Original Research Article Website : www.ijbasr.org.in ISSN : 2349-1965
Peer Reviewed and Refereed Journal Impact factor 0.9 2015; 2 (2); 175 - 177
International Journal of Basic & Applied Science Research

EFFECT OF DIFFERENT CONCENTRATION OF SODIUM FLUORIDE IN MICE (*Mus musculus*) BONE MARROW CELLS

Pushpa Kumari and O. P. Chaurarasia
P. G Department of Zoology, T. M. Bhagalpur University, Bhgalpur-812007 (Bihar).

Abstracts

Higher Level of Fluoride in ground water is major concern in all over the world. In vivo genotoxicity investigation of the action of fluoride on bone marrow cells, Sodium fluoride was administrated through the drinking water to 6-8 weeks old Swiss albino mice for 7 days at 1 ppm, 2 ppm and 4 ppm Exposure of fluoride induce various types of chromosomal abnormalities were observed. The increase in frequency of chromosomal abnormality was due to significant increase in individual type (Chromatid breaks, Chromatid gaps, acentric fragment, minute fragment, Ring Chromosome) as well as Gross Type (Hypoploidy Polyploidy). The effect was dose descendent. This result indicates that the action of fluoride in vivo is more genotoxic at lower concentration (1 ppm) than at higher concentration (4 ppm).

Abstracts: Toxic, Fluoride, Genotoxic, Ground water

INTRODUCTION:

Pollution of the environment is an undesirable change in the chemical, physical and the biological characteristics of air, water and soil due to contamination. The effect of the pollution may be local or global.Water pollution not only effects water quality but also threats to human health, economic development and social prosperity (M. Milovanovic, 2007) It can arises from many sources, including domestic and industrial waste water, agriculture particles and shipping. The major types of water pollutants are sewage and waste materials (Ramchandra and Srivastava 2004, Kumar 2005). Fluorine is the lightest members of halogen group and is essential in minute quantity for normal mineralization of bone and teeth. It does enhance the strength of bone and teeth but on the other hand if taken up in excessive amount may be toxic to plants and animals. Because the concentration of sodium fluoride is 0.7 to 4.5 ppm above the permissible does 0.5 ppm (Chaurasia, 2007). Major health issues due to drinking fluoride contaminated water include dental fluorosis, teeth mottling, skeletal fluorosis and deformation of bone in human being. Around 200 million people from 25 nations have health risk due to incidence of dental and skeletal fluorosis (S.K.., *et. al.,* 1999). Dental fluorosis is endemic in about 50% district of India with the problem with most pronounced in the state of Andhra Pradesh, Bihar, Gujarat, Madhya Pradesh, Punjab, Rajasthan, Tamilnadu, and Utter Pradesh (K. Brindha *et. al.,* 2011) . According to one study 30-50% of district of Bihar is affected by flurosis. According to the Bihar Govt.8, 188 villages in 11 districts have excess fluoride in ground water (A.K Susheela, 1987). Fluoride predominantly affects the skeletal system, brain,

Corresponding Author : Pushpa Kumari
E-mail : pushpakumaree.765@gmail.com
Date of Acceptance : 20.09.2015
Date of Publication : 30.10.2015

spinal cord, and structure and function of skeletal muscle. It inhibit the synthesis of DNA protein and cell proliferation with the significant increase in the concentration of fluoride chromosome aberration were induced in a dose and treatment time dependent fashion (chaurasia *et. al.,* 2007). According to the review by the U.S Department of agriculture fluorides have done more damage to livestock world wise, than any other air pollutant (Division of Oral Health 1999). In the present investigation we found an induction of chromosome aberrations in bone marrow cells of following in vivo treatment in a laboratory.

MATERIALS AND METHODS:

Sodium Fluoride is a used for experiment. 100mg Sodium fluoride are dissolving with 100 ml distilled water to make stock solution. The Stock Solutions (1 ml) was diluted with 100 ml distilled water to prepare 1 ppm solution,(2 ml) stock solution diluted with 100 ml distilled water to prepare 2 ppm solution, (4 ml) stock solution Diluted with 100 ml distilled water to make 4 ppm solution. 6-8 weeks old Swiss albino mice were feed orally with 1 ppm, 2 ppm & 4 ppm fluoride @ 0.5 ml/day in three groups were exposed. Animals injected with 0.4 % colchicines @ 1 ml / 100 gm / bwt intraperitonial before sacrificing. The bone marrows from both the femurs were flushed in hypotonic solution. Incubated at 31^0C for 20 munities, centrifuged it and fixed in acetomethanil fixative. The slides were prepared by flame drying and giemsa staining technique (Preston *et. al.,* 1987). The chromosome aberration was evaluated in mitotically dividing bone marrow cells by random screening of about 300 well spreader metaphase plates. Both structural and numerical variations in the chromosome were analysed.

RESULTS AND DISCUSSION :

Among 300 metaphase plate screened per group, the frequency of total chromosome abnormalities were at 1 ppm (10 ± 1.73) 2 ppm (23.00 ± 2.42) and 4 ppm (27.33 ± 2.57) compare to control (3.33 ±1.03) value (Table –1). The abnormal cells and chromosomal abnormalities were increased with increase of concentration of sodium fluoride (NaF). Thus the effect was dose dependent, both individual and gross type of abnormalities observed. The gross abnormalities were (2.66 ± 0.86), (4.66 ±1.21) and (5.66 ±1.77) respectively 1 ppm, 2 ppm and 4 ppm. Among individual type, chromatid breaks, gaps, acentric fragment etc while, hyperploidy, hypoploildy, stickiness in gross type. This clearly indicates the patency of F to induce chromosome aberration in the bone marrow cells of mice. Dosage and mode of fluoride exposure could play an important role in modulating genotoxicity of fluoride (Chlubek (2003).

CONCLUSION:

The works performed on different concentration of sodium fluoride on anthropological pollutants in water induce genotoxicity. Most of the studies on fluorides toxicity show potent genotoxic nature of fluoride but the molecular mechanisms by which it induce toxicity is not fully clear. Probably fluoride directly attacks the amine group associated with DNA or indirectly through free radicals generation. Involvement of endogenous gluthathine in the NaF induced genotoxicity supports the indirect effect of fluoride on DNA through the generation of free radicals. Toxic effect of fluoride can be reduced by the government or any authorized agency should conduct the survey of that area where such pollution exist and an awareness programme are also be made and necessary steps should needed to take by which the people were not directly or indirectly exposed. Water supply from more than 100 m deep bores generally contains permissible limit of fluoride from drinking. A preventing measure may be advised for people of that area to take any antioxidant regularly. The

REFERENCES:

1. A.K .Susheela, Fluorosis in India, The magnitude and severity of the problem, Sci. Dev. Env, 1987; 147-157.
2. Chqurasia O.P, Kumari Chanda, Ankita and Sangita, Genotoxic effect of ground water salts rich in fluoride, cytologia, 2007; 79 (2) : 141-144.
3. Chlubek, D,. Fluoride and Oxidative oxidation stress, fluoride, 2003; 36: 207-208.
4. Division of Oral Health National centre for chronic Disease prevention and Health Promotion, CDC. Achievements in public health 1900-1999, floatation of drinking water to prevent dental carries. MMWR morb mortal wkly Res. 1999, 48 (41), 900-40.
5. K.Brindha, R. Rajesh, R. Murugun and L. Elango, Fluoride contamination in ground water in parts of Nalgonda district Andhra Pradesh, India, Environ Monit Assess 172, 2011, 481-492.
6. Kumar Shiv (2005): Bioremediation of Distillery effluent by selected aquatic macrophytes, PhD Theses, T.N .Bhagalpur University, (Kubo and Rose 1973). (Macklin 1974).
7. M.Milovanovic, Water quality assessment and determination of pollution sources along the Axios/Vardar River, South Eastern Europe, Desalination, 213, 2007, 159-73.
8. Preston, R.J Dean B.J.Galloway, S.Holden,H, Mc Fee, A.F and shel by, M., Mammalian in Viro cytogenetic assay. Analysis of chromosome aberration in bone marrow cells. Mutual, Res.1987; 189: 157-165.
9. Ramchandra and Srivastava Archana: Toxico logical Evolution of Bacterial decolourised, analogically treated distillery effluent with common duck used (Lamina Minor) Journal of environmental biology, 2004; 25 (1) 93-98.
10. S.K Andezhath, A.K Sushella and G.Ghosh, Fluorosis Management in India: The impact due to Networking between Healh and rural drinking water supply agencies (IAHS-AISH publication, 1999; 260, 159-165.
11. Deka Boruah, H. P.,. North eastern coal and environment: An overview. Proc. on Characterization and Gainful Utilisation of NE Coal, Published by RRL, orhat, 2006; pp 28–33.
12. Gogoi, J., Pathak, N., Dowrah, J., and Deka Boruah, H. P., In situ selection of tree species in environmental restoration of opencast coalmine wasteland; Proceedings of Int. Semon MPT 2007; pp 678

***