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## Physico-Chemical Studies On Drinking Water of Dausa City and its Impact on Human Population

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**ABSTRACT:** Various kind of human development is resulting in different kind of pollution to the water resources. Monitoring of Drinking water quality and its serious analysis is very significant relative to access the human health hazards. This paper is an attempt for the same purpose. The sample were collected from main areas of the Dausa City and were analysed for the desired physiochemical parameters applying the internationally valid standard methods. Results were compared with the international standards. It was found that drinking water quality is very poor leading to very dangerous health hazards as the most of the samples were not found to be fit on international drinking water standards. This study suggests a need to revise a more advance drinking water resources development and public health awareness policy and in depth research.

**KEYWORDS:** TDS; EC.; chlorides; fluorides; nitrates; total hardness. BOD; TS; TSS; physiochemical parameters; drinking water quality etc. TH= Total Hardness, TA= Total Alkalinity, DO=Dissolved Oxygen, COD=Chemical Oxygen Demand, BOD=Biochemical Oxygen Demand, Temp=Temperature, Cond. =Conductivity, TS=Total Solids, TDS=Total Dissolved Solids, TSS=Total Suspended Solids All the parameters measured as mg/L except Temperature (°C) and Conductivity (µs/cm)

### I.INTRODUCTION

The drinking water quality is very significant and vital concern at present as it is related with the present and future health perspective of the human race. Urban population of Dausa city is mainly dependent on govt. water supply and self boreholes as the city falls in desert area of the western Rajasthan India. Government uses bore wells and Indira Gandhi canal water for this purpose. There is heavy Industrial development in Dausa City and these water resources are being contaminated and polluted by various modes from a several decades resulting in current early and delayed health hazards for the human population residing in this city.[1,2]

Thereof this research work an attempt was made to access the physiochemical analysis of the drinking water and the related human health hazards in the selected area.

#### Experimental:

Drinking water samples of different locations at Dausa city area was collected and studied during the period from may 2011 to August 2012. Electrical conductivity values were measured using systronics conductivity meter. Total alkalinity was evaluated by titration with standard 0.1M HCl using methyl orange and phenolphthalein as indicators<sup>1</sup>. Standard procedures<sup>[2-5]</sup> involving spectrophotometry, flame photometry and volumetry were used for the determination of water quality parameters. All the chemicals used were of AR grade.[3,4]

Total 22 no. of water samples were analysed most of the samples were found to be alkaline due to presence of carbonates and bicarbonates and other temporary hardness.  $P^H$  was find to be in the range of 7.6 to 8.5 this may result in the releasing of the toxic heavy metals like Zn, Pb, Cd And Cu, Fe etc from the supply pipes. A higher alkalinity also results in the deteriorating palatability of the drinking water. However all the sample pH were found to be within the prescribed limit of the WHO (6.5 –8.5). Total Hardness of water depends upon the amount of calcium and magnesium and other ions.

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A high Magnesium concentration causes nausea, muscular neuropathy and paralysis in human body when it reaches a level of about 400mg/L. Magnesium value in the studied area varied between 14-78 mg/L.[5,6]

DO value in the studied area varied between 2.1-5.2 mg/L. 09 sampling points showed higher DO values than the prescribed limit by WHO. High amount of

DO imparts good palatability to water. BOD value in the studied area varied between 1.8-7.2 mg/L. All sampling points showed BOD values within the limit prescribed by WHO. Ground water with high value of BOD is due to microbial activities related to the bulk industrial effluents dumpsites. The old damaged supply pipe may also contribute to this factor.

Hardness value in the studied area varied between 223-678 mg/L. 4 sampling points showed higher hardness values than the prescribed limit by WHO. Alkalinity is due to the presence of bicarbonate, carbonate and hydroxide compounds calcium, sodium and potassium. Alkalinity itself is not harmful to human beings. Alkalinity value in the studied area varied between 196-665 mg/L. 9 sampling point showed alkalinity value within the limit prescribed and 13 sampling area showed higher alkalinity values than the prescribed limit by WHO.[7,8]

According to WHO, nearly 80% of all the diseases in human beings are caused by water<sup>10-11</sup>. The water quality parameters of the various areas of Dausa city Rajasthan indicates that the drinking water samples are not fit on the standard parameters and the quality is poor for drinking purpose. After purification treatment only this water can be used for drinking. The values of correlation coefficients will help in selecting proper treatment to minimize pollution. Drinking water pollution in the studied area should be controlled by the proper environment management plan to maintain proper health conditions of people.

## II. DISCUSSION

India is among the 23 nations around the globe where health problems occur due to excess ingestion of fluoride (>1.5 mg/l) by drinking water. In Rajasthan, 18 out of 32 districts are fluorotic and 11 million of the populations are at risk. An exploratory qualitative survey was conducted to describe perception of the community regarding fluoride and related health problems in Rajasthan. A study on distribution and health hazards by fluoride contaminate in groundwater was performed in 1,030 villages of Dausa district of Rajasthan. One thousand thirty water samples were collected and analyzed for fluoride concentration. Fluoride concentration in these villages varies from 0.2 to 13.0 mg/l. Seven hundred fifty-six (73.4%) villages have fluoride concentration above 1.0 mg/l. Sixty (5.83%) villages have fluoride concentration above 5.0 mg/l with maximum numbers (24, 19.5%) from Dausa. A detailed fluorosis study was carried out in 41 villages out of 60 villages having fluoride above 5.0 mg/l in the study age, sex, and occupation data were also collected. Four thousand, two hundred fifty-two individuals above 5 years age were examined for the evidence of dental fluorosis, while 1998 individuals above 21 years were examined for the evidence of skeletal fluorosis. The overall prevalence of dental and skeletal fluorosis was found to be 3,270/4,252 (76.9%) and 949/1,998 (47.5%), respectively. Maximum of 23.9% (1,016) individuals have mild grade of Dean's classification. Three hundred seventy-four (8.8%) individuals have severe type of dental fluorosis. The Dean's Community Fluorosis Index for the studied area in total is 1.62. Maximum CFI 3.0 was recorded from Dausa. Five hundred sixty-six (28.3%) individuals have Grade I type of skeletal fluorosis while only 0.6% (12) individuals have Grade III skeletal fluorosis. Thus, the prevalence and severity of fluorosis increased with increasing fluoride concentration. It was interesting to note that in some villages, the prevalence and severity of fluorosis were highest in subjects belonging to the economically poor community. Similarly, male laborers showed highest prevalence of fluorosis. Prevalence and severity of fluorosis were observed higher in subjects using tobacco, bettle nuts, and alcoholic drinks. In contrast, subjects using citrus fruits and having good nutritional status showed low prevalence.[9,10]

## III. RESULTS

High Resolution Inductively coupled plasma mass spectroscopy (HR-ICP-MS) technique has been used to study the concentration of heavy metals (Zn, Cd, Pb, Cu, Mn, Fe, Se, Cr and Th) in drinking water samples collected from 10

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different locations of Dausa in Rajasthan, India. The heavy metals have been studied for their health hazards and the concentration is correlated with recommended safe limits as suggested by various protection agencies. Moreover, significant correlation has been observed among the physico-chemical properties of water and heavy metal concentration. The results reveal that drinking water contaminated with heavy metals is prone to radiological and chemical threats for inhabitants.[11,12]

The drinking water has become a serious problem due to the ground water is contaminated by the addition of toxic substance. A number of studies have been conducted in the whole world to determine the concentration of heavy metals in water samples [1-5]. Among heavy metals Zn, As, Cu, Cd and Pb are present throughout the earth crust and are much toxic than other metals. The previous studies reveal that intake of these metals may result chronic damage. From the health point of view the intake of large amount of Zinc can cause anaemia. The intake of Cadmium by food and water can injure the renal, pulmonary, skeletal, testicular and nervous system. Excess of Lead in the human body may lead to cause headache, irritability, abdominal pain and various symptoms related to the nervous system. Large consumption of Arsenic via water may lead to gastrointestinal symptoms, severe disturbances of the cardiovascular and central nervous systems, and eventually death. Large intake of Copper may cause stomach and intestinal distress such as nausea, vomiting, diarrhea and stomach cramps. In our recent investigation, the activity concentration of natural radionuclides in the soil samples of Dausa city of Rajasthan, India was found to be higher than MCL [6]. The concentration of natural radionuclides in soil and water is proportional to heavy metal concentration at particular place. In the target region the main sources of drinking water is mainly tube well. The water obtained from the tube well may be unsafe for drinking purposes and very harmful from the health point of view. Hence measurements of heavy metal concentration in water sample of Dausa in Rajasthan, India have significant importance. These studies will be helpful in determination whether the water of this district can be used for drinking purpose without posing any health hazard to the inhabitants. There is no literature available which is showing that any attempt has been made for the measurement of heavy metal concentration in water of Dausa, Rajasthan, India. In the present study, heavy metal concentration in water from Dausa region of Rajasthan, India has been investigated systematically.[13,14]

## IV.IMPLICATIONS

Water covers over 71% of the earth's surface and is a very critical natural aid for people (countrywide surroundings studies council, 2007) [11]. But, only 2.5% of the earth's water is fresh and therefore suitable for intake. Now not handiest that, however of that 2.5%, more than -thirds is locked away in glaciers and no longer in particular capable of help meet the growing needs of society [3]. It is the fundamental right of every man or woman to get pollutants unfastened water. A water pollutant affects drinking water, rivers, lakes and oceans everywhere in the international, which therefore harms human fitness and the herbal environment. Water pollutants include sewage and waste water, industrial waste, oil pollutants, marine dumping, atmospheric deposition, radioactive waste, underground storage leakages, worldwide warming, eutrophication and so forth. [4]. Water pollutants may not reason immediate impact at the health of the person however can prove deadly ultimately. Heavy metals from commercial procedures can accumulate in nearby lakes and rivers, proving harmful to the marine animals, different animals consuming this toxic water and people using animal merchandise. Pollution in industrial waste can purpose immune suppression, reproductive failure or acute poisoning. Microbial pollutants from sewage regularly result in infectious diseases like cholera and typhoid fever that are the primary purpose of toddler mortality. Water pollutants can be unfavorable to the economic system as it is able to be high-priced to treat and prevent infection. Waste that does not damage down quickly accumulates within the earth's waters and eventually makes its way to the oceans (water pollution guide). Diarrheal diseases represent a major health hassle in developing international locations and also a high hazard to guests who visit those international locations. Conservative estimates region the global loss of life toll from diarrheal sicknesses at about two million deaths in line with 12 months (1.7 to 2.5 million deaths), rating 1/3 amongst all causes of infectious ailment deaths international (global fitness organization, 2012).[15,16]

## V.CONCLUSIONS

The measured concentration of heavy metals in water samples from the Dausa city of Rajasthan are higher than the safe limit recommended by WHO (2011) and US Environmental Protection Agency (USEPA, 2011). The TDS and

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conductance of 40% water samples has been found more than the recommended safe limit as given by WHO and a good positive correlation between the concentration of Se, Cu and Fe with TDS in studied water drinking water samples are found within the MCL limit as approved by WHO. The overall result shows that heavy metal concentration in nine drinking water samples cross the MCL as recommended by various protection agencies and therefore unsafe for drinking purposes which is harmful for health point of view.[17,18]

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