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Toxicity of ovary and kidney due to excessive intake of fluoride content in female albino rat

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Abstract: The main objective of this research study was to find out the toxic effect of fluoride in female rat during diet intake. When the doses of sodium intake were increased in rat it showed a great toxic effect on the reproductive as well as physical functions of the rat. Higher intake of sodium leads to significant increase in size of the ovary, uterus, kidney etc. Rats which had ingested NaF showed increases in the weights of the ovaries and also the relative weights of the uterus and kidney. The results indicate that exposure of female rats to NaF in drinking water has adverse fetotoxic effects.

Key words: fetotoxic, lysosomal, histopathological.

INTRODUCTION

Although fluoridation of water supplies is practiced in many places in the hope of reducing the incidence of dental caries, there is continuing concern that exposure to fluoride could cause toxic effects. An epidemiological study to assess whether fluoride could affect human birth rates using a U.S. database of drinking water systems showed an association of decreasing total fertility rate with increasing fluoride levels.[1] Fluoride is considered as one of the important constituent for prevention of dental carries tooth decay.[2] These studies have suggested that fluoride toxicity may cause adverse effects in the reproductive system of organisms living in fluorosis endemic areas. Additionally, it was also found that in vitro exposure of human sperm to fluoride (250 mm) lead to altered lysosomal activity, glutathione levels and caused morphological anomalies producing a significant decline in sperm motility[3]. Multiple animal models have also shown that fluoride toxicity decreases fertility in most species studied, but so far these studies have concentrated mainly on the reproductive toxic effects of fluoride on male animals. Thus endemic fluorosis has been seen many parts of the world that cases damage to different tissues such as skeleton, teeth along with other soft tissues such as kidney, spleen brain etc.[4,5]

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MATERIAL AND METHOD

Experimental study

15 female albino rats having the average weight of about 120-150 gm were bought from the local market and were kept in the laboratory in the university department for its further study. All the rats were kept in the cage under normal laboratory conditions with care and fed water and pellet.

15 rats were randomly divided in to three groups. Each of the group contained 5 rats each. Group 1 the rats were treated with distilled water that contained no fluoride concentration. Group 2 the rats were treated with 10 mg of sodium fluoride in water, and group 3 of the rats were treated with 20 mg of sodium fluoride for at least 30 days. Each of the animals was weighed before & after experiment was carried out. After 30 days of the protocol each of the rats were sacrificed and the tissues of the ovary were dissected for the further study of the histopathology as described earlier as well as different concentrations of the hormone found in ovary.[6,7]

Histopathological study of the ovary

The dissected tissues of the ovary were then collected and immediately fixed by immersion in Bouin's liquid for 24 hours. The samples were then processed according to different histological technique followed by dehydration, xylene was used for clearing and then it was fixed in paraffin wax. About 5 micrometers thick secretion of the ovarian tissues was stained in hematoxylin-eosin for the morphological study.[8] The sections were then mounted in DPX for the further study.

Collagen study of kidney

For the study of collagen in kidney the tissues of the kidney was dissected, cleared and weighed. The tissues of the kidney was then homogenized and then homogenate for the biochemical analysis.

RESULT & DISCUSSION

From the above analysis the result obtained showed that the structure of the ovary observed in group 1, group 2 and group 3 showed various differentiations in the histopathological structure. When observed in control group it was found that there was no change in the structure of the ovary while in group 2 & group 3 there was great differentiation. In group 2 the ooplasm showed degenerative changes without any nucleus & nucleolus. In group 3 rats fed with 20 mg of sodium fluoride also showed degenerative changes in the ovum. The ooplasm was seen shifted towards the one side and the nucleus & the nucleolus was not visible. The estrogen level of fluoride treated rats showed decline in its concentration. Finally the research of fluoride on female albino rat shows that fluoride has adverse effect on the different reproductive organelles of the rats as well as it reproductive behavior. The analysis of kidney showed great variation in total collagen count. NaF when fed in 10 mg caused a significant decrease of about 78% in total collagen count and when the rat was fed with 20 mg of NaF showed complete list of the collagen fibril packing with respect to the control group.

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