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The inhibitory activity of buckwheat flours fermented with selected lactic acid bacteria on the formation of advanced glycation products

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Abstract

The functional properties of buckwheat flour fermented with selected lactic acid bacteria have received increasing attention due to the suggested reduction of coronary heart disease, diabetes and cancer incidence in humans. Advanced glycation end products (AGEs) are a complex group of compounds formed in a non-enzymatic way when reducing sugars react with amino acids of proteins and other protein-derived molecules. Protein glycation in human is believed to be implicated in the development of chronic degenerative diseases. The potential non-pharmacologic prevention of fermented buckwheat flours against formation of AGEs was addressed. In this study the inhibitory activity of buckwheat flours fermented with selected lactic acid bacteria on the formation of AGEs was addressed. Fermentation of 2 types of buckwheat flours (whole meal and thermally treated flours) with selected lactic acid bacteria (L. acidophilus (145, La5, V), L. casei (LcY, 2K), L. delbrucki subsp. bulgaricus (151, K), L. plantarum (W42, IB), L. rhamnosus (GG, 8/4, K), L. salivarius AWH, Streptococcus thermophilus Mk-10) was performed in 5% suspension at 37�?°C during 24 h. The inhibitory activity of methanol-water (67%) extracts obtained from freeze-dried fermented flours was studied in a bovine serum albumin (BSA)/glucose and BSA/methylglyoxal (MGO) model systems whereas aminoquanidine (AG), a commonly used inhibitor of glycation process, has served as a reference compound. The extracts from whole meal and thermally treated buckwheat flours showed inhibitory activity (40% and 31%) as compared to AG (86%) in BSA/glucose system. Fermentation with lactic acid bacteria caused no changes or slight decrease in the inhibitory activity with exception made to L. rhamnosus GG and L. casei 2K where inhibitory activity of fermented whole meal flour was higher by 20 an 10% as compared to non-fermented one. These findings were not confirmed in BSA/MGO system. Fermentation of thermally treated buckwheat flours caused decrease in the inhibitory activity measured in both model systems.

The influence of selected lactic acid bacteria (LAB) and Rhizopus oligospora (LSF) on the content of rutin and total phenolic compounds (TPC), the antioxidant capacity of the ABTS test, the FRAP test and the photochemiluminescence technology measurement, and the raw buckwheat Inhibitory activity of flour and roasted buckwheat flour in vitro advanced glycation (AGE) fluorescence end product formation. LSF caused a slight, specific LAB-dependent increase in TPC and a decrease in conventional content. Fermented raw buckwheat flour contains higher amounts of rutin and TPC, but the largest increase in TPC is observed in mushroom-fermented roasted flour. There are LAB-dependent differences in the antioxidant capacity of buckwheat flour, while the inhibitory activity of baking powder on AGE formation is generally reduced. It can be concluded that LSF and BAL and selected fungi can improve the antioxidant and functional properties of buckwheat flour.

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