



THE EFFECT OF SUPPLEMENTATION PROBIOTIC *Lactobacillus casei* STRAIN Shirota L AGAINST COLONIZATION OF *Staphylococcus aureus* Nasal Swab ISOLATES FROM PATIENTS WITH ALLERGIC RHINITIS

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ABSTRACT

Staphylococcus aureus is the most important type of bacteria causing infections in humans. There are several potential factors for *Staphylococcus aureus* nasal carriers in healthy adults, i.e. chronic sinusitis, the long-term skin trauma, respiratory allergies, asthma, allergen injection therapy. Probiotics are life microorganisms which have a positive effect on prevention or treatment of certain disease conditions when consumed. Manipulation of intestinal flora with probiotics for the prevention and treatment of rhinitis allergy should be developed. This study aims to determine the effect of supplementation probiotic *Lactobacillus casei* Shirota strain against colonization *Staphylococcus aureus* nasal swab isolates from patients with allergic rhinitis.

This research was quasi-experimental case-control design with a control group pretest-posttest design. The study was conducted at the Microbiology and Research Laboratory School of Medicine Muhammadiyah Yogyakarta University, on February-July 2011. Forty two students school of medicine Muhammadiyah Yogyakarta University, with the inclusion criteria suspect allergic rhinitis based on history. Volunteers who have a history of allergic rhinitis were taken nasal swab to check the number of *S.aureus* bacteria. Volunteers consumed milk containing *Lactobacillus casei strain* Shirota daily for a month, then taken to be examined nasal swab *S.aureus* bacteria numbers.

The results showed that the average number of bacteria nasal swab isolates before supplementation about 92 CFU. After given the probiotic *Lactobacillus casei* Shirota strain during a month, the average number of *S.aureus* about 27 CFU. It can be concluded that supplementation with *Lactobacillus casei* strain Shirota probiotics can reduce *Staphylococcus aureus* colonization in patients with allergic rhinitis.

Key words: *Staphylococcus aureus*, *Lactobacillus casei*, allergic rhinitis

INTRODUCTION

Staphylococcus aureus is a type of bacteria which is most important causing human infection. Almost everyone will experience some type of infection *S. aureus* throughout his life, from mild skin infections, food poisoning, to severe infections (Jawetz *et al.*, 2005). Research on *Staphylococcus aureus* community to be a little high due attention to *Staphylococcus aureus* in the hospital setting. Based on previous studies, it is known that there are several potential factors for career nasal *Staphylococcus aureus* in healthy adults. Such factors include smoking, anatomical abnormalities of the nose, chronic sinusitis, diabetes with insulin therapy, rheumatoid arthritis, hemodialysis, long-term skin trauma, respiratory allergies, asthma, allergen injection therapy, other chronic diseases, contact with patients.

Allergic rhinitis is a chronic inflammatory disease of the nose. Allergic rhinitis become a global health problem, affecting approximately 10 to 25% of the population. In Indonesia, prevalence rhinitis allergic is not known for certain, but data from different hospitals showed that allergic rhinitis has a frequency range from 10-26% (Sudarman, 2001). Allergic rhinitis is not a fatal disease but the symptoms can affect a person's health status and reduce the

quality of life of patients. Including lowering labor productivity, the effective time of work, and school achievement (Baraniuk, 2000).

This disease is caused by inflammation of the nasal mucosa reaction mediated by immunoglobulin E (IgE), after exposure to allergens (type I hypersensitivity reaction Gell and Combs). Disorders of the nose can be a symptom of itching of the nose that can extend to the eyes and throat, sneezing, and nasal congestion (Bousquet *et al.*, 2001).

Current research indicates that probiotics have a strong influence on the regulation of primary immuno physiology in intestinal mucosal barrier (Rautava *et al.*, 2005). Probiotics are live microorganisms, when consumed has a positive effect on the prevention or treatment of a specific disease conditions. The potential use of probiotics alter the composition of the intestinal flora in certain high-risk groups, such as premature babies, patients with diarrhea, children treated antibiotics, patients with viral gastroenteritis and some atopic diseases are not only potential applications but also due to the fact this agent interaction mechanisms of probiotics with intestinal tissue (Saavendra, 2001).

Lactobacillus is a probiotic that is able to perform fermentation to break down food substances that are not digested by the intestine to form lactic acid, hydrogen peroxide, and other products that will not inhibit the beneficial bacteria (pathogens) and fungi. Lactobacillus produce B vitamins (niacin, pyridoxine, and folic acid) and lactase enzyme which functions to break down lactose into sugars short chain so it will be easier to digest (Anonim, 2009).

Lactobacillus and Bifidobacterium bacteria which is resistant to gastric acid and bile, is able to adhere the walls of the gastrointestinal tract that protect the gastrointestinal mucosa, and potentially capable of producing substances as antimicrobial, competing with pathogenic microbes in nutrition and to increase the immune system response phagocytic cells (Orrhage *et al.*, 2000). As more and more evidence of the benefits of manipulation gut flora with probiotics for the prevention and treatment of atopic disease, the benefits should be developed on diseases of allergic rhinitis.

MATERIALS AND METHODS

Materials used for the examination of *S. aureus* bacteria numbers are: supplementation milk contain *L.casei* strain Shirota, blood agar media, Manithol Salt Agar media, Gram staining, sterile cotton sticks, petridish, test tubes, ose, bunsen flame, autoclave, measuring pipette, tweezers. The data collected in this study were 42 students of school medicine Muhammadiyah Yogyakarta University, who have a history of allergic rhinitis asked to fill out questionnaires. From questionnaire, data qualified allergic rhinitis/atopy, nasal swabs were taken using sterile cotton stick to be examined number of *S. aureus* bacteria. Furthermore, volunteers supplemente milk containing *L.casei* strain Shirota for a month, then take a nasal swab for *S. aureus* bacteria examined. Identification *S.aureus* bacteria using streak plate method. Nasal swabs from volunteers inoculate on blood agar, then incubated at 37 ° C, for 24 hours. Colonies that grow to be identified using Gram staining. Colonies that have microscopic characteristics cocci, Gram positive, clusters, calculated the amount then tested MSA in the media by Manithol Salt Agar and incubated at 37 ° C, for 24 hours. MSA test is positive if the Manithol Salt Agar media is yellow. *S aureus* will ferment Manithol Salt Agar media, causing the yellow media.

RESULTS AND DISCUSSION

The subject of this research are 42 students of school medicine, Muhammadiyah Yogyakarta University. Selection of subjects based on history checks to make sure the subjects suspect from allergic rhinitis. After the examination the total number of *S. aureus* bacteria before and after the supplemented probiotic *Lactobacillus casei* strain Shirota for a month. The results of the total number of bacteria can be seen in Figure 1. Of the 42 samples examined, nearly 100% of total number of bacteria decreased *S. aureus* nasal isolates.

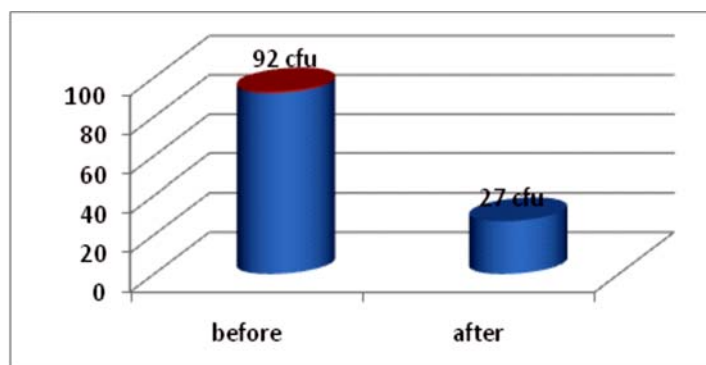


Figure 1. The results bacteria numbers of *S. aureus* nasal isolates before and after supplementation of the *Lactobacillus casei* strain Shirota for a month in patients with allergic rhinitis

The average bacteria number of *S. aureus* nasal isolates from allergic rhinitis suspect before supplementation is 92 CFU. After supplementation of the *Lactobacillus casei* strain Shirota for one month, the average number of bacteria is 27 CFU. The statistical analysis paired t-test results obtained $p < 0.05$. Top of Form

This study demonstrates that supplementation of *Lactobacillus casei* strain Shirota for a month can reduce the bacteria number of *S. aureus* nasal isolates from allergic rhinitis suspect. Giving probiotics in allergy prevention is homeostasis biological systems improvement efforts aimed at patient immunomodulating the immune response by balancing Th1 and Th2 immune responses.

Probiotics are normal flora of the gastrointestinal tract that can control the balance of intestinal microflora and the physiological effects that benefit the health of the host. Probiotics also have the ability as a strong activator of the innate immune system because it has a specific molecule on the cell wall, known as pathogen-associated molecular patterns (PAMPs). Specific molecules (PAMPs) recognized by specific receptors (specific pattern recognition receptors, PRRS). PAMPs existing one on probiotics is lipoteichoic acid (LTA). LTA, a biologically active molecule, is a characteristic of Gram positive bacteria and has a biological impact (induction of cytokine production) similar to LPS (Järveläinen & Miettinen, 2001; Miettinen *et al.*, 2001).

Biologically active molecules probiotics peptidoglycan and teichoic acid in the form of a pathogen-associated molecular patterns (PAMPs) are recognized PRRS (pattern recognition receptors) in the case of TLR2 and TLR4. TLR2 and TLR4 induce transcription of several proinflammatory cytokines in response to stimulation by probiotics, which help bridge the innate immune system to the adaptive system by inducing a variety of effector molecules and co-stimulators (Saito, 2004). Digestive tract as part separator inner protective of a wide

range of antigens, derived from food and microorganisms from outside the body (Sanderson & Walker, 1993). The gastrointestinal tract is an early defense for disposal antigen, elimination of foreign substances that enter through the gastrointestinal mucosa and regulate reactions between antigens and specific immune responses (Brandtzaeg, 1995). Intestinal microflora and probiotics may influence the host immune system through its effects on mucosal barrier and immune system maturation. Primary effector known as the innate immune system, which is a non-specific defense system mediated by monocytes, macrophages, and dendritic cells. Innate immune system contribute regulate the function of antigen-specific adaptive immune system, such as the balance of the immune response profile associated cytokine or chemokine receptor. *Lactobacillus* GG has the ability to improve intestinal mucosal immunity are particularly increasing the number of IgA-producing cells and other immunoglobulin-producing cells, stimulates the local release of interferon which facilitates antigen transport and increase the uptake of antigen by Peyer's patches (Gorbach. 2000).

CONCLUSION

The conclusion of this study is supplementation of probiotic *Lactobacillus casei* strain Shirota is able to reduce *Staphylococcus aureus* colonization in patients with allergic rhinitis.

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