

FLUORIDE INSTIGATING GENOTOXICITY IN BONE MARROW CELLS OF *Mus musculus*

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ABSTRACT

Fluoride is a frequent, long lasting non biodegradable pollutant that poses serious health risks. Muscle weakness, joint discomfort, weariness, non ulcer, polyurea, dyspepsia and other non erosive gastro instance tangled disease are some of its defining characteristic. World Health Organisation advises against adding fluoride above 1.5 ppm in drinking water. Swiss albino mice (*Mus musculus*) With an average of body weight of 30 gram Orally administered 2 ppm off sodium fluoride in water with the help of garbage for 45 days in a row. A random sample of 300 evenly spaced metaphase plates was examined. Based on statistics , the number of aberrant cells an chromosomal anomalies were determined and interpreted.

Keywords : *bone marrow , chromosome , mice , mitosis , sodium fluoride*

INTRODUCTION

Fluoride is a frequent, long-lasting, non-biodegradable pollutant that poses serious health risks and is challenging to eliminate at low pollution levels. The World Health Organization (WHO) advises against using fluoride in drinking water in excess of 1.5 ppm. Drinking water, food, dental products, and pesticides are the main sources of exposure to the environmental contaminant fluoride (F). Fluorosis is a slow-moving degenerative disorder that is known to affect primarily the skeletal systems, teeth, and the structure and function of skeletal muscles (Kaul and Shusheela, 1974). Fluorosis is a slow-moving degenerative condition that is known to predominantly impact the skeletal and dental systems, as well as the composition and efficiency of skeletal muscles. (Kaul and Shusheela, 1974). Muscle weakness, joint discomfort, weariness, non-ulcer dyspepsia, polyurea, and other non-erosive gastrointestinal diseases are some of its defining characteristics. (Susheela and Bhatnagar, 2002). Based on research papers and a few overdose incidents, it was established that the probable toxic dose was 5mg per kg of body mass. PTD is believed to be the lowest dose that can result in serious and sometimes fatal symptoms, requiring hospitalisation. (Waitford 2011). Above a threshold of 1.5 ppm, the World Health Organization advises against adding fluoride to drinking water. Fluoride that is soluble in water can be readily absorbed by the intestine and quickly digested by humans. (Chinoy et al., 1991). According to research, fluoride impairs sperm function and morphology, motility, accelerates sperm death, and interrupts key stages of the fertilisation process both in vivo and in vitro, including sperm capacitation, hyperactivation, and acrosomal response. (Dvoraokovao, -Hortavao K et al., 2008). Fluoride interferes with typical endocrine processes, which negatively affects endocrine activity, according to the National Research Council's yearly reports. By attaching to its receptors or spermatozoa, it may also affect sperm function. (Sharader Frechette K, 2007). Male reproductive health is harmed by excessive fluoride exposure in a number of ways. (Long et al., 2009). However, several studies conflict with one another and claim that fluoride has no negative effects on male reproductive health. (Taos and Suttie JW, 1976).

The detrimental effects of fluoride on blood have been successfully investigated using a variety of experimental models. (Kant V, 2009; Khand are A L et al., 2000; Cetin N , 2004; Eren E , 2005; Karadeniz A , 2008; Uslu B , 1981 ;Choubisa S , 1996). Fluoride restricts the passage of K⁺ Cl⁻ ions and hinders the formation of hematopoietic cells, which make blood, in bone marrow cavities (Choubisa S, 1996 and Santoyo, 2013). Additionally, it affects the neutrophil, causing a reduction in phagocytic activity (Elferink J.G. 1981), lipid peroxidation in polymorphonuclear leukocytes (Kessaabi M. 1985), and superoxide radical formation. (O₂⁻). In the cell, fluoride can interact with divalent cations to impact the metabolism or maintenance of chromosomes or the activities of enzymes. It can interfere with other processes or react directly with DNA as part of a complex. The genotoxicity of fluoride in mouse bone marrow cells is a subject of scant literature (Kumari and Chaurasia , 2015). The current project aims to investigate the genotoxicity of fluoride in mice.

MATERIALS AND METHODS:

Laboratory inbred albino Swiss Mice (*Mus musculus*) weighing an average of 30 g were fed 2 ppm NaF in water with the help of gavage for 30 days. Following animal sacrifice, slides were produced using the colchicines-hypotonic acetomethanol-flame drying giemsa staining procedure [Singh and kumar ,2012 ; Chaurasia and Sinha ,1987]. A random sample of 300 evenly spaced metaphase plates was examined. Statistics were used to determine and interpret the number of aberrant cells and chromosomal abnormalities (Chaurasia et.al., 2005 and Chaurasia et.al., 2007)

RESULT AND DISCUSSION:

The sodium fluoride treated group had an overall abnormality frequency of 9%, which is significantly greater than the control groups frequency of 1.3%. Both structural and mitotic disruptive alterations where are observed in both group. In the control group, there were 13(4.3 ± 1.27) total abnormalities, of which 9 (3.0 ± 0.91) where structural abnormalities and 4(1.3 ± 0.48) where mitotic disruptions. According to table one, treatment with 2 ppm of sodium fluoride caused a substantial rise in total abnormality by 101 (33.66 ± 3.17) of which 74 (24.66 ± 3.1) and mitotic disruptive 27 (9 ± 1.01)where of the structural type.

Exp. Variants	Structural changes		Mitotic disruption		Total Abnormalities	
	No.	% ± S.E.	No.	% ± S.E.	No.	% ± S.E.
Control	09	3± 0.91	04	1.3±0.48	13	4.3±1.27
Sodium Fluoride (2ppm)	74	24.66±3.11	27	09±1.01	101	33.66±3.17

Table: frequency of chromosomal aberrations in mice's bone marrow after 45 days of exposure to sodium fluoride (No of metaphase Studied = 300)

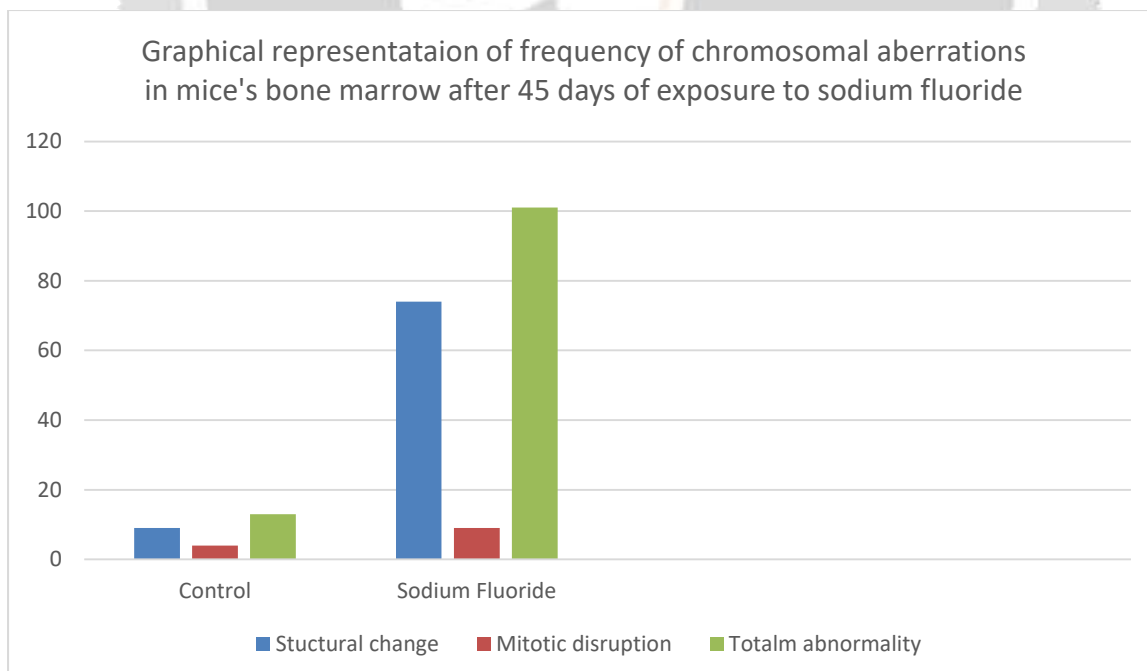


Table one, Shows that chromatic breaks, chromatic gaps, minute fragments, acentric fragments was observed among structural type of chromosomes.

Polyploidy, clumping, stickiness, hypoploidy was observed among mitotic abnormalities.

Observations shows that, due to increase in the both abnormalities of individuals or structural and mitotic disruptive type, there was increase in the chromosomes abnormalities. In which structural types of abnormalities were more significant than mitotic disruptive type.

CONCLUSION:

Based on research papers and observations, Fluoride mostly enters in the body with food, through respiration and the products that contains fluoride. The problem of fluoride pollution, which causes genotoxic impacts on animals, particularly those who consume water with excessive fluoride levels. The human population must receive processed water without any fluoride concentration as a safety precaution, or antioxidants must be added to counteract fluoride's detrimental effects

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