

CHAPTER I

INTRODUCTION

1.1 Background of the study

Milk for human consumption generally comes from cow's milk, although in certain areas goat's and horse's milk are also consumed. Milk is a nutritious drink because it contains complete nutritional elements that the body needs. Milk can come from animal or vegetable origin. Animal milk has a good composition for the body, but is not suitable for people who are lactose intolerant, because it contains lactose which can be detrimental to the health of people who are lactose intolerant. Milk that is suitable for people who are lactose intolerant is vegetable milk, for example soy milk, mung bean milk, or jack bean milk. The plant-based milk that is widely sold on the market is soy milk. The price of plant milk is relatively cheap compared to animal milk (Triastuti, 2016). One alternative to milk cows other than soy milk, namely peanut tempeh milk.

Lactose intolerance is a condition in which people experience digestive symptoms, such as bloating, diarrhoea, and gas after eating or drinking milk or other dairy products (NIH, 2014). In Indonesia, especially in Jakarta, 21% of children aged 3-5 years old, experience lactose intolerance, 58% of children aged 6-11 years old as well (Solaeman EJ, 2014). Symptoms of lactose intolerance vary in severity and can be triggered by varying amounts of lactose consumption. This is not an allergy, but rather a sensitivity caused by a lack of the enzyme lactase, which is necessary for the digestion of lactose. Therefore, people with lactose intolerance can only consume products that are low in lactose. However, many existing low-lactose products are imported from abroad and are expensive. So the idea arose to make milk from peanut tempeh because peanuts are relatively cheap, economical and easy to find.

People in Indonesia have long known peanuts as a traditional food that is cheap, delicious and contains high nutritional value. This allows public awareness of the benefits of peanuts as an alternative drink for lactose intolerance. Peanuts contain vitamin E, folic acid, protein, manganese, biotin, fiber, magnesium, monounsaturated fat, and are rich in antioxidants (Yulian, 2021). This nutritional content makes peanuts the main source of protein after soybeans. The proteins, fats and carbohydrates in tempeh are very easily digested by the body, so it is very safe for consumption by all ages from toddlers to the elderly and can be processed into milk, so tempeh makes it possible to make vegetable milk, namely tempeh milk (Darajat, 2014) . Tempeh milk is a product of extracting tempeh with water to obtain a solution with dissolved solid components. Tempeh milk is one of the second generation tempeh products (Widowati, 2005). Modification of soybean tempeh into peanut tempeh is a variation of tempeh made using peanuts as the basic ingredient.

Indonesian people consume tempeh as a meat substitute due to the affordable price. In the beginning, it is perceived as a low-class food compared to other protein foods (e.g. egg, fish, and meat). However, over the last four decades, the attitude toward tempeh has changed. It is widely consumed as an inexpensive, nutritious food by people from different socio-economic classes, not only in rural but also in urban areas (Fidyasari et al., 2021). Tempe is the result of solid-state fermentation of soybean with the help of a mold starter called *Rhizopus spp.* The manufacturing of tempeh goes through several steps of processing, such as soaking, de-hulling, washing, boiling, draining, cooling, inoculating with starter, and incubating at room temperature (30 ± 2 °C) (Rahayu et al., 2015).

During incubation, soybean fermentation occurs, indicated by the formation of compact cake, where the beans were fully covered and bound together by the white mold *mycelia*. This is because the mold that grows on tempeh can retain most of the nutrients contained in peanuts, increase protein

digestibility, and increase the levels of several types of vitamins. Tempeh has been reported to possess potential beneficial properties to human health (Polanowska et al., 2020). The functionality of tempeh is notably due to the presence of bioactive compounds known as isoflavones. These phytochemicals mainly found in soybeans can act as antioxidants that protect human cells from oxidative stress linked to aging and many chronic diseases including cardiovascular diseases, atherosclerosis, hypercholesterolemia, diabetes, neurodegenerative diseases, and even cancer (Liguori et al., 2018). During fermentation of tempeh, enzyme beta-glycosidase secreted by molds breaks down the bond forming conjugated isoflavones, resulting in the liberation of free isoflavones that are stronger antioxidants and more easily absorbed in higher amount in human intestine compared to conjugated isoflavones (Barnes et al., 2011).

Tempeh contains sufficient amounts of macro and micro minerals, such as copper and zinc minerals. Tempeh mold can produce the enzyme phytase which will break down phytic acid (which binds several minerals) into phosphorus and inositol. With the breakdown of phytic acid, certain minerals (such as iron, calcium, magnesium and zinc) become more available for the body to utilize (Tamang et al., 2016). Peanut tempeh has a higher protein content compared to fresh peanuts, and is rich in vitamins B and phytochemicals such as isoflavones, phytic acid, phytosterols, and p-Coumaric acid. Apart from that, peanut tempeh also has a higher fiber content, which can help maintain a healthy digestive tract. The way to process peanut tempeh milk is fermented peanut tempeh, then steamed until cooked, then blended with water until smooth. Strain the liquid using a cloth three times and take the juice, then cook over low heat and add fiber cream, pandan leaves, sugar and salt. cook until thickened. Tempeh milk is ready, don't forget to store it in a container and refrigerate it.

1.2 Objective of the study

The objectives of this study are following below:

1. To introduce peanut tempeh milk as a better and much nutritious milk option for those who experience lactose intolerance.
2. To increase knowledge about the potential of peanut tempeh as a source of nutrition that can help overcome lactose intolerance and improve the quality of life of individuals who experience lactose intolerance.