

Chemical and Therapeutic Aspects of Kefir

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Abstract

Kefir is a probiotic food. Probiotics have shown to be beneficial to health, being presently of great interest to the food industry. Kefir grains are an example of symbiosis between yeast and bacteria. They have been used over years to produce kefir beverages from milk, whey, sugar solution and fruit juices, that is consumed all over the world, although its origin is Caucasian.

Keywords: Nutrition; Probiotic; Beverage

Introduction

Kefir is a culture employed to produce beverages from milk and fruits [5,13,14,15,16,20,21]. The grains of kefir are irregularly shaped, which resemble miniature cauliflower blossoms. The kefir is a mixed culture of various yeast species of the genus *Kluyveromyces*, *Candida*, *Saccharomyces* and lactic acid from bacteria of the genus *Lactobacillus*, *Lactococcus*, *Leuconostoc*, *Bacillus* and *Acetobacter* combined in a matrix of proteins and polysaccharide 'kefiran' [13,-16,19,20,23,27]. In Brazil, the grains of kefir are used in private household [13,14,15,16,20] and they are added to different types of milk, such as cow, goat or sheep, coconut, rice and soy milk [5,13,14,15,16,20,21].

The microorganisms present in kefir carried out three types of fermentation during the fermentation process: lactic, alcoholic and acetic. [12,13,14]. The kefir beverages contains vitamins, minerals and essential amino acids that help the body with healing and maintenance functions [5,13,14,15,16,20,21].

The objective of this review is to report chemical and therapeutic characteristics of kefir.

Chemical Composition of Kefir

Kefir is a fermented beverage of milk, whey, sugar solution or fruits juice [12,13,14,15,19]. Kefir grains resemble miniature cauliflower blossoms Figure 1 [8]. A vast variety of different symbiotic species of microorganisms forming the kefir grains, comprising yeast and bacteria, have been isolated and identified. The *Lactobacillus* genus is the most frequent. *Leuconostoc*,

Lactococcus, *Streptococcus* and *Acetobacter* genus are commonly detected. [3,7,11,14,15,19,25]. The yeast isolates belonging to species of the *Kluyveromyces*, *Candida*, *Pichia*, *Zygosaccharomyces* and *Saccharomyces* genus [7,10,11,22].

In our studies, we find the microbiota of the Brazilian kefir (for isolation and PCR-DGGE methods) composed of yeast and bacteria's. Lactic acid bacteria were the major isolated group identified, followed by yeasts and acetic acid bacteria's such as *Lactobacillus kefir*, *Lactobacillus lactis*, *Lactobacillus* sp., *Lactococcus* sp., *Leuconostoc* sp., *Acetobacter acetic*, *Acetobacter lovaniensis*, *Acetobacter* sp., *Saccharomyces cerevisiae*, *Kluyveromyces marxianus*, *Pichia* sp., *Candida* sp., *Kazachstania aerobia* and *Lachancea meyersii* [13,14,15,16].

The microorganisms present in kefir carried out three types of fermentation during the fermentation process: lactic, alcoholic and acetic [12,13,14]. The compounds formed are divided in two groups: major and minor end-products (secondary metabolites).

O lactic acid, acetaldehyde, diacetyl, acetoin, acetone are originates from fermentation of homofermentative and heterofermentative lactic acid bacteria's present in kefir grains.



Figure 1: Kefir grain.

[1,2,3,9,18]. The formation of ethanol in kefir beverages is essentially obtained by the conversion of acetaldehyde to ethanol by alcohol dehydrogenase, an enzyme present in kefir yeasts and lactic acid bacteria's [9].

Biosynthesis of acetic acid may be from various amino acids, e.g. *Streptococcus* genus are able to form acetic acid from glycine, alanine and leucine [2]. Acetate may also be formed from pyruvate by *Acetobacter* genus [9].

Studies have shown that kefir have antimicrobial activity [4,5,6,21]. These studies indicate that kefir antimicrobial activity is associated with the production of organic acids, bacteriocins, carbon dioxide, hydrogen peroxide, ethanol and diacetyl.

The nutritional/chemical composition of kefir is variable. It depends on the source fat content of milk, the microbial composition and the technological process of kefir. The nutritional/chemical composition of kefir is composed mainly of protein, mineral content (Calcium, Phosphor, Magnesium, Potassium, Sodium, Chloride), essential amino acids (tryptophan, Leucine, Lysine, Valine), vitamins (A, Carotene, B1, B2, B6, B12, C, D, E), aromatic compounds (Acetaldehyde, Diacetyl, Acetoin) and trace elements (Iron, Copper, Molybdenum, Manganese, Zinc) [19].

Therapeutic Aspects of Kefir

The kefir microbial interactions and the bioactive compounds resulting of yeast and bacteria metabolism, and the benefits associated with the use this beverage confers kefir the status of a natural probiotic [4,5,6,18,19,20,21,24]. The effect caused by kefir beverages consumption in the intestinal microbiota is due to a pathogen inhibition by acids and bacteriocin production in the intestinal mucosa [22].

The anticarcinogenic role of kefir can be attributed to cancer prevention by activation of the immune system [6,23]. Lactic acid Bacteria's present in kefir may involve the inhibition of the cholesterol absorption in the small intestine [26]. Lactic acid Bacteria's also have the ability to decrease lactose concentrations by presence of β -galactosidase activity in fermented process, make them suitable for consumption by people classified as lactose intolerant [7,23]. Kefir has also been shown effective against hypertension [19].

The polysaccharide matrix, called kefiran Figure 2, is produced by lactic acid bacteria and usually associated to the therapeutic properties of kefir [19]. Kefiran has frequently been claimed to be effective against a variety of diseases, antitumor activity, antibacterial and antifungal activities [19]. kefiran was modulate key steps in the virulence of *Bacillus cereus* in intestinal infections [4].

Considerations

Currently, the application of probiotics in the food industry is in expansion. The symbiotic relationships between different microorganisms present in kefir, as well as their interactions, could assist in the improvement of technological processes and benefits to health. From an industrial point of view, the



Figure 2: Kefiran.

development of kefir beverages is welcome providing benefits to health, and insert the market a new functional food with therapeutic benefits.

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