

Health Effects of Water Fluoridation

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Abstract- The fluoridation of water is considered a common practice in various countries and the health impact of fluoride have been raised by various experts. The impact of fluoridation of water is felt by millions of people in the form of dental and skeletal fluorosis, arthritis, high fracture rates, and similar bone-related affectations. High consumption of fluoridated water is responsible for enamel of children, and spots on the enamel. Hence, this paper provides an analysis of the health impacts and the current health situation in relation to the use of fluoride in the water in numerous countries of Asia. This analysis also provides a thorough understanding of the impact of fluoride on health details which can help health authorities in their policy-making activities concerning fluoridation of water in these areas.

Keywords: Nitrate, Fluoride, Nitrogen fertilization, Preventive techniques, Water treatment technologies

1. INTRODUCTION

The fluoridation of water is considered a common practice in various countries like Australia, Brazil, Malaysia, the US, India, and Vietnam. Most European countries do not fluoridate their water, but in different parts of the world with high risks of water contamination, fluoridation has been a common practice [1-4]. Questions concerning the health impact of fluoride have been raised by various experts arguing that water fluoridation carries with it significant health risks which may not be easily managed in the long run. This paper will provide an analysis of the health impacts and the current health situation in relation to the use of fluoride in the water, mostly in countries of Asia, including Pakistan, India, Sri Lanka, Bangladesh, Egypt and Nepal [4-5]. This analysis is being carried out in order to establish a more thorough understanding of the impact of fluoride on health, details which can help health authorities in their policy-making activities concerning fluoridation of water in these areas.

2. A SYNOPSIS ON FLUORIDATION

In general, fluoride is often added to water as a decontamination agent to remove bacteria and other possible contaminants [6]. In various countries, especially in developing countries, this is the only means of filtering their water supply. It is a cheaper and easier option for these territories whose need to decontaminate the water supply is imperative. Other, more developed, countries, have other decontamination processes and options, options which allow them to do away with the fluoridation of their water supply [2-3]. In Central Asia, fluoridation of water is a common practice. However, in recent years' various health issues in regard to the persistent introduction of fluoride in the water have been raised [2].

3. HEALTH ISSUES

Based on an assessment by the British Geological Survey, [7] fluoride build-up has become significantly apparent in the ground waters of Central Asia and Africa. Countries that have been affected worse include China, India, Sri Lanka, West Africa, and other African and South American territories [7]. Fluorosis issues arose in India and became major issues for its various territories, including Pradesh and Tamil Nadu. Fluorosis also emerged as a major issue in Sri Lanka and Bangladesh [3,6]. In Pakistan, fluorosis was also seen as a major health issue, and this prompted detailed research studies by the UNICEF on the subject matter [6]. In recent years, recommendations on the elimination or at least the reduction of fluoride in the water have been suggested as a healthier option for the decontamination of water. To some extent, the reduction of fluoride use has been implemented; however, undeniably, the health effects of fluoride in water are still persistent.

At low concentrations, fluoride is beneficial to the teeth, mostly in helping eliminate teeth decay; admittedly, it also does decontaminate water as it kills various bacteria which may be present there[8-9]. However, at excessive levels, fluoride can cause negative health effects. Such effects mainly include dental and skeletal fluorosis. When fluoride is absorbed into the bloodstream, it is distributed to other parts of the body, most of it being retained in the calcium-rich areas of the body like bones and teeth [8,10]. Once absorbed, it may eventually lead to various health effects. High levels of fluoride can manifest as dental fluorosis, which often manifests as yellowish striations on the teeth enamel; and high levels of fluoride have also been associated with the erosion of the enamel. High levels of dental fluorosis have been seen in countries like India and China with about 60 million individuals affected.

An excessive amount of fluoride in the water may also cause skeletal fluorosis. Endemic skeletal fluorosis has been detected in India, China, and most of Africa [2]. Compounded with issues which relate to poor nutrition and diet, osteosclerotic, as well as tendinous calcification and bone deformity, it can also be present among individuals with high levels of exposure to fluoride [11]. In an article by Sethi (2012), the author discussed how the depleting ground waters in India as well as the persistent increase in its population have been causing public health issues in terms of water supplies becoming unfit for drinking. As a result, fluoride has been used to decontaminate these waters; however, such action has also led to health issues. To compound the situation, arsenic has been found in abundance in the ground waters of India [11]. In effect, the risk for India's health has been significant, especially among children, with excessive fluoride levels in their

water causing delays in their physical and mental development and causing kidney problems among adults [11].

Similar scenarios have also been seen in Pakistan. Tahir and Rasheed (2013) discuss that fluoride has been known to affect the kidneys, the muscular system, as well as normal erythrocyte levels [5]. With high levels of fluoride in Pakistan's drinking water, the occurrence of hip fractures has also increased. Fluoride has also been considered a carcinogenic, affective with cancer mostly the bones [3,12]. In Sri Lanka, aside from dental and skeletal fluorosis, chronic kidney disease has also emerged as one of the major health issues caused by fluoride. These health risks have also been seen in other Central Asian countries, including Nepal and Bangladesh [12]. Along with other heavy metals like zinc and mercury, fluoride has been found in high levels of concentration in their ground waters. In addition, unfortunately, these are the heavy metals that have been known to cause most health risks to humans.

Tahir and Rasheed (2013) also point out that, based on their study in Pakistan, excessive levels of fluoride in water seems to have been a contributory element in the deaths of native people from unknown chronic diseases which share symptoms like bones and joints deformities [5]. In India, tests undertaken by the government authorities revealed that about 70% districts in the country had fluoride levels in their ground waters well above the permissible levels [13]. The health authorities declare that, considering the safety levels of fluoride, serious health issues can arise, including weak bones and pain in joints.

Scientists and other researchers have long established that excessive levels of fluoride in the water can be poisonous to the human body [14]. Bryson and Colburn (2004) discuss that, based on studies on the enamel of children, observed lines and spots on the enamel indicate excessive fluoride exposure [14]. Their studies reveal that high and persistent exposure to fluoride can block normal "breathing" for cells and can lead to the malformation of collagen [14]. The EPA in Washington also declares that there is a link between the fluoridation of water and the development of carpal tunnel syndrome and arthritis [15]. The Manchester Guardian also reported that fluoride poisoning in untested wells was the cause of severe arthritis experienced by millions of people in Central India. [15]

For older individuals, fluoridated water has also been linked with the higher risk of hip fractures [16]. In numerous studies covering different countries, high risks of hip fractures were seen in fluoridated communities, in some of them up to 87% higher than in areas with fluoride levels below 1.5 ppm [3,16]. The National Cancer Institute Toxicological Program (2012) also established that fluoride is a carcinogen. Studies by the New Jersey Department of Health indicate that there was a 6.9-fold increase in bone cancer among young males, especially in fluoridated areas [16]. In congressional hearings, the US National Cancer Institute indicates that about 40,000 cancer deaths could be attributed to fluoride [16].

Infertility has also been linked with increased fluoridation. Scientists from the Food and Drug Administration report that there was a strong correlation between fertility rates in women and higher fluoride levels [3,16]. They also indicate that for the impact on animal species in terms of fertility is actually even higher than on humans. Scientists also link high fluoride levels with brain damage or lower intelligence quotients (IQ). IQ levels of children with high exposure to fluoride were significantly lower. Studies on rats also indicate that neurotoxic effects were apparent when the subjects were exposed to high fluoride levels (1,3,16). The laboratory study also indicated that rats exposed to fluoride before birth were born hyperactive and retained this quality throughout their lives; however, those exposed as young animals indicated more depressed activity [16]. The scientists established that brain cells exposed to fluoride have manifested depletion of some brain chemicals, thereby causing neurological issues.

4. CONCLUSION

In conclusion, it is worth mentioning that fluoridation of water presents various health issues. In Asia, the impact of fluoridation of water is felt by millions of people in the form of dental and skeletal fluorosis, arthritis, high fracture rates, and similar bone-related afflictions. Although permissible levels of fluoride may decontaminate waters, excessive and cumulative levels of fluoride can have serious health consequences, including those already mentioned, as well as cancer, carpal tunnel syndrome, and neurological issues. Under these conditions, there seems to be a significant need for the health authorities to establish alternatives to water decontamination, especially in areas like Asia, which have been severely affected by the fluoridation of water.

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