Bifidus Fermentation Increases Hypolipidemic and Hypoglycemic Effects of Red Ginseng

TRINH, HIEN-TRUNG¹, SANG-JUN HAN¹, SANG-WOOK KIM², YOUNG CHUL LEE³, AND DONG-HYUN KIM⁴

¹Department of Life and Nanopharmaceutical Sciences and Department of Pharmaceutical Science, Kyung Hee University, Seoul 130-701, Korea
²Kuan Zenzac Biotech Research Institute, Kuan Industries Co., Ltd., Konasun 312-911, Korea
³Korea Food Research Institute, Seongnam 463-420, Korea

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Abstract Antihyperlipidemic and antihyperglycemic effects of Red Ginseng (RG, steamed and dried root of Panax ginseng C.A. Meyer, family Araliaceae), major component of which is ginsenoside Rg3, and Bifidobacterium-fermented RG (FRG), major component of which is ginsenoside Rh2, were investigated. Orally administered RG and FRG potently reduced the serum triglyceride levels in corn-oil-induced hypertriglyceremidemic mice as well as total cholesterol and triglyceride levels in Triton WR-1339-induced hyperlipidemic mice. Of the saponin and polysaccharide fractions of RG and FRG, the polysaccharide fraction inhibited postprandial blood glucose elevation of male Wistar streched mice and reduced the blood triglyceride levels in corn-oil-induced hypertriglyceremidemic mice. The saponin fraction and its ginsenosides Rg3 and Rh2 reduced blood triglyceride and total cholesterol levels in Triton WR-1339-induced hyperlipidemic mice. The inhibitory effect of FRG and its main constituents against hyperlipidemia and hyperglycemia in mice were more potent than those of RG. These findings suggest that hypolipidemic and hypoglycemic effects of RG can be enforced by Bifidus fermentation and FRG may improve hyperlipidemia and hyperglycemia.

Keywords: Panax ginseng, red ginseng, fermentation, hypolipidemic activity, hypoglycemic activity

Fermentation decomposes organic materials in the absence of air (oxygen). Some of these products (for example, alcohol and lactic acid) are of importance to humans, and fermentation has therefore been used for their manufacture on an industrial scale. These processes are performed by lactic acid bacteria, such as Bifidobacterium sp. and Lactobacillus sp., and some molds, such as Saccharomyces sp. [11, 16, 21, 28]. These microbes transform some components of foods as well as convert sugars to alcohol and lactic acid. For example, lactic acid bacterial fermentation of ginseng produces lactic acid as well as compound K, which is transformed from ginsenosides Rb1, Rb2, and Re and exhibits potent cytotoxicity against tumor cells [2, 29].

Ginseng (root of Panax ginseng C.A. Meyer, family Araliaceae) is widely used in Asian countries as a traditional medicine for enhancing body strength, recovering physical balance, and stimulating metabolic function [1]. When it is steamed, it is called Red Ginseng (RG) [6]. RG contains polysaccharides and ginsenosides such as Rg3, Rb1, Rb2, and Re as main constituents [17]. The ginsenoside Rg3, which is a representative constituent in RG, is produced from protopanaxadiol ginsenosides by steaming of raw ginseng. When RG is fermented by Bifidobacterium H-1, ginsenoside Rg3 is transformed to ginsenoside Rh2, which is a representative constituent in fermented RG (FRG) [3, 4]. Compared with ginsenoside Rg3, ginsenoside Rh2 exhibits potent cytotoxicity against tumor cells, antiallergic effect against mast cells, and antiinflammatory activity in microglial cells [4, 20, 23]. However, the antihyperlipidemic and antihyperglycemic effects of FRG and its constituents have been thoroughly studied.

Therefore, in the present study, RG was fermented by Bifidobacterium H-1, which is potently able to ferment RG and transform ginsenoside Rg3 to ginsenoside Rh2, and the hypolipidemic and hypoglycemic activities of RG and FRG investigated.