Antispermatogenic Effects of Organotion (II) Compound in Rats

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Abstract

To investigate the effects of Organotin (II) on male reproductive functions and study the mechanisms underlying these effects, Organotin (II) were administered orally to two groups of male rats at 1.5 mg and 3 mg/kg b.wt. for 60 days. Group I served as control and received the treatment vehicle, distilled water. Treatment caused a non significant decrease in the testicular weight at 1.5 mg but a significant ($P \leq 0.01$) depletion was observed at 3 mg/kg b.wt/day dose levels properties in male rats. The density of sperms in the testes was decreased significantly ($P \leq 0.01$) at 1.5 mg dose level while it was decreased highly significantly ($P \leq 0.001$) at 3 mg. The serum testosterone, FSH and LH level was decreased significantly ($P \leq 0.01$) at 1.5 mg dose level while it was highly significantly decreased at 3 mg dose levels when compared with that of control group. The results indicated that Organotin (II) have anti-fertility effect in the male rats.

Keywords: Organotin (II), anti-fertility, investigate, vehicle treatment

Introduction

If the world's population grows, there is a pressing need to expand the number of family planning options available to couples. It is possible to encourage population control. As a result, it's critical to continue researching healthy, reliable, affordable, and reversible male contraceptives. Indeed, both hormonal and non-hormonal male contraceptive studies have made significant progress over the last several decades(Lyttle and Kopf, 2003). The most promising hormonal male contraceptive system. Organotin (II) was used in this analysis to assess their potential contraceptive efficacies in wistar strain male rats. The widespread use of organotin compounds as reagents or intermediates in organic synthesis has prompted the production of a large number of new organotin compounds in recent decades (Ghani and Deo, 2014). Over the last few decades, a large number of organotin macrocyclic complexes with nitrogen donors have been registered (Chaudhary et al., 2006; Zhang et al., 2016).

Material and method

Adult male albino rats (*Rattus norvegicus*) weighing 180-220 gm were chosen for the experiment.

Treatment Protocol

Animals of identical body weight, height, and age were randomly assigned to threecare groups, each with ten animals.

EXPERMENT -1

Organotin compound (II)

Organotin (II) were administered orally for 60 days.

The animals were divided in to three groups:

GROUP I : Animals in this group were given vehicle (0.5 ml distilled water/day/rat) to serve as vehicle treated control.

GROUP II : Organotin (II) at the dose of 1.5 mg /kg body weight in 0.5 ml distilled water/day /rat.

GROUP III : Organotin (II) at the dose of 3 mg /kg body weight in 0.5 ml of distilled water/day/rat.

Reproductive performance

Mating experiments were used to investigate the reproductive success of the control and extract-treated rats. Male rats were caged overnight with parous females (proestrous / estrous) in a 1:2 ratio for a fertility test over the last 5 days. The appearance of sperm in the vaginal smears the next morning confirmed mating, and this was considered the first day of pregnancy.

Autopsy Schedule

All overnight fasted rats from different groups were sacrificed under ether anaesthesia twenty-four hours after the last dose was administered. A heart puncture was used to extract blood samples. Hematological parameters were determined by collecting a small amount of blood in vials containing anticoagulant. The serum was isolated by centrifugation after the rest of the blood sample clotted at 37°C.

Body and Organs Weight

Rats's body weights were measured before and after treatment. Reproductive organs such as the testes, epididymis, seminal vesicle, and prostate gland, were dissected and cleaned of adherent fat and blood clot. On a digital electronic balance, each organ was weighed separately. Bouin's flu fixed half of the reproductive tissues.

Sperm Parameters

Sperm motility and density

100 mg of cauda epididymis was minced with a sharp razor blade and suspended in 2 ml normal saline (0.9 percent NaCl, 37^{o}C). The suspension was passed through a nylon mesh to separate the tissue from the sperm to determine sperm motility and density (sperm counts). Under cover slip, one drop of the uniformly mixed sample was added to a neubauer's counting chambers. Perceived motility is a measure of quantitative motility. (Srikanth et al., 1999;Zaneveld and Polakoski, 1977)

Hormones Analysis

The ELISA technique was used to measure Testosterone, FSH (Follicle Stimulating Hormone), and LH (Leutinizing Hormone).

Statistical Analysis

All measured values of body and reproductive and vital organ weight, sperm dynamics and fertility test, biochemical parameters, testicular cell dynamics, haematological and serological investigations were averaged and represented in terms of mean ± sem using the system of Ipstein and Poly (1970).

Results

Body weight

When comparing the body weight of the animals at all three dosage levels of organotin (II) over 60 days, including the rehabilitation group, there were no major differences when compared to the control group.

Reproductive organ weight

Testes

At 1.5 mg, organotin (II) induced a non-significant decrease in testicular weight, but at 3 and 5 mg/kg b.wt/day dose levels, significant ($P \leq 0.01$) and highly significant ($P \leq 0.001$) depletion was observed.

Epididymides

When rats were given 1.5 mg of Organotin (II), there was no substantial decline in relative weight of epididymides, however there was a significant ($P \leq 0.01$) and extremely significant ($P \leq 0.001$) dose based decline in relative weight of epididymides in rats given 3 mg/kg b.wt/day for 60 days

Seminal vesicle

The weight of seminal vesicles was not significantly reduced after oral administration of organotin (II) at a dosage of 1.5 mg. When comparing the recovery group of animals to the control group, substantial ($P \leq 0.01$) and extremely significant ($P \leq 0.001$) reductions were observed at 3 mg dose level.

Prostate gland

The weight of the prostate gland was not significantly reduced after oral administration of organotin (II) at 1.5 mg dose level, but highly significant (P≤0.001) reductions were observed at 3 mg dose level.

Vas deferens

At the dose level of 1.5 mg, organotin (II) treatment resulted in a non significant (P≤0.05) reduction in the weight of the vas deferens in the rehabilitation community of animals. When 3 mg dose level were administered.

Reproductive performance

Sperm dynamics

After 60 days of treatment with organotin (II) at 1.5 mg/kg b.wt/day, 3 mg/kg b.wt/day sperm characteristics such as density and motility were examined.

Sperm density

Testes

The density of sperms in the testes was reduced significantly (P≤0.01) in the 1.5 mg dose group and non-significant in the recovery group, but extremely significantly (P≤0.001) in the 3 mg.

Sperm motility

Cauda epididymis

Except for the recovery group, all three treated groups experienced a significant reduction in sperm motility in the cauda epididymis after receiving 1.5 mg, 3 mg of organotin (II).

Hormonal Analysis

Serum Testosterone

As compared to the control group, serum testosterone levels were significantly (P ≤0.01) lower at 1.5 mg dose level, and extremely significantly (P ≤0.001) lower at 3 mg dose level.

Follicle Stimulating Hormone (FSH)

When compared to the control group, the FSH level was reduced significantly (P ≤0.01) at 1.5 mg dose level, and extremely significantly (P ≤0.001) at 3 mg dose levels.

Leutinizing Hormone (LH)

When compared to the control group, the LH level was reduced significantly (P ≤0.01) at 1.5 mg dose level, and extremely significantly (P ≤0.001) at 3 mg.

Treatment	Body weight (gms)		Reproductive organ weight (mg / 100 gm body weight)				
	Initial	Final	Testes	Epididymis	Seminal Vesicle	Prostate	Vas deferens
Group I Control (vehicle treated)	180.00 ±6.01	219.00 ±8.14	1006 ±31.01	458.33 ±10.60	465.22 ±19.25	310.00 ±13.42	155.26 ±7.72
Group II 1.5mg/kg.bwt/ day for 60 days	199.55^{ns} ±13.24	221.98** ±5.06	988.56^{ns} ±24.12	388.78** ±16.72	452.43* ±21.27	234.42* ±5.87	125.88^{ns} ±\5.55
Group III 3mg/kg.bwt/day for 60 days	182.60^{ns} ±3.20	218.24* ±4.90	840.60** ±24.80	332.32** ±11.51	420.10** ±20.24	199.37** ±11.70	122.47* ±8.68

Treatment	Sperm density (million/ml)		Sperm motility Cauda epididymis %
	Testis	Cauda epididymis	
Group I Control (Vehicle treated)	3.55 ±0.33	53.50 ±1.62	69.01 ±6.73
Group II 1.5mg/kg.b.wt/ day for 60 days	2.80^{ns} ± 0.70	42.21** ±0.91	29.57** ±4.88
Group III 3 mg/kg.b.wt/day for 60 days	1.91** ±0.26	30.66** ±1.35	26.05** ±4.24

Treatment	Testosteronng/dL	Follicle Stimulating Hormone (FSH) mIU/mL	Leutinizing Hormone (LH) IU/L
Group I Control (vehicle treated)	3.30 ±0.49	0.55 ±0.06	5.17 ±0.45
Group II 1.5mg/kg.b.wt/day for 60 days	3.08^{ns} ±0.57	0.45 * ±0.04	4.47^{ns} ±0.42
Group III 3 mg/kg.b.wt/day for 60 days	2.64* ±0.20	0.21** ±0.03	3.12** ±0.21

Discussion

The Weight Of Testes And Other Male Reproductive Organs Was Significantly Reduced After Oral Administration Of Organotin (Ii). The Weight Of Testes Largely Depends On The Mass Of Differentiated Spermatogenic Cells. The Reduction In The Weight Of Testis May Be Due To Loss Of Spermatids And Spermatozoa, Reduced Tubular Size And Inhibition Of Steroid Synthesis By Leydig Cells (Jana Et Al., 2006) Androgen Plays A Major Role In Male Reproductive System Androgen Is Needed For The Maintenance And Growth Of The Male Reproductive Organs, Including The Formation Of Testes. It Aids In The Normal Maintenance Of Male Reproductive Organ Structure And Function (Hernandez Et Al., 2007). The Motility And Density Of Sperm Collected From The Epididymis Are Normally Used To Assess Sperm Content. Following The Oral Administration Of Organotin (Ii), Sperm Motility Was Reduced. In Both Treatment Classes, A Dose-Related Reduction In Cauda Epididymal Sperm Motility Indicated A Change In Sperm Maturation In The Epididymis (Sarkar Et Al., 2000). This Effect May Have An Inhibitory Effect On Gonadotropin Release, Resulting In A Decrease In Testosterone Output And A Shift In Spermatogenesis In Male Rats, Resulting In Lower Serum Testosterone Levels.The Action Of Fsh On The Sertoli Cells And A High Intratesticular Testosterone Concentration Are Needed For Spermatogenesis. The Decrease In Lh Causes The Leydig Cells To Produce Less Testosterone, And The Decrease In Intratesticular Testosterone Combined With The Suppression Of Fsh Causes A Decrease In Sertoli Cell Function, Which Is Needed For Germ Cell Maturation And Survival (Wang And Swerdloff,2010).

Conclusion

To summarise, the findings show that organotin (II) are possible antispermatogenic compounds that can suppress male fertility without affecting overall metabolism.

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