



## Emerging Impact of Bee Propolis for Gut Health: Evidence and Mechanisms

Kai WANG<sup>1</sup>, Xiaolu JIN<sup>2</sup>, Qiangqiang LI<sup>1</sup>, Alexandra Christine Helena Frankland SAWAYA<sup>3</sup>,  
Richard K. Le LEU<sup>4</sup>, Michael A. CONLON<sup>5</sup>, Liming WU<sup>1</sup>,\*Fuliang HU<sup>6</sup>

<sup>1</sup> Institute of Apiculture Research, Chinese Academy of Agricultural Sciences, Beijing 100093, China;

<sup>2</sup> Beijing Advanced Innovation Center for Food Nutrition and Human Health, College of Food Science and Nutritional Engineering, China Agricultural University, Beijing 100083, China;

<sup>3</sup> Faculty of Pharmaceutical Science, Universidade Estadual de Campinas, UNICAMP, Campinas, Brazil;

<sup>4</sup> Central and Northern Adelaide Renal and Transplantation Service, Royal Adelaide Hospital, Adelaide 5000, Australia;

<sup>5</sup> CSIRO Health and Biosecurity, Adelaide, SA 5000, Australia;

<sup>6</sup> College of Animal Sciences, Zhejiang University, Hangzhou 310058, China.

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\*Corresponding author /Yazışılan yazar

### Abstract

Bee propolis is an important hive product and considered beneficial to health. However, evidence of its potential for improving gut health is still lacking. We hereby investigated the effects of dietary supplementation with propolis against dextran sulfate sodium (DSS)-induced acute colitis model in rats. Moreover, effects of propolis extracts on intestinal barrier function were explored in human intestinal epithelial cells. Rats were fed with control diet or supplemented with different amounts of Chinese propolis (0.1%, 0.2%, and 0.3%) to examine effects on acute colitis induced by 3% DSS in drinking water. Propolis at 0.3%, but not lower levels, significantly improved colitis symptoms compared with the control group, with a less pronounced disease activity index (DAI), a significant increase in colon length/weight ratio and an improved distal colon tissue structure as assessed by histology. Although short chain fatty acid levels in digesta were not altered by propolis supplementation, 16S rRNA phylogenetic sequencing revealed a significant increase in gut microbial diversity after 21 days of 0.3% propolis supplementation compared with controls including a significant increase in bacteria belonging to the *Proteobacteria* and *Acidobacteria* phyla. In human intestinal epithelial cells, propolis increased transepithelial electrical resistance with organized expressions in proteins related to TJ assembly, i.e., occludin and ZO-1, by activating AMPK and ERK signaling. Overall, these data provide new insights into understanding the beneficial effects of propolis on gut health and have important implications for human IBD prevention/treatment.

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