

## Bioremedial Effect of Rhizome Extract of *Curcuma Longa* on Endosulfan Toxicity of Number of Spermatoocyte in Seminiferous Tubules of Testis of Swiss Albino

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### Abstract

The present study deals with the effect of endosulfan on number of spermatoocyte in seminiferous tubules of Testis of Swiss albino mice and bioremediation through *Curcuma longa* (Turmeric). Endosulfan was administered orally to male Swiss albino mice group @ 3.0 mg/kg b.w. per day for 28 days. After that, they were administered orally *Curcuma longa* @ 200 mg / kg b.w. per day for 28 days. After that, each group of mice was sacrificed and their testis tissues were fixed for light microscopic study. Light microscopic study showed the number of spermatoocyte varies from  $90 \pm 1.52$  to  $91 \pm 1.47$  in normal control mice. On exposure of endosulfan to the mice, the number of spermatoocyte decline to half of its number compare to control mice. *Curcuma longa* treatment on those endosulfan treated group showed significant increase in number of spermatoocyte upto  $59.4 \pm 1.48$  to  $61.2 \pm 1.21$ . Thus, from entire study it is concluded that endosulfan causes infertility in mice where as Turmeric maintains normal fertility.

**Key Word-** Swiss albino mice, Endosulfan, Testes, *Curcuma longa*.

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### I. Introduction

Pesticide plays a vital role in agricultural, industrial and residual pest control. They have offered the protection of crops in the field, thereby the society with abundant, inexpensive, whole some and attractive fruits and vegetables. Moreover, they have decreased public health concerns by reducing the level of vector – borne disease (Aspelin 1998). Pesticides are some of the most frequently released toxic chemicals into the environment. Although the use of pesticides enhances crop productivity, humans also pay a price for the benefits. Around the world, approximately 3 million acute poisonings and 220,000 deaths from pesticide exposure have been reported annually (Marrs; 1993, USDAi 1994 and Yasmashita et al; 1997). Endosulfan is an organochlorine insecticide effective against a wide range of pests of cereals, coffee, cotton, fruits, oilseeds, potato, tea and vegetables. Moreover, it is easily absorbed by the stomach, lungs and skin and exposure through any route can be hazardous. Commercially produced endosulfan consists of two isomers  $\alpha$  endosulfan and  $\beta$  endosulfan. Both these forms have been proved to be genotoxic to human gonads [3,4].

Due to the high persistence and bioaccumulation potential, the Stockholm Convention has classified endosulfan as environmental hazards and banned the use of many of them. Pesticide safety is classified by the World Health Organization (WHO) according to the results of LD<sub>50</sub> tests, which document the amount of a chemical required to kill 50% of a population of laboratory animals. Turmeric is an ancient spice and a traditional remedy that has been used as a medicine, condiment and flavoring. Turmeric has a long history of medicinal use in South Asia, mentioned in Sanskrit medical dissertation and widely used in Ayurvedic systems. Susruta's Ayurvedic Compendium in 250 B.C recommends an ointment containing turmeric to relieve the food poison effect. Its major constituents, curcumin, various curcuminoids, curcuma oil – particularly dl-arturmerone – exhibit a wide range of biological activities, e.g. anti-bacterial, anti-inflammatory, hypolipidemic, hepatoprotective, lipoxygenase, cyclooxygenase, protease inhibitor effects, besides being effective active oxygen species scavengers and lipid peroxidase inhibitors.

### II. Materials & Methods

In present study following parameters were investigated –

1. To find out the LD<sub>50</sub> and maximum permissible dose of endosulfan (per kg b.w.) for the test animal. (swiss albino mice)
2. To observe effect of Endosulfan toxicity on testes of mice under light microscopy
3. To assess the impact rhizome extract of Turmeric (*Curcuma longa*) extract on endosulfan induced abnormality on testes of mice.

Pesticide used - Endosulfan (EC-35%)  
 Medicinal plant extract used:-  
 Fruit extract of Turmeric (*Curcuma longa*)

**Dose Administrated**

-The LD<sub>50</sub> Value of endosulfan and Turmeric was established and their maximum permissible dose (MPD) was calculated.

-Endosulfan LD<sub>50</sub> – 7.0 mg/kg b.w. and maximum permissible dose – 3.0 mg/kg b.w.

-Turmeric – LD<sub>50</sub> – 1600 mg /kg b.w. and maximum permissible dose - 200 mg /kg b.w.

During present study Endosulfan was administrated to male Swiss Albino Mice for 4 weeks @ 3.0 mg/kg b.w. per day and Rhizome extract of Turmeric were also administrated to Endosulfan treated mice for 4 weeks @ 200 m.g. / kg b.w. After that they were sacrificed and their testis tissues were fixed for light microscopic study.

**III.Observation**

**MORPHOLOGICAL CHANGES:-**

Following morphological changes investigated after administration of 3 mg/kg b.w./day Endosulfan for 4 weeks.

-The male mice showed aggressiveness after a week while after 28 days aggressiveness decreases.

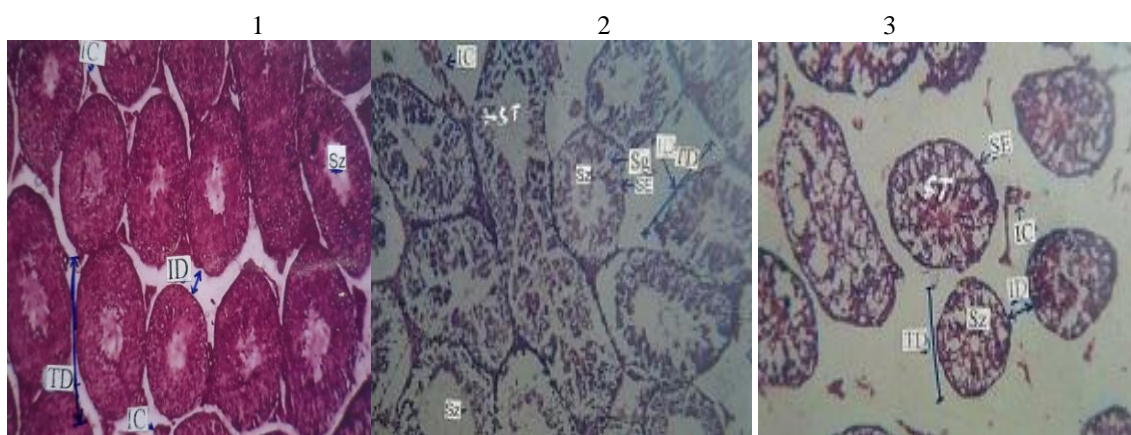
-The male mice showed hair fall after treatment of 15 days.

-Bulging of eyes was observed in 15% mice.

-Body weight loss.

**HISTOLOGICAL CHANGES:-**

No of spermatocyte in seminiferous tubules varies from  $90 \pm 1.52$  to  $91 \pm 1.47$  in normal control mice. On exposure of endosulfan (3 mg / kg b.w.) to the mice for scheduled duration showed the number of spermatocyte decline to half of its number compare to control mice. *Curcuma longa* treatment on those endosulfan treated group show significant increase in number of spermatocyte up to  $59.4 \pm 1.48$  to  $61.2 \pm 1.21$ .



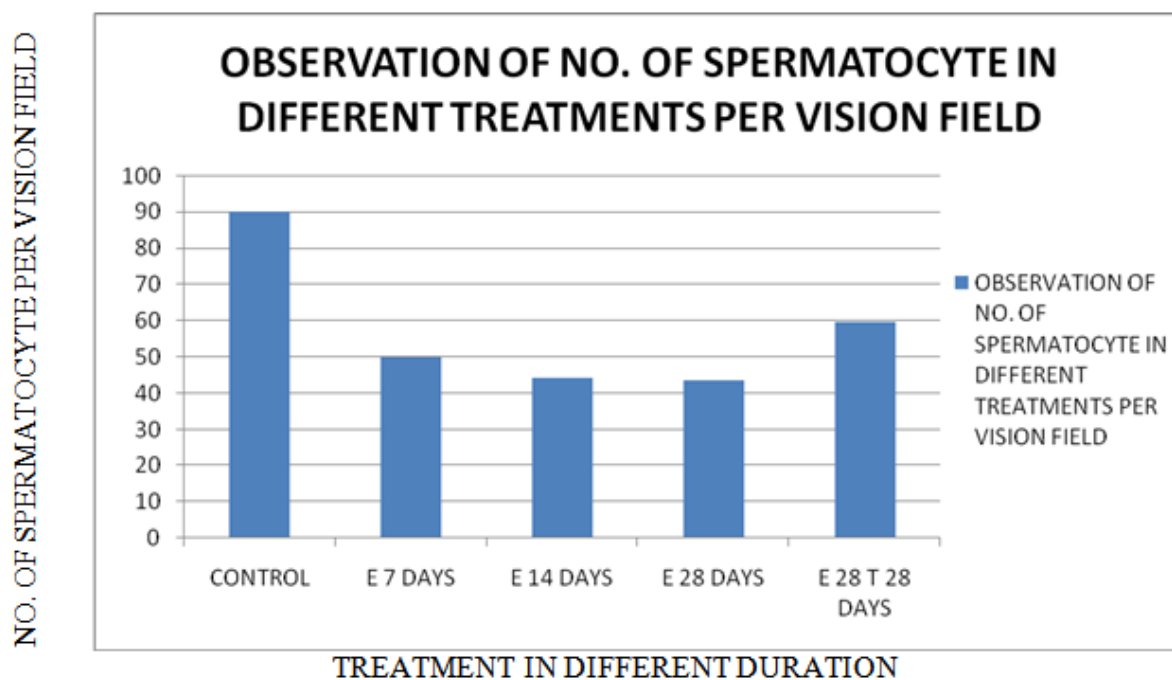
**T.S OF TESTIS OF DIFFERENT TREATMENT**

Fig-1 Control

Fig-2 Endosulfan Treated 28 days

Fig-3 Turmeric administered (28days) after endosulfan Treatment (28 days)

Observation	No. of spermatocyte in seminiferous Tubule
Control (Mean±S.E.)	$90 \pm 1.52$
Endosulfan 7Days (Mean±S.E.)	$49.8 \pm 1.39$
Endosulfan 14Days (Mean±S.E.)	$44 \pm 1.63$
Endosulfan 28Days (Mean±S.E.)	$43.4 \pm 1.0$
Turmeric 28Days (Mean±S.E.)	$59.4 \pm 1.18$



#### IV. Discussion

Light microscopic examination of testis after exposure of 3.0 mg/kg b.w. per day for 28 days Endosulfan showed significant decrease in the no. of spermatoocyte, decrease in spermatid & spermatozoa and Turmeric treatment at the dose of 200 mg/kg b.w. per day for 28 days after 28 days endosulfan treatment showed increase in no. of spermatoocyte and regeneration of interstitial cells and spermatogonia.

A number of studies have shown similar effect:-

- Detailed studies in adult rats exposure to 2.5, 5 & 10 mg/kg/day endosulfan for 5 days per week for 10 weeks showed reduced intratesticular spermatid counts, sperm abnormalities and changed in the marker enzymes of testicular activities such as lactate dehydrogenase, Gamma-glutamyl transpeptidase (Khan sinha et al 1996; et al., 1995)

- Dutta et al. (1993) have found the number of the interstitial cells increased throughout on malathion treatment per day right from 10<sup>th</sup> days

- Kumar and Nath (2007) have also observed that endosulfan disrupt the golgi complex during acrosome formation.

- Curcumin protect isoproterenol induced myocardial infarction in rats (Nirmala et al. 1996)

- Curcumin also reported to have antibacterial, anti-tubercular and anti-HIV (Mazumdar et al. 1995)

Therefore one should be very cautious while using these types of pesticides in crop fields, because it becomes one of the major factors in reducing the fertility power as well as a causative factor of different diseases in human beings.

#### V. Conclusion

Endosulfan causes deleterious effects on the number of spermatoocytes in Swiss albino mice, but after the treatment of *Curcuma longa* there was a significant increase in the number of spermatoocytes. Thus, from the entire study it is concluded that endosulfan causes infertility in mice whereas Turmeric maintains normal fertility.

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