

## Reverse Osmosis: Use or not to use?

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Air, water and soil very important for our living but urbanization and industrialisation, have polluted all of it. None of the is left undisturbed but the condition of water is more dreadful as we use it for drinking purpose too. We have numerous methods to purify water and one of them is reverse osmosis.

**Reverse osmosis (RO)** is a water purification technology that uses a semipermeable membrane to remove ions, molecules and larger particles from drinking water. RO removes inorganic minerals which are unhealthy and healthy too<sup>3</sup>. Improvement in RO technology including advanced membrane material, module and process design, and energy recovery has led to cost reduction which in turn gaining interest to its commercial as well as household applications. In this article, the applications of RO, its advantages, and limitations are being discussed especially related to health.

By purifying drinking water, we can minimize the exposure to contaminants and may potentially reduce our allergy symptoms and chances of getting infections. Though, both distilled and reverse osmosis water are demineralised, but having demineralised purified water is harmful or not to your body, one needs to decide it based on the situations and place where one lives.

### Advantages

RO reduces sodium and other minerals from hard water. It also removes toxin such as lead, mercury, Fluoride, Arsenic, Chlorine which may impart bad effect to health of the human being<sup>2,3,7</sup>. All these minerals has negative effects in one or the other way. One could still have a high level of total dissolved solids, which will impact the taste.

Bottled water is expensive, additionally those plastic bottles create a lot of solid and non biodegradable waste as they all too often go non recycled and end up in landfills. A RO system will pay for itself in lesser time because it will cost hardly

some paisa per glass depending upon the purchase and brand<sup>6</sup>. Secondly, whenever we need clean drinking water, it's just a tap away, hence reducing the cost.

The impurities in home's water are going to affect the taste of the food and it requires more time to cook as total dissolved solvents delay the process of cooking<sup>8</sup>. If you're using municipal tap water for cooking, there's a good chance you have too much chlorine in it. This not only cause food to taste odd, it discolors it as well<sup>1,8</sup>.

RO water filter is great for removing commonly found Cryptosporidium in lake, river and public supply water, hence serves as bacterial decontaminator<sup>3,9</sup>. Other thing is having crystal clear ice cubes. Water crystalizes as it freezes. Ice forms from the outside in, and as this happens the impurities are forced to the center of the ice cube, resulting in the cloudy appearance. Ice cubes made with an RO will keep your drinks cool longer without watering them down as much.

### Disadvantages:

In reality, one should be getting most of the mineral for body needs from the food we eat, but the minerals from water are also important. The only thing skeptics of RO can point to as a disadvantage is that reverse osmosis systems filter out most of the minerals, which can be valuable to health. Some studies shown having a minimum mineral content protects cardiovascular system<sup>11</sup>. While RO water purifier removes dissolved impurities it also removes natural mineral such as iron, magnesium, calcium and sodium which are essential to the human body and cause a mineral deficiency in the body. Recent studies shows these minerals are essential for functioning of the body.<sup>2,5,6,11</sup> As natural minerals are removed water gets de-mineralized as a result water taste is affected and altered<sup>1</sup>

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RO water purifier does not kill waterborne disease-causing bacteria and viruses<sup>10</sup>. There is high probability that microorganisms can pass through RO membrane, so it is advisable to pass RO water through the UV water purifier to treat microorganisms or some alternate method can be used. Drinking RO water can cost you time, energy and money too. RO water purifier takes too long to the purification of water. Approximately much more water compared to filtered out water flushed down as waste water. Adding on to it, its cost. Compared to counterpart water purifiers, UV and RO water purifier consumes much more electricity.

Chlorine in the water can damage RO membrane. It makes small pores of RO membrane, clogged and makes drastic reduction in performance. On breakage of membrane dissolved salts, bacteria, viruses can easily pass through RO membrane. It is advisable to replace RO membrane once in a year. However, no mechanism is there, to know when to replace RO membrane.

The water is usually acidic. One of the primary reasons RO water is unhealthy as removing the minerals makes the water acidic (often well below 7.0 pH). Drinking acidic water will not help maintain a healthy pH balance in the blood, which should be slightly alkaline. Furthermore, the dissolved mineral found in drinking water are organic, which means your body has a difficult time absorbing them<sup>10</sup>. This negates any potential health benefits. Some critical containments are still there like volatile organic containments, chlorine, pharmaceuticals and a host of other synthetic chemicals<sup>1</sup>

### Conclusion

Reverse osmosis is a way of filtering water. There's no real way for reverse osmosis to filter out harmful ingredients and leave good ones in the water. RO can be a good option if someone live somewhere with super contaminated water or as a short-term solution, like when we're camping or going out. Unfortunately, removing all of the vitamins and minerals from your water supply can impact your health by leading to mineral deficiencies. These systems can also waste a lot of water and electrical energy, so not affordable to everyone. Ultimately, the right decision is the one that works best for your family keeping in mind the cost, health, benefits and harmful effects

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