Some facts of drinking water quality and health risk.

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It is well known fact that varieties of diseases are responsible due to various contaminants and microorganisms present in water and food products. Mankind is suffering with various hygienic problems because of contaminated food and water, resulting huge growth of hospitals and Doctors. Water quality and quantity are equally important for human requirements. In the limited resources, quantity of water one can compromise as per availability, while for quality not in any conditions, because quality as it is directly related to the health. Water is very essential commodity for human consumption, required about 3-4 litter in different quantum, directly as well as in terms of liquid like fruits juice and cooked food throughout a day. Hence, its purity is quite important looking to the health risk. Further water spreads and enters in each and every cell or tissues of the body; hence its good as well as bad effects appear within short time, affecting complete body.

Incidence of water borne diseases shown its direct affects on the morbidity and mortality of men

power and labor forces, reduces productivity of industries and agriculture and also put stress on budgetary resources of a family as well as to a Nation. It is affecting on development and economy, hence house wife immediately conscious in such situation like the health and home ministry.

Risk factors observed against contaminated water.
Safe water is one that can not harm the consumer even when ingested over prolonged periods. Water may be safe, but if contaminants reflect in terms of unpleasant test or appearance, it may drive consumers to search another source of water hence; it must become wholesome and relishing too.[1,]

Drinking water, provide not just a source of hydration, but also a source of essential or beneficial ions, such as fluoride, chloride, phosphate, calcium, magnesium, potassium, sodium and trace elements such as iron, copper, manganese, zinc, selenium and silicon (as dissolved silica). These are important physiologically in the prevention of dental caries, maintenance of skeletal and cardiovascular health, regulation of immune and hormone functions, muscle contraction, nerve impulse transmission and antioxidants that may reduce the risks of cancers.

It is a responsibility of the authority supplying water to a large community, to provide safe and good quality water, palatable, wholesome, relishing and also protected against new entry of pollutants, up to the consumers end. It is not an easy task, require constant monitoring and surveillance. Former Director General of **World Health Organization, Dr. Halfdan** said that, "The number of water taps per 1000 persons is a better indication of health than the number of hospital beds."

There are many toxic chemicals can enter to water resources from different ways and means including industries, agricultural activities, sewerage and human wastes. Little is known about the effects of these toxic chemicals on human health; often the effects do not become noticeable for long period of time and also it is difficult to distinguish them from the effects of other factors that impose impact on our day to day's life (e.g. food nutrition, stress, air quality and atmospheric temperature, etc. Now global warming is also considered as one of the reason.

One very important term in water quality is 'Total dissolved solids' (TDS). It is a measure of solids dissolved in water comprises inorganic salts and small amounts of organic matter. The principal constituents are usually the anions of calcium, magnesium, sodium and potassium and cations of carbonate, bicarbonate, chloride, sulphate and particularly in groundwater, nitrate (from agricultural area) and fluoride (from fluorspars hilly terrains). An aesthetic objective of ≥500 mg/L established for total dissolved solids (TDS) in drinking water. At higher levels, excessive hardness, unpalatability, mineral deposition and corrosion may occur. ***At low levels they may have equally adverse effects*;**

Salt contents are in water and in our body.

Salt is a vital substance for the survival of all living creatures. Water and salt regulate the water content of the body. Water itself regulates the wate r content of the interior of the body cell by working its way into the entire cell it reaches, [1] it has to cleanse and extract the toxic wastes of cell metabolisms.

Salt forces some water to stay outside the cells. It balances the amount of water that stays outside and inside the cells. Theoretically to say, there are **two oceans** of water in the body; one ocean is holding inside the cells of the body, and the other ocean is holding outside the cells. Good health depends on a most delicate balance between the volume of these oceans, and this balance is only achieved by salt contents.

When water is available to get inside the cells freely, it is filtered from the outside the salty ocean and injected into the cells overworked despite their water storage[1]. This is the reason why in severe dehydration we develop an edema and retain water. The design of our body is such that the extents of the ocean of water outside the cells gets expanded to have the extra water available for filtration and emergency injection into vital cells.

The brain commands an increase in salt and water retention by the kidneys; this is how we get an edema when we do not drink enough water. With water and salt, one can also get rid of heavy metals such as lead, mercury, arsenic, amalgam and over some toxicants, salt are able to break molecular structures of toxicants.

Methods developed for removing soluble contamination from water.

Water received from natural resources may have variety of contaminants appeared as turbidity, color, odor and some time temperature. These can remove by conventional water treatment as usually given at water treatment plant (W.T.P). Components like Chlorides, Hardness, Nitrates, and Sulfates, TDS etc; if very high than the prescribed standard values are objectionable should be removed by specific treatment known as molecular sieving technique like Reverse Osmosis (RO), Demineralization (DM), Deionization (DI), Distillation and Softening etc depending on the uses, requirements and economy. These techniques can remove almost 95 to 99 % of the soluble matter. Soluble material present as color in water (due to organic color chemicals as contaminants) can remove by passing water through activated carbon treatment; this may also remove bad smell (due to some volatile organic unsaturated soluble compounds).

Water almost or completely free of dissolved minerals as a result of distillation, deionization, membrane filtration, electro dialysis or other technology is called *deminerlised water*. There are many advantages and disadvantages on drinking deminerlised water. The argument in against to drinking such water is that we lost a primary source of necessary minerals in our diet and that water has lost its own minerals will attract and absorb minerals already in our body, causing a mineral_deficit also the absence of minerals in water effects on the functions of many parts of our body.

At domestic level

Water treatment at domestic level requires knowledge and interest of consumers particularly housewife for protection of health risk of her family. Invariably people, who suffer, not only mean to have unsafe water facility but also information on how to minimize effects of unsafe water. Varity of RO, DM, DI and softening plants are available, which remove 90 to 95 % soluble compounds and microorganisms from water. It is good that the pollutants and pathogenic microorganisms can get retained but simultaneously it removes the required elements and minerals from water which are health improving.

It is fact that natural surface water has very low contents of dissolve solids (TDS) and other impurities then the microorganisms. At domestic level water having low TDS (under prescribed IS limit) required no specific treatment for their removal, but under the threat of microbial contamination and water borne diseases people apply molecular sieving technique like RO, DM, & DI treatment. It removes microorganism but also lost minerals turned undesirable for drinking purposes (potability). Here removal of turbidity if any by simple filtration and disinfection to remove microorganisms is quite enough against any health risk. Simple water purifier can do this job. Without confirming the water quality and actual need of any demineralization technique, people and women procure RO plant in a house just as a status symbol now a days. Their ignorance unknowingly invites suffering with its adverse health effects. Attractive advertisements and effective marketing also plays important role to misguide the public.

As per the National and International standard of drinking water, minimum requirement or limit for TDS is 500mg/L but in case of RO treated water most of the times it is observed <50 mg/L, which is not fair for health and have dangerous adverse health effect. Water become test less or bitter, little acidic, nonpalatable, not relishing and undesirable for consummation.

Alkaline drinking water (real mineralized water) is saturated with negatively charged ions. These negatively charged ions attract the positively charged ions of harmful acids and neutralize them. The human body continually creates acids, as a byproduct of metabolic reactions. In addition, acids are introduced into the system by eating verity of food material and during digestion process.

Many secreted and digested acids are swept away by the blood stream, filtered out by the kidneys, and released from the body through urine. Other acids leave the body through

perspiration. Your body can only process a certain amount of acids, somehow it is possible to overload the system and for the body to become rich in acids.
The ionization process due to addition of minerals breaks down water molecules in to micro-clusters allowing rapid delivery to cell walls for a superior hydrating effect at a cellular level. Micro-clustered water delivers nutrients to the cells more efficiently. Among several other benefits including proper hydration, detoxification and balance in your body's pH levels, drinking alkaline water can ultimately contribute to weight loss and anti-aging.
Most of the tap water in the United States is acidic. Most commercially sold bottled water is also acidic. The pH of drinking water varies from area to area, depending on the ionic concentration. Concerned about contaminants and the taste of their drinking water, millions of Americans are turning off the tap. As a result, bottled water has become a leading source of hydration.
Certain natural compounds or elements are important and required even in little quantity in drinking water and have much important direct and indirect health significance. Among them Ca^{+2}, Mg^{+2}, Na^{+} and K^{+} are quite concern. It is advisable to have certain minerals in required quantity to keep water wholesome, palatable and relishing. Hence sometimes it is necessary to add such minerals salts in required quantity to make it in real sense a mineral water.

Conclusions:

1. It is desirable to get tested our drinking water at every periodic intervals.
2. Free chlorine should checked at every week end.
3. If your water is from any unpolluted surface source and turbid frequently then install a good quality water purifier not any RO plant.
4. If water has TDS contents higher than the prescribed higher limit and not much hard then apply RO or DM system and if it is considerably hard then apply any water softening treatment. However, don't forget to reminerlisation of water.
5. Your drinking water is from community w/s and well treated then check free chlorine at consumer's end time to time. In case chlorine observed < 0.2 ppm continually for three days then complain to the authority.

References:

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