**AN OVERVIEW OF WATER KEFIR, ITS BENEFITS AND APPLICATIONS**

**ABSTRACT**

Water kefir consumption has increased during the last few years. Water kefir is suitable for plant-based lactose-free diets. People are more aware of the relevant role of a healthy diet to improve their well-being. This led to a growing demand for healthy probiotic foods where traditional fermented beverages like water kefir are gaining special attention. Water kefir, also known as 'aquakefir or 'sugary kefir, is an artisanal fermented beverage, slightly effervescent with acid and fruity flavour and low alcohol content. Water kefir has more health benefits and higher nutritive value. Water Kefir is known for its sugar, vitamin and mineral content. Consumption of kefir improves the overall health of pregnant women, also known for its anti-diabetic, anti-allergic and anti-cancer properties. Various applications of kefir include in the medical field, biopolymer, and control of food contamination.

KEYWORDS: Vegan, fermented Beverage, lactose-free, biopolymer and aquakefir.

**INTRODUCTION**

Fermentation is the process in which a substance breaks down into a simpler substance with the help of microorganisms like yeast and bacteria. Probiotics are live microorganisms that provide health benefits when consumed, by enhancing or revivng the gut microbiota. Water kefir is sour alcoholic fermented beverage with the fermentation by water kefir grains. Water kefir is a traditional fermented drink and a symbiotic culture of bacteria and yeast (SCOBY) held in a polysaccharide biofilm matrix created by the bacteria. The fermented, filtered and grain-free beverage is known as "water kefir'', "sugary kefir" or "aquakefir" (among other regional names). Grains are called "water kefir grains'', and their strengthening immunity has gained importance in the prevention of diseases, especially after COVID-19 pandemic. As a result, adequate and balanced nutrition is receiving more attention than ever before to prevent diseases or overcome them with the least amount of harm. According to reports, consuming functional foods, which are not drugs or dietary supplements, increases the continuity of health (Altun kamarli et al., 2021). Water kefir is a probiotic drink, prepared by dissolving water kefir grains in a sugar water solution, the grains are a symbiotic assortment of bacterial and yeast strains, which need an environment of sugar water to thrive well. The microbial strains in water kefir feed on the sugar in the water and produce a slightly sweet, mildly tangy carbonated drink with traces of alcohol (Fuller Roy ., 2007). It is obtained as a result of the fermentation of Sugar by water kefir grains in which dried fruits can be often included in the fermentation process (Cufaoglu Gizem & Erdinc Ayse Nur., 2023).

Water kefir is a slightly carbonated fermented beverage with 2% lactic acid content. It is obtained by Fermenting sugar in kefir grains, which are white or yellowish in colour and translucent in appearance. The types of microorganisms in the water kefir differ depending on the sugar, carbon sources, and fermentation conditions. The microbiota mainly consist of lactic acid bacteria, acetic acid bacteria, and yeasts. Fermented water kefir contains metabolites including sugar, fruit-derived components, lactic acid, acetic acid, ethanol, carbon dioxide, mannitol, vitamins, and amino acids such as arginine. The production of water kefir has traditionally occurred on a small scale and the use of defined starter cultures is not commonly practiced.

**WATER KEFIR HEALTH BENEFITS**

The health benefits of water kefir intake are empirically sustained by Centuries of consumption by humans. In such time of consumption, microorganisms found in water kefir have shown to be non-pathogenic and together with the Organic Acids they produce. They can inhibit the growth of pathogenic microorganisms such as Salmonella sp., Shigella sp. (Koroleva, 1988; Anselmo et al., 2001; Zavala et al., 2016), Salmonella typhimurium, E. coli and Staphylococcus Aureus (Romero-Luna et al., 2020) (Seydim Zeynep B.Guzel., 2021).

* **RICH IN BENEFICIAL BACTERIA**

The most significant benefits of water kefir is its probiotic content. Probiotics are a type of beneficial bacteria found in the gut that play an integral role in almost every aspect of health, from cancer prevention to immune function and beyond, kefir is considered a better source, as it provides a diverse range of bacteria and yeast. Some research shows that kefir grains contain up to 56 different bacterial and yeast strains. Some of the most common families of beneficial bacteria found in kefir include Lactobacillus, Lactococcus, Streptococcus and Leuconostoc (Ajmera Rachael., 2018).

* **SCAVENGES CANCER CELLS**

Some research suggests that water kefir helps to decrease the growth of certain types of cancer cells. A study proved that kefir extract was effective in blocking the growth of breast cancer cells. Meanwhile, other studies show that kefir could be beneficial against colon and blood cancer as well because it's rich in probiotics, it also helps to boost immune function to potentially aid cancer prevention. However, more research is needed to evaluate how water kefir may impact the growth and development of cancer cells in humans (Ajmera Rachael., 2018).

* **BOOST IMMUNE FUNCTION**

Due to its high concentration of beneficial bacteria, adding water kefir to the daily diet gives the immune system a hearty boost. Studies show that certain strains of probiotics help reduce the risk of intestinal infections, prevent the recurrence of urinary tract infections in women and even keep respiratory infections at bay. Through animal studies, it has been shown that water kefir helps suppress inflammatory responses in issues like asthma etc. Plus, one small six-week study in 18 people found that consuming kefir daily was able to control inflammation and optimize levels of immune cells in the body (Ajmera Rachael., 2018).

**EFFECT OF WATER KEFIR ON ENTERIC BACTERIAL PATHOGEN**

Antagonistic properties of kefir against enteric bacteria have been associated with many factors such as the production of organic acids, hydrogen peroxide, acetaldehyde, carbon dioxide, kefiran, bacteriocins, S-layer proteins, adhesion of pathogens on yeast cell walls, competition for nutrients and space (Leite et al., 2013; Menezes et al., 2020; Mobile et al., 2009; Shen et al., 2018).

**ROLE OF KEFIR AGAINST FOOD CONTAMINATION**

Control of food contamination is a global challenge. Several chemical and physical methods have been employed for years to bring down the contaminants level in food (Randhawa, Asghar, Nadeem, & Ahmad., 2018). Recently, biological methods have gained more attention. In this approach, microorganisms, extraction enzymes, or probiotic products are applied to convert contaminants into compounds with less or no toxicity. Probiotic microorganisms are considered safe as they do not produce harmful metabolites. Lactic acid bacteria and some yeast species are the most important probiotics that are widely used in the food industry ( Touranlou Fateme Asadi et al., 2023). Kefir grains contain different types of bacteria and yeast, including homo- and hetero-fermentative lactic acid bacteria, lactose and non-lactose-assimilating yeast (Bahati et al., 2021). There are many ways that LAB or yeast interacts with food contaminants. The specific way it happens depends on the type of contaminant, the strain of the microbe, and the physical and chemical conditions (Touranlou Fateme Asadi et al., 2023).

**KEFIR AS BIOPOLYMERS**

The need for a replacement for petroleum-derived polymeric materials has increased the demand of bio-based materials, such as biopolymers. The market for natural polymers is increasing, especially to fulfil the growing demand for clean-label products with applicability in the food, cosmetic, and pharmaceutical industries. EPS of microbial origin is an important natural alternative since they present, in addition to technological benefits, numerous beneficial effects due to their antioxidant, antimicrobial, immunomodulatory, and anti-tumour properties, not found in more traditional plant-based polymers (Lucena Monalisa de Alencar et al., 2022).

The biological activity of kefir's potential is anti-inflammatory, immunomodulatory, and antimicrobial activity, as well as anti-mutagenic and anticancer properties. These grains also produce exopolysaccharides (EPSs), a carbohydrate polymers which provides cell adhesion and protect microorganisms against severe environmental conditions. The EPS from water kefir grains is mainly composed of dextran. Dextran is the main component of the polysaccharide matrix of water kefir grains, produced by dextransucrase from sucrose, with consecutive a-(1-6) bonds in their main chains, which generally constitute 50% of the total bonds of this biopolymer. Dextran can be employed as a thickener, emulsifier, viscosity modifier, and stabilizer and is biodegradable.

**CONCLUSION**

Kefir consumption tends to have benefits including antibacterial, anti-inflammatory, reversal of lactose intolerance, general GIT improvement and immunomodulatory properties. Studies have indicated the potential application of water kefir and its components in the prevention and treatment of infectious enteric bacteria. Nowadays, consumers are more aware of the relevant role of a healthy diet to improve their well‐being. This growing demand for healthy probiotic foods where traditional fermented beverages like milk kefir and water kefir are gaining special attention.

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