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REVIEW - IMPACTION OF HUMAN HEALTH BY POOR QUALITY WATER

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Abstract:
Surface water and groundwater resources and water-related illnesses are increasing, especially under changing climate scenarios such as diversity in rainfall patterns, increasing temperature, flash floods, severe droughts, heatwaves and heavy precipitation. We conducted this review to emphasize the impact of polluted water on human health. Water represents a critical nutrient whose absence will be lethal within days. Water's importance for prevention of nutrition-related noncommunicable diseases has emerged more recently because of the shift toward large proportions of fluids coming from caloric beverages.

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INTRODUCTION:

Water is essential for life; prevention of dehydration has been a crucial component to survival since the time when primal creatures escaped from the oceans to live on land. The key adaptations are shared by a variety of species, including humans. Without water, humans can survive only for days. Water makes up 75% of an infant's body weight and 55% of an elderly person's body weight and is required for cellular homeostasis and survival [1].

Currently, 1.1 billion people lack access to safe water and 2.6 billion people lack good sanitation, particularly in developing nations, and there is a disparity in access to both better sanitation and safe drinking water supplies between rural and urban regions. Four out of every five people on the planet do not have access to safe drinking water in a rural environment [2]. On a global scale, the restricted access to safe water and to improved sanitation causes 1.6 million deaths per year; more than 99% thereof occur in the developing world. Nine out of ten Children are affected by events, and Sub-Saharan Africa accounts for half of all childhood mortality [3,4]. The readily preventable diarrheal disorders caused by contaminated water and a lack of sanitation and hygiene account for 6.1% of all health-related deaths; one study indicates that contaminated water causes 15% to 30% of gastrointestinal ailments [5].

Many of humanity's primary concerns in the twenty-first century are related to water supply and/or water quality difficulties [6]. Climate change will exacerbate these issues in the future by raising water temperatures, melting glaciers, and intensifying the water cycle, potentially leading to greater floods and droughts [7].

Chemical water pollutants are classified into two types: macropollutants, which often occur at the milligram per liter level and contain nutrients such as nitrogen and phosphorus species, and natural organic components [8].

Although the causes and effects of these major classical pollutants are very well recognized, developing sustainable treatment strategies for them remains a research problem [9]. High nutrient loads, for example, can cause increased primary biomass production, oxygen deprivation, and harmful algal blooms [10]. Excessive irrigation and increased salt loads entering surface water offer another long-term problem [11]. High salt concentrations make drinking water unfit for consumption and impede crop development in agriculture. The problem is exacerbated in several coastal areas, including India. and China, by marine salt intrusion into groundwater owing to overexploitation of aquifers and sea level rise [12].

METHODLOGY:

Literature search conducted though databases; PubMed and EMBASE, up to 2021, regarding the impaction of polluted drinking water on human health. Only human subjects were included, limited to only English language publish studies or books. And references of included studies were reviewed for any more matching papers.

DISSCUSION:

The physicochemical Water characteristics can influence the growth of biological life forms in water, hence affecting water quality [1,12]. This category includes physical parameters like as temperature, turbidity, electrical conductivity, and chemical qualities such as dissolved oxygen (DO), biological oxygen demand (BOD), and chemical oxygen demand (COD).

When we speak about water, we are generally referring to all forms of water, whether soft or hard, spring or well, carbonated or distilled. Furthermore, we obtain water not only directly as a beverage but also indirectly through food and, to a lesser extent, from the environment. to some part from macronutrient oxidation (metabolic water). The proportion of water obtained through beverages and meals varies with the amount of fruits and vegetables consumed. The ranges of water in various foods are presented below (Table 1). It is believed that roughly 22% of water in the United States comes from food consumption, although it would be much greater in European countries, particularly Greece, which consumes more fruits and vegetables, or South Korea [13,14]. The sole comprehensive investigation of water use and water intrinsic to food in the United States discovered a 20.7% contribution from food water; however, as we will explain later, this research was predicated on a poor overall evaluation of water intake [15,16].

Table 1: The Water Content Range for Selected Foods

Percentage	Food Item
100%	Water
90–99%	Fat-free milk, cantaloupe, strawberries, watermelon, lettuce, cabbage, celery, spinach, pickles, squash (cooked)
80–89%	Fruit juice, yogurt, apples, grapes, oranges, carrots, broccoli (cooked), pears, pineapple
70–79%	Bananas, avocados, cottage cheese, ricotta cheese, potato (baked), corn (cooked), shrimp
60–69%	Pasta, legumes, salmon, ice cream, chicken breast
50–59%	Ground beef, hot dogs, feta cheese, tenderloin steak (cooked)
40–49%	Pizza
30–39%	Cheddar cheese, bagels, bread
20–29%	Pepperoni sausage, cake, biscuits
10–19%	Butter, margarine, raisins
1–9%	Walnuts, peanuts (dry roasted), chocolate chip cookies, crackers, cereals, pretzels, taco shells, peanut butter
0%	Oils, sugars

The large variety of different mineral phases and possible interactions between solutes, which are relevant for adsorption processes, complicate the environmental assessment of metal pollution and its health effects [17]. Rapid progress in X-ray spectroscopy was instrumental in elucidating the structure of metal ions adsorbed on mineral surfaces because the method allows identification of the specific molecular neighbors of metal ions in complex mineral environments [18]. Such molecular-level information helps develop an understanding of the factors affecting the mobility of toxic metal ions. A precondition for biological action is the potential ability of metal ions to cross cell membranes. Strong bonds to mineral particles and stable macromolecular complexes typically prevent uptake. As a consequence, direct methods have been developed to assess the mobility and bioavailability of metal contaminants in complex media, e.g., soils or sediments [19]. To determine the fate and distribution of metals in the environment, insight from molecular-level studies and in situ field observations can then be scaled up using simple or more sophisticated reaction/transport models, which combine physical, chemical, and (micro)biological processes. The last step of an assessment procedure addresses the effects of biological uptake. The analysis of potential effects of nanoparticles provides an illustrative example. In recent years, the rapidly growing use of engineered nanoparticles for industrial and commercial applications caused concern about the biological effects of this type of new anthropogenic pollutant for the aquatic environment and human health. There is now preliminary evidence that such particles do not only release toxic metals at constant rates but could also exert direct specific harmful effects, which require further research [20].

Importance of water for health:

Physical activity and water:

The role of water and hydration in physical activity, particularly in athletes and in the military, has been of considerable interest and is well-described in the scientific literature [21]. During challenging athletic events, it is not uncommon for athletes to lose 6–10% of body weight in sweat loss, thus leading to dehydration if fluids have not been replenished. However, decrements in physical performance in athletes have been observed under much lower levels of dehydration, as little as 2% [22]. Under relatively mild levels of dehydration, individuals engaging in rigorous physical activity will experience decrements in performance related to reduced endurance, increased fatigue, altered thermoregulatory capability, reduced motivation, and increased perceived effort [23,24]. Rehydration can reverse these deficits, and also reduce oxidative stress induced by exercise and dehydration. Hypohydration appears to have a more significant impact on high-intensity and endurance activity such as tennis and long-distance running than on anaerobic activities such as weight lifting or on shorter-duration activities, such as rowing [25].

During exercise, individuals may not hydrate adequately when allowed to drink according to thirst. After periods of physical exertion, voluntary fluid intake may be inadequate to offset fluid deficits. Thus, mild to moderate dehydration can therefore persist for some hours after the conclusion of physical activity. Research in athletes suggests that, principally at the beginning of the season, they are at particular risk for dehydration due to lack of acclimatization to weather conditions or suddenly increased activity levels [26]. A number of studies show that performance in temperate and hot climates is affected to a greater degree than performance in cold temperatures [26, 27,28. Exercise in hot conditions with inadequate fluid replacement is associated with hyperthermia, reduced stroke volume and cardiac output, decreases in blood pressure, and reduced blood flow to muscle [29].

During exercise, children may be at greater risk for voluntary dehydration. Children may not recognize the need to replace lost fluids, and both children as well as coaches need specific guidelines for fluid intake [30]. Additionally, children may require longer acclimation to increases in environmental temperature than do adults. Recommendations are for child athletes or children in hot climates to begin athletic activities in a well-hydrated state and to drink fluids over and above the thirst threshold [30].

Cognitive and water:

Water, or its lack (dehydration), can influence cognition. Mild levels of dehydration can produce disruptions in mood and cognitive functioning. This may be of special concern in the very young, very old, those in hot climates, and those engaging in vigorous exercise. Mild dehydration produces alterations in a number of important aspects of cognitive function such as concentration, alertness and short-term memory in children (10–12 y), young adults (18–25y) and in the oldest adults, 50–82y [27]. As with physical functioning, mild to moderate levels of dehydration can impair performance on tasks such as short-term memory, perceptual discrimination, arithmetic ability, visuomotor tracking, and psychomotor skills. However, mild dehydration does not appear to alter cognitive functioning in a consistent manner [27,28,30]. In some cases, cognitive performance was not significantly affected in ranges from 2–2.6% dehydration. Comparing across studies, performance on similar cognitive tests was divergent under dehydration conditions. In studies conducted by Cian and colleagues, participants were dehydrated to approximately 2.8% either through heat exposure or treadmill exercise. In both studies, performance was impaired on tasks examining visual perception, short-term memory, and psychomotor ability. In a series of studies using exercise in conjunction with water restriction as a means of producing dehydration [31].

Water and hemodynamic response:

Blood volume, blood pressure, and heart rate are closely linked. Blood volume is normally tightly regulated by matching water intake and water output, as described in the section on kidney function. In healthy individuals, slight changes in heart rate and vasoconstriction act to balance the effect of normal fluctuations in blood volume on blood pressure [31]. Decreases in blood volume can occur, through blood loss (or blood donation), or loss of body water through sweat, as seen with exercise. Blood volume is distributed differently relative to the position of the heart whether supine or upright, and moving from one position to the other can lead to increased heart rate, a fall in blood pressure and, in some cases, lead to syncope. This postural hypotension (or orthostatic hypotension) can be mediated by drinking 300–500 ml of water [32,33]. Water intake acutely reduces heart rate and increases blood pressure in both normotensive and hypertensive individuals [34]. These effects of water intake on the pressor effect and heart rate occur within 15–20 minutes of drinking water and can last for up to 60 minutes. Water ingestion is also beneficial in preventing vasovagal reaction with syncope in blood donors at high risk for post-donation syncope [35]. The effect of water drinking in these situations is thought to be due to effects on the sympathetic nervous system rather than to changes in blood volume [32,35].

To reduce the human health burden due to poor water quality and the lack of improved sanitation and hygiene, WHO and the United Nations Children's Fund have launched as a millennium development goal (MDG) to halve the population without access to safe drinking water and basic sanitation by 2015 [32]. In 2006, 87% of the world's population used safe drinking water sources compared to 77% in 1990. With respect to sanitation, however, the numbers are less encouraging; the total population without access to improved sanitation has decreased only slightly since 1990 from approximately 2.5 to 2.4 billion [35].

CONCLUSION:

It's important to understand the role of fluid intake on health has emerged as a more relevant topic, owing in part to the move toward large quantities of fluids derived from caloric beverages. Pesticide applications in nonagricultural/urban regions also cause water contamination in drainage and sewer systems due to increased runoff of pesticide-containing rainfall over sealed surfaces such as roofs and roadways. In terms of the overall environmental implications of widespread agriculture, reducing soil and water pollution caused by pesticide emissions is seen as a critical component in agricultural management methods to reduce ecological changes and sustain biodiversity.

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