

BIOREMEDIAL EFFECT OF FRUIT EXTRACT OF EMBLICA OFFICINALIS ON TUBULAR DIAMETER OF SEMINIFEROUS TUBULES OF TESTIS ON ENDOSULFAN INDUCED TESTICULAR TOXICITY OF MALE SWISS ALBINO MICE**Kailash Kumar***

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ABSTRACT

The intence use of pesticides as modern chemicals has created a lot of health problem in human including cancer, liver toxicity, male sterility etc, by its persistence nature. Endosulfan, a pesticide of organochlorene group, is being extensively used as an insecticide for different crops. It accumulates in human body through food chain and cause sterility in human beings. It also causes a wide range of harmful health effect in human including cancer, injury in nervous system, lung damage, reproductive dysfunction and sterility. Under present investigation effect of endosulfan on testes of male swiss albino mice was analysed to predict its toxigenic potential and correlated with the histopathology of testis. In my present investigation, endosulfan was administered orally to male swiss albino mice group for 4-weeks @ 3.0 mg/kg b.w. per day for 4 weeks. After that each group of mice were sacrificed and their testis tissue were fixed for light microscopic study. The histopathological study of normal control mice showed tubular diameter of seminiferous tubules varied from 3.12 ± 0.25 to $3.28 \pm 0.4 \mu\text{m}$, after exposure of Endosulfan To the mice showed the value decreses from 3.02 ± 0.4 to $2.48 \pm 0.37 \mu\text{m}$. After the administration of *Emblca officinalis* to the endosulfan treated mice its value increases from 2.89 ± 0.38 to $2.97 \pm 0.25 \mu\text{m}$. Further it was also found that the number of interstitial cells and spermatogonia decreases after Endosulfan treatment, but after the administration of *Emblca officinalis* on endosulfan treated mice shows regeneration of spermatogonia and interstitial cells.

KEYWORD: Male mice, Endosulfan, Testes, *Emblca officinalis*.**INTRODUCTION**

Reproductive health is one of the challenging global issues among scientific community in the direction of betterment of human health & welfare and male sterility is one of the major problem in the scenario of reproductive biology. Recently several cases of sterility reported are due to indiscriminate use of chemicals in agricultural field as well as in public health sector. It may be threatening signal for future survival of mammalian species including human too. No doubt, in developing countries reproductive biologists are dealing with two simultaneous problems, one is population explosion and the other is male infertility. Thus causing imbalance in male, female sex ratio, which is directly concern with social problem of the developing country. Environmental contaminants due to the intensive use of insecticides as modern agrochemical have created a lot of problem to the animal in terms of biochemical and physiological alteration on their metabolism. It exerts their impact at cellular and subcellular level prior to any gross sign of damage, being apparent in the morphology of animal. However the widespread use and misuse of pesticides has created an awareness of the potential health hazards

and the need to protect the consumer from residues in food. Humans can be exposed to a range of pesticides by occupational exposure and bystander exposure to off – target drift from spraying and pesticide residues on agricultural producers. Additionally, humans and animals can be exposed to pesticide due to environmental contamination of drinking water (both surface and ground water) and consumption of fish from contaminated water reservoirs. It has been estimated that 85-90% of all pesticides creates potential health risks. The pattern of pesticide usage in India is different from that for the world in general. In India 76% of the pesticide used is insecticide, as against 44% globally (Mathur, 1999). Endosulfan is an organochlorene compound of cyclodiene group .Endosulfan undergoes oxidation to form a primary insecticidal metabolite, Endosulfan sulfate which is as toxic as endosulfan. The WHO classified endosulfan in category 25 (moderately Hazardous). *Emblca officinalis* is commonly known as Indian gooseberry belongs to family euphorbiaceae. It is well known that *Emblca officinalis* has medicinal and therapeutic value since ancient time used in Ayurveda Fruit extract is reputed Rasayanas and rejuvenators and

also promote health and longevity by increasing immunity against diseases, arresting the ageing process and revitalizing the body in debilitated conditions. It contains natural potent antioxidants which protect animals' body against damages and degenerations caused by free radicals oxidative stress produced by chemical pollutants.

MATERIALS AND METHODS

In present study following parameters were investigated –

1. To find out the LD₅₀ 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 fruit extract of Amla (*Emblica officinalis*) extract on endosulfan induced abnormality on testes of mice.

Pesticide used - Endosulfan (EC-35%)

Medicinal plant extract used:-

Fruit extract of Amla (*Emblica officinalis*)

Dose Administrated

- The LD₅₀ Value of endosulfan and Amla Was established and their maximum permissible dose (MPD) was calculated.
- Endosulfan LD₅₀ – 7.0 mg/kg b.w. and maximum permissible dose – 3.0 mg/kg b.w.
- Amla – LD₅₀ - 1250mg /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 Amla extract 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.

OBSERVATION

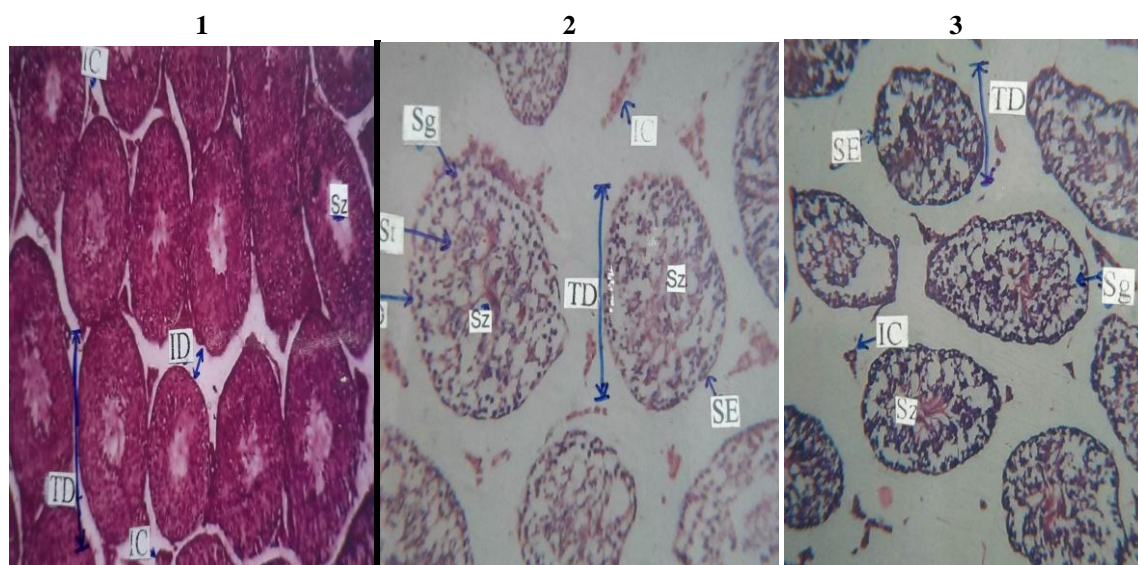
MORPHOLOGICAL CHANGES

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

The tubular diameter of seminiferous tubules in normal control mice ranges from 3.12 ± 0.25 to $3.28 \pm 0.4 \mu\text{m}$. The exposure of endosulfan (3 mg / kg b.w.) to the mice for scheduled duration shows a sharp decrease in the tubular diameter upto $3.02 \pm 0.4 \mu\text{m}$ to $2.48 \pm 0.37 \mu\text{m}$. Endosulfan exposure shows significant decrease with respect to *Emblica officinalis* administration on the endosulfan treated mice showed increase in the tubular diameter upto 2.89 ± 0.38 to $2.97 \pm 0.25 \mu\text{m}$.



T.S OF TESTIS OF DIFFERENT TREATMENT

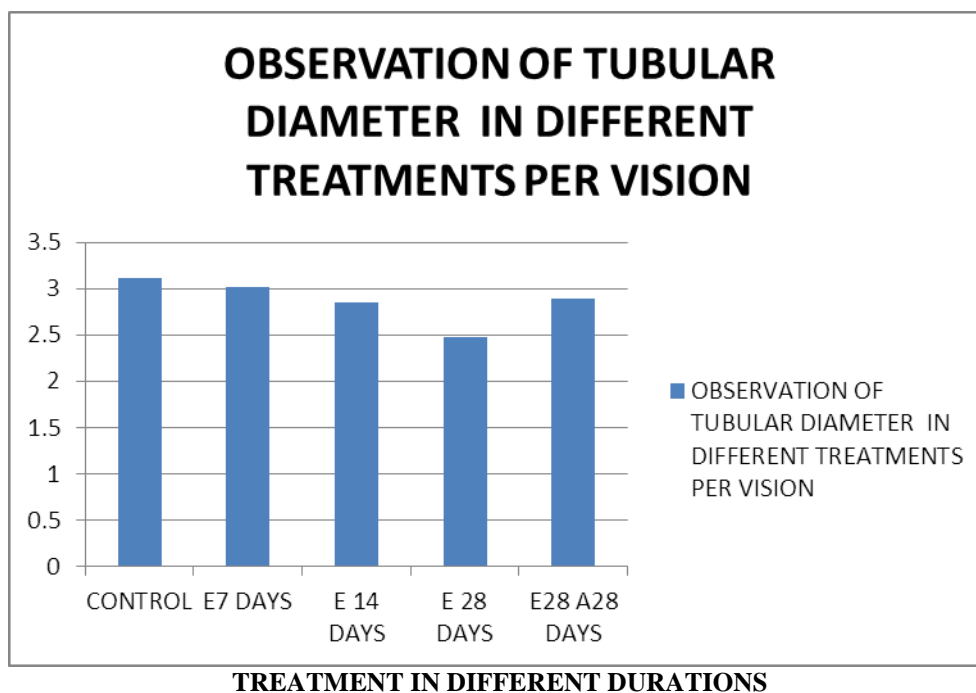
Fig-1 Control

Fig-2 Endosulfan Treated 28 days

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

Observation	Measurement of tubular diameter of seminiferous tubule(μm)
Control (Mean \pm S.E.)	3.12 \pm 0.25
Endosulfan 7Days (Mean \pm S.E.)	3.02 \pm 0.51
Endosulfan 14Days (Mean \pm S.E.)	2.85 \pm 0.50
Endosulfan 28Days (Mean \pm S.E.)	2.48 \pm 0.37
Amla 28Days (Mean \pm S.E.)	2.89 \pm 0.52

TUBULAR DIAMETER PER VISION FIELD



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 tubular diameter, decrease in interstitial cell & spermatozoa and Amla treatment at the dose of 200 mg/kg b.w. per day for 28 days after 28 days endosulfan treatment showed increase in tubular diameter 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 10th days

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

- Kumar SG, Harish N, Dharmesh SM, Salimath V (2006) Free and bound phenolic antioxidants in amla (*Emblca officinalis*) and turmeric (*Curcuma longa*). J Food Comp Anal 19: 446-452.

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

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

CONCLUSION

Endosulfan causes deleterious effect on Tubular diameter of seminiferous tubule in the Swiss albino mice, but after the treatment of *Emblica officinalis* there was significant increase in Tubular diameter. Thus, from entire study it is concluded that endosulfan causes infertility in mice where as Amla maintain normal fertility.

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