Nat. Volatiles & Essent. Oils, 2021;8(1): 228-232

NVEO
Natural Volatiles & Essential Oils

Comparative Analysis of Water Quality Indices in CEC Bilaspur Area

Shubhlakshmi Tiwari[1], Sharda Pratap Shrivas[2]

[1]Department of Civil Engineering, Chouksey Engineering College Bilaspur, Chhattisgarh, India
[2]Department of Mechanical Engineering, Chouksey Engineering College Bilaspur, Chhattisgarh, India

Abstract

This summary summarises the results of a complete water quality survey undertaken on the Chouksey Engineering College site. The examination attempted to examine different characteristics, including temperature. Iron levels were within the range and is suitable for drinking. Nitrate concentrations were within the limits, ensuring safety for drinking water purposes. Fluoride levels were optimal for dental health benefits. The average Temperature, Total Suspended Solids (TSS), Hardness, pH, Turbidity, Chloride, Iron, Nitrate, and Fluoride are found to be 26.75°C, 1.612 mg/l, 286.66 mg/l, 7.03, 1.59 NTU, 137.44 mg/l, 0.23 mg/l, 4.553 mg/l, 0.14 mg/l. Overall, this assessment provides valuable insights into the campus water quality, highlighting areas of strength and areas requiring attention. Findings will guide targeted interventions to maintain or enhance the quality of campus water resources, promoting environmental sustainability and public health within the college community.

Keywords : Water quality, pH, Total Hardness, TSS, Temperature, Iron, Nitrate, Fluoride.

1. Introduction

This work was based on testing of quality of water indices and 12 different samples were collected from Chouksey Engineering College campus situated at Lalkhadan, Bilaspur (C.G) from 12 different tubewells and taps and observed values were compared with standard values recommended by World Health Organization (**WHO**). After many years of research, water quality standards are established to guarantee that water is used efficiently for a certain purpose. Water quality analysis involves measuring needed water parameters using conventional procedures to ensure they meet standards. This assessment will help us to evaluate the water quality of CEC college campus and will let us know the water parameters present in it so it can use it for various purposes like sanitation, drinking, gardening, etc. Ultimately, the findings of this water quality assessment will inform decision-making processes related to campus infrastructure, landscaping practices, and pollution prevention measures. By prioritizing the health of our campus environment, we demonstrate our commitment to sustainability and create a safer, healthier, and more vibrant campus community for all.

2. Literature review

According, to the investigation done on Evaluation of Physico-Chemical Quality of Drinking Water in Bilaspur District of Chhattisgarh State by T.P Chandra (2014), the Physico-chemical properties of drinking water used by the public of Bilaspur district and findings reveal the fact that the drinking water of this area, especially in urban area and few patches of semi urban area of this district is not suitable for public health. So far the source of drinking water is concerned mostly tap water and hand pump water at some extant is not suitable for human society [1]. Across the city of Bilaspur, India six strategic sampling stations were collected over a period of six months-starting from March to August 2013 to evaluate the qualitative status of the groundwater of the city. Seven key diagnostic parameters were selected as indicators of the

groundwater quality and these are pH, conductivity, TDS, chlorides, sulphates, nitrates and fluorides. The analysis of the results indicates that the groundwater quality is pathetic and far from the standards lay down by various international agencies [2]. Water quality is dependent on the type of the pollutant added and the nature of self-purification of water [3]. The main objective of WQI is to turn complex water quality data into information that is understandable and usable by the public. WQI based on some important parameters can provide a simple indicator of water quality. It gives the public, a general idea of the possible problems with water in a particular region [4].

Water is an essential nutrient that is involved in every function of the human body and two-thirds of the human body is made of water. It helps to transport nutrients and waste products in and out of the cells. Water dissolves the carbon, oxygen and salts present in the body and distributes to the different parts through the process of blood circulation. It is also needed for the maintenance of proper body temperature [1-5]. Water is indispensable and one of the precious natural resources of this planet. Since, it is not only essential for the survival of human beings but also for the animals, plants and all other living beings. Therefore, drinking water should not be containing unwanted impurities, harmful chemical compounds or harmful bacteria and it should be always remain pure [5]. Water is essential to sustain life, and a satisfactory supply must be made available to consumers. Failure to provide effective treatment of water sources and safe distribution of treated drinking water can expose the community to the risk of outbreaks of diseases or other adverse health effects [6]. For drinking water to be wholesome it should not present a risk of infection or contain unacceptable concentration of chemical hazardous to health and should be aesthetically acceptable to consumer [7].

3. Objective of work

❖ It was found that water plays an important role in the life of students, and especially during physical activity. Therefore, water quality assessment in a college campus is much needed to ensure good health of students.
❖ Limited research addresses the impact of various campus activities (e.g., laboratory experiments, landscaping practices, food services, recreational events) on water quality. Understanding how these activities collectively influence water quality indices is crucial for developing targeted mitigation strategies.
❖ Collaborate with students, faculty, administration to raise awareness about water quality issues and to increase participation in water conservation and pollution prevention efforts.
❖ This evaluation aims to enhance the management of water quality within our college campus, providing a comprehensive understanding of the various parameters present in our water sources. By conducting this assessment, we seek to ascertain the suitability of our water for a multitude of purposes, ranging from sanitation and laboratory applications to construction, drinking, and gardening.

4. Methodology

- 10 ml of water sample is measured using the measuring cylinder.
- Water sample is transferred into a beaker.
- Weight of the filter paper is recorded.
- Filter paper is adjusted in the funnel.
- Water is transferred to the conical flask through the filter paper.
- Filter paper is kept in the oven in order to get it dried.
- Once the filter paper gets dried, it is taken out.
- The weight of filter paper is then recorded.
- The initial weight of the filter paper is then subtracted from the final weight.
- The result which we get is the amount of suspended solids in 10 ml of water.
- It is divided by 10 in order to get the amount of TSS per ml of water.

The assessment of total hardness in the water samples indicated varying levels across the sampled locations, with concentrations ranging from 200 mg/L to 395 mg/L of calcium carbonate equivalents ($CaCO_3$). These findings reflect the mineral content in the water, primarily attributed to dissolved calcium

and magnesium ions. The observed hardness levels fall within the permissible range for drinking water, as per IS:10500.2012. However, higher levels of hardness, especially towards the upper end of the observed range, may lead to scaling issues in plumbing systems, reduced soap efficiency, and potential aesthetic concerns **such** as soap scum in bathing water.

Table1: Total Hardness

Sr. No.	SAMPLING LOCATION	RESULT	ACCEPTABLE LIMIT	PERMISSIBLE LIMIT
1	Industry Drinking Water (Bore)	200	200	600
2	BHMS Building (Bore)	290	200	600
3	Main Building (Tap)	395	200	600
4	EMEC Building (Bore)	305	200	600
5	EMEC Building (Tap)	315	200	600
6	Girls Hostel (Bore)	315	200	600
7	Boys Hostel (Bore)	295	200	600
8	Pharmacy Building (Tap)	300	200	600
9	Pharmacy Building (Bore)	335	200	600
10	College Mandir (Bore)	315	200	600
11	Arpa River Water	150	200	600
12	Lalkhadan Drinking Water (Bore)	225	200	600

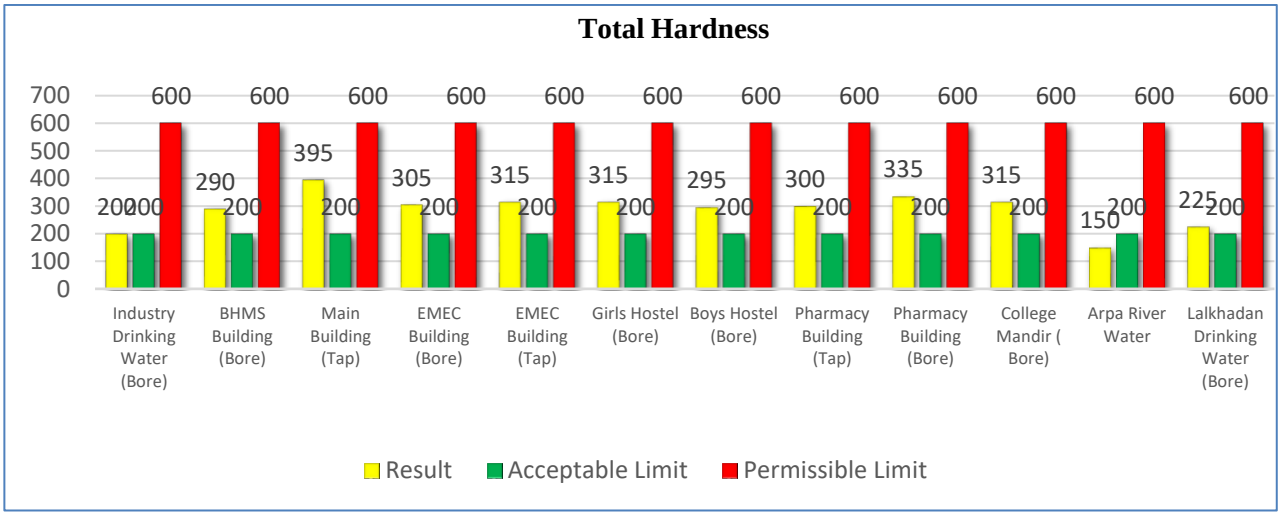

Fig 1 Hardness Result

5. NITRATE

The analysis of nitrate in the water samples revealed varying concentrations ranging from 1.91 mg/L to 12.98 mg/L across different sampling sites. These findings suggest potential sources of nitrate contamination, possibly from agricultural runoff or septic system leaching. While the measured concentrations generally comply as per IS:10500.2012. Nitrate contamination can lead to methemoglobinemia (or "blue baby syndrome") in infants if levels exceed regulatory limits. Therefore, further investigation into the specific sources of nitrate pollution and implementation of targeted mitigation strategies are recommended to safeguard water quality and public health in the affected areas.

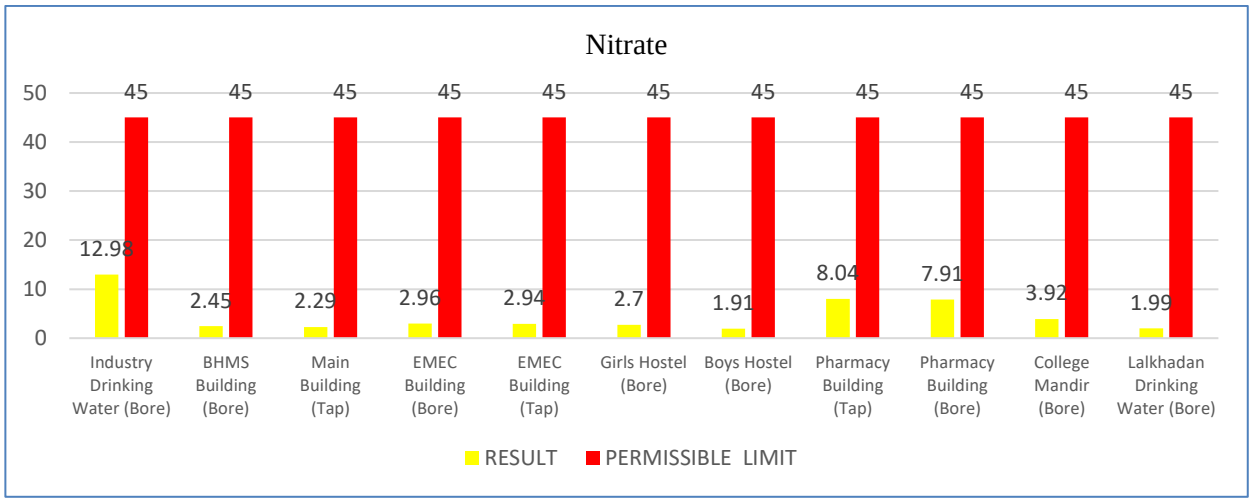

Fig 2 Nitrate result

The assessment of iron content in the water samples revealed varying concentrations across the sampling sites. The average iron levels ranged from 0.21 mg/L to 0.25 mg/L, with higher concentrations observed in certain locations. These findings are significant as they indicate the presence of dissolved iron in the water supply, potentially affecting water quality and consumer perception. While the measured concentrations are within the limits according to IS:10500.2012, elevated iron levels could still lead to aesthetic issues such as metallic taste, staining of plumbing fixtures, and discoloration of water.

Table 1: Iron Content

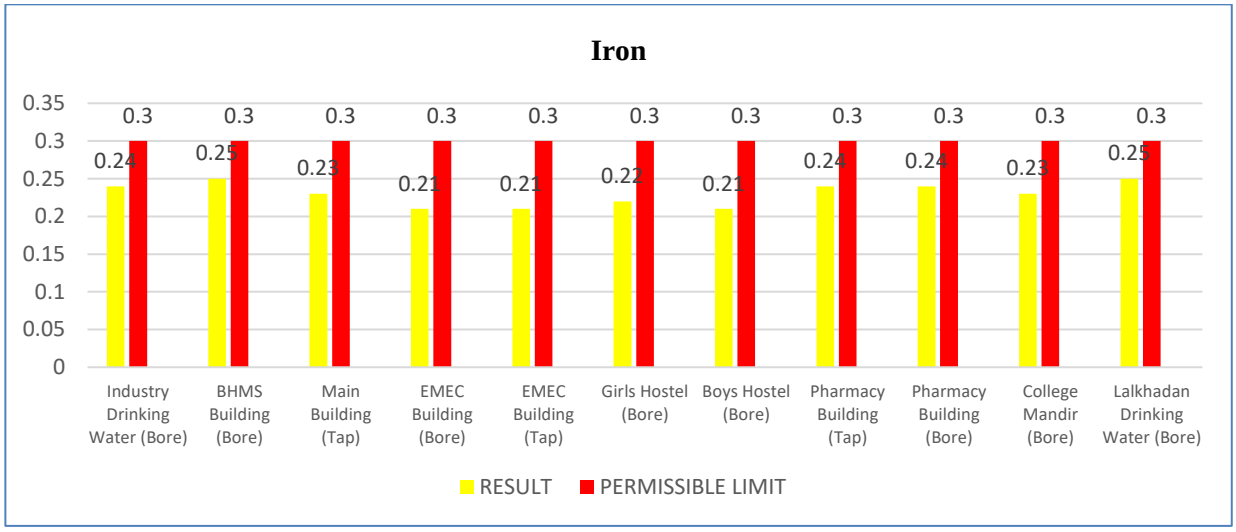

Fig 3 Iron content test result

The assessment of fluoride content in the water samples revealed consistent concentrations within the range of 0.122 mg/L to 0.174 mg/L across all sampling sites. These findings indicate that fluoride levels are within the optimal range recommended for dental health benefits, as per guidelines set by the World Health Organization (WHO) and IS:10500.2012. The observed concentrations are sufficient to promote dental cavity prevention without posing risks of dental fluorosis. This suggests that the water supply is effectively fluoridated to support public health initiatives.

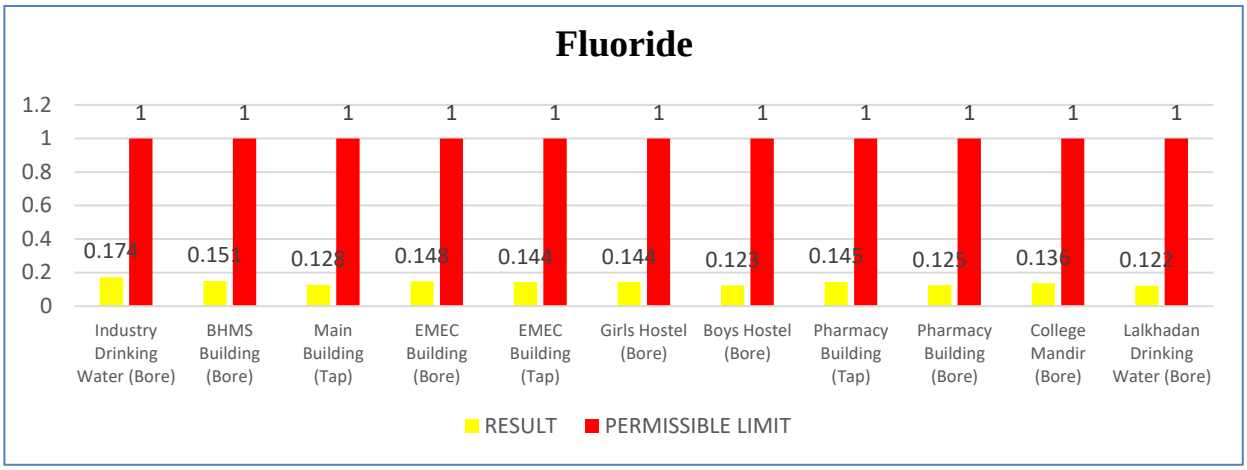

Fig 4 Fluoride test result

- Chloride content ranged from **59.98** mg/L to **184.91** mg/L, with concentrations generally within acceptable limits for drinking water quality. Sources of chloride, such as road salt or industrial activities, should be monitored to prevent excessive accumulation.
- Total hardness levels ranged from **150** mg/L to **395** mg/L of calcium carbonate equivalents (CaCO3), potentially leading to scaling and reduced soap efficiency at higher concentrations.
- Iron content ranged from **0.21** mg/L to **0.25** mg/L, indicating minimal presence within acceptable limits for drinking water.
- Fluoride concentrations were between **0.122** mg/L and **0.174** mg/L, aligning with optimal levels for dental health benefits.
- Nitrate levels varied from **1.91** mg/L to **12.98** mg/L,

Conclusion

In conclusion, the assessment of water quality on our college campus has provided valuable insights into the health and sustainability of our local environment. When comparing the results of our college campus samples with lalkhadan, industry and arpa river water we found that our college campus water samples are within the permissible limits as per IS:10500. 2012 and is safe for drinking and other purposes. Ongoing collaboration between students, faculty, and administration will be essential in maintaining the integrity of our water systems and fostering a more sustainable campus environment for generations to come.

1. D.K. Shrivastava , Seema yadav ,T.P. Chandra, Evaluation of Physico-Chemical Quality of Drinking water in Bilaspur District of Chhattisgarh state, 2014
2. Pandey Ambuj, Groundwater quality study of Bilaspur, Chattisgarh, India, Journal of Environmental Research and Development 8 (3A), 582, 2014.
3. S. P. Gorde, M. V. Jadhav, Assessment of Water Quality Parameters: A Review, International Journal of Engineering Research and Applications ISSN : 2248-9622, Vol. 3, Issue 6, Nov-Dec 2013.
4. Y. S. Vatkar, S.V. Kore, V.S. Kore and G.S.Kulkarni, Evaluation of Water Quality Indices for the Drinking water of Engineering Colleges in Kolhapur city, International Journal of Scientific & Engineering Research Volume 4, Issue3, March-2013.
5. HP Shivaraju, Assessment of physico-chemical and bacteriological parameters of drinking water in Mysore city, India, International Journal of Research in Chemistry and Environment 2 (1), 44-53, 2012.
6. Elisabeta CHIRILĂ, Turchean BARI, Lucica BARBES, Drinking water quality assessment in Constanta town, Ovidius Univ. Annals Chem 21 (1), 87-90, 2010.
7. P Payment, M Waite, A Dufour, Introducing parameters for the assessment of drinking water quality, Assessing microbial safety of drinking water 4, 47-77, 2003.