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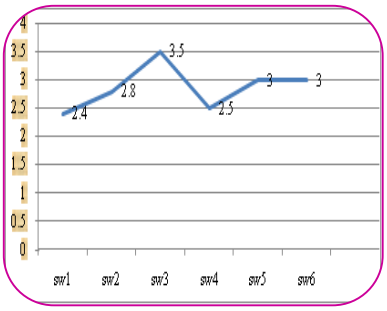
HIGH FLUORIDE INCIDENCE IN GROUNDWATER AND ITS POTENTIAL HEALTH EFFECTS IN PARTS OF SARGUJA AREA, CHHATTISGARH



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ABSTRACT :

Assay of fluoride concentration in ground water samples around Surajpur district in Sarguja revealed that fluoride content in beyond the permissible limit in some residential areas. The extent of Fluoride present in different samples was obtained by spectrophotometer. the extent of fluoride was found in village Baraul found to be from minimum 2.4 to 3.0 mg/l. village Ramtirath found to be from minimum 2.1 to 3.0 mg/l. but in village Fatehpur and Barwahi found to be from minimum 2.1 to 3.50 mg/l. it is further added that extent of fluoride content in water depends on the climatic conditions and increase in summer.

KEYWORDS : *Fluoridation, Dosage, Fluorosis, Aesthetic, Consumption.*

INTRODUCTION

Safe **drinking water** is essential to **humans** and other life forms. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack accesses to adequate sanitation. There is a clear correlation between access to safe water and **GDP** per capita. However, some observers have estimated that by 2025 more than half of the **world population** will be facing water-based vulnerability. A recent report (November 2009) suggests that by 2030, in some developing regions of the world, water demand will exceed supply by 50%.Water plays an important role in the **world economy**, as it functions as a **solvent** for a wide variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70% of the **fresh water** used by humans goes to **agriculture**.Water is the **chemical substance** with **chemical formula** **H_2O**: one **molecule** of water has two **hydrogenatomscovalentlybonded** to a single **oxygen**atom. Water appears in nature in all three common states of matter and may take many different forms on Earth: water vapor and clouds in the sky; **seawater** and **icebergs** in the polar oceans; **glaciers** and **rivers** in the **mountains**; and the liquid in aquifers in the ground. At high temperatures and pressures, such as in the interior of giant planets, it is argued that water exists as **ionic water** in which the molecules break down into a soup of hydrogen and oxygen ions, and at even higher pressures as **superionic water** in which the oxygen crystallizes but the hydrogen ions float around freely within the oxygen lattice.Fluoride's effects depend on the total daily intake of fluoride from all sources. About 70-90% of ingested fluoride is absorbed into the blood, where it distributes throughout the body. In infants 80-90% of absorbed fluoride is retained, with the rest excreted, mostly via urine; in adults about 60% is retained. About 99% of retained fluoride is stored in bone, teeth, and other calcium-rich areas, where excess quantities can cause fluorosis. Drinking water is typically the largest source of fluoride. In many industrialized countries swallowed toothpaste is the main source of fluoride exposure in unfluoridated communities.

OBJECTIVES OF THE PRESENT WORK

The quality of water is of vital concern for mankind since it is directly linked with human welfare. It is matter of history that faecal pollution of drinking water caused water bourne diseases which wiped out entire population of cities. The aim of this study was to determine the amount of fluoride in drinking water of five villages of Sarguja dist. Polluted water is the culprit in all such cases. The major sources of water pollution are domestic waste from urban and rural areas, and industrial wastes which are discharged in to natural water bodies. For this Physico-chemical analysis of drinking water samples will be taken from different five villages and aware to avoid all problems which come from more fluoride.

INTRODUCTION OF SELECTED AREA

With 60% percent of tribal population is one of the under developed districts in Chhattisgarh. About 36% of area encompasses reserved and protected forest land. Ambikapur is the district headquarters. The total population of the district is 1970661 (2001) census, out of which 93.03% is rural population. The net irrigated area is 31968 ha. out of which 6077ha. (19% only) is irrigated by ground water. District is a great table land of numerous hills and plateau. The two important Physiographic features of the district are the Mainpat plateau and the Jamirpatplateau. The former is 28.8 km long and 12.8 km wide and rises to a maximum height of 1152.45 meters. It forms the southern boundary with Raigarh district. The Jamirpat is about 3km wide. It forms the eastern boundary of Sarguja with Jharkhand State.

MATERIAL & METHOD

Samples were collected and analyzed as per procedure laid down in the standard methods for examination of water and waste water of American public Health Association (APHA) composite sampling method was adopted for collection of samples of water from five location of village. Sample for chemical analysis were collected in polyethylene containers. Samples collected for metal contents were acetified (1.0 ml HNO_3 per liter samples). Some of the parameter like P^H Temperature, conductivity, dissolves oxygen T.D.S. were analysed on site using portable water analysis kit. The other parameter were analyzed at laboratory.

Method: SPADNS SPECTROPHOTOMETRIC.

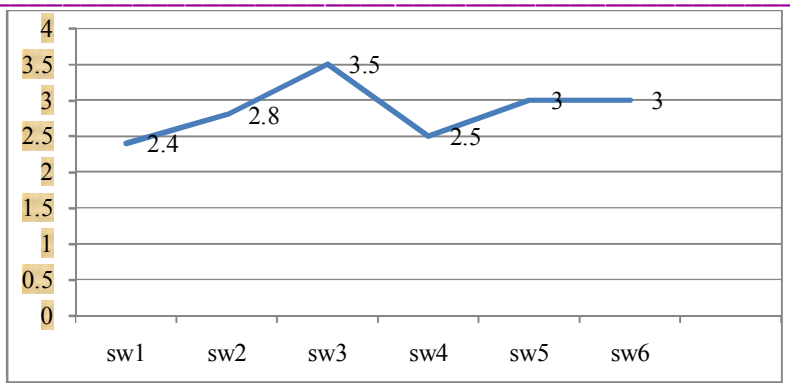
RESULT & DISCUSSION

Village I - Birimkela

A Total number of six samples were collected and tested for their fluoride concentration. Three samples represent surface water collected from river/nallah and represented as s1-sw_1, s2-sw_2, s3-sw_3 while the remaining samples were collected from under-ground water/tube wells s4-sw_4, s5-sw_5, s6-sw_6. All the six samples were colorless, odorless, and free from solid suspension. The results of absorbance have been compiled below for the s-1 samples.

Table 1: Fluoride Concentration of water samples in village Birimkela

Samples	Fluoride in mg/l
s1-sw_1	2.40
s1-sw_2	2.80
s1-sw_3	3.50
s1-sw_4	2.50
s1-sw_5	3.0
s1-sw_6	3.0

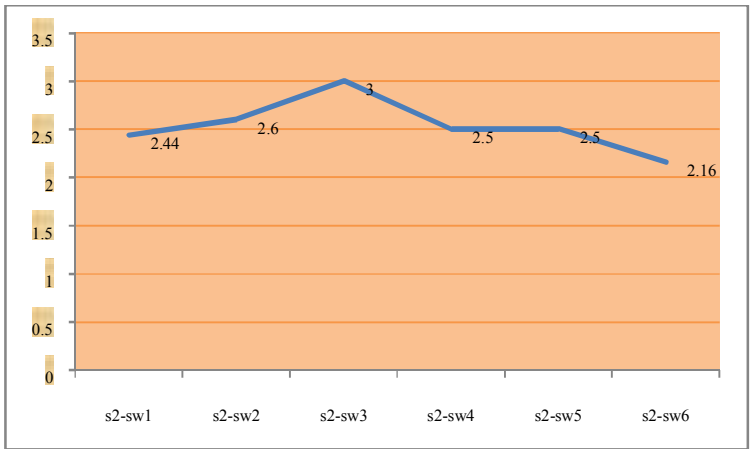


Village II Chando

A Total number of six samples were collected and tested for their fluoride concentration. Three samples represent surface water collected from river/nallah and represented as s1-sw_1, s2-sw_2, s3-sw_3 while the remaining samples were collected from under-ground water/tube wells s4-sw_4, s5-sw_5, s6-sw_6. All the six samples were colorless, odorless, and free from solid suspension. The results of absorbance have been compiled below for these samples.

Table 2: Fluoride Concentration of water samples in village Chando

Samples	Fluoride in mg/l
S2-sw_1	2.44
S2-sw_2	2.60
S2-sw_3	3.0
S2-sw_4	2.50
S2-sw_5	2.50
S2-sw_6	2.16



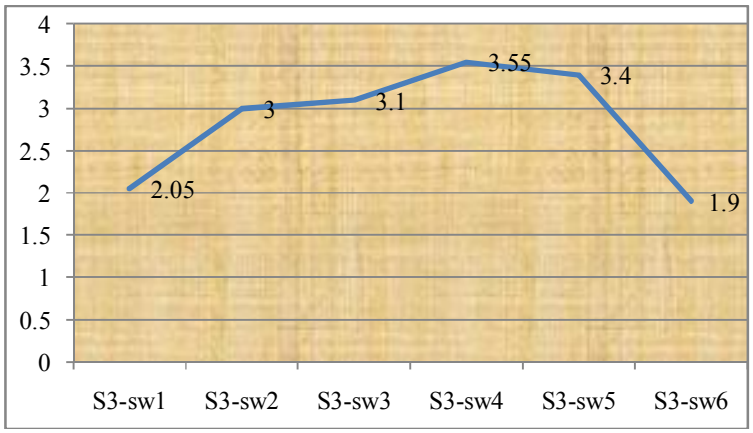
Water samples

Village III- Kussu

A Total number of six samples were collected and tested for their fluoride concentration. Three samples represent surface water collected from river/nallah and represented as s3-sw_1, s3-sw_2, s3-sw_3 while the remaining samples were collected from under-ground water/tube wells s3-sw_4, s3-sw_5, s3-sw_6. All the six samples were colorless, odorless, and free from solid suspension. The results of absorbance have been compiled below for these samples.

Table 3: Fluoride Concentration of water samples in village Kussu

Samples	Fluoride in mg/l
S3-sw_1	2.05
S3-sw_2	3.00
S3-sw_3	3.10
S3-sw_4	3.55
S3-sw_5	3.40
S3-sw_6	1.90



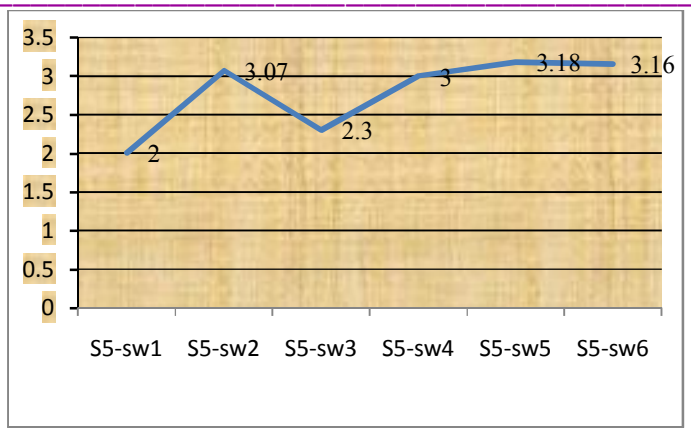
WATER SAMPLES

Village IV- Belkharikha

A Total number of six samples were collected and tested for their fluoride concentration. Three samples represent surface water collected from river/nallah and represented as s5-sw_1, s5-sw_2, s5-sw_3 while the remaining samples were collected from under-ground water/tube wells s5-sw_4, s5-sw_5, s5-sw_6. All the six samples were colorless, odorless, and free from solid suspension. The results of absorbance have been compiled below for these samples.

Table 4: Fluoride Concentration of water samples in village Belkharikha

Samples	Fluoride in mg/l
S5-sw_1	3.16
S5-sw_2	3.18
S5-sw_3	2.50
S5-sw_4	3.0
S5-sw_5	3.50
S5-sw_6	3.20



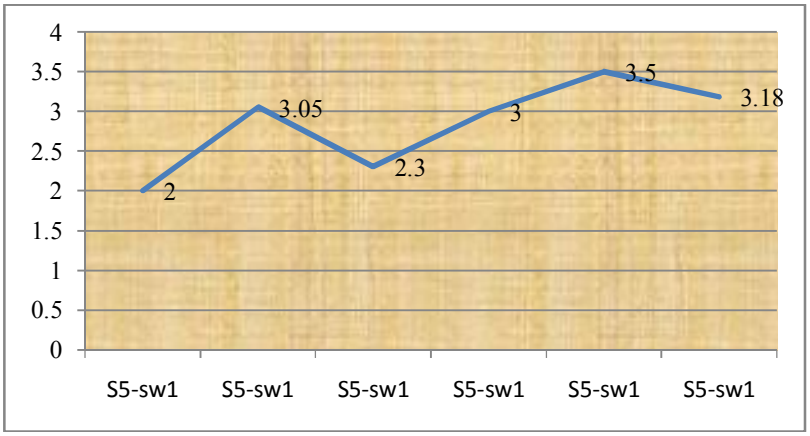
WATER SAMPLES

Village V- Gagoli

A Total number of six samples were collected and tested for their fluoride concentration. Three samples represent surface water collected from river/nallah and represented as s1-sw_1, s2-sw_2, s3-sw_3 while the remaining samples were collected from under-ground water/tube wells s4-sw_4, s5-sw_5, s6-sw_6. All the six samples were colorless, odorless, and free from solid suspension. The results of absorbance have been compiled below for these samples.

Table 6: Fluoride Concentration of water samples in village Gagoli

Samples	Fluoride in mg/l
S6-sw_1	2.0
S6-sw_2	3.05
S6-sw_3	2.30
S6-sw_4	3.0
S6-sw_5	3.50
S6-sw_6	3.18



WATER SAMPLES

Result of analyses of Water from Five villages of dist. are recorded in Table-1, 2, 3, 4 and 5. In all the five villages each have six sampling station (three were collected from the surface and three sampleswere collected from the tube well) of village- **Birimkela** fluoride was recorded in the range of 2.40, 2.80, 3.50,

2.50, 3.0 and 3.0 mg/l . Maximum permissible limit for fluoride as world Health organization (WHO) is 1.5 mg/l. all six samples fluoride found excessof their permissible limit.

Water samples analyses of villages of ditrict are recorded in Table-1, 2, 3, 4 and 5. In all the five villages each have six sampling station (three were collected from the surface and three samples were collected from the tube well) of village- **Chando** fluoride was recorded in the range of 2.44,2.44, 3.0, 2.50, 2.50, and 2.16 mg/l . Maximum permissible limit for fluoride as Indian standard (IS) is 0.6 to 1.2 mg/l. all six samples fluoride found excessof their permissible limit.

Maximum permissible limit for fluoride as NEERI manual (1991) is 1.0 mg/l. Water from villages is recorded in Table-1, 2, 3, 4 and 5. In all the five villages each have six sampling station (three were collected from the surface and three samples were collected from the tube well) of village- **Kussu** fluoride was recorded in the range of 2.05, 3.00, 3.10, 3.55, 3.40 and 1.90 mg/l. all six samples fluoride found excess of their permissible limit.

The concentration of fluoride from villages is recorded in table. In all the villages each have six sampling station (three were collected from the surface and three samples were collected from the tube well) of village- **Belkharikha** fluoride was recorded in the range of 3.16, 3.18, 2.50, 3.0, 3.50 and 3.20 mg/l. all six samples fluoride found excess of their permissible limit .Maximum permissible limit for fluoride as NEERI manual (1991) is 1.0 mg/l and maximum permissible limit for fluoride as world Health organization (WHO) is 1.5 mg/l.

The concentration of fluoride from villages is recorded in table. three were collected from the surface and three samples were collected from the tube well of village- **Gagoli** fluoride was recorded in the range of 2.0, 3.07, 2.30, 3.0, 3.50 and 3.18 mg/l. all six samples fluoride found excess of their permissible limit .Maximum permissible limit for fluoride as NEERI manual (1991) is 1.0 mg/l and maximum permissible limit for fluoride as world Health organization (WHO) is 1.5 mg/l.

CONCLUSION

The preset study has been made to evaluate the Fluoride concentration of water samples collected from the villages of Sarguja Dist, Chhattisgarh. Each village has made six sampling satation. These samples were analyzed for study of fluoride and their effect in surrounding area. Fluoride in naturally occurring in water can be above or below from recommended levels. Both the excess and deficiency of fluoride in water produces adverse effects on the health. Maximum acceptable limit for fluoride as world Health organization (1985) is 1.5 mg/l. In present study the fluoride concentration of water samples of all five villages were found over the permissible limit. Therefore, there was harmful effect of fluoride were found in all villages .

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