

The effect of probiotics on immune system

Abstract

In recent years, the research into probiotics indicates that supplementing with probiotics is probably more important than taking a multi-vitamin or antibiotics. This paper presents the interaction between host-derived probiotics and immunomodulatory. Studies have revealed probiotics can produce a unique substance that affects the expression of particular genes which are related to immune regulation in humans. The effect of gastric microbiota such as *Lactobacillus fermentum* and *Lactobacillus plantarum* is an amazing example to demonstrate how they are able to regulate the immune system. In fact, the studies indicate that *L. plantarum* ZDY 2013 pretreatment can prevent gastric mucosal inflammation induced by *h. pylori*. In addition, *L. fermentum* UCO-979C-obtained from human gut shows an efficient growth in the rodent (Mongolian gerbil). It can stop stimulation to produce cytokines like IL8 by *h. pylori* in gastric adenocarcinoma human cells (AGS) cells.

Keywords: probiotics, lactobacillus, immunomodulation, cytokines

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Introduction

Probiotics are live microorganisms that an appropriate amount of them may lead to a host of health situation. The probiotics are mainly members of the genera *Lactobacillus* and *Bifidobacterium* and *Saccharomyces*. There is much evidence about the role of probiotics in the prevention of disease. *In vitro* and *In vivo* studies have shown antibacterial effects of probiotic bacteria. Antimicrobial effect of probiotics due to produce organic acids, antimicrobial peptides such as bacteriocin and H_2O_2 . Probiotics are used for treating intestinal diseases, including infectious diarrhea, antibiotic-associated diarrhea, atopic disease, necrotizing enterocolitis, ulcerative colitis, and irritable bowel syndrome, and extra intestinal diseases, such as allergy. Recent studies have demonstrated the particular genes and substances of probiotics can regulate the immune system in humans and animals. Hence probiotics have the ability to cure diseases that are related to immune response, like a viral infection. Thus, it is important to study the interaction between probiotics and immune system to understand the way that they can help to cure diseases.¹ The studies have revealed that microbiota has a significant role to form host physiology and immunomodulatory response. It has specified that the alteration in the number of microbiota can cause various diseases like, obesity, diabetes and even liver cirrhosis. Recently, the role of probiotics in order to treatment of *h. pylori* which can cause gastrointestinal disease is determined as complement or alternate to antibiotics. An example for human microbiota is *Lactobacillus* bacteria. They are a genus of Gram-positive bacteria.² In this regard, *L. plantarum* ZDY 2013 has gained from traditional Chinese fermented soybeans as probiotic has an antimicrobial features *in vitro*. The results have demonstrated the use of *L. plantarum* ZDY 2013 can prevent from gastric inflammation by *h. pylori*.³

Probiotics promote immunomodulation against viral infections

One of the advantages of probiotics is protection against viral diseases. For instance, intranasal inoculation of mice with active or inactive probiotics (*L. reuteri* or *L. plantarum*) has decreased the need of granulocyte, production of several cytokines and decreased viral activity. Also, mice with probiotic could resist to viral agents, pneumonia virus, and dangerous pathogens. Finally, it proves that

the use of *L. plantarum* HEAL9 and *L. paracasei* 8700 for a period (three months) could decrease probability to have the cold infections in healthy individuals.^{4,5}

The role of *L. plantarum* ZDY 2013 and *L. fermentum* UCO-979C in order to eradicate bacterial infection such as *h. pylori* by the immunomodulatory response:

The reports have shown an increase of pro-inflammatory cytokine expression in the gastric mucosa has occurred in the patients who are suffering from *h. pylori*. In this regard, the individual immune response has an important effect on the development of serious diseases after *h. pylori* infection. In addition the regulation of *h. pylori*-induced inflammation can stop the chronic gastric inflammation and cancer. Many reports have indicated the impact of probiotics on the immunomodulatory system to cure individuals with *h. pylori* infection efficiently. For instance, the study has shown pretreatment with *L. plantarum* ZDY 2013 can prevent from gastric mucosal inflammation. In fact, stimulation and release Th1/Th17 cell response in the gastric mucosa is one of the significant factors to *h. pylori* pathogenesis. In this study the great amount of inflammatory cytokine RNA for IFN- γ , IL1 β and IL17 has been obtained after 6weeks, though in the LP+HP group (LP+HP=normal chow diet with 400 μ l of viable cells of *L. plantarum* ZDY 2013), the increase in the level of mRNA which is related to IL1 β and IFN- γ has been stopped. It can be inferred from this research that *L. plantarum* ZDY 2013 pretreatment could prevent Th1 cell response by *h. pylori* infection.⁶

Another study has revealed *L. fermentum* UCO-979C can decrease the production of inflammatory chemokine IL-8 by *h. pylori* infection in the human gastric epithelial cells. It shows the beneficial effect of probiotics on the immunomodulatory system. Additionally, *L. fermentum* UCO-979C which has obtained from the human gut can inhibit the function of *h. pylori* by regulating the immune system.⁷

Conclusion

Recent evidence reveals the impact of probiotics on the regulation of host homeostasis, involving immune health in humans. Also, the use of probiotics can protect the host against infection, reduce harmful bacteria, and stimulate immune response. However, more researches should be done to show the accurate probiotic mechanism to apply

them better for clinical purpose.⁸⁻¹¹ As we can see in the recent studies, microbiota like *L. plantarum* ZDY 2013 and *L. fermentum* UCO-979C have a great impact on the constraint of production of pro-inflammatory cytokines by *h. pylori* infection. In conclusion, these microbiotas can regulate the immune system and they have improved the interventional procedure in the patients who have the *h. pylori* infection.

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Conflict of interest

The author declares no conflict of interest.

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