

論 文 要 旨

Antibacterial activity of phellodendron bark
against *Streptococcus mutans*

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Objectives: In this study, we investigated antibacterial activity of plant extracts against *S. mutans* and found that phellodendron bark (PB) had the strongest activity among extracts.

Then, we investigated the effect of PB on *S. mutans* cariogenic activity.

Methods: The antibacterial activity on *S. mutans* clinical isolates were determined by the minimum inhibitory concentration (MIC) using the microdilution method. In addition, the effect of PB against UA159 on the growth curve and cell viability, the biofilm formation, and the amount of adenosine triphosphate (ATP) efflux were measured. Regarding the effects on pathogenicity, pH drop assay and the expression of genes responsible for acid production and acid tolerance were verified. Furthermore, the antibacterial activity was evaluated by analyzing the three-dimensional image of the biofilm using a confocal laser microscope.

Results: The MIC range of PB was 9.8-312.5 $\mu\text{g/ml}$. PB suppressed biofilm formation at high concentrations, although PB did not affect the expression of glucosyltransferase genes. Additionally, PB suppressed the decrease in pH from adding excess of glucose. The expression of genes responsible for acid production was increased by the addition of excess glucose without PB, whereas their expression levels were not increased in the presence of 1 \times and 2 \times MIC of PB. Although PB showed a bacteriostatic effect on planktonic *S. mutans* cells, we found that more than 2 \times MIC of PB showed a partial bactericidal effect on biofilm cells.

Conclusions: PB not only showed antibacterial activity against *S. mutans* but also decreased the cariogenic activity in *S. mutans*.