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Research Article

ANALYTICAL STUDY OF HISTOPATHOLOGICAL CHANGES INDUCED BY OF ENDOSULFAN IN KIDNEY OF ALBINO RATS

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ABSTRACT

An effective sub lethal dose (0.32 ppm/kg^{-1} bw) of endosulfan was injected to five week of albino rats and its exposure was studied in histopathology of kidney after15, 30 and 45 days of exposure. These histopathological changes in renal tissue of rats exposed to endosulfan by intradermal injection showed pronounced changes in the structure of renal corpuscle. The result of present study shows that exposure to endosulfan induced severe renal damages. the histopathological examination coupled with significant changes in kidney function The present findings suggested that endosulfan is a nephrotoxic chemical and that exposure to produces significant renal toxicity, in rats. Hence, stringent regulation of the use of endosulfan in our environments should be highly recommended to the various environmental protection agencies.

Key words: endosulfan, environment, histopathology, intradermal, nephrotoxic

INTRODUCTION

Pest control chemicals are poisons and they may present immediate danger to user if used improperly. Some of them highly toxic and may cause serious metabolic disorders and even death if inhaled or ingested through oral route (Frank and Brawn, 1984, Zhou and Hu,1984) Endosulfan is one of the synthetic organochlorine insecticide of the cyclodine group with a mixture of two stereo isomer:α-and β-endosulfan in the ratio of 70:30. It has widespread use in agriculture and forestry to control a wide verity of insect pests and on non food crops such as cotton and tobacco.

The chemical is sometimes found to affect non-target organisms including human, in the course of its application. Although endosulfan is reported to be one of the most toxic pesticides in the market today, with its widespread use in agriculture, human are most likely to be exposed to it by eating food contaminated with endosulfan. Population that are usually susceptible to endosulfan include the unborn and neonates, the elderly and people with liver, kidney, immunological haematological or neurological disease (ATSDR 2000).endosulfan is well absorbed through ingestion, inhalation and skin contact. Particularly endosulfan is known to be an endocrine disruptor, being highly toxic at acute exposure (Chitra et.al 1999; Rose et al.1999; Fulia et. al. 2011)

Moreover, the interaction of the ROS and other reactive metablities, generated from endosulfan metabolism, with the renal tissue may as well cause cellular injury, hence, damage to the tissue. Once of the renal tissues are damaged, the overall functionality of the kidneys may be compromised. Renal dysfunction may be caused by several diseased conditions and exposure to toxins. Also renal dysfunction of any kind affects all parts of the nephron to some extent, although sometime, either glomerular or tubular dysfunction is predominant. The effect of renal disease on plasma and urine depands on the propotion of glomeruli to tubules affected and on the number of nephrons involved. Since endosulfan is a frequently used pesticide and the incidence of toxic injury to the liver in relation to its widespread use reported in the literature (Sharma and Chauhan 2009).

MATERIAL AND MATHOD

Chemical

The liquid endosulfan (Thioden 35% EC) used in this study was obtained from Northern Minerals Limited agrochemical shop in watt market, Ahmedabad, (Guj.)

Animals

An effective sub lethal dose (0.32 ppm/kg^{-1} bw) of endosulfan was injected to five week of albino rats and its exposure was studied in histopathology of kidney after15, 30 and 45 days of exposure. Five Week of albino rats weighing between 38±40 gm were obtained from Zoology Department Animal House of the University of Rajasthan Jaipur. They were fed with a standard laboratory diet and tap water. Illumination was 12 h light/dark cycle and room temperature was 25±2°C. The animals were divided into two groups as experimental and control. The experimental rats were exposed to endosulfan (0.32 ppm/kg^{-1} BW) for different duration 15, 30 and 45 days of exposure. Untreated animal were used as control. Both treated and control animals were sacrificed after certain intervals.

OBSERVATION

For treatment, after 15, 30 and 45 days of exposure each rat was placed in anesthetic jar containing cotton wool soaked in chloroform. Complete anesthesia was considered accomplished when the pedal movements and eyelid reflex disappeared and animal becomes recumbent while still breathing. Animals were sacrificed by cervical dislocation and kidney tissue were taken and immediately fixed in 10% formalin for histological examination. Each tissue were cut into 2.5 µm thickness and stained with haematoxyline eosin and photomicrographs were taken by light microscope.

RESULT

The histological structure of kidney tissue of rats in the control group, and rats exposed to endosulfan are shown in fig 1, 2, 3 and 4 respectively. The renal cortex area was selected for histological examination with the light microscope, because this area which contain renal corpuscles and associated tubules, showed more pronounced histopathological changes in endosulfan treated animals, compared with the control. These histopathological changes in renal tissue of rats exposed to endosulfan by intradermal injection showed pronounced changes in the structure of renal corpuscle including swelling appearances, increasing urinary space, inflammatory cell infiltration degeneration of glomaruli and associate tubules structure. Also the result of histology of renal tissue obtained for the control rats showed normal renal corpuscles, consisting of a tuft of capillaries

DISCUSSION

The result of present study shown that exposure to endosulfan induced severe renal damages, as shown in the histopathological examination coupled with significant changes in kidney function. The similar result are reported for malathion and other pesticides which indicated that exposed these pesticide lead to induced physiological and biochemical disturbances in experimental animals.(Yousef et al 2003, Adenirun et al 2006 Kerem et al. 2007, Attia and Nasr,2009)

Also, the ultrastructure of the cells of renal proximal tubules, vacuoles with damaged external membrane were observed, as well as swollen and pleomorphic mitochondria. The histopathological changes observed to be associated with exposure to endosulfan therefore correlates with the results of the study reported by Tos-Luty et al. (2003) for malathion.

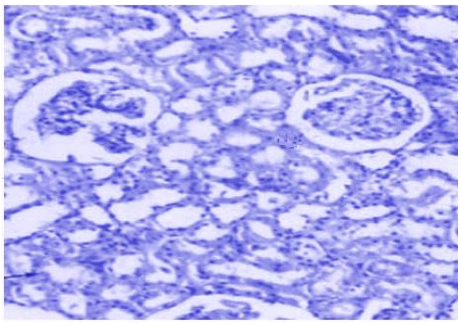

Fig 1: Micrograph of the kidney o control rat showing normal integrity of the cortex and blood vessels.

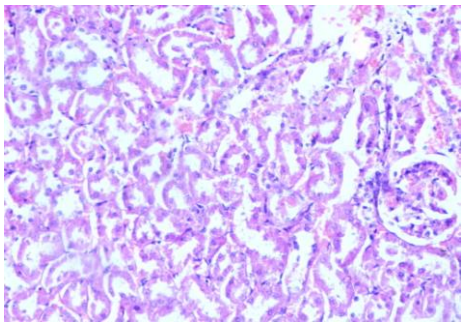

Fig 2:Micrograph of the kidney exposed to endosulfan after 15 day of exposure showing congestion in capillaries in glomerulai mild to moderate cellular swelling with mild inflammatory cell infiltration.,

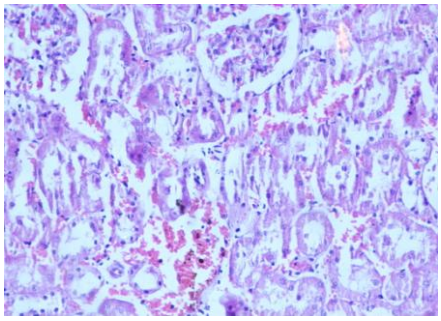

Fig 3: Micrograph of the kidney exposed to endosulfan after 30 day of exposure showing haemorrhage mononuclear inflammatory cell infiltration and degeneration of renal tubules.

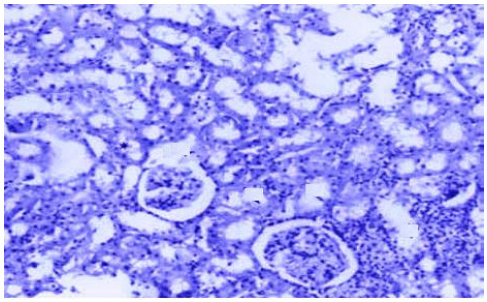

Fig 4: Micrograph of the kidney exposed to endosulfan after 45 day of exposure showing congestion and haemorrhage moderate degeneration and sloughing of renal epithelium.

CONCLUSION

The present findings suggested that endosulfan is a nephrotoxic chemical and that exposure to produces significantrenal toxicity, in a route-of-exposure-independent pattern, in rats. Hence, stringent regulation of the use of endosulfan in our environments should be highly recommended to the various environmental protection agencies.

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