

# Anti-*Helicobacter pylori* Activity of the Methanolic Extract of *Geum iranicum* and its Main Compounds

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*Geum iranicum* Khatamsaz, belonging to the Rosaceae family, is an endemic plant of Iran. The methanol extract of the roots of this plant showed significant activity against one of the clinical isolates of *Helicobacter pylori* which was resistant to metronidazole. The aim of this study was the isolation and evaluation of the major compounds of *G. iranicum* effective against *H. pylori*. The compounds were isolated using various chromatographic methods and identified by spectroscopic data (<sup>1</sup>H and <sup>13</sup>C NMR, HMQC, HMBC, EI-MS). An antimicrobial susceptibility test was performed employing the disk diffusion method against clinical isolates of *H. pylori* and a micro dilution method against several Gram-positive and Gram-negative bacteria; additionally the inhibition zone diameters (IZD) and minimum inhibitory concentrations (MIC) values were recorded. Nine compounds were isolated: two triterpenoids, uvaol and niga-ichigoside F1, three sterols, -sitosterol, -sitosteryl acetate, and -sitosteryl linoleate, one phenyl propanoid, eugenol, one phenolic glycoside, gein, one flavanol, (+)-catechin, and sucrose. The aqueous fraction, obtained by partitioning the MeOH extract with water and chloroform, was the most effective fraction of the extract against all clinical isolates of *H. pylori*. Further investigation of the isolated compounds showed that eugenol was effective against *H. pylori* but gein, diglycosidic eugenol, did not exhibit any activity against *H. pylori*. The subfraction D<sub>2</sub> was the effective fraction which contained tannins. It appeared that tannins were probably the active compounds responsible for the anti-*H. pylori* activity of *G. iranicum*. The aqueous fraction showed a moderate inhibitory activity against both Gram-positive and Gram-negative bacteria. The MIC values indicated that Gram-positive bacteria including *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Bacillus subtilis* are more susceptible than Gram-negative bacteria including *Escherichia coli* and *Pseudomonas aeruginosa*.

**Key words:** *Geum iranicum*, *Helicobacter pylori*, Eugenol