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CALCIUM LEVELS IN DRINKING WATER FROM COMMUNITY DRINKING PLANTS IN ANEKAL TALUK

Supriya S., Nebula Murukesh*, Keerthana M., Sankalpa

St. Francis de Sales College, Bengaluru- 100

School of Science, Department of physical Science and Mathematics, St. Francis De Sales College, Bengaluru

**nebulamurukesh@gmail.com*

ABSTRACT: In the recent years, there are so many challenges like, increasing the demand of customers, ever growing competition, ageing infrastructure and so on. Asset Management is a critical process which includes so many complexities like finance, transportation, effective decision making and alike. There is significant role of graph neural networks in the field, life cycle of Asset Management. In this paper, we initiate to give a comprehensive review of the application of graph neural network in the life cycle delivery of Asset Management. The groundwater is a widely exploited resource in the Bengaluru region. The groundwater of these regions is hard and cannot be consumed directly. Most of the villages depend on RO-based community water plants for drinking water. The calcium levels in drinking water is important for the well-being of organisms. Water from different sources varies in calcium content. Consumption of water containing excess or low levels of calcium is deleterious to health. Calcium carries messages to virtually all important functions of cells. The current study is an attempt to understand the difference in calcium levels in groundwater and RO water, including community drinking water plants in villages in Anekal Taluk. The water samples were collected from villages in Anekal taluk and analyzed for calcium content titrimetrically. The pH and TDS of the samples were also estimated.

KEYWORDS: *Calcium, Drinking water, RO, Ground water*

INTRODUCTION

Water is one of the basic needs of human beings. The quality of drinking water is very important for a healthy society. The composition of water varies widely in local geological conditions. The potential for adverse health effects from long term consumption of demineralized water[1,9] is of interest not only in countries lacking of adequate fresh water, but also in countries where some home water treatment systems are widely used. Calcium plays a vital role as a bone mineral and as a messenger in signal transduction[2]. Böhmer et al[2]. stated that calcium-rich mineral waters seem to offer an interesting, effective alternative to calcium supplementation from milk and dairy products because of their comparable or possibly even better bioavailability of calcium. The knowledge on actual calcium concentration in drinking water is critical to evaluate the health status of a society.

Groundwater is the water present beneath Earth's surface in rock and soil pore spaces and in the fractures of rock formations. About 30 percent of all readily available freshwater in the world is groundwater. Groundwater resource in Anekal Taluk is widely exploited for irrigation and other domestic purposes in addition to drinking purpose. The taluk resident mainly depends on RO filtered groundwater for their drinking The taluk resident mainly depends on RO filtered groundwater for their drinking water. The present study is an attempt to understand the amount of calcium present in RO filtered water including community RO plants and groundwater collected from various locations

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and households thereby evaluating the purification capacity of the plants as well as identify the water suitable for consumption.

The main objectives of this paper are:

- To study the Calcium levels in RO drinking water and tap water.
- Compare of the Ca levels in various types of RO and tap water.
- Identify the water ideal for consumption

MATERIALS AND METHODS

Study Area

Bangalore Urban district, is the most populous district in the Indian state of Karnataka. Bangalore Urban has five taluks: Hebbal (Bangalore North), Kengeri (Bangalore South), Krishnarajapura (Bangalore East), Yelahanka (Bangalore North Additional) and Anekal. Groundwater resource in Anekal Taluk (Figure 1) is widely exploited water resource.

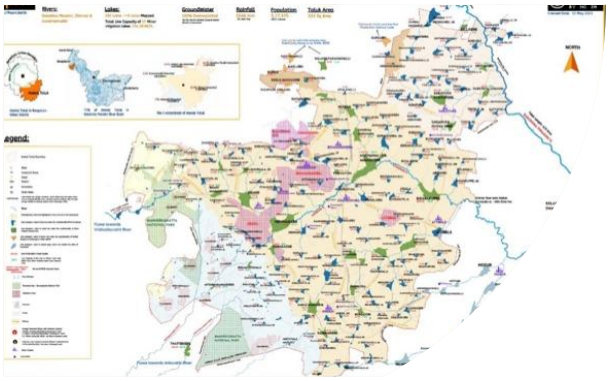

Fig 1. The Study Area

The locations from where water samples were collected are given in Table 1.

The RO and tap water samples were collected from 13 locations in Anekal Taluk. Ten RO water samples were collected from households RO units from 8 locations in which 3 samples were collected from a same layout where same water is supplied to all the homes and five RO water samples were collected from community RO plants.

Sample Collection

The details of sample collection is given in Table 1. Water samples were collected in clean plastic water bottles plastic bottles. The tap water samples were also collected from all the 13 locations from where RO water samples were collected. The sampling and analysis of various physico-chemical attributes were done following the standard procedures as detailed in APHA 2012[3].

Estimation of Calcium, pH & TDS: Estimation of Calcium in the water samples is carried out through complexometric titration using EDTA[3]. pH is measured using SHAPURE DIGITAL pH meter and TDS of the water samples is measured using SHAPURE DIGITAL TDS meter.

RESULTS AND DISCUSSIONS

pH

The pH of water sample of all the station showed (Table 2), the pH values found ranged from 5.9 to 6.8 in RO water samples whereas the values ranged from 6.8 to 7.4 in the ground water samples.

The pH values of groundwater samples from all the stations showed values within the pH range of 6.5 to 8.5 as specified by BIS for drinking water. The pH of RO water samples were found to be less than 6.8 except at H1 and C3 which under the normal pH for RO water is 5 to 7. So in the study it is found that RO waters could not satisfy the BIS standard[8]for pH whereas the tap water pH is satisfying the standard drinking water pH.

Total Dissolved Salts

The total dissolved salts varied from 124 to 893 mg/ml in the tap water samples whereas in the RO water samples it varied from 10 to 104 mg/ml (Table 3). The values of TDS in topwater samples exceeds the permissible limits of TDS (500 mg/ml) set by BIS whereas all the RO waters the TDS values are within the permissible limits. Drinking water is normally expected to be without visible solids. These solids could be both organic

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and inorganic. The disadvantage of increased TDS is that they are aesthetically unacceptable and they harbour microorganisms, of which some are pathogenic[4]. The RO water samples are showing low values which is less than 50mg/ml. As of now there is no scientific evidence that low TDS water is deleterious to health. The best tasting drinking water for most consumers contains about 10.00-100.00 mg/L total hardness as CaCO3 and a TDS of about 150.00-250.00 mg/L[5].

Calcium Content

The variation in the amount of calcium present in the water samples are as given in figure 2. The values for calcium in RO waters ranged from 14.08 to 210 mg/l in RO water samples and it varied from 118.24 to 308.62 mg/l in tap water samples. The permissible limits of calcium in drinking water samples. The variation in the amount of calcium present in the water samples are as given in figure 2. The values for calcium in RO waters ranged from 14.08 to 210 mg/l in RO water samples and it varied from 118.24 to 308.62 mg/l in tap water samples.

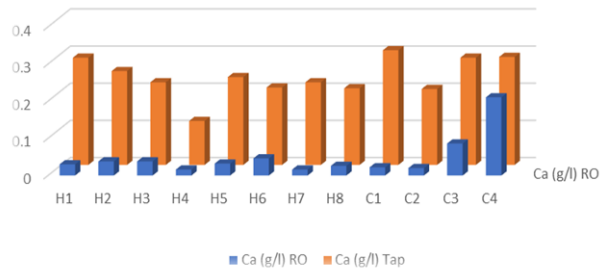

Figure 2: Calcium in the water samples

The permissible limits of calcium in drinking water samples is 75mg/l. The high TDS and the high calcium levels in the tap water can be the reason for high calcium content in the RO water. A high calcium level and TDS value indicates the high values of hardness of the water in the area of study. There was no variation between the RO water samples collected from home and community RO plants.

Calcium carries messages to virtually all important functions of cells. Dietary reference values for individuals over 19 years of age vary from 1000 mg to 1300 mg[6].

The rapid growth of RO is attributed to a number of techno-economic factors, including low energy requirements, low operating temperature, modular design and low water production costs.

Water type is the cornerstone in reverse osmosis system designing. In the RO industry all natural waters are usually grouped under two types: brackish (1000–15000 mg/l) and seawater (>15,000 mg/l) as based on their total salinity. Only two RO membrane types are commercially available (i.e., BWRO and SWRO), which are currently used for all waters regardless of the wide variation in their chemical nature, even those of similar salinity[7].

CONCLUSION

RO units suitable for the water type and that can maintain the quality parameters within the range of healthy drinking water needs to be designed for future use.

REFERENCES:

1. Rylander, R., & Arnaud, M. J. (2004). Mineral water intake reduces blood pressure among subjects with low urinary magnesium and calcium levels. BMC public health, 4, 1-5.
2. Böhmer, H., Müller, H., & Resch, K. L. (2000). Calcium supplementation with calcium-rich mineral waters: a systematic review and meta-analysis of its bioavailability. Osteoporosis international, 11, 938-943.

3. Rice, E. W., Bridgewater, L., & American Public Health Association (Eds.). (2012). Standard methods for the examination of water and wastewater (Vol. 10). Washington, DC: American public health association.
4. Sasikaran, S., Sritharan, K., Balakumar, S., & Arasaratnam, V. (2012). Physical, chemical and microbial analysis of bottled drinking water.
5. Islam, M. R., Sarkar, M. K. I., Afrin, T., Rahman, S. S., Talukder, R. I., Howlader, B. K., & Khaleque, M. A. (2016). A study on total dissolved solids and hardness level of drinking mineral water in Bangladesh. Am J Appl Chem, 4(5), 164-169.
6. Dawson-Hughes, B. (1998). Vitamin D and calcium: recommended intake for bone health. Osteoporosis international, 8, S30.
7. El-Manharawy, S., & Hafez, A. (2001). Water type and guidelines for RO system design. Desalination, 139(1-3), 97-113.
8. IS 10500 (2012): Drinking water (cpcb.nic.in)
9. Kozisek, F. (2005). Health risks from drinking demineralised water. Nutrients in drinking water, 1(1), 148-163.

Sl. No.	Type of RO	Sample Details	Sample Labels assigned
1	Livpure, Domestic RO	Hosa Road	H1
2	Domestic RO	Anand Nagar	H2
3	Puro aqua RO alk , Domestic RO	Kammasandra	H3
4	Aqua natural RO, Domestic RO	Hosur	H4
5	Aqua natural RO, Domestic RO	Hosur	H5
6	Grand aqua, Domestic RO	Electronic City	H6
7	Aqua grande, Domestic RO	Attibele	H7
8	Pureit RO UV, Domestic RO	Doddahagade	H8
9	Purit Marvell Domestic RO	Doddahagade	H9
10	Aqua D Pure, Domestic RO	Doddahagade	H10
11	Community RO	Mayasandra	C1
12	Community RO	Kodlipura	C2
13	Community RO	Bommanahalli	C3
14	Community RO	Hebbagodi	C4
15	Community RO	Naganaikanahalli	C5

Table 1: Details of Sampling Locations and Type of water collected

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Sample Details	pH	
	RO	**TAP**
H1	6.8	7.4
H2	6.4	7.2
H3	6.2	7.2
H4	6.6	7
H5	6.4	7.2
H6	5.9	6.8
H7	6.2	7
H8	6.5	7.3
C1	5.9	6.8
C2	5.9	7
C3	6.8	7
C4	6.7	6.9

Table 2. Variation in pH in the water samples

Sample Details	TDS	
	RO	**TAP**
H1	10	124
H2	24	359
H3	15	601
H4	21	659
H5	20	666
H6	44	893
H7	34	645
H8	43	656
C1	94	815
C2	38	634
C3	104	415
C4	59	546

Table 3. Variation of TDS in the water samples