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Alleviation of Health Complaints Following Regular Consumption of Filtered Tap Water (AcalaQuell®) Is Independent from Placebo Effects:

A Randomized, Double-Blind, Controlled Field Study

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ABSTRACT

Recently, it was shown that regular consumption of a standardized amount of filtered tap water improved the self-reported physical complaints. However, since individuals were fully aware of the type of water they consumed, it was unclear to what extent this effect was ascribable to placebo effects. This paper tests the effectiveness of an in-home water filter system (AcalaQuell®), which was compared with a sham water filter containing no significant filter ingredients. Both filters were concealed, and participants knew that the probability to receive the clinically proven filter was 50%. There were large differences between the two groups ($0.7 < d < 2.0$.). For individual-specific complaints, the reduction was 38% for the filtered water group while the reduction in the placebo group was about 8%. Subjective health complaints are considerably reduced after daily intake of AcalaQuell®-filtered tap water during a three-week administration period. This effect is specific and independent from placebo effects.

KEYWORDS

AcalaQuell, Drinking Water Contamination, Effectiveness, Health Benefit, Health Complaints, In-Home Water Filter, Placebo Effect, Public Health

1. INTRODUCTION

Health is critically dependent on the quality of drinking water (Chowdhury et al., 2019; Clasen et al., 2014; Daughton, 2018; Koopaei and Abdollah, 2017), but many health care professionals tend to somewhat reduce its significance to maintaining physiological functions, e.g., blood pressure, pH, and body temperature (Armstrong and Johnson, 2018; Perrier, 2019). Yet, throughout recorded human history the preventive and curative power of water was well known and part of various therapeutic approaches (Moss, 2010). Even if one disregards or questions the healing properties of water, many entertain a widespread misconception with regard to the quality of drinking water. The rapidly rising number of toxic substances contaminating municipal surface and groundwater impacts all wastewater treatment works (Petrie et al, 2015). Flowing waters used as municipal water supplies also show high concentrations of contaminants which act as vectors for waterborne contaminants or pathogens (Lechner, 2020). However, there is a discrepancy in the understanding of the situation

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and its implication for public health. A recent American survey of perceptions about water showed that while 60 percent of the experts recognized that pathogens, fertilizers or pesticides pose a risk to public water systems in the U.S., the majority still rated the water supply as normal or good (Eck et al., 2019). This contradiction could stem from a subjective probability bias or a defense mechanism (Ferrer and Klein, 2015), which is even more accentuated if one takes into account additional factors that may corrupt tap water quality. Apart from microbiological and biochemical concerns, water treatment and transportation are additional potential harmful factors. It has been argued that the intake of 'stressed' water disrupts the water between and within cells in the human body and may prompt pathological macromolecular changes (Davidson et al., 2013). Among such stressors are, e.g., water disinfection (e.g. chlorine or ozone), supplementation (e.g. fluoride), and compression of water through pipe transportation from the supplier to the household. Bottled water, which some regard as a viable alternative, is also contaminated, regardless of whether the bottle is made of plastic or glass. For instance, in a recent study testing 259 bottles from 19 different countries, 93 per cent showed some sign of microplastic contamination (fragments and fibers), which stemmed from both packaging and bottling (Mason et al., 2018). In a large study conducted in Germany, the country with the highest number of bottled mineral water brands, about one third failed to meet the drinking water regulations defined by the EU (Birke et al., 2010). A recent systematic review selecting studies that used procedural blank samples and a validated method for particle composition analysis found that the high-quality studies confirmed strong microplastic contamination of drinking water with the maximum reported contamination of 628 MPs/L for tap water and 4889 MPs/L for bottled water (Danopoulos et al., 2020).

These findings are cause for concern both from the point of view of ecological damage and the burden caused for the health care system. They also suggest that the definition of healthy or 'vital' water warrants reconsideration over and above current regulation policies and recommendations established by national and international health organizations. For example, Pollack (2001) showed that water in the human cell is found in a state of structured aggregation, which he dubbed EZ-water (exclusion zone water). In this state, water homogenously organizes against a hydrophilic surface to form a crystalline structure, 'forcing' other molecules beyond the EZ. Experimental evidence indicates that EZ-water has a negative electric charge which improves its functions for biochemical and structural processes (e.g. by improving the phase angle of tissue, cf. Emilee and Wilhelm-Leen, 2014). Additionally, it also contains higher levels of oxygen, which may help to improve wound healing (Ladizinsky and Roe, 2010), enhance lactate clearance kinetics (Fleming et al., 2017), protect against muscle fatigue (Ivannikov et al., 2017), and boost the immune status and liver function (Grubera et al., 2005). This suggests that there are factors beyond mere contaminants threshold values that influence the quality of the water.

In fact, epidemiological studies support the notion that less-than-optimal household water quality has adverse effects over time, as do natural water sources due to the increase of environmental contamination (Vörösmarty et al., 2010). Health-conscious consumers seek alternative sources, for instance by resorting to point-of-use (POU) water treatment systems which may improve tap water quality, especially with regard to filtering out some of the most commonly known contaminants (Brown et al., 2017). However, there is a general lack of studies investigating such POUs in actual use (i.e. in real life). Recently, the effectiveness of one such POU system, an in-home water filter system, was tested in a pre-clinical sample of adults suffering from various health complaints (Schneider, 2021). According to several chemical analyses this filter system significantly reduces pesticides, bacteria, light-, heavy-, and semi-metals, pharmaceuticals and other major contaminants. The device also aims to revitalize tap water by restoring its original (hexagonal) structure, which is thought to improve the water's bioavailability and biophysiological properties. This claim has not yet been tested empirically, but Schneider (2021) found large health improvement rates after daily consumption of filtered water for three weeks. On average, both physical and mental complaints decreased considerably ($1.0 < d < 1.4$), with individuals suffering from a higher complaint burden at the onset of the study experiencing