

Antimicrobial Activity of *Opuntia ficus indica* var. *saboten* Against *Salmonella* and *Escherichia coli* O157:H7

So Hyun Kim¹, Nam Hoon Kwon¹, Ji Yeon Kim¹, Ji Youn Lim¹,
Wonki Bae¹, Jun Man Kim¹, Kyoung Min Noh¹, Jin Hur¹, Woo Kyung Jung¹,
Sook Shin¹, Jong Eun Lee², Jung Chan Ra², and Yong Ho Park¹

¹Department of Microbiology, College of Veterinary Medicine and
School of Agricultural Biotechnology, Seoul National University,
Seodooon-Dong 103, Kwonsun-Gu, Suwon, Gyunggi, 441-744, KOREA

²RNL Life Science, Seodooon-Dong, Kwonsun-Gu, Suwon, Gyunggi, KOREA

Introduction

There is increasing interest in natural products such as herb extract and probiotics with incidence of antibiotic resistant bacteria. The *Opuntia ficus indica* var. *saboten* is indigenous to Cheju island in Korea and has been used as a folk medicine for a long time. It is used as emollient, moisturizing, hypocholesterolemic, hypoglycemic, anti-inflammatory agent and in gastric mucosa diseases. Several substances that have antimicrobial activities, such as alkaloids, saponins, flavonoids, and polypeptides, have been isolated from *O. ficus indica* var. *saboten*. Therefore, this study was focused on the determination of antimicrobial activity of *O. ficus indica* var. *saboten*.

Materials and Methods

Antimicrobial activity of the product against *Salmonella enteritidis*, *S. enterica* serovar Typhimurium DT104 and *Escherichia coli* O157:H7 was determined in vitro and in vivo.

To investigate the antagonistic activity, mice were challenged with *S. enterica* serovar Typhimurium DT104 (3.7×10^8 cfu/mouse) after prefeeding with the product for 7 days and one group of mice was continued to feeding with the product for 3 more days after challenge. The fecal shedding of *S. enterica* serovar Typhimurium DT104 and serum IgG and intestinal IgA against the organism were examined.

Results and Discussion

Though bactericidal effect of the product was not observed, it had inhibitory activity against *Salmonella* and *E. coli* O157:H7 on the Mueller Hinton Agar containing supernatant of the product. The fecal shedding was dramatically

decreased and *S. enterica* serovar Typhimurium DT104 was not detected in feces and intestines 3 days after challenge. Antibody responses of the intestinal IgA were significantly increased in mice fed with the product before and after challenge. These findings suggest that the product made by herb extract has an antagonistic activity against *S. enterica* serovar Typhimurium DT104 in vitro and also in the gastrointestinal tract in mice. In addition, administration of the product might enhance the mucosal immune response to against *S. enterica* serovar Typhimurium DT104.

Acknowledgement

This study was supported by the Brain-Korea 21 project.

References

1. Cutter, C. N. Antimicrobial effect of herb extracts against *Escherichia coli* O157:H7, *Listeria monocytogenes*, and *Salmonella typhimurium* associated with beef. *J. Food Prot.* 63:601-607 (2000).
2. Frati, A. C., E. Jimenez and C. Raul Ariza. Hypoglycemic effect of *Opuntia ficus indica* in non-insulin dependent diabetes mellitus patients. *Phytother. Res.* 4:195-197 (1990).
3. Galati, E. M., M. T. Monforte, M. M. Tripodo, A. d'Aquino and M. R. Mondello. Antiulcer activity of *Opuntia ficus indica* (L.) Mill. (Cactaceae): ultrastructural study. *J. Ethnopharmacol.* 76:1-9 (2001).
4. Galati, E. M. M. M. Tripodo, A. Trovato, N. Miceli and M. T. Monforte. Biological effect of *Opuntia ficus indica* (L.) Mill. waste matter Note I: diuretic activity. *J. Ethnopharmacol.* 79:17-21 (2002).
5. Otshudi, A. L., A. Foriers, A. Vercruyse, A. Van Zeebroeck and S. Lauwers. In vitro antimicrobial activity of six medicinal plants traditionally used for the treatment of dysentery and diarrhoea in Democratic Republic of Congo (DRC), *Phytomedicine.* 7:167-172 (2000).
6. Park, E. H., J. H. Kang, S. H. Lee and K. H. Shin. An anti-inflammatory principle from cactus. *Fitoterapia.* 72:288-290 (2001).