

Abstract

The overall aim of this thesis was to develop a non-dairy probiotic beverage. Bottle gourd (*Lagenaria siceraria*) was taken as a substrate for the development of the probiotic beverage. Bottle gourd is a vegetable easily and widely grown in India, and studies have reported about its various health benefits. It was difficult to extend the shelf life of bottle gourd juice because it is high in nutrients that promote microorganism growth. A pasteurisation technique was developed using the combined processes of microwave and ultrasound. The semi thermal pasteurisation technique was developed in order to keep the nutritional properties of the juice intact and reduce the adverse effects of conventional pasteurization. Bottle gourd is a vegetable widely used in different cuisines, but the use and safety of consuming bottle gourd juice was a matter of concern. An *in vitro* toxicity study in human erythrocytes, human peripheral blood mononuclear cells (HPBMC), and THP-1 human monocyte cell line, as well as an acute and subacute *in vivo* study in wistar rats (*Rattus norvegicus*), revealed that bottle gourd juice was non-toxic. Bottle gourd juice was found to have anti-diabetic properties in *in vitro* and enzymatic tests on α -amylase, α -glucosidase, DPP-4, and the L6 rat skeletal muscle cell line. The result was supported by *in vivo* anti-diabetic studies on streptozotocin induced diabetic rats (*Rattus norvegicus*). The anti-inflammatory property of bottle gourd juice was supported by the results of studies on the THP-1 cells pre-treated with bottle gourd juice, which showed a notable reduction in TNF- α and IL-1 β gene expression in the presence of lipopolysaccharide (LPS). The luciferase activity assay also revealed that NF-kB gene expression of THP-1 cells in presence of LPS was reduced in the presence of bottle gourd juice. Hedonic scale analysis with fuzzy logic supported the sensory property of the bottle gourd juice pasteurised by the combined process of microwave and ultrasound to be better than the conventionally processed juice. Rice beer (Zutho) and fermented bamboo shoots were collected from Nagaland and Manipur, India. Two probiotic strains were isolated and identified from the samples (*Lactobacillus plantarum* and *Limosilactobacillus fermentum*). The pomace left as waste after the preparation of bottle gourd juice was utilised for soluble dietary fibre extraction. The soluble dietary fibre of bottle gourd pomace was successfully utilised by strains of isolated bacteria, supporting its prebiotic property. The probiotic bottle gourd beverage was developed using the soluble dietary fibre of bottle gourd as a prebiotic and *Lactobacillus plantarum* as a probiotic.