds in Herbs and Spices: A Review of the Most Effective Antioxidant and Anti-Inflammatory Active Principles. Critical Reviews in Food Science and Nutrition. 2013 :53 (9), 943-953.

Srinivasan K. Plant foods in the management of diabetes mellitus: spices as beneficial antidiabetic food adjuncts. Int J Food Sci Nutr 2005.;56 (6):399–414

Uchibayashi M. .The coriander story. Yakushigaku Zasshi. 2001 :36(1):56–7..

WHO laboratory manual for the examination and processing of human semen - 5th ed.

Zaneveld, LTD. and R S. Jeyendran,. Sperm Function Tests. In: Infertility and Reproductive . Medicine Clinics ofNorth America. Overstreet I.W. (Iids.), Saunder, Philadelphia. 1992.

Table.1. Effects of coriander on sperm parameters

Parameter	Control	G.1 50 ml/ kg/ BW	G.2 100ml/ kg/ BW
Body (g)	28.20±0.67	28.10±0.64	29.1±0.43
Testis (g)	0.20±0.081	0.17±.0063*	0.16±.006*
Sperm concentration (total 106)	65.30±3.06	91.6±2.27*	96±1.28*
Motility (%)	35.79±2.36	92.30±2.49*	96.6±2.38*
Viability(%)	65.26±3.06	83.80±2.37*	90±2.03*

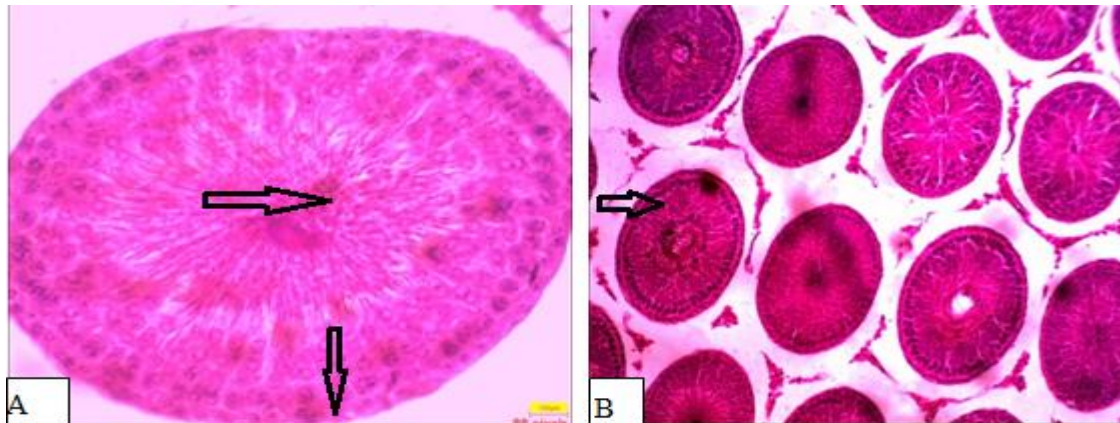


Figure 1. A; Regular seminiferous tubule with normal germinal epithelium morphology (x100). B; Regular seminiferous tubule with normal germinal epithelium morphology in control group (x100).

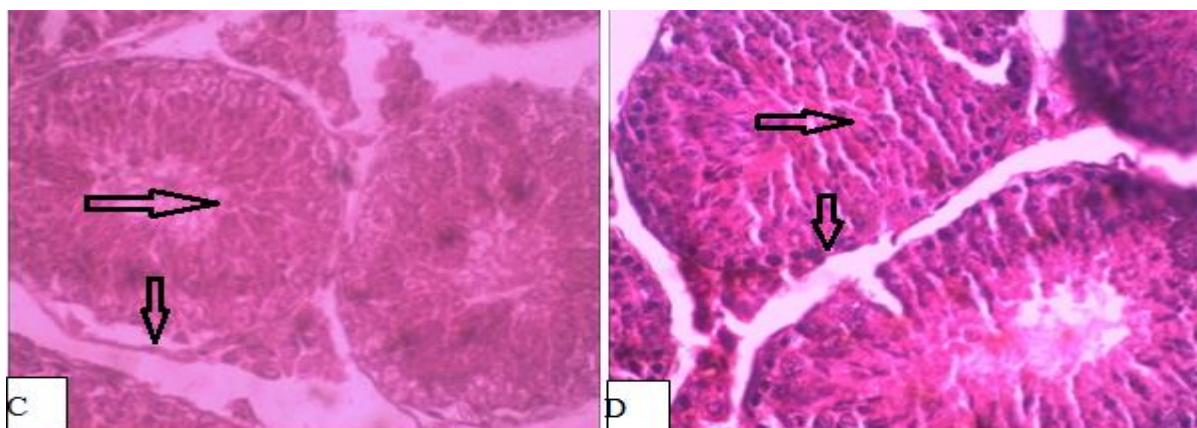


Fig. 2. C and D; Regular seminiferous tubule with normal germinal epithelium morphology. Sperm presence in lumen and showing significant increase in the luminal spermatozoa at 50 mg kg⁻¹ b.wt and 100 mg kg⁻¹ b.wt concentration of Coriandrum sativum . (x100).