

Euro Dental 2018: Does crystal clear water clear the minerals away? A cross sectional study

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Objectives: Water is a vital for every function in the body and is an important source of mineral intake. The consumption of mineral water has greatly increased in the past decade. Studies have shown the effect of various minerals on dental health. Water is a rich source of all these minerals. The aim of the study was to estimate the levels of various minerals from different sources of drinking water.

Introduction: The consumption of mineral water has been increasing of late for reasons such as taste, smell and purity. The very concept of mineral water was first defined by the International Balneological Congress at Nauheim, Germany in 1911 as water containing at least 1000mg of dissolved mineral constituents per liter. Over the years this definition of mineral water was changed many times and today the acceptable level had fallen to 200mg/l.

Minerals are an important part of drinking water and have both direct and indirect health significance. They are essential for the normal maintenance of the body. The commonly found minerals in water include calcium, sodium, potassium, copper, manganese, iron, fluoride and magnesium. Water borne minerals are in ionic form and are easily absorbed by the gastrointestinal tract, it has been suggested that drinking water may be an important source of mineral intake.

Minerals like calcium and magnesium are abundant in drinking water and have important physiological functions and an unsuitable intake of these minerals may increase the likelihood of the disease. Along with calcium, fluoride has beneficial effects on prevention of dental caries due to the formation of crystalline hydroxyapatite leading to more resistant enamel.

The purpose of this study was to determine the levels of some commonly found minerals like calcium, magnesium, fluoride, iron, chloride and sulphate in various sources of drinking water.

Design: Drinking water was collected from various sources which included Kaveri tap water, bore well water, water purified using activated carbon filter, and water purified using reverse osmosis and two commercially available mineral bottled water. The above samples were sent to water testing certified company to check the levels of various minerals and other parameters using IS 3025. The results were subjected to statistical analysis.

Methology: A convenience sample of water has been collected from various sources of drinking water. The samples included municipal tap water (Kaveri water), bore well water, water purified by activated carbon filter, water purified by reverse osmosis and two brands of commercially available mineral bottled water.

Five samples of each category containing one liter of water were sent to water testing certified company. The levels of various minerals and hardness of the water was tested using IS 3025. The various minerals in the water that is calcium, magnesium, fluoride, iron, sulphate and chloride levels were measured and subjected to statistical analysis.

The values were subjected to Kruskalwalis test to find out whether there is significant difference between the water samples for various minerals. Mann-Whitney pair test was done to compare the difference in each mineral for the given pair of water samples.

Results: In the present study; it was noticed that the bore well water had the highest minerals followed by Kaveri, activated carbon filter, reverse osmosis and commercially available bottled water respectively.

It was observed that bore well water had the highest mineral content among all the samples, However, the hardness of bore well water was 458 mg/l which is more than the standard limit as per IS 10500 making it unfit for drinking.

It was observed that kaveri water had more minerals when compared to activated carbon. Calcium, magnesium, chloride and sulphate were significantly higher in Kaveri water. Though, iron and fluoride was higher in Kaveri water than activated carbon it is not statistically significant. When Kaveri water is compared to commercially available drinking water and water purified by reverse osmosis there was significant increase among all the minerals. Commercially available drinking water had least amount of minerals when compared to all the samples and was statistically significant. Though the amount of fluoride, iron and sulphate was more in water purified by reverse osmosis than commercially available bottled

water, it was not statistically significant.

Discussion: Many bottled waters are simply tap water processed using one or more of the processes of distillation, reverse osmosis, deionization, or filtration. This leaves the water virtually devoid of both nutrients and contaminants.¹⁷ The appeal of these waters is therefore a reduction in impurities like lead and pesticide residues, or better taste but not enhanced mineral content. Bottled processed waters contain little or no minerals. It should also be noted that unlike tap water, purified waters and water purifiers reduce or eliminate the fluoride that is added by many municipal treatment facilities to promote dental health. The bottled water which are marketed as mineral water are poor in minerals which are essential for the normal maintenance of health.

In this study it was observed that commercially available mineral water and water purified with reverse osmosis had negligible amount of minerals and are significantly less when compared to Kaveri water. Hence, individuals consuming only bottled water may have lower mineral consumption which could affect the oral and general health.