



Title-Analysis of Drinking Water of Pilgrimage City Nashik and Near Holy Places -A Review

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Abstract

The consumption of water samples obtained from different ecological locations had concentrations of the selected minerals lower or upper than the standard confines, except for manganese, fluoride and some hazardous materials. The concentrations of manganese and arsenic in two mineral water samples were slightly higher and lower than the standard international optional limits. Most of the selected minerals found in the tap water samples were below the international standard limits, except for iron and manganese. The concentrations of iron and manganese in the tap water samples were higher than the standard limits, which were obtained from one and three of the studied locations, respectively. The data obtained may also provide important information related to daily intake of these minerals from drinking water.

The Bureau of Indian Standards (BIS) has particular drinking water quality standards in India to offer safe drinking water to the people. It is needed that drinking water sources should be tested regularly to know whether water is summit the agreed standards for drinking or not and, if not, then, the level of contamination/ unacceptability and the follow-up required.

Quality with a view to ensure provision of safe drinking water to the consumers.

Keyword- Metals and non metallic determination, Atomic absorption spectroscopy, Drinking water.

Introduction

Water, a renewable store, is not plentifully available in Maharashtra (India). A total of 500 mm of average annual rainfall produces the clean water supply of this state. An approximate amount of 125 mm (mm) of rainwater runs off as surface flow and in the river systems each year. The total requirement for water usage is vague to become 20 mm by the year 2020, which equates to 12% of the total water available. Approximately 99% of the water supply in Maharashtra (India) comes from rain and streams in the country. However, groundwater at this time contributes 1% of the water necessary.

Usually, individuals living in urbanized countries have proper water supply at home. The quality of water homeward bound is clean and safe for consumption and can be consumed directly from the tap without pretension any health threat [4]. The quality of drinking water in the United States, Europe, and Canada is proper according to the criteria set moreover by their governments or the World Health Organization (WHO) [5]. On the other hand, the United Nations has reported that 1.2 billion people are not able to access safe drinking water [1].

Nowadays, even with provisions of clean water to every dwelling in huge cities, most people in developing countries have a preference to get through bottled drinking water, either locally bottled or imported. This preference for bottled water is due to the condition of tap water supplied to homes with an intolerable flavour and an nasty manifestation in certain areas, which could be due

to the taste of chlorinated tap water [6] or the contamination of tap water from leaking pipes and other forms of deterioration [7, 8]. In India, the volume of municipal water used by consumers for drinking is high [9]. However, most municipal people chosen bottled water as a substitute to tap water [10]. Today, bottled drinking water has undergone a decontamination course, packed, and sold to the centre of population [11].

Quality control of the water supply is monitored by a municipal corporation in the country. The Department of Environment is the agency that monitors the river basins in India to determine water quality in relation to major pollution sources [3], whereas state water authorities are responsible for the monitoring of unprocessed water quality in the reservoirs at the intake point of the treatment plants [1]. Quality and safety of bottled drinking water (DW) are monitored by the Ministry of Health, India, that is the source for the bottled DW [1]. However, geographical locations may affect the quality of portable water, which its mineral contents are very dependent on the mineral compositions of the soil and pollutants such as heavy metal.

In order to minimize mineral toxicity and maintain the transparency of water utilization, the TW, DW that is proposed for human consumption should observe with the mandated standard limits. The places of the water obtained may influence the mineral compositions of the water. No previous study has been performed to evaluate the mineral contents in both TW and bottled DW from different locations in India, especially the micro mineral

and heavy metal contents. Therefore, in this study, we expected to determine the selected minerals in DW obtained from various locations in Nashik District (India) and compared with other studies from various locations. The selected minerals in different brands of bottled DW and MW obtained and collected from various locations were determined to investigate the quality of Indian DW.

Nashik- has a individuality of its own due to its mythological, historical, social and cultural importance. The river Godavari flows through the city. Temples and ghats on the banks of Godavari have made Nashik one of the holiest places for Hindus all over the World. In a true way the city can be called as city of Temples. The segment gives the description of the temples in & around the city. It also covers the Holy measures taking place in the city.

Shirdi,-- A small village in Kopargam Taluk, in Ahmednagar, Maharashtra is regarded to be an important pilgrimage place in India as prudent Sai Baba lived here till his death. It is about 285 km, which is 6 hours drive from Mumbai.

Trimbakeshwar

This place is famous for the Trimbakeshwar Temple and as the foundation of the Godavari River. Trimbakeshwar is about 38 km away from Nashik. Trimbakeshwar enshrines one of the 12 jyotirlingas dedicated to Shiva and this one is considered to be one of the main jyotirlinga

Dudhsagar

Dudhsagar waterfall, situated at Someshwar is a much-loved destination for youngsters where they come often to liven up their spirits. This is one of the best picturesque spots in Nashik. The waterfalls are 10m long and the water is milky white, so it is called Dudhsagarwaterfall.

SaptashringiDeviTemple

The temple is at Wani, which is 55 km from Nashik. This temple is at Saptashringi Hill. The presiding goddess Saptashringi Devi has 18 weapons in 18 hands and is positioned ready to clash the demons. Maharashtra Engineering Research Institute (MERI) or at Sitakund at Mhasrul village is on the way. Sita the wife of Rama used to bathe at this is the site.

Nandurmadhmeshwar

Nandurmadhmeshwar is at a distance of 60 km from Nashik. There is a bird sanctuary here. This place is known as bird-lover's paradise. This place is also known as the Maharashtra's Bharatpur. This bird sanctuary has been developed here since 1950. Nandurmadhmeshwar is home to thousands of wandering birds. October to March is the ideal season to bird watch.

2. Materials and Methods

2.1. Sample Preparation

A total of 10 bottled DW samples from 10 locations were randomly collected from the shelf of selected local supermarkets and hypermarkets in different areas from Nashik District, India. Stratified sampling was applied for the sample selection. The bottled water samples comprised of 10 samples of DW. All drinking water samples were collected and sealed in 500 mL plastic bottles. All bottles were kept sealed and chilled at 4°C until the time of analysis.

Demineralised one liter plastic containers were used for collection of DW samples. The bottles were preserved in a 1:1 nitric acid solution for 2 days and rinsed with demineralised water. The DW samples were randomly collected from different locations in the selected 10 popular areas of Nashik district India. Three replicates of DW samples from each location were randomly collected from two different places in each of the identified areas of Nashik in India. The DW samples were collected from shops, schools, petrol stations, and housing areas. The replicate samples of one liter each were obtained from the tap after the water was left running for at least 5 min before sample collection.

2.2. Sample Analysis

The DW, samples (100mL) were analyzed for the minerals using a nov AA 400 flame atomic absorption spectrophotometer (AAS) system (AnalytikJena, Jena, Germany) and a GBC 908AA graphite furnace AAS system (GBC, Victoria, Australia), whereas manganese (Mn) in the samples was analyzed using a spectrophotometry system equipped with an auto sampler, an electrothermal vaporizationThe EPA 600/4-91-0101 method [13] was applied for determination of minerals in the samples. Nonmetal mineral contents in DW samples were analyzed using test kits purchased from Merck (Darmstadt, Germany) and measured using a Spectroquant NOVA 60 photometer (Merck, Darmstadt, Germany). All solutions were prepared using double-distilled acids and type I water from laboratory reagent-grade water systems.

A flame AAS method was used to determine the concentrations of sodium (Na), magnesium (Mg), potassium (K), calcium (Ca), iron (Fe), copper (Cu), and zinc (Zn) in the DW samples. For the flame AAS method, minerals of the samples were analyzed by applying several circumstances as described in Table 1. A graphite furnace AAS was used to determine chromium (Cr), and lead (Pb). The specific atomic absorption was set (Table 1), and absorbance was obtained. Certified test kits purchased from reputed business-related market Chemicals were used to determine the non-metal mineral contents in the water samples.



Table 1: Mineral concentrations in drinking water (DW) samples from Nashik,Shirdi,Trimbakeshwar,Vani,Mahsrul and the standard limits re commended by Indian Food Regulations and international regulations.

Drinking Water(mg/L)	Na	Mg	K	Ca	Fe	Cu	Zn	Cr	Pb
B-1(Nashik,Patradi fhata)	0.001	Tr	Tr	0.002	0.003	Nil	Nil	0.04	Nil
B-2(Mahatma nagar,Nashik)	0.0031	Tr	0.011	0.003	0.003	Nil	Nil	0.02	Nil
B-3(Shirde)	0.0064	Tr	0.013	0.005	0.004	Nil	Nil	0.05	Nil
B-4(Trimbake shwar)	0.004	Tr	Tr	0.0003	0.006	0.004	0.001	0.03	Nil
B-5 (Trimbakes hwar,Viloli village)	0.0038	Tr	0.014	0.007	Tr	0.005	0.001	0.2	Nil
B-6 (Vani village,Pavan Nagar)	0.004	0.003	0.0015	0.005	0.007	0.006	0.002	0.1	Nil
B-7 (SaptashringiDeviTemple)	0.002	Tr	0.002	0.008	0.005	0.007	0.001	0.1	0.002
B-8 (Mhasrul water tank, Vani village)	0.0001	Tr	Tr	Tr	0.004	0.003	Nil	0.2	Nil
B-9 (Trimbakeshwar)	0.002	Tr	0.0003	0.006	0.006	0.006	Nil	0.001	Nil
B10(Nandurmahdmeshwar)	0.12	Tr	0.004	0.006	0.008	0.003	Nil	0.003	Nil
WHO	200	--	--	--	300	2000	---	50	10
EU 2001	200	---	---	---	200	2000	---	50	10
Indian Standard	0.04	3.0	0.08	7.5	0.3	0.05	5.00	ND	0.01





All data were presented as mean of two replicates (mg/L), Tr-trace, ND-not detected, WHO- world Health Organisation, EU-European Union Standards, IS-Indian Standard

High-purity mineral standards (CertiPUR grade) were purchased from Merck Chemicals (MERY, India) and were used for calibration and quality control. authorized reference materials were obtained from (MERY, India) the determination of the accuracy of the analytical method. Ultrapure nitric and hydrochloric acids were obtained from Modern Chemicals (Nashik, India).

3. Results and Discussion

Concentrations of the selected minerals in 10 DW samples are presented in Tables-1. The selected minerals determined were Na, Mg, K, Ca, Fe, Cu, Zn, Cr, Pb, The concentrations of the selected minerals found in the DW samples were compared with national and international standard limits. The selected minerals in the studied water were also evaluated by comparing to other international studies.

Based on the results, the selected minerals in the DW samples obtained from different geographical locations were diverse. It shows that geographical location greatly influenced the mineral compositions of the ground water or portable water, where the most important factor is environmental pollution. Besides, the studied water samples also contained clinically significant levels of macro- and micro minerals.

Mineral Concentrations in DW Samples

Among the DW samples studied, DW B.-1, B-10, had the highest concentrations of Na

DW B-7 had the highest concentrations of Ca, Concentrations of Mg is highest in DW B-6 and Concentrations of Cu is highest in DW B-7 Concentrations of Cr is highest in DW B-6 Concentrations of K is highest in DW B-7 Concentrations of Zn is highest in DW B-10

Quality Control

Comparative Assessment on Variation of Selected Minerals in DW Samples according to the National and International Standard Limits

The studied minerals in all DW samples were below the standard limits recommended by the WHO Guidelines for Drinking Water Quality 2016, the Council Directive on the quality of water intended for human consumption [17], the United States Environmental Protection Agency (USEPA) Drinking Water Contaminants Regulations [18], and the Indian Food Regulations 1985-360B for packaged drinking water [19] (Table 2). No national and international standard limits were available for Ca and K in DW. Some of the USEPA recommendations are secondary standards which are not enforceable. These include Fe, Cu, Mn, F, Cl, and SO₄.

4. Conclusions

This study evaluated the selected macro minerals, micro minerals, heavy metals, and other inorganic elements in the water usually consumed by Indian. All mineral concentrations in the DW samples studied were found to be below the national and international standard limits. Cr and Pb were not detected in most of the DW samples studied, except Cr in one of the samples and Pb in two samples. Cr was also found in trace amounts in all DW samples, whereas trace amounts of other minerals were detected in some of the samples studied. Highest permitted level recommended by the WHO Guidelines 2016 and the EU Standards 1998. As DW is an important source of mineral intake in the rural areas, high level of heavy metals in the water may present adverse health effects to the populations. The findings of this study suggest that regular determination of minerals in bottled DW is important to prevent the occurrence of mineral toxicity due to drinking these water.

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