

## **CHAPTER 1**

### **INTRODUCTION**

Rice is one of the major staple foods for nearly half of the world's population for centuries. There are about 90% of its production and consumption in Asia. Consumer's preferences vary from place to place. The Japanese prefers sticky rice, Americans like a semi-milled long grain rice or even brown rice, Asian culinary dominates spicy and scented Basmati/Jasmine rice, and the Indian prefers a well-milled white rice. Starch is the main constituent of rice that is made up of two major fractions, amylose and amylopectin. Amylose is the key determination of eating and cooking quality of cooked rice (Ghasemi et al., 2009).

Black glutinous rice is an economically important rice species and derives its name from its rich natural anthocyanin compound, such as cyanidin-3-glucoside and peonidin-3-glucoside, which possess anti-oxidative and anti-inflammatory activities (Hu et al., 2003). Beside this, black glutinous rice contains other beneficial components, including polyphenolics, flavonoids, vitamin E, phytic acid, and  $\gamma$ -oryzanol. These antioxidant compounds eliminate reactive oxygen species such as lipid peroxide and superoxide anion radicals and lower cholesterol content (Ichikawa et al., 2001).

Starch is the main constituent of rice that is made up of two major fractions, amylose and amylopectin. Amylose is the key determination of eating and cooking quality of cooked rice. One of the most important processing steps to provide desirable texture in rice grains is cooking. It involves heat and mass (water) transfer. The rice grains are boiled in limited or excess amount of water for cooking. The starch of milled rice grain absorbs moisture and swells during cooking due to its gelatinization (Yadav and Jindal, 2007). In general, rice qualities are evaluated based on flavor, texture, color and other properties like glossiness, looseness and kernelness. Since the consumers' choice and textural preferences in various regions are different, it is difficult to determine a standard procedure for cooking rice. There are some

methods for rice cooking in Iran like open pan cooking, pressure cooking, cooking in an electric rice cooker and microwave cooking (Lakshmi et al., 2007).

The health benefits of milk and fermented milk products have been known since medieval times. Drinking milk has taken the advantage of the extensive nutritional value not only to the child, but also to the adult and the elderly. The health benefits of dairy products are the result of biologically active components that are present in native milk and also, due to their suitably modulated activities produced through the action of probiotic bacteria, in the fermented or sour milk products. In addition to modification of several milk components, the probiotics may also act directly as preventive agents, or in therapy of some contagious, atopic, tumor or other severe diseases. The health-promoting effect of the prefermented functional foodstuffs materializes directly through interaction with consumed microorganisms (probiotic effect) or, indirectly, as a result of action of microbial metabolites generated during the fermentation process (biogenic effect). The most important biogenic metabolites include vitamins, proteins, peptides, oligosaccharides, and organic acids, including fatty acids (Ebringer et al., 2008). Fermented milk products such as yogurt are produced throughout the world. Yogurt consumption leads to better growth and increase nutrient utilization which is due to more digestible protein, more calcium and certain B group vitamins. Besides nutritional value, it has hypocholesterolaemic and antitumouric effects (Kumar and Mishra, 2004).

The objective of this research was to find an optimum condition in the processing of black glutinous rice by investigating rice particle sizes, pH reduction in the soaking and boiling solution, ratio of soaking water to rice, soaking time, heating methods and heating time to produce black glutinous rice solution. The rice solution was subsequently fermented by *Streptococcus thermophilus* and *Lactobacillus bulgaricus* to obtain fermented black glutinous rice drink.