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Jumlah Koloni *Streptococcus mutans* pada Anak Asma dengan Pemberian Probiotik *Lactobacillus reuteri*

Total Colony of Streptococcus mutans in Asthmatic Children with Feeding Probiotics Lactobacillus reuteri

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Abstrak

Beberapa kondisi kesehatan gigi dan mulut sering dikaitkan dengan asma yang diderita oleh anak-anak. Salah satunya adalah meningkatnya kejadian karies gigi serta penurunan produksi saliva, juga perubahan kondisi rongga mulut yang berpeluang menyebabkan terjadinya karies. Tujuan penelitian ini adalah untuk mengetahui jumlah koloni Streptococcus mutans pada anak asma yang diberi pakan probiotik *Lactobacillus reuteri*. Penelitian ini melibatkan empat belas subjek berusia 9-12 tahun, tujuh anak penderita asma dan tujuh anak non-asma (kelompok kontrol). Plak subjek diambil kemudian dihitung koloninya. Setelah pengambilan plak, sampel diminta untuk meminum tablet probiotik dua kali sehari setelah makan. Dilakukan selama 2 minggu. Perhitungan jumlah koloni *Streptococcus mutans* sebelum dan sesudah pemberian tablet hisap probiotik pada anak kelompok asma dan kelompok kontrol. Rerata jumlah *Streptococcus mutans* sebelum pemberian probiotik pada anak penderita asma yaitu 23,71x104 CFU/ml dan setelah pemberian probiotik 10,14x104 CFU/ml. Sedangkan pada kelompok kontrol (non-asma), jumlah *Streptococcus mutans* sebelum pemberian probiotik adalah 14,29 x104 CFU/ml dan setelah pemberian probiotik 9,43x104 CFU/ml. *Lactobacillus reuteri* probiotik tablet hisap dapat menurunkan jumlah *Streptococcus mutans* di rongga mulut anak penderita asma.

Kata Kunci: Total Koloni, Streptococcus mutans, Probiotik Lactobacillus reuteri, Anak penderita asma

Abstract

Some oral health conditions are often associated with asthma in children. One of them is the increasing incidence of dental caries as well as a decrease in saliva production, is also a change in the conditions of the oral cavity is very likely to lead to the formation of dental caries. The purpose of this study was to determine the number of colonies of Streptococcus mutans in asthmatic children with feeding probiotics Lactobacillus reuteri. This study involved fourteen subjects between the age 9-12 years old, seven asthmatic children and seven non-asthmatic children (control group). Plaque of subjects were taken and then counted the colonies. After taking the plaque, the sample was asked to take a probiotic tablet twice daily after meals. This is done for 2 weeks. Counting the number of colonies of Streptococcus mutans by colony counters before and after administration of probiotic lozenges for children with asthma group and the control group.**:** The mean for the number of Streptococcus mutans before administration of probiotics in asthmatic children that is 23,71x104 CFU / ml and after the administration of probiotics 10,14x104 CFU / ml. Whereas in the control group (non-asthmatic), the amount of Streptococcus mutans before administering probiotics is 14.29 x104 CFU / ml and after the administration of probiotics 9,43x104 CFU / ml. Lactobacillus reuteri probiotic lozenges can reduce the number of Streptococcus mutans in the oral cavity of asthmatic children.

Keywords: Total colony, Streptococcus mutans, Lactobacillus reuteri probiotic, asthmatic children

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1 Introduction

The prevalence of dental caries in children aged 10 years is 80%. The process of caries involves four main factors that interact with each other, namely teeth and saliva (host), microorganisms, substrate, and time [1]. (Tang et al (1997) reported that in an examination of 5171 preschool children taken from a public health program in Arizona, the prevalence of caries in children aged 1 year was 6.4% almost 20% for 2 years, 35% for age 3. years, and 49% for 4 years of age [2]. In a study conducted by Kusumaningsih [3], it was reported that 81.03% of children in Surabaya suffered from dental caries and 25.86% had a high CSI (Caries Severity Index) index [4].

Not only healthy children, children with systemic disorders are also affected by caries. As asthma is a chronic disease in various countries in the world whose prevalence is constantly increasing every year. Asthma itself is a collection of clinical symptoms characterized by airway obstruction and is reversible Several studies report that asthma affects 3–5% of the adult population and 10% of the pediatric population [5].

In America at all ages, the prevalence of asthma increased from 7.3% in 2001 to 8.2% in 2009. In several countries including Canada, United States, United Kingdom, New Zealand and Ireland, the prevalence of asthma is higher than 10% [6]. Indonesia as a developing country has an asthma prevalence of around 1-2% [7].

The relationship between asthma and the oral cavity is currently the subject of research by several dentists. Several studies have shown a link between asthma and caries. In patients with asthma, there is high caries formation, as is the change in salivary flow and buffer capacity associated with asthma or its treatment [8].

Several oral health conditions are often associated with asthma sufferers, especially children. One of them is the increase in the incidence of caries in the teeth and the decrease in saliva production, as well as changes in the condition of the oral cavity which are likely to cause the formation of dental caries. Particularly saliva, saliva is greatly influenced by the general state of the host [9]. Saliva with its components is involved in the occurrence of

caries. Saliva contains immunoglobulins including IgA, IgG and IgM. IgA is the largest immunoglobulin in saliva, which is about 60% preventing the attachment of *Streptococcus mutans* to the tooth surface [10]. It can be concluded that a decrease in saliva production can cause a decrease in IgA in the oral cavity which functions to prevent the attachment of *Streptococcus mutans* (bacteria that cause caries on teeth).

Streptococcus mutans is an oppurtunistic commensal bacteria in the oral cavity which plays an important role as the main cause of dental caries. These bacteria have the ability to adhere to the tooth surface, colonize and cause caries [11]. There are various ways to inhibit the growth of the causes of dental caries, including cleaning plaque regularly, limiting intake of sucrose (sugar), inhibiting acid production in the mouth, and giving probiotics [12]

Based on research, probiotics were found to reduce the growth of bacteria and fungi in premature babies in intensive care. *Lactobacillus reuteri* ATCC 55730 and *Lactobacillus rhamnosus GG* (LGG). The product of *Lactobacillus reuteri* is a suspension with 5 drops per day. The results showed that probiotics significantly reduce bacterial and fungal infections.

Currently, the use of probiotic bacteria to support oral health is highly recommended. This is because based on the results of research on *Lactobacillus* in the oral health ecosystem *Lactobacillus reuteri* inhibits the growth of several *Streptococci in vitro* [13]. *Lactobacillus reuteri* also provides benefits to its host by helping to fight pathogenic bacteria. The mechanism of action of *Lactobacillus reuteri* is to maintain host conditions by suppressing the growth of microorganisms, namely by producing antimicrobial substances as well as by changing microbial metabolism by increasing beneficial enzymes, which can inhibit the growth of pathogenic bacteria, fungi, and protozoa [14].

Seeing the considerable number of benefits of probiotics, especially *Lactobacillus reuteri* in preventing caries and plaque, researchers want to conduct research using *Lactobacillus reuteri* probiotics in asthmatic children in relation to the growth of *Streptococcus mutans* which plays a role in causing caries.

2 Materials and Methods

This study involved fourteen subjects between the age 9-12 years old, seven asthmatic children and seven non-asthmatic children (control group). Plaque of subjects were taken and then counted the colonies. After taking the plaque, the sample was asked to take a probiotic tablet twice daily after meals. This is done for 2 weeks. Counting the number of colonies of *Streptococcus mutans* by colony counters before and after administration of probiotic lozenges for children with asthma group and the control group.

3 Results and Discussions

The mean for the number of *Streptococcus mutans* before administration of probiotics in asthmatic children that is 23,71x104 CFU / ml and after the administration of probiotics 10,14x104 CFU / ml. Whereas in the control group (non-asthmatic), the amount of *Streptococcus mutans* before administering probiotics is 14.29 x104 CFU / ml and after the administration of probiotics 9,43x104 CFU / ml.

The results of data processing obtained from the calculation of the number of *Streptococcus mutans* in the asthma group plaques, there was a decrease in the number of *Streptococcus mutans*. There was a significant difference in the number of *Streptococcus mutans* before and after giving *Lactobacillus reuteri* probiotic. The use of *Lactobacillus reuteri* probiotic bacteria is an alternative therapy to prevent caries by reducing the number of *Streptococcus mutans*. These *Lactobacillus reuteri* bacteria have several antibacterial substances called bacteriocins which produce a substance called "reuterin". Other components possessed by *Lactobacillus reuteri* besides reuterin are organic acids, hydrogen peroxide, which can inhibit the growth of pathogenic bacteria [15].

Based on the research of Calgar [16], in normal children, there was a decrease in the *Streptococcus mutans* bacteria after consuming probiotics containing *Lactobacillus reuteri* (ATCC 55730) for two weeks. In a study conducted by Krasse (2006), there was a decrease in plaque and gingivitis after two weeks of consuming probiotics. According to the research of Nase [17], children who

consumed milk containing *Lactobacillus rhamnosus GG* for 7 months showed decreased dental caries and reduced number of *Streptococcus mutans* colonies [16].

Research by Venkatesh [18], shows that there is a significant difference in the number of *Streptococcus mutans* colonies between the group of children with asthma and the control group. Children with asthma have a higher caries rate and this increases according to the duration of the asthma. Inhaled corticosteroid drugs that can reduce salivary flow, change saliva composition, and increase dental plaque are one of the factors for increasing caries in asthmatic children [19]. Mazzoleni (2008), also stated that the use of -2 Agonist group drugs also causes a higher number of cariogenic bacteria. In this study, a sample of asthmatic children consumed asthma medication-2 agonists and corticosteroids which caused an increase in the number of *Streptococcus mutans* before consuming probiotics.

A decrease in *Streptococcus mutans* in children with asthma can be caused by cleaning through probiotic lozenges which can stimulate salivary secretion, the pH of saliva increases, so that the number of bacteria in the oral cavity can decrease. To stimulate salivary secretion and increase the speed of salivary secretion can be done by using lozenges, so that the results will be useful as a mouth cleanser from residual carbohydrates that are easily fermented by oral microorganisms. Acid clearance is formed due to glycolysis of carbohydrates by acidogenic microorganisms, due to the high speed of saliva flowing over plaque.

In addition, the increase in salivary secretion will cause an increase in salivary buffer capacity so that it can neutralize the acidic plaque pH, due to the increase in carbonate ions (HCO3-) which play a role in salivary buffer capacity. Increased salivary flow will increase the levels of urea, ammonia (NH3), calcium (Ca2 +), phosphate (HPO42 +), sodium (Na +) which is a source of salivary alkalinity so that it can increase plaque pH which falls due to carbohydrate glycolysis.

The results show that after giving probiotics to children with asthma it can cause increased salivary flow, increased pH, reduced dental plaque. The results of this study are in accordance with the theory that probiotics act as immunomodulators, namely increasing sIgA in saliva. sIgA inhibits the function of the enzyme glucosyl transferase *Streptococcus mutans* and inhibits the attachment of *Streptococcus mutans* to the salivary pellicle on the tooth surface.

In relation to the occurrence of dental caries, the virulence of *Streptococcus mutans* is indicated by its ability to form dental plaque from sucrose. Producing the extracellular enzyme glucosyl transferase (GTF) which is present in the bacterial cell wall. This enzyme does not dissolve easily in water, is sticky, making it easier for bacteria to adhere to the tooth surface and can break down sucrose to produce glucans.

From the research that has been done, it can be seen that consuming probiotic lozenges can reduce the number of *Streptococcus mutans* in the oral cavity in children with asthma. From this study, it is highly recommended that the use of probiotics in children with asthma in order to inhibit the formation of *Streptococcus mutans* colonies which cause the risk of caries increases.

4 Conclusion

Lactobacillus reuteri probiotic lozenges can reduce the number of *Streptococcus mutans* in the oral cavity of asthmatic children.

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