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RESEARCH ARTICLE

ANALYTICAL STUDY FOR DETECTION OF FLUORIDE IN DRINKING WATER IN SELECTED AREA OF RAIPUR

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ABSTRACT

The survey indicated that many of the people is this region of Raipur have either dental or skeletal fluorosis. A study has been carried out for the determination of fluoride in drinking water in selected area of Raipur. Fluoride was determined by using SPAND reagent and acid zirconium chloride by spectrophotometer of 570 nm. The value range from 0.6 mg/L to 5.83 mg/L. Most of the city have higher concentration of fluoride than suggested by WHO and BIS and most of the people were affected by fluorosis like dental fluorosis or skeletal fluorosis. After the analysis of sample is this region. It was found that high 60 percent of citizen are prone to fluorosis which caused by excess fluoride concentration in drinking water.

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INTRODUCTION

Fluoride is a geochemical contaminant and natural sources account for much of the fluoride found in surface and ground waters. Fluorine is the highly reactive and most electronegative of all elements. It is never found free in nature. About 96% of the fluorine in the body is found in bones and teeth. Recognition of fluoride hazards has been document since 19th century. After the Second World War the detrimental effects from fluoride have greatly increased with extensive industrialization. These industries are the major users of the material containing high concentration of fluoride. When there minerals are subjected to various industrial processes high amount of fluoride is released into the atmosphere. Major part of fluoride is deposited in alkaline soil and is bound with clay minerals and becomes highly soluble. Present of large amount of fluorine is associated with dental and skeletal fluorosis > 1.5 mg/L and inadequate amounts with dental caries <1mg/L (W.H.O. 1984). The maximum permissible limit of fluoride has been proposed to be 1.5 mg/L in drinking waters by various international regulatory bodies like W.H.O. united state public Health service etc. In dental flurosis the common symptom observed are discolor of the teeth. It may start with white yellow and become brown to black. The discoloration may be in sport. In skeletal fluorosis high dose of fluoride replace bone calcium fluoride, bones become soft crumble and chalky white maximum effect of fluoride.

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Study Area

The water samples were taken from Urla, Dharsiva, Bhanpuri chowk, Tendwa, Hirapur, Guma.

Objective

The objective of the study is to detect fluoride concentration in drinking water in different localities of Raipur city. This work also important as by knowing fluoride concentration of selected area we can find out whether the concentration is in the range of 0.5-1.5 ppm. In this study we will calculate the fluoride concentration in Urla, Dharsiwa, Hirapur, Bhanpuri chowk, Guma, Tendua.

MATERIALS AND METHODS

1) Fluoride may be present either naturally or artificially in drinking water are absorbed to some degree in the bone structure of the body and tooth enamel.

The SPANDS method was used to estimate fluoride present in various water samples. This method tolerates many interference and determines fluoride in water sample when present even is traces. The reacting is immediate colors is salable and us waiting period is necessary.

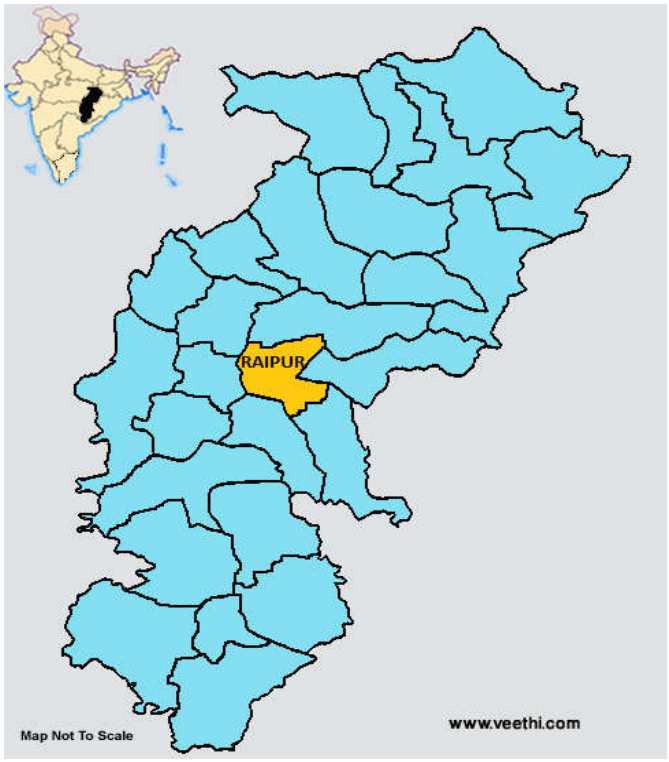
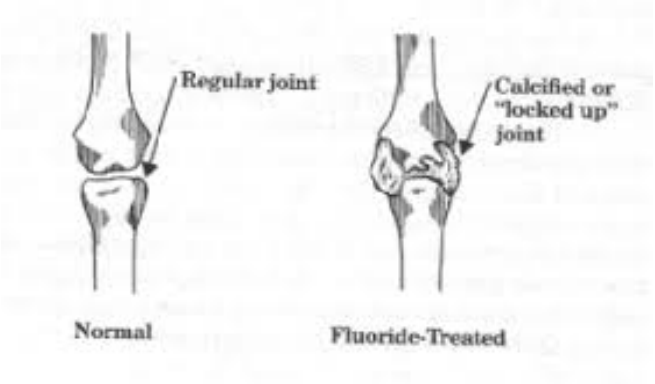


Table-effected of fluoride concentration

Fluoride concentration (mg|L)	Effected
less than 1.5	No effected
1.5 to 3.0	Dental effected
3.0to 6.o	Mild skeletal flourosis
More than 6.0	cripping skeletal flourosis



Principle

Fluoride ion change the colour of zirconium SPANDS complex and the colour change is proportional to the fluoride ion concentration. Few water sample which coloured and

turbid were distilled and then subjected of fluoride determination.

Reagents

1 Fluoride stock solution
2 Fluoride standard solution
3 Acid zirconyl spands reagent
4 Reference solution
5 Sodium arsenite solution

Procedure

50 ml of water sample taken in a Nessler tube 1 to 2 drops of sodium arsenite solution were added to treat residual chlorine and were mixed well 10.0ml of the acid Zirconyl-SPAND regent were added to the sample and content thoroughly mixed. The spectrophotometer was set zero with the reference solution and then the absorbance of the sample was measured. The concentration of fluoride in mgs in the water sample equivalent to the observed optical density were determined from the calibration graph.

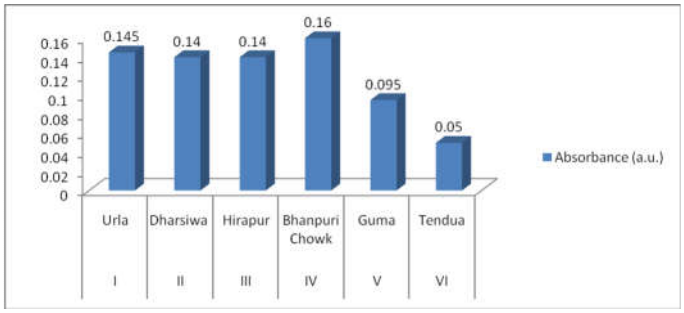
RESULTS AND DISCUSSION

We have taken water sample from six different localities of Raipur city and calculated the concentration of fluoride in this sample. Firstly we have calculated the absorbance of standard solutions prepared. In calculating absorbance by UV spectrophotometer, spectrometer was set zero absorbance using reference solution at 570nm and the absorbance of the standard was measured immediately.

Observation Table Showing

Six sample of different locality of Raipur

Sample No.	Locality of sample	[F] CONC
I	Urla	0.145
II	Dharsiwa	0.140
III	Hirapur	0.140
IV	Bhanpuri Chowk	0.160
V	Guma	0.095
VI	Tendua	0.050



The concentration of fluoride is maximum in sample IV i.e. bhanpuri chowk according to the literature studied is found that fluoride sources are soil underground rocks minerals such as fluorapetite, flourile etc. This suggests that bhanpuri chowk has fluoride containing rocks soil and minerals similarly. Sample I has fluoride concentration e.g. Tendua which means here mineral soil and rocks having fluoride are not present.

Conclusion

In this study we have collected water sample from different localities of Raipur city and calculated the fluoride Concentration in there sample we find that the fluorine concentration was maximum in bhanpuri Chowk and minimum in Tendua area of Raipur if fluoride concentration is in abundance it can lead to dental and skeletal flourosis as bones also have hyedroxyapetite $Ca_5(OH)$ $(PO_4)_3$ which can incorporate fluorine Another effect of this is mottling of mouth thus fluoride concentration should be within the save limit of 0.5 ppm to 1.5. Thus this work has great significant. This study has great value in Raipur region of.. Chhattisgarh belt due to developing massive industrialization in this belt. All these industries use material having very high fluorine concentration. This fluoride gets deposited underground along with rain water, durind disposing of water obtained from these industries fluoride concentration in urla-0.145, dharsiwa-0.140, hirapur-0.40 bhanpuri chowk-o.160, guma-0.095, tendua-0.050.

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