Effects of *Lactobacillus* spp. on improving the efficiency of *Gardenia jasminoides* treatment in *Helicobacter pylori* infection

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Helicobacter pylori infection is associated with chronic gastritis, peptic ulcers, and gastric cancer. About 50% of the population in the world is infected by *H. pylori*. Furthermore, 70% to 95% of *H. pylori*-infected patients are suffering from peptic ulcer. Gardenia has been used as an herbal medicine to treat liver and gall bladder disorders such as hepatitis and acute jaundice, as well as inflammation and fever in Chinese medicine for many years. The effective pharmacological actions, such as protective activity against oxidative damage, as well as cytotoxic, anti-inflammatory, and fibrolytic activities, have been demonstrated. Geniposide is one of the major iridoid glycosides in gardenia fruit and is transformed into genipin by bacterial enzymes in the intestine and then absorbed. In vivo, genipin could also react with amino acids to form the genipin-amino acids complex. In our study, it has showed that the anti-*H. pylori* activity of genipin was as least 10-fold higher than that of geniposide. Therefore, the biotransformed genipin is highly possible to treat or prevent *H. pylori* infection. Microbial enzymes play important roles in biotransformation. β-glucosidase were noted in association with the pharmacological actions of herbal medicines. In this study, a total of 68 *Lactobacillus* spp. field isolates were screened for best β-glucosidase activity. An isolate *Lactobacillus* spp. strain JB-3 showed the best β-glucosidase activity, the enzyme activity was 3 fold higher than other isolates. By monitoring the concentration of genipin, strain JB-3 could efficiently convert geniposide into genipin. The conversion ability of 5×10^9 of JB-3 was doubling the amount of genipin in an hour. In infected AGS cells, 0.1mM of genipin significantly decreased *H. pylori*-induced IL-8 by 20 % after 6 hr treatment. And also, the invasion ability of *H. pylori* was suppressed by 0.1 mM of genipin for 6 hrs by 40 %. However, geniposide did not show any anti-*H. pylori* activity. In this study, we determined that bioconverstion of *Lactobacillus* spp. could improve the biological activity of gardenia extract for treating *Helicobacter pylori* infection.

Keywords: β-glucosidase, *Lactobacillus* spp., *Helicobacter pylori*