Vol 6 Issue 4 Jan 2017

ISSN No : 2249-894X

Monthly Multidisciplinary Research Journal

Review Of Research Journal

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RNI MAHMUL/2011/38595 **ISSN No.2249-894X**

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REVIEW OF RESEARCH

ISSN: 2249-894X
IMPACT FACTOR : 3.8014(UIF)
VOLUME - 6 | ISSUE - 4 | JANUARY - 2017

STUDY TO ASSESS FLUORIDE CONCENTRATION IN DRINKING WATER IN KOTPUTLI IN RAJASTHAN

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ABSTRACT:

Clean and safe drinking water is as vital as fresh air for the survival of mankind. Under-ground water is a good source of drinking water. Unfortunately, it might contain high level of fluoride which is injurious to health of hard tissues of human body, namely teeth and bones. Contrarily, normal level of fluoride act as anti dental caries agent. Prospective study was done in town Kotputli, Rajasthan to detect fluoride concentration of drinking water. The mean fluoride (2.4±0.60mg/L) was significantly (p<0.0001) higher than the BIS reference value.

KEYWORDS: *Fluoride concentration of water, water quality, fluoride level of drinking water.*

INTRODUCTION:

Water is necessary for origin and survival of life. According to World Health Organization, it is imperative to provide safe and clean drinking water to every citizen. It is one of ten important goals (WHO,1990).

Water is a constituent of diet, though it provides no calories. It forms around 70% volume of cytoplasm of cell. Water is the important constituent of all body fluids.

Underground and surface waters are important sources of drinking water. However, neither sources provide clean and safe drinking water. Major concern for deteriorating quality of drinking water is the effluents discharged from industries, agricultural field, acid rain and domestic waste. Surface water is contaminated through direct and indirect pollutants from air and land. Underground water resources are affected by leaching of various pollutants from the soil (Holt, 2000).

Fluorosis is the manifestation of high fluoride in body. Water is main source of fluorine (WHO,1999). Its level in ground water depends on type of rocks and minerals. Fluorine intake through any source is useful up to its 1.0mg / l concentration. Higher concentration of fluorine is harmful. Endemic fluorosis can be in form of dental fluorosis and or skeletal fluorosis. These conditions are associated with abnormality in structure and functions of teeth and bones of body (WHO, 2001).

MATERIALS AND METHODS

Sample collection

Water samples were collected from 30 sites located in town, Kotputli, Rajasthan. The method of randomization was adopted for sample selection and water sample collection. Polythene bottles of 1L were used for water sample collection. These bottles were treated with hydrochloric acid and washed with tap water to drain acid. Thereafter, bottles were rinsed with distilled water to avoid any contamination. Source of water samples was under-ground water and water samples were taken from hand pumps and overhead water tanks. Each bottle was filled, sealed and name of site was written on the bottle.

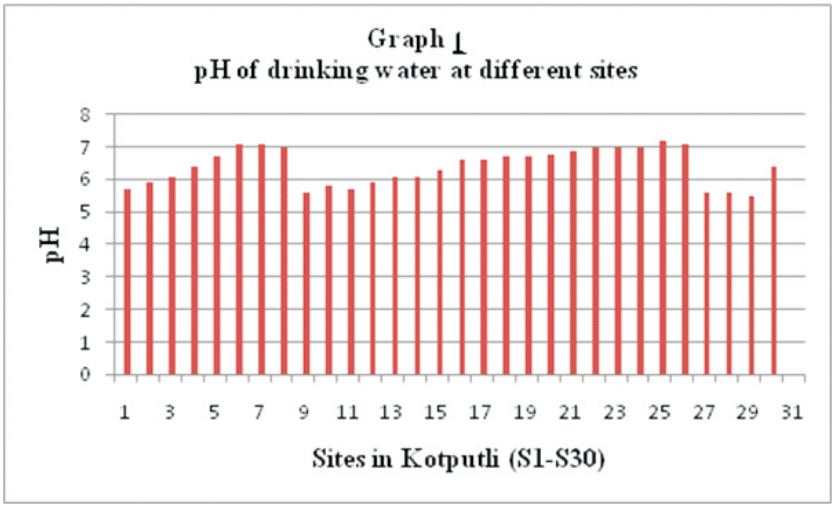
Experimentation

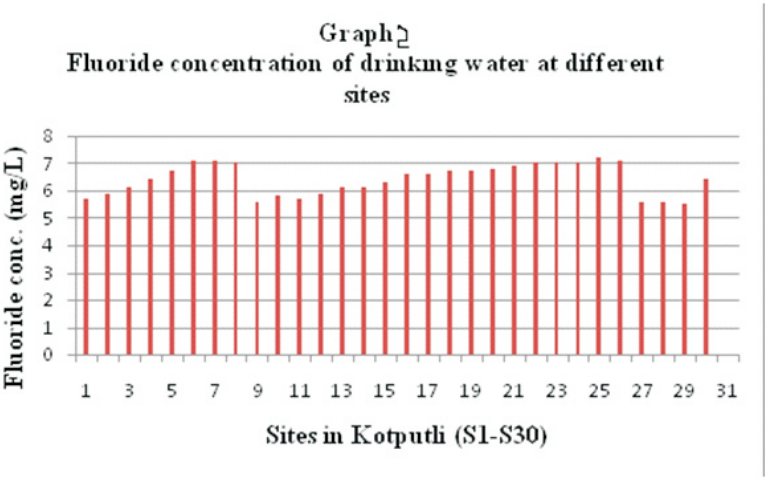
1. Color of water samples was determined by sense of sight.
2. Odor of water samples was determined by sense of smell.
3. Taste of water samples was determined by gustatory perception.
4. pH of water samples was determined by digital pH meter.
5. Fluoride concentration of water samples was determined by fluoride testing kit.

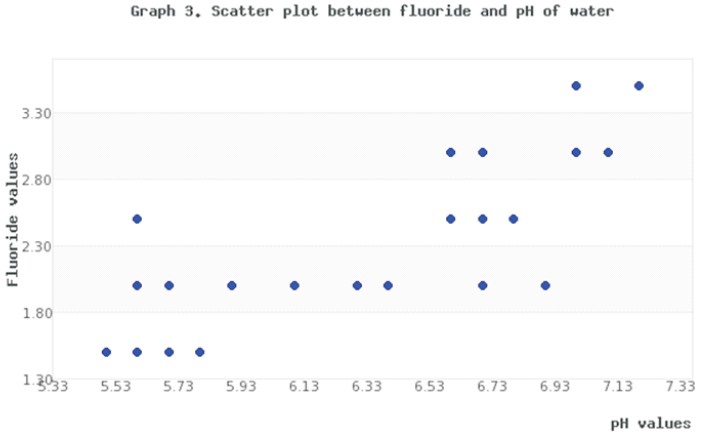
RESULTS & DISCUSSSION

Table 1. Analysis of water samples from Kotputli, Rajasthan

Characteristics	Reference value(BIS)	Mean	S.D.	't' test Significance level
pH	6.5 – 8.5	6.41	0.56	Not computed
Fluoride (mg/L)	1.0	2.4	0.60	<0.0001







Water samples (n=30) were collected by randomization from different sites situated in town, Kotputli in Rajasthan. Color of water samples was assessed by direct observation. All samples were observed to be without any color deposits. Further, all water samples were odorless. All water samples tasted salty. It might be due to presence of high sulfate concentration of magnesium and or sodium in under-ground water (USEPA 2016)

PH OF WATER SAMPLES

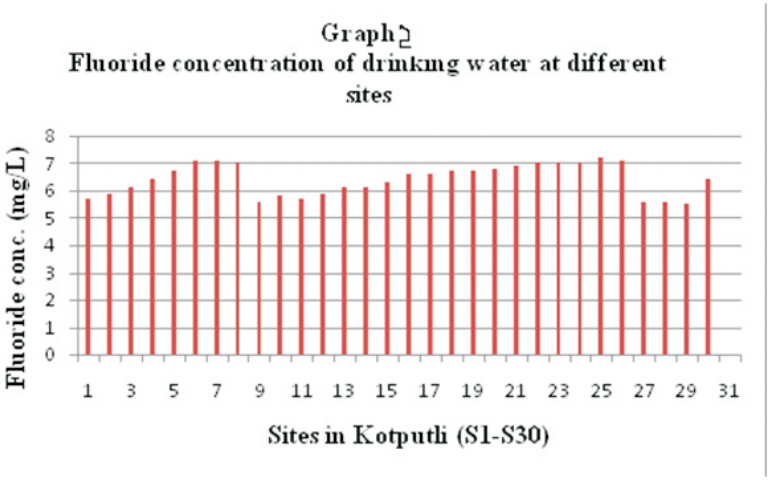
As shown in table 1, the mean (6.41mg/L) and S.D. (±0.56) of pH of water samples was observed. Graph 1 showed variation in pH values of drinking water across 30 sites I Kotputli. The highest pH was at sites 6 and 25 in range (7.1-7.2), whereas, lowest pH values of drinking water were observed at sites 29, 27, 28,1,9,10 in the range (5.5-5.8), as in graph 1. Overall, mean pH value (6.41) of water samples is within reference range (6.5-8.5) prescribed by Bureau of Indian Standards (BIS, 2012).

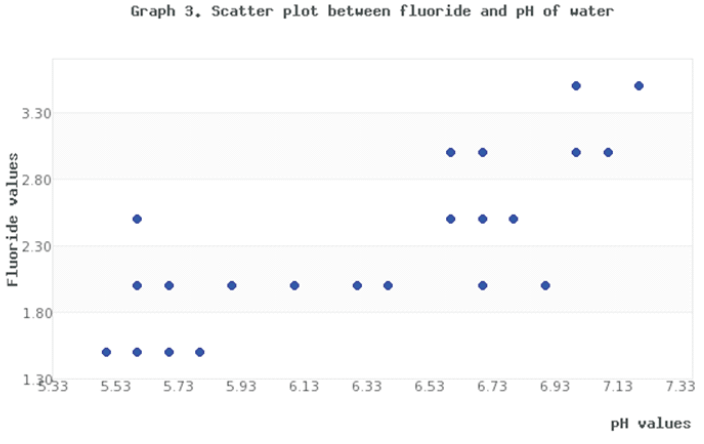
FLUORIDE CONCENTRATION

Fluoride concentration (mean=2.4mg/L) with S.D.(±0.60) of water samples (n=30) was observed, as in table 1.

Test statistics of fluoride conc. (t=12.7) and critical value of fluoride conc. (t=2.045) at degree of freedom (df.=29) & (0.05) significance level were calculated. Test statistics were higher than critical value. Therefore, alternate hypothesis was accepted.

Presence of fluoride in ground water can be a result of natural resources. Fluorine exists widely on earth in mineral form. Rocks rich in minerals like apatite and fluorite are source of fluoride in underground water.





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Fluoride in water up to 1mg/L is necessary for normal structure of hard tissues of body. It acts as anti-plaque agent for prevention of dental caries. Excessive fluoride consumption leads to a decay of teeth and bones and called as endemic fluorosis (WHO, 1999; WHO, 2001).

Highest fluoride concentration in water was observed at sites 24 and 25 (3.5mg/L), whereas, lowest fluoride level was detected at sites 1, 10, 28, 29 (1.5mg/L), as in graph 2.

Further, bivariate analysis as shown in graph 3, proved a positive and direct correlation between fluoride concentration and pH of drinking water.

CONCLUSION

Water is one of the basic needs of life. High fluoride in drinking water damages teeth and bones. It should be treated with modern techniques to provide safe drinking water to mankid.

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