

## HEALTH RISK ASSESSMENT TO CHLORIDE AND COPPER IN DRINKING WATER OF RURAL REGION OF BHUSAWAL, MAHARASHTRA (INDIA)

Sanjay A. Nagdev<sup>1\*</sup>, Ashish B. Budhrani<sup>2</sup>, Mayur R. Bhurat<sup>1</sup>, Dr. Upendra B. Gandagule<sup>3</sup> and Mrinal Sharma<sup>4</sup>

<sup>1</sup>Shri. Prakashchand Jain College of Pharmacy and Research, Palaskhede (Bk.)-Jamner Maharashtra, India.

<sup>2</sup>Department of Pharmaceutics, Datta Meghe College of Pharmacy, Wardha, Maharashtra, India.

<sup>3</sup>Department of Pharmacognosy, K.Y.D.S.C.T's College of Pharmacy, Sakegaon-Bhusawal, Maharashtra, India.

<sup>4</sup>Department of Pharmacology, Dreamz College of Pharmacy, Khilra- Sundernagar, Himachal Pradesh, India.

**\*Corresponding Author: Prof. Sanjay A. Nagdev**

Shri. Prakashchand Jain College of Pharmacy and Research, Palaskhede (Bk.)-Jamner Maharashtra, India.

Article Received on 07/03/2020

Article Revised on 27/03/2020

Article Accepted on 16/04/2020

### ABSTRACT

The Present investigation was designed for the estimation of vital trace element Chloride and Copper in drinking water from the natural origin such as well, bore-well and river (Tapti) of Bhusawal (Maharashtra) (21.0455° N, 75.8011° E). Samples were evaluated as per Bureau of Indian standards 10500 for Chloride and Copper, Concentration of Chloride and Copper in water samples of River, well and Bore-well of Bhusawal region was found within the safe limits of World Health Organization guidelines and also study finding suggest that well is the better and rich source of Copper and Chlorides as compared to Bore-well and River and the human population living in the region and utilizing water from well would be less prone to Copper and Chloride deficiency and risks associated with it as correlated to human population utilizing water from various sources like Bore-well and River.

**KEYWORDS:** Copper, Chloride, estimation, vital trace, water, drinking water.

### INTRODUCTION

Chloride and Copper are the essential trace elements present in water which are needed by human body to regulate the cell functioning and various processes in human body.<sup>[1]</sup> Required amount of chloride and copper intake ranges from 750 to 900 mg/day and 1-5 mg/day respectively in human body. Chloride deficiency symptoms include muscle weakness, loss of appetite, irritability, dehydration, and profound lethargy. Without chloride, the human body would be unable to maintain fluids in blood vessels, conduct nerve transmissions, move muscles, or maintain proper kidney function and copper deficiency includes osteoarthritis and brittle bones, retarded growth, anaemia, ageing and also copper deficiency affects RBC Formation, energy production, Connective tissue and hair growth etc.<sup>[2]</sup> Hence the overall objective of the present study is to quantitatively estimate the amount of essential trace elements chloride and copper in drinking water to ensure safe levels of chloride<sup>[3]</sup> and copper<sup>[4]</sup> in drinking water to fulfill the daily requirement of body as per Bureau of Indian Standards specification from different Natural sources such as river, well and bore well.<sup>[5]</sup>

#### Collection of water samples

Different sources such as river, well and bore well of Bhusawal (21.0455° N, 75.8011° E) region was selected

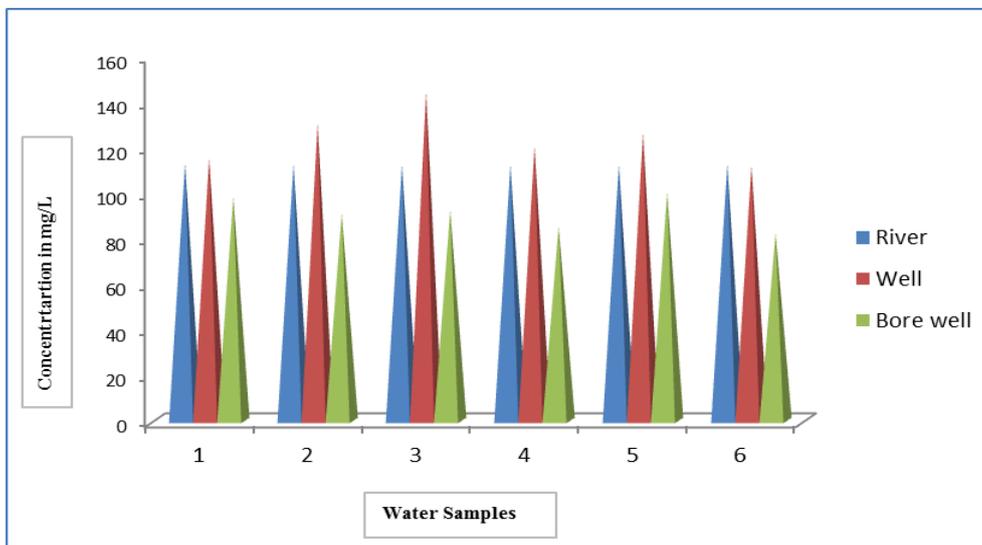
for study. Water samples were collected with utmost care to ensure that no contamination occurs at the time of collection or prior to examination. Closure was removed with care to avoid contamination and held near base filled with water without rinsing and closed immediately. Plastic bottles of one liter capacity were used for trace element determination, washed with nitric acid (3%) rinsed three times with distilled water, dried and filled with water leaving no air space and tightly closed with plastic closures to prevent any leakage. Each container was clearly marked with name and date of sampling.<sup>[1]</sup>

**Sampling from well and bore-well:** To the discharge tap of mechanical pump fitted to nicely or bore-well, the rectified spirit was applied and allowed to dry earlier than series of the sample, Water was pumped to waste for four to five minutes and then flow was restricted to permit filling the bottle without splashing.<sup>[6]</sup>

**Sampling from river:** Areas of relative stagnation in a stream were avoided. For collection of sample of water from river, bottles was hold in hand close to base and plunging its neck downward below the surface and turned until the neck points slightly upward, the mouth being directed resist to the flow.<sup>[7]</sup>

**Table No. 1: Concentration of Chloride in water samples of well, bore-well and river (Tapti) of Bhusawal region.**

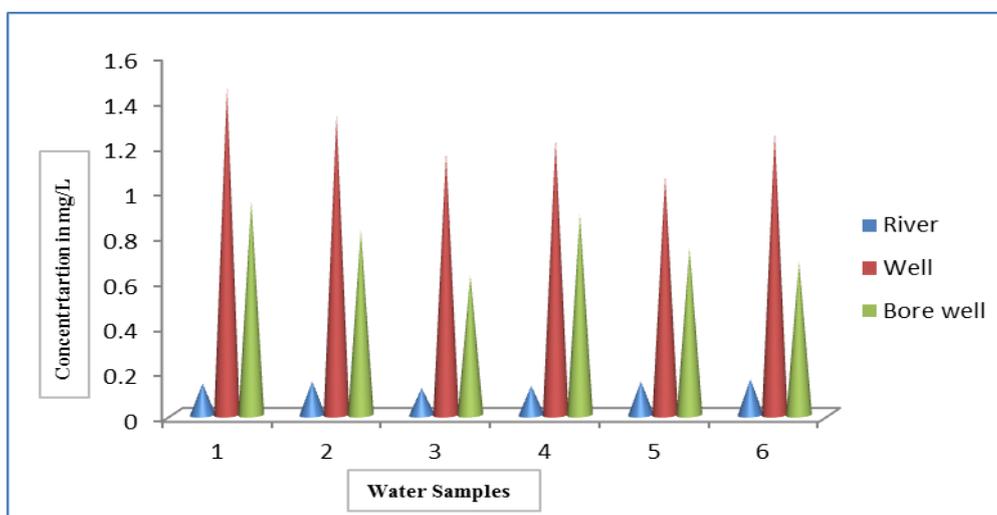
Concentration of Chloride in mg/L				
Sample No.	River (Tapti)	Well	Bore well	WHO Safe limit
1	112.88	115.25	98.22	250 - 1000 mg/L
2	112.45	130.40	90.83	
3	112.12	144.29	92.23	
4	112.10	120.26	85.22	
5	112.22	126.20	100.13	
6	112.56	111.78	82.22	



**Figure 1: Concentration of Chloride in Water samples of River (Tapti), well and Bore-well of Bhusawal region.**

**Table No. 2: Concentration of Copper in water samples of well, bore-well and river (Tapti) of Bhusawal region.**

Concentration of Copper in mg/L				
Sample No.	River (Tapti)	Well	Bore well	WHO Safe limit
1	0.14	1.45	0.95	0.05 - 1.5 mg/L
2	0.15	1.33	0.82	
3	0.12	1.16	0.62	
4	0.13	1.22	0.89	
5	0.15	1.06	0.74	
6	0.16	1.25	0.68	



**Figure 2: Concentration of Copper in Water samples of River (Tapti), well and Bore-well of Bhusawal region.**

### Evaluation of water samples

Evaluation of water samples was carried out as per Bureau of Indian Standard 10500 for safe water quality parameter of Chloride and Copper.<sup>[8]</sup>

### RESULTS

Concentration of Chloride and copper in all water samples were found within the safe limits of World Health Organization guidelines and Concentration of Chloride and copper was found high in water samples of well of Bhusawal (21.0455° N, 75.8011° E) region.

### DISCUSSION

Quantitative estimation of Chloride and Copper in drinking water samples from Natural sources of Bhusawal (21.0455° N, 75.8011° E) region showed that concentration of Chloride and copper was found within acceptable safe limits as per WHO guidelines and Concentration of Chloride and Copper was found high in water samples of Well as compared to Bore well and River (Tapti), therefore from the study it can be suggested that Population residing in Bhusawal region consuming water from Well are getting more Chloride and copper as compared to Population Consuming water from Bore Well and river (Tapti) and Population Consuming water from Well will be less prone to Chloride and Copper deficiency and other diseases associated with Chloride and Copper deficiencies.

### CONCLUSION

Quantitative estimation of Chloride and copper in water samples from Natural sources of Bhusawal (21.0455° N, 75.8011° E) region showed that concentration of Chloride and Copper is within acceptable safe limits as per WHO guidelines and Population residing in Bhusawal region consuming water from Well will be less prone to Chloride and copper deficiency and risks associated with it.

### ACKNOWLEDGEMENT

The authors wish to thank Shri. Prakashchand Jain College of Pharmacy and Research, Palaskhede (Bk.)-Jamner for providing facilities to conduct this research work.

### REFERENCES

1. Sanjay A. Nagdev, Ravi P. Kalsait, Milind J. Umekar (2016); Quantitative estimation: An approach for quantification of essential trace elements in drinking water from natural sources; Archives of Applied Science Research, 8(9): 12-18.
2. P Lingamaneni., R Chitturi, V Reddy (2015); A review on role of essential trace elements in health and disease" Journal of Dr. NTR University of Health Sciences, 4(2): 75-85.
3. Chloride in Drinking water (1993); Background document for development of WHO Guidelines for Drinking water Quality.
4. Copper in Drinking-water (1993); Background document for development of WHO Guidelines for Drinking-water Quality.
5. Bureau of Indian Standard Drinking Water specification (2012); Indian Standards, 10500: 2012.
6. Nagdev SA, Bhurat MR, Gupta KR (2018); Health risk assessment to Zinc in Drinking Water of rural residents living in Bhusawal city, Maharashtra (India); PharmaTutor, 6(5): 48-50.
7. Nagdev SA, Bhurat MR, Gandagule UB, Gupta KR (2018); Health risk assessment to Calcium in drinking water of rural residents living in Bhusawal city, Maharashtra (India); Pharma Tutor, 6(10): 41-43.
8. Guidelines for Drinking Water Quality (1993); World Health Organization; Second Edition-Volume-1, Geneva.