



ISSN 2456-3110

Vol 4 • Issue 2

Mar-Apr 2019

Journal of
**Ayurveda and Integrated
Medical Sciences**

www.jaims.in

JAIMS



Charaka
Publications

Indexed

Ayurvedic perspective of water, its pollution and purification

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ABSTRACT

According to Ayurveda water is considered as one among the *Panchamahabhootas* and *Prana*/life of the entire universe. The 5000 year old classics, of India like *Sushruta Samhita* and *Charaka Samhita* have analyzed the issues related to water its pollution, causes, effects, its impacts on the body and universe, and the measures to purify the polluted water and also the prevention of water pollution. Even several thousands of years before, the great sages of India had envisaged the issue of water pollution, its hazardous effect on health, community and environment and the measures to purify them. A lion share of these organic methods of purification still remains virgin to the field of researches. A combination of one or more of these measures when applied in a systematic manner can sometimes be more effective than the most advanced chemical methods of purification. For that this holistic science and its treasures are to be explored and unveiled to its best.

Key words: Water Pollution, Water Purification, Ayurveda, Jala Prasadana.

INTRODUCTION

Water is the elixir of life and the substratum on which the entire universe is built upon it. It is one among the natural resources upon which the human race has made miracles for development. In the era of scarcity of natural resources, man keep on utilizing it irrationally for various purposes without even thinking of its availability and purity. Apart from utilization exploitation of this resource in the name of purity is a major reason for water pollution.

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Submission Date: 25/02/2019 Accepted Date: 21/03/2019

Access this article online

Quick Response Code



Website: www.jaims.in

DOI: 10.21760/jaims.4.2.14

The major causes of water pollution are;

1. Intellectual blasphemy of the people.^[1]
2. Natural occurrence
3. Alteration in Climate

Intellectual blasphemy is nothing but the thoughtless and erroneous human acts which harm him as well as his surroundings. It can produce catastrophic changes to the environment. Dumping of wastes in water sources, deforestation, extensive use of chemicals and pesticides etc. are some of the common examples of this. It can later result in alteration of climatic pattern and environmental texture. Alteration in the climate can bring about drastic changes in the properties of drinking water, properties of drugs and properties of food grains. It can result in the the occurrence of many diseases, drought, the scarcity of water and eventually results in the ruining of the entire region.^[2] In some region the natural occurrence of mineral ore concentration is high in water and in certain areas the water becomes hard water due to the presence of calcium and magnesium salts. This also makes the water unfit for drinking and household activities.

Purificatory Methods

Several cleansing methods are mentioned in *Sushruta Samhitha*. Ayurvedic parameters for purity assessments are;

- *Roopa* (appearance)
- *Varna* (colour)
- *Gandha* (smell)
- *Rasa* (subtle taste)
- *Guna* (subtle quality)
- *Veerya* (active principle)
- *Vipaka* (evolved active principle)
- *Prabhava* (unknown effect)
- *Dosa karma* (action on vital humors of the body)

Jala Prasadana

It is the process of removing the turbidity of water. There are several methods mentioned in Ayurvedic classics for the purification of water. All these methods were aimed to make the water potable. Some of the techniques are;

- Usage of drugs like *Kathaka* (*Strychnos potatorum*), *Gomedaka* (hessonite), pearl, *Saivala* (an alga), *Bisa Granthi* (rhizome of lotus), specific flowers, powders etc.^[3]
- Boiling - It is very effective in disinfecting water.
- Solar purification - Sun is considered as a *Vishahara Deva*. Exposing water in direct Sun light is practiced even today.
- Sand filtration - This method uses a bag containing a layer of charcoal and over that a thick sand layer is maintained and water is allowed to flow through the bag. This method is used in many Indian villages even today to filter out the mineral ores from water.
- Cooling with external *Seetheekarana* techniques there are nearly seven methods mentioned in *Sushruta Samhita* for cooling water.
- *Hamsodaka* the specially prepared water is said to be very pure^[4] and can be used for all purposes. It

is the water prepared in *Sharat Rtu* (spring season) by exposing it to sunlight in the morning and moonlight in the night and purified by the star Augustus (*Agastya*).

- The technique of immersing heated metallic rods.
- Copper/silver purification. Keeping water in copper or silver vessels is also considered to be a good method of purification.
- *Jala Nikshepana* (storage of water) in specially made chambers like well with *Amlaki Phalaka* (wooden planks of Amla) layed underground, or with *Munja Valaya* (*cyperus rotundus* rings) grown, or wells in the form of a bamboo chamber etc. are still in practice.

Recent Studies

A few of these methods are tested so far and the recent studies proved that these methods of water purification are true and scientific and they have stood the test of time. Some of the notable studies are enlisted here. And all these studies have yielded a positive result in this respect.

1. Microbiological Effectiveness of Disinfecting Water by Boiling in Rural Guatemala, Ghislaine rosa et.al.^[5]

In a 5-week study in rural Guatemala among 45 households who claimed they always or almost always boiled their drinking water, boiling was associated with a 86.2% reduction in geometric mean thermo-tolerant coliforms (TTC) (N = 206, P < 0.0001). Despite consistent levels of fecal contamination in source water, 71.2% of stored water samples from self-reported boilers met the World Health Organization guidelines for safe drinking water (0 TTC/100 mL), and 10.7% fell within the commonly accepted low-risk category of (1-10 TTC/100 mL). As actually practiced in the study community, boiling significantly improved the microbiological quality of drinking water, though boiled and stored drinking water is not always free of fecal contaminations.

2. Solar disinfection: an approach for low-cost household water treatment technology in Southwestern Ethiopia, Awrajaw dessei et.al.^[6]

The experiment was carried out at turbidity 2NTU, pH 7, and various water temperature (38.1°C, 41.8°C, 45.6°C and 51.1°C) and solar intensities, using clear and black plastic bottles filled to different depths. The results show that the rate of microbial inactivation in relation to depth of water, turbidity, container type, intensity of light and color of container was statistically significant ($p < 0.05$). However, bottle placement, exposure and water pH were unrelated to microbial inactivation. Bacterial re-growth was not observed after solar disinfection. By adjusting the parameters, complete and irreversible fecal coliform inactivation was achieved within an exposure time of less than four hours in the areas where the solar irradiance is about 3.99 kW/m² and above.

3. Water lilies used for water purification by Hebrew university researchers^[7]

Last year, a pilot experiment was established at the Haifa municipal waste water treatment plant to test the purification capabilities of the water lily. Results showed a marked reduction of the amount of cadmium in the sludge following exposure to the water lilies. Other experiments with industrial sludge also showed promising results in removing heavy metals such as cadmium, mercury, nickel and cobalt.

4. Experimental study of 'Sushrutokta Jala Prasadana Vidhi' with special reference to Gomeda, Amit Achyut et.al.^[8]

Gomeda shows positive changes in water. It reduces magnesium, hardness, dissolved solids, turbidity, conductivity, pH, salinity; and increases dissolved oxygen.

5. Efficacy of Copper-Silver Ionization in Controlling Biofilm and Plankton Associated Waterborne Pathogens, HsiuYua et.al.^[9]

Copper-silver ionization is efficacious for control of biofilms and plankton associated waterborne pathogens in a model plumbing system. Copper-silver ionization may be capable of controlling waterborne pathogens, in addition to *Legionella*, in the hospital water distribution system.

6. Effectiveness of algae in the treatment of a wood-based pulp and paper industry waste water, Tarlan E et.al.^[10]

In this study, the ability of algae to treat a wood-based pulp and paper industry waste water was investigated. Tests were performed in batch reactors seeded with a mixed culture of algae. Under different lighting and initial waste water strength conditions, changes in COD, AOX and color contents of reactors were followed with time. Algae were found to remove up to 58% of COD, 84% of color and 80% of AOX from pulp and paper industry waste waters. No remarkable differences were observed in COD and color when light intensity and wastewater strength were changed, while AOX removals were strongly affected. Algal species identification studies revealed that some green algae (*Chlorella*) and diatom species were dominant in the treatment.

CONCLUSION

Even several thousands of years before, the great sages of India had envisaged the issue of water pollution, its hazardous effect on health, community and environment and the measures to purify them. A major share of these organic methods of purification still remains virgin to the field of researches. A combination of one or more of these measures when applied in a systematic manner can sometimes be more effective than the most advanced chemical methods of purification. For that this holistic science and its treasures are to be explored and unveiled to its best.

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How to cite this article: Dr. Lakshmy C. Senan, Dr. Balaji S, Dr. Rabinarayan Tripathy. Ayurvedic perspective of water, its pollution and purification. J Ayurveda Integr Med Sci 2019;2:75-78. <http://dx.doi.org/10.21760/jaims.4.2.14>

Source of Support: Nil, **Conflict of Interest:** None declared.
