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Water Purifications Methods in Ayurveda and Contemporary Methods

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Abstract: ***Water is the essential source on the earth for living organism and plants. Water cover over 70% of the earth surface and is very important for the people as it is essential requirement of human life. It is an inorganic, tasteless, odourless and colourless substance but still half of world specially developing countries are far from the goal to full fill the daily pure water requirement of Lack of pure drinking water, sanitation and hygiene result in the loss of 0.4 million lives annually in India.***
According to WHO 80% of the diseases are water born and even can cause epidemics. As per WHO world water day report approximate 3.4 million people mostly children die from water related diseases. The chief water borne infection and diseases are bacterial, viral & parasitic diseases like typhoid, cholera, encephalitic, poliomyelitis, hepatitis, skin infection& GIT disorders through polluted water.
According to Ayurved, water is considered as among the Panchamahabhootas and prana or life of the entire universe. Old classics of India have analysed the issues related to water, its causes of pollution, impact on the body. In Sushruta Samhita the measures to purify the polluted water and also the prevention of water pollution are described.
Keywords: Water pollution, Ayurved, Water purification

I. INTRODUCTION

In India the quality of water is bilaterally deteriorated due to excessive exploitation and mixing of sewage and industrial waste in water sources.

About 85% 0f rural population and more than 50% of urban population in India is directly dependent on ground water for their drinking and other use. Thus, the increased need of water for various purposes culminated in excessive withdrawal of ground water.

An ancient of practice of collecting rain water and using it for drinking has been discontinued now except in remote parts of Rajasthan and such other desert regions. With the enormous growth of industrialisation, the atmosphere today has become greatly contaminated with smoke, chemical vapour, poisonous gases etc. since rain water also gets polluted by these, we nowadays hear of acid rain salty rain, etc. this not good for health living beings, especially man, to use such polluted rain water, for drinking, even water has to be purified before using it for drinking, if inevitable. Water in today's world is contaminated and not safe for drinking water we need water purifiers to produce clean and safe drinking water.

The water purifiers not only clean the water from dirt but also make it safe by removing micro-organisms. Water purification method needed to cost effective, improved taste of water, lower microbes level, decrease risk of health hazards, different skin disease etc. Disadvantages of RO water purifier Removes essential minerals: While RO water purifier removes dissolved impurities, it removes natural mineral such as iron, magnesium, calcium and sodium which are essential to the human body.

II. SOURCES OF WATER POLLUTION

There are various sources of water pollution with large number of people living in communities now adays, supply of good drinking water to all, has to be undertaken on a massive scale. Rivers and large tanks are the chief source of drinking water now. With unclean, unscrupulous and unethical activities of the people, these sources of water are being abused greatly; sewage and sullage, industrial wastes and effluents, chemical pesticides, etc are being allowed into rivers, lakes and tanks, etc thus polluting the water.

According to *Ayurveda* He who bathes by immersing in rain water, which has been contaminated with presence of insects (worms), or urine, excreta, ova, dead bodies of animals, which is purified, having great accumulation of grasses and leaves, which is dirty or containing poisonous substance, or drinks fresh rain water during *Varsa-ritu*—rainy season will get affected by both external and internal disease quickly[2].

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III. HEALTH HAZARDS OF WATER CONTAMINATION

These are classified into two broad groups. Chemical and biological hazards. Biological hazards are the classical (specific) water borne diseases, caused by the presence of an infective agent or an aquatic host in the watwer.eg -viral disease (poliomyelitis, viral hepatitis A, E), bacterial disease (typhoid fever), protozoal disease, helminthic disease. Snail, cyclops etc. Chemical hazards are non-specific water born disease. These occur due to presence of certain harmful substance or due to presence of higher or lower concentration in water, as deficiency of iodine results in goitre, excess of lead – poisoning, hardness of water is unsuitable for boilers in industries. Other water associated disease or hazards resulting from contact with water infections of eyes, ears, nose, throat, vulvo-vaginitis and ringworm infections of foot. Other group of disease, related to water, are mosquito-borne disease[3].

In *Ayurved* Poisoned water will be slimy, possesses strong odour and froth and has lines on their surface; frogs and fish living in such water die of intoxication; bird living in marshy places fly around intoxicated; men, horse and elephants which immerse in this water will develop *Chardi*(vomiting), *Moha* (delusion), *Jwar*(fever), *Daha* (burning), *Shofa* (sensation and swelling).The *Doshas* which get aggravated in these animals should eliminated and attempts made to purify the contaminated water[4].

In *Sushruta Samhita* polluted water and rain water unusual should not be consumed every day, both these produce aggravation of *doshas* and unsuitable to health; he who drinks polluted water without purifying it, gets affected quickly by dreaded diseases such as dropsy, anaemia, skin disease, improper digestion, dyspnoea, cough, nasal catarrh, abdominal pain, tumours of the abdomen, abdominal enlargement or any others[5].

IV. PURIFICATION OF WATER

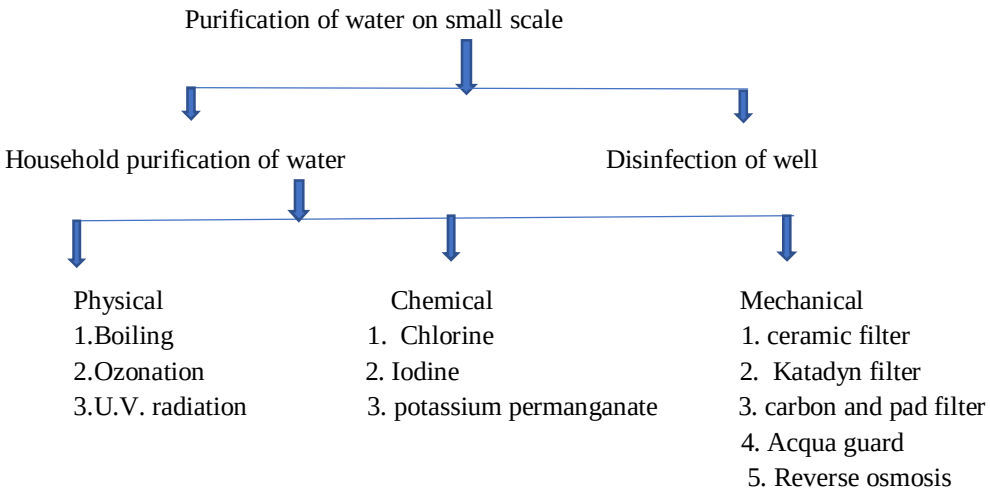
The purpose is to produce hygienically safe and aesthetically pleasing water. We can describe mainly in two type[6]-

1) Purification of water on large scale
2) Purification of water on small scale

Water purification on large scale required for town and cities. This is done in three steps-storage, filtration and chlorination. Purification of water on small scale are mainly divided into to two parts first is Household purification of water and second is Disinfection of well.

Further household purification of water classified into three groups—

a) Physical methods-Boiling, Ozonation, U.V. radiations
b) Chemical methods- Chlorine, Iodine, Potassium permanganate
c) Mechanical methods- Ceramic, katadyn filter, carbon and pad filter, aqua guard, reverse osmosis



Reverse osmosis treatment invention of this technique is a milestone in man's creation for drinking resource. Reverse osmosis is based on water reverse theory in nature.

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NASA and US first applied this theory in purifying the astronaut's urine as a resource for drinking water in space.in this process, water is purified in 5 stages –

- 5µ sediment filter,
- activated carbon block filter,
- Gag filter,
- TF composite membrane with 0.0001 mm pore (RO membrane),
- Bacteriostatic silver impregnate activated carbon.

In Ayurveda according to different acharyas some tools which can make *kalushita jala* (contaminated water) acceptable.
They are as follow--

- Boiling over fire, heating by exposing to sunrays, immersing heated iron balls, sand or stone into water are the methods to purify contaminated water Putting flowers such as *naga, champaka, utpala,patala* etc into water and allowing these for some time to stay in it[7].
- Water kept stored in vessels made of gold, silver, copper, bronze, precious stones or in earthen pots and made fragment by putting flowers into it should be used for drinking[7].
- In *Sushruta Samhita* method of clearing turbidity of polluted water are seven—such as by the use of *Kataka*, (adding the paste of the Kataka nut of water), *Gomedaka*(gem/dolomite),*Bisa Granthi*(rhizome of lotus), *Saivala mula* (root of algae)-these are immersed in water*; Vastra*(cloth, filtering through it *), Mukta*(pearl) and *Mani*(crystals of rocks) or Gems by immersing in water[7].
- In *Sharada Ritu* (autumn season) water which is exposed to sun rays during the day time and to the Moon's rays at night the 'best' quality water. It is *Rasayana*(rejuvenating), *Balya* (strength promoting), *Medhya* (intellect promoting), alleviates three *doshas*, *Anabhishyandi* (which does not obstruct channels of circulation). It is called ***Hansodaka*[8].**
- *Dhava (Anogeissus latifolia Wall. EX.), Ashwakarna (Dipterocarpus alatus Roxb.), Asana (pterocarpus Aarsupium Roxb.), Paribhadra (Erythrina variegate), Patala (stereospermum suaveolens DC.), Siddhaka (vitex negundo L.), Mokshka (Schrebera swietenioides Roxb.), Amalatas (Cassia fistula L.), Somavalka (Acacia leucorrhoea Roxb.)* should be burnt and ash spread on the water of lakes, reservoirs of water and a handful (1anjli= 187gm) of this ash should be put into the pot containing drinking water to be used when needed[9].

V. CONCLUSIONS

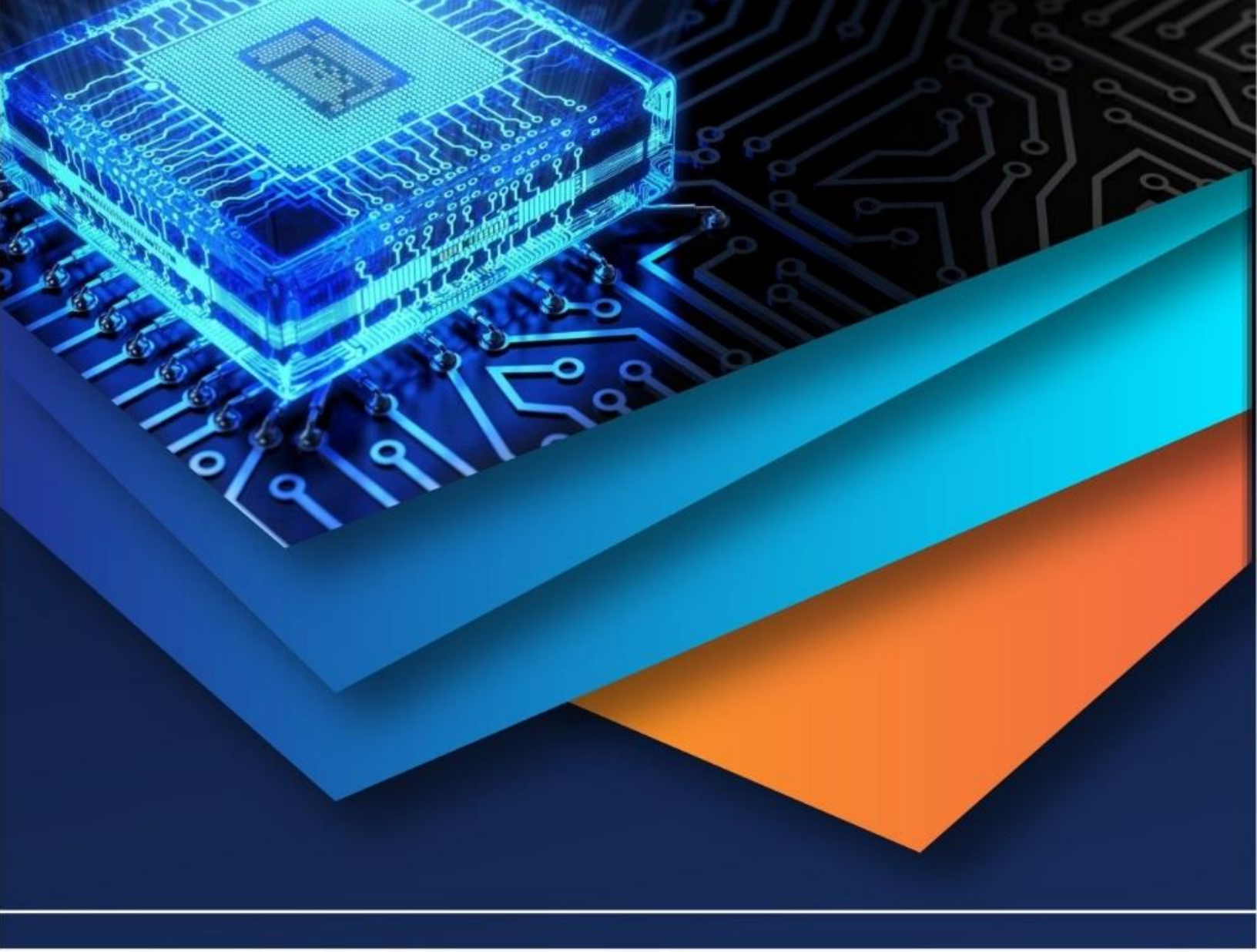
water pollution is worldwide issue for livings and we facing its harmful health hazards. Major sources of water pollution are discharge of domestic and agriculture wastes, population growth, excessive uses of pesticide and fertilizers and urbanization. Many waterborne infectious diseases are related with faecal pollution of water sources and results in faeco-oral route infection. Health risk associated with polluted water includes different diseases such as respiratory diseases, gastrointestinal diseases, cancer, neurological disorders and cardiovascular disease. It is recommended that there should be proper waste disposal system and waste should be treated before entering into the river. Educational and awareness programmes should be organised to controlled the pollution.
Common disadvantages of RO water are following-

1) The RO water purifier is ineffective in eliminating bacteria and viruses that cause waterborne diseases. There are more opportunities for bacteria to get through the RO membrane.
2) Different tastes: As natural minerals are taken out, water becomes de-mineralized, which affects its taste and renders it insipid.
3) It takes a lot of time to purify water with a RO water filter.
4) There is more water wasted than is filtered out and flushed down the toilet as waste water.
5) A costly RO water filter uses a lot more power.
6) The lack of a method to determine when to replace the RO membrane increases the danger of fracture
7) RO membranes can be harmed by chlorine. Chlorine plugs the tiny pores of the RO membrane, drastically decreasing efficiency.

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