College: Veterinary Medicine **Student's Name:** Sumayah Faruq Kasim Yahyah
Dept.: Physiology, Pharmacology and Chemistry **Supervisor's Name:** prof. Dr. Jassim Mohammed Ahmed

Certificate: Master **Specialization:** Physiology

Title:

Effect of Sodium Fluoride on Some Physiological Parameters and the Role of Calcium and Vitamin C in Adult Male Rats

Abstract:

The current study was conducted in the Animal House of the Faculty of Veterinary Medicine / University of Basrah to evaluate the role of calcium chloride and vitamin C each one alone or both together in some physiological parameters and histological changes for male rats exposed to sodium fluoride (NaF).

Fifty adult male rats were used which are divided randomly into five equal groups as follows the first group (control group): The animals of this group were given distilled water orally by gavage. Second group (NaF): The animals of this group were given Sodium Fluoride (1/10 of LD50) (5.2 mg/kg b.w/day) orally by gavage. Third group (NaF+CaCl2): The animals of this group were given sodium fluoride (1/10 of LD50) (5.2 mg/kg b.w/day) + Calcium Chloride (20 mg/kg b.w/day) orally by gavage. Fourth group (NaF+ Vitamin C): The animals of this group were given Sodium Fluoride (1/10 of LD50) (5.2 mg/kg b.w/day) + Vitamin C (100 mg/kg b.w/day) orally by gavage. Fi fth group: The animals of this group were given Sodium Fluoride (1/10 of LD50) (5.2 mg/kg b.w/day) + Calcium Chloride (20 mg/kg b.w/day) + Vitamin C (100 mg/kg b.w/day) orally by g avage. The experiment continued for 45 days. At the end of the experiment, the study animals were sacrificed under anesthesia. Blood samples were taken and the serum was separated for the study of the biochemical parameters, and tissue samples of the thyroid, liver, kidneys, testicles, and femur were studied for histological changes. The epididymis was separated from all treatments to study the characteristics of epididymal sperm. The study showed the following results:

A significant decrease in final body weight, body weight gains were recorded in NaF treated group compared with control group, while NaF group treated with CaCl2, Vitamin C and both together resulted in a significant increase of final body and body weight gain compared with NaF group.

A significant increase in relative weight of kidneys was recorded in NaF treated group compared with control. However a significant decrease in kidneys weight were recorded in all treated groups compared with NaF group, where no significant difference was observed between them and the control. As ignificant elevation in thyroid stimulation hormone (TSH) and a significant reduction in tri-iodothyronine (T3) and thyroxin (T4) hormones concentration were observed in NaF treated group compared with control, however a significant improvement were recorded in above cited parameters in all treated groups. A significant increase in follicle stimulating hormone (FSH) and Luteinizing

hormone (LH) and a significant decrease in testosterone hormone concentrations were observed in NaF treated group compared with control, while a significant degrees of improvements were showed in all treated group compared with NaF group. A significant decrease in serum concentration of calcium and phosphorous were recorded in NaF treated group compared with control, on the other hand a significant amelioration in above cited parameters were recorded in all treatment with some variation. A significant elevation in serum concentration of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphates (ALP) enzymes and a significant reduction in glucose concentrations were recorded in NaF treated group compared with the control. Moreover a significant degree of improvement was recorded in above cited parameters in all treated groups compared with NaF group with some variation between them.

A significant increase in serum concentration of triglyceride (TG), total cholesterol (TC), low density lipoproteins (LDL -C) and very low density lipoproteins (VLDL-C) and a significant decrease in high density lipoproteins cholesterol (HDL-C) in NaF treated group compared with control. On the other hand significant improvements in the above parameters were observed in all fluoride treated groups compared to fluoride group. The study showed a significant increase in the conce ntration of creatinine and urea in the fluoride treated group compared to the control group, while a significant improvements in these parameters were observed in all treated groups and in different degrees compared to the non-treated fluoride group.

Finally a significant decrease in epididymal sperm concentration, individual motility, live sperm percentage and significant increase in both dead sperm and sperm abnormality percentage in fluoride treated animals compared with control. However significant degrees of amelioration were recorded in ab ove mentioned parameters in all treated groups compared with NaF group.

The histopathological results indicated that NaF causes proliferation in thyroid follicles, characterized by formation of large number of small follicles in thyroid gland. Liver section of NaF treated group shows destruction of hepatocytes architecture, several areas of necrosis, disrupted sinusoid and vacuolation. However, histological examination of the kidney in NaF treated group shows enlarged glomerulus, destruction of cuboidal epithelium of renal tubules.

On the other hand in rats treated with NaF, their testis showed histopathological changes including severe suppression of spe rmatogenesis as there was vacuolation and degeneration of spermatogonia and primary spermatocytes. Finally the femur bo ne of rats treated with NaF, showed marked reduction of ostiocytes, in one section there were foci of proliferation ostiocytes at the periphery. Different degrees of amelioration were observed in above tissues in animals groups treated with CaCl2, Vitamin C and both together except in the kidney section of NaF group treated with calcium where no improvement is found.

Conclusion: Exposure of adult male to NaF resulted in significant changes in the parameters of thyroid, liver, kidney and tes ticular functions accompanied with histopathological changes in these organs. On other hand co-administration of calcium, Vitamin C, each alone or both together reduce to some extent of these changes.