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Abstract

Fifteen newhampshire hens at nine month old used to determine the effect of different levels of sodium fluoride (150 PPM, 300PPM). The period of experiment reached two months. The first group administrated (150PPM) sodium fluoride with ration / daily, while the second treated group, administrated (300PPM) sodium fluoride with ration / daily. Each treated groups revealed a variety of relative pathological changes which characterized in the first treated group by mild pathological changes in the spleen, liver, ovaries and oviduct. Which involvement enlargement of these organ. While morphologic and pathological changes which occurs in second treated group these pathological alterations which included, sever enlargement of liver and spleen, the liver was pale-yellowish in appearance and ecterich, paeticael haemorrhage was distributed on the lower surfaces of right and left lobes. Also, the spleen was enlarged, congested and dark – reddish in the colour. The ovaries in second treated group were appeared congestion in the ovarian follicles. And some of ovarian follicles was atrophied, interstitial oedema was found among ovarian follicles and fibrosis occur in the infundibulum and magnum led to retention of eggs

Introduction

Inorganic fluorides are soluble in water without undergoing significant hydrolysis, for examples of inorganic fluorides include hydrofluoric acid (HF), sodium fluoride (Naf), in terms of its reactivity, fluoride differs from chloride and other halides, and is more strongly solvated due to its smaller radius / charge ratio (1). Fluoride is found naturally in low concentration in drinking water and foods, water under ground sources is more likely to have higher levels of fluorides, whereas the concentration in sea water averages 1.3 parts per million (PPM)(2). Fresh water supplies generally contain between 0.01 – 0.3 PPM, while the ocean water contains 1.2 – 1.5 PPM (3). Hydrofluoric acid has a variety of specialized applications, including its ability to dissolve glass (4). Fluoride salts are commonly used to inhibit the activity of phosphatases, such as serine, threonine phosphatases (5). It may do this by replacing the nucleophilic hydroxyl ion in this enzymes active sites (6). Fluoride – containing compounds are used in topical and systemic fluoride therapy for preventing tooth decay, they are used for water fluoridation and in many products associated with oral hygiene (7). Soluble fluoride salts, of which sodium fluoride is the most common, are mild toxic but have resulted in both accidental and suicidal deaths from acute poisoning (4). While the minimum fatal dose in human is not known, a case of a fatal poisoning of an adult with four grams of sodium fluoride is documented (8). 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 (9). The aim of present study to under taken the effect of sodium fluoride on the liver, spleen, ovaries and oviduct of the newhampshire hens.
Materials And Method

Fifteen female newhampshire hens used in this present study to estimate the affect of sodium fluoride on the female reproductive system of these birds. The age of experimental birds was nine months, the average weight 2.5 kilogram, they were marked with serial wing number, and individually housed in plastic cages. The temperature ranged (20 – 25 C ), with light period, twenty hour light followed by four hours dark daily. Experimental birds were given ration and water ad libitum along period of the experiment ( two month ). Each treated groups received a graded dose of sodium fluoride, 150 PPM, 300PPM. Fifteen laying hens were divided randomly and equally into three groups as follow:

Group 1 : administrated 150 PPM with ration.

Group 2: administrated 300 PPM with ration / daily.

Group 3 : control group give diet without sodium fluoride. After the end of experiment the birds were dissected, to show the pathological changes, on the liver, spleen, ovi-ducts and ovaries, used digital camera type Sony .manufactured in Japan to take photos for these organs.

Results

Grossly, spleen, liver, ovaries and oviducts was appeared normal in size and structure and devoided of any pathological changes in the control group ( figures 1,2).in the treated groups (150PPM, 300PPM ) of sodium fluoride the results showed a variety of pathological alteration in above organs. Group 1: treated with (150PPM) of sodium fluoride showed a mild pathological changes in the spleen, liver, ovaries and ovi-ducts, the pathological changes appeared as mild enlargement and change in colour of these organs, and ovarian follicles decrease in number when compared with control group (figure 3). The colour of liver was pale and spleen appearance was slightly congested. group 2: was determined that the morphological and grossly alterations which occurs in high dose (300PPM) of sodium fluoride, these pathological changes involved, sever enlargement of liver and spleen, the liver appeared pale – yellowish and ecteric in the colour ( figure 4), on the lobes of liver showed paeticael haemorrhage was distributed on the lower surfaces of the left and right lobes, the spleen was enlarged and dark – reddish in colour and congestion was prominent on their surface ( figure 5). The ovaries in the treated group 2: was exhibited congestion in the ovarian follicles, and some ovarian follicles was atrophied and interstitial odema appeared among the ovarian follicles, from other hand , fibrosis occurred in the infundibulum and magnum of ovi-ducts which led to retention of eggs in side the magnum (figure 6).
Figure 1: shows the normal colour and Normal size of the spleen And liver(l) of New Hampshire Birds (control group).

Figure 2: Control group: normal size of Ovarian Oocytes (o.o) and ovarian Follicles (o.f) in the Ovary of New Hampshire.
Figure 3: The ovary of control group of Newhampshire (o.f1) Appeared Normal size and colour.

The treated Group 1 (150 PPM) With Sodium fluoride (o.f2) show Moderate Enlargement in ovarian Follicles, and decrease in number.

Figure 4: The second treated group (300 PPM) Sodium fluoride, shows the liver of Newhampshire hen hyperatrophy Enlarged, icteric and pale – yellowish in colour (y), with paetical heamorrahge Spread on the lower surfaces of left And right lobes (h).
Figure 5: The second treated group (300 PPM) Sodium fluoride, the spleen (s) of Newhampshire hen appeared Congested, enlarged and dark – Reddish in colour.

Figure 6: The ovary of the newhampshire Hen At dose (300 PPM) sodium Fluoride Shows fibrosis in Magnum (f), and Interstitial odema (o.d) distributed among Atrophied ovarian follicles as well as Congestion(co) in ovarian follicles.

Discussion

The effect of sodium fluoride on female reproductive system in the mammals and birds need more information in this aspect, due to data base about effect of sodium fluoride still unadquate, especially in
birds. The previous studies was conducted on the male reproductive system in human (10,11) they mentioned decrease in number of spermatozoa and semen volume. Other investigator (12), recorded decreasing in the embryo ‘s number in pregnant female rats and rabbits due to exposure to sodium fluoride. The present study was revealed pathological changes in female reproductive system especially at (300 PPM) of sodium fluoride, and present findings corresponding with previous studies carried out on the female reproductive system of screech – owls (13 , 14) they found significant impairment of over all reproduction, and suggested that the sodium fluoride could cause slight to moderate reproduction disorders in owls in fluoride polluted area. In the female laboratory animals such as rabbit, the histo-pathological changes in the rabbit ovary was determined by (15) when animals injected sodium fluoride solution in the animal treated with 5,10 , 20 and 50 mg / Kg body weight daily, the animals treated with 10 and 20 mg fluoride, ovary exhibited congested oocyte in the ovarian follicles, the degenerative changes were most pronounced in the rabbit treated with 50 mg fluoride, these finding which similar to pathological changes was appeared in the ovaries of treated second group in this present study. The present shows, that spleen enlarged, congested and its colour changed, when the treated birds were given (300PPM) sodium fluoride, these changes identical with previous study on rats by (16), they reported increase in size of lymph nodes, due to affect of sodium fluoride on the lymphatic system as proliferative agent. In this present study, the liver hyperatrophy and enlarged and became icteric, yellowish and pale in colour, may be due to effect of sodium fluoride at (300 PPM) on the liver tissue especially hepatic cells, bile duct, hepatic vessels, and led to dysfunction of this organ, and may be causes decrease in hepatic enzymes, and decrease in metabolic activities such as glycolysis, oxidative phosphorylation and lipid peroxidation, these suggestions are agreement with (17, 18) in the rats.

References


