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Effect of Sodium Fluoride on Gonado-somatic index of Swiss albino mice

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Abstract
Adult Swiss albino mice were treated with sodium fluoride (NaF) (10 ppm, 30 ppm, 50 ppm) until autopsy.
In the present investigation, alterations in the testis of Swiss albino mice treated with various dose of NaF have been studied at various intervals (7^{th} , 14^{th}& 28^{th} days)
The value of Gonado-somatic index decline significantly on day 7 from its normal value.
The decreasing pattern continued gradually on day 14 and day 28 but in recovery group the value increased but less than the control value.
Keywords :- *Testis, Sodium fluoride, Ganado-somatic index, Swiss albino mice*

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I. Introduction

Fluoride contamination in ground water has drawn world-wide attention. In some parts of Rajasthan fluoride concentration in ground water is above the maximum permissible level, giving rise to fluorosis[1].

Fluorine combine directly at ordinary or elevated temperatures with all elements[2] and therefore react vigorously with most organic compounds sodium fluoride is the most important of the alkali fluorides.

It has been stated that 45% of the water sources have fluoride content exceeding 1.0 ppm and varied from 0.5 to 50 ppm under ground water of several region of Rajasthan such as Nagaur, Jodhpur, Bikaner, Pali and Sirohi.

The acute effect of the ingestion of the massive doses of fluoride are an irritant poison later becoming apparent in enzyme system such as enzyme melabolism, cellular respiration and the endocrine function.

The present investigation the testis exhibited various changes in the value of GSI after dose of NaF and during recovery following withdrawal of NaF treatment.

Experimental design and animal Grouping

The solution of NaF (10, 30 and 50 ppm) were prepared in double distilled water. The animal were fad fresh solution daily.

The animal were devided into three groups

Group-I (Normal)

The animal of this group provided with standard pellet feed and received tap water adlibitum.

Group-II (sodium fluoride treated animals)

The animal of this group received sodium fluoride at the dose-rate of different levels in drinking water.
This group was further divided into three subgroup on the basis of sodium fluoride dose
Sub group A – 10 ppm
Sub group B – 30 ppm
Sub group C – 50 ppm
The animal of these three sub groups were given Sodium fluoride for 7, 14 and 28 days in drinking water.

- **Group – III (After withdrawal of treatment recovery**)

This group was further divided into two subgroups
Sub group A – 10 ppm
Sub group B – 50 ppm
In these groups, animals were treated with Sodium fluoride for 28 days as in group II and were sacrificed after 7, 14 and 28 days of cessation of Sodium fluoride treatment.

Autopsy of animals

Animals from each group were autopsied by cervical dislocation at each post- treatment intervals of 7, 14 and 28 days. The weight of the animals was recorded and testes were taken out and blotted.

The weighr of the testis was calculated per 100 gms of body weight, which was expressed as gonado-somatic index

$$\text{Gonado-somatic index mg/100 gm boy weight} = \frac{Weight\ of\ testis}{Total\ body\ weight} \times 100$$

In the present investigation, alteration in the testes of mice treated with Various doses of sodium fluoride have been studied at various intervals

Sodium fluoride treatment did not significantly affect the body weight of the animals and no difference in the growth rate was observed. The changes in the value of gonadosomatic index (mg/100 gm body weight) of Swiss albino mice after sodium fluoride treatment in various groups are expressed in table and histogram

The value of gonodo-somatic index in the group 1 (normal) was 321 ± 7.14

II. Result

Group II a (Experimental)

In the 10 ppm sodium fluoride group, the value of GSI declined significantly ($P < 0.01$) on day 7 (283±6.36) from its normal value.

The decreasing pattern continued gradually on day 14 (281± 1.73) and day 28 (262± 4.63).

The values on day 14 ($P < 0.01$) and day 28 ($P < 0.001$) were statistically significant as compared to the normal value

Group II b – (Experimental)

In the 30 ppm Sodium fluoride treated group, the value of GSI declined significantly ($P <$ 0.01) on day 7 ((278± 4.05) and lower down further upto day 14 (271± 5.21) and day 28 (267± 6.36).

The values wer statistically Significant ($P < 0.01$) when compared with the normal value.

Group II C (Experimental)

Similar decrease in the values of GSI was also observed after 50 ppm sodium fluoride treatment.

A statistical significant ($p < 0.01$) decrease in the value of GSI was registered after day 7 (267± 5.79) and day 14 (257± 13.5) and it continued upto day 28 (243± 5.52).

The value was statistically Significant ($P < 0.001$) as compared with the normal value.

Group III a (Recovery)

In the recovery group, a gradual increase in the value of GSI was observed after day 7 (268± 4.63), but it was significantly lower ($P < 0.001$)

As compared to the normal value. The value further increased on day 14 (273± 1.73) and day 28 (279± 11.00) but did not reach the normal value and it was significantly lower ($p < 0.02$) as compared to the normal value.

Group III b (Recovery)

On the contrary, in the recovery groups the values of GSI increased significantly ($P < 0.001$) on day 7 (250± 5.79) from its normal value.

The decreasing pattern continue gradually on day 14 (263± 15.13) and day 28 (277± 4.63).

The values on day 14 ($P < 0.02$) and day 28 ($P < 0.01$) were statistically significant as compared to the normal value.

Changes in the values of Gonado-somatic index (mg/100 gm body weight) in various experimental group $Mean \pm S.F.$

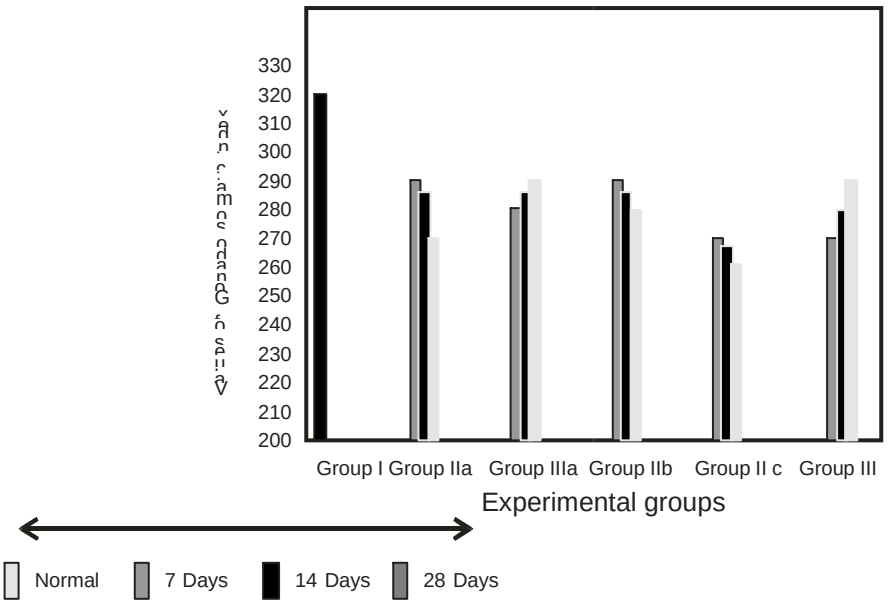
DOSE	TREATMENT (Experimental and Recovery)	AUTOPSY INTERVALS (Intervals of Autopsy periods)		
		7 days	14 days	28 days
10 ppm	Group II a (Experimental)	283 ± 6.36 ***	281 ± 1.73 ***	262 ± 4.63 ***
	Group III a (Recovery)	268 ± 4.63 ****	273 ± 1.73 ****	279 ± 11.00 **

30 ppm	Group II b (Experimental)	278 ± 4.05 ***	271 ± 5.21 ***	267 ± 6.36 ***
50 ppm	Group II c (Experimental)	267 ± 5.79 ****	257 ± 13.5 ***	243 ± 5.52 ****
	Group III b (Recovery)	250 ± 5.79 ****	263 ± 15.13 **	277 ± 4.63 ***

The value of Gaondo-somatic index in group I (Normal) 321 ± 7.14

HISTOGRAM

Changes in the values of gonado-somatic index (mg/100gm body weight) in various experimental groups (Means $\pm$S.E.)



III. Discussion

In the present investigation the values of GSI decreased in all the experimental groups. The decrease in GSI at later intervals may be due to the absence of spermatocytes & spermatids, which would have made an increasing contribution to the testis mass. The GSI increases in all the recovery groups but does not regain normal value. The decrease in the testis weight may reflect a reduction in the number of spermatogenic elements and spermatozoa[3]

The decrease in weight of the testis may be due to absence of spermatids and spermatozoa from the testis [4-5] and correlated decrease in testicular weight and size of absence of postmeiotic cells[6].

The reduced production of gonadotropins after steroidal and non steroidal agent causes decrease in the weight of testis[7].

Decrease Values of organo-somatic index may be attributed to weight loss, degeneration of organ, decreased protein level and decrease in the weight of organ.

The decrease in body weight after 30 days of Sodium fluoride treatment. After 30 days of Sodium fluoride withdrawal, the body weight did not recover as compared to the control[8].

Decreasing body and epididymis weight but those of vas deference and seminal Vesicle was not affected[9].

The organo-somatic index after administration of sodium fluoride and reported a decrease in the value[10].

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