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Probiotics and Synbiotics as Potential Biotics in Gut Health-Promoting Nutrition

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***ABSTRACT*:** Disorders of gut health can impact a variety of health problems, including the digestive system, immunity, and even mental health. The aim of this study was to investigate the potential of probiotics and synbiotics as potential biotics in nutrition to improve gut health. This study used qualitative research methods. The data collection technique for this is literature study. The data that has been collected is then analyzed in three stages, namely data reduction, data presentation and drawing conclusions. The research results show that probiotics and synbiotics are potential biotics in nutrition that can improve intestinal health. Probiotics and synbiotics can help modulate the composition of the body's beneficial microbiota. In addition, it can help reduce levels of pathogenic bacteria and help reduce persistent inflation of the intestines, which can improve the balance of the body's beneficial microbiota.s

Keywords- Probiotics, Synbiotics, Potential Biotics, Gut Health

INTRODUCTION

Disruptions in gut health can have a wide-ranging impact on overall health. Health problems such as indigestion, a compromised immune system, and even mental health issues can result from compromised gut health. Poor gut health can lead to digestive disorders such as diarrhea, constipation, irritable bowel syndrome or inflammatory bowel disease. In addition, an unhealthy gut can also affect the immune system, as most of the immune system is located in the gut. Disruptions in gut health can lead to chronic inflammation, which can increase the risk of autoimmune and infectious diseases (Aron-Wisnewsky et al., 2021).

Efforts to improve gut health can include potential biotics. Potential biotics refer to the types of good microorganisms, such as probiotics and synbiotics, that can provide health benefits when consumed by humans. These microorganisms can help maintain the balance of microbiota in the body,

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especially in the digestive tract, which is an important part of the human immune and digestive systems. Potential biotics can help optimize body function, improve digestion, increase nutrient absorption, and maintain a healthy immune system (Dahiya & Nigam, 2022).

Potential biotics that are considered to improve gut health include probiotics and synbiotics. Probiotics are microorganisms such as yeast and bacteria that have the benefit of improving digestive function and restoring the balance of normal intestinal flora (Prihanto, 2021). The use of probiotics has become an alternative to treat various digestive problems, eczema, fungal infections in the vaginal area, lactose intolerance, and urinary tract infections. Probiotics are generally available in supplement form and are often used as part of therapy. In addition, probiotics can also be found in various fermented food and beverage products such as tempeh, kefir, pickles, and yogurt (Nurita et al., 2023).

Meanwhile, synbiotics are a combination of probiotics and prebiotics that work synergistically to provide health benefits. Probiotics act as live microorganisms that colonize the digestive tract, while prebiotics act as a food source for synbiotic microorganisms. This combination aims to enhance the positive effects of live microorganisms and facilitate their growth in the gut. One example of synbiotics is oligosaccharide fermentation in the colon that produces physiological effects, including an increase in the population of bifidobacteria in the colon (Krisandini, 2023).

Previous research by (Wresdiyati et al., 2013) showed that the treatment of L. fermentum and L. plantarum can lower the percentage of small intestine ventricular damage by 14–62% and increase the thickness of the fine intestinal mucosa 14–29%. The conclusion was that indigenous probiotic treatments L. Fermentum & L. Plantarum may improve the health of the small intestin. L. planarum is better at inhibiting the damage of the large intestines of mice infected with EPEC. Other studies by (Hartono et al. 2016, 2016) have shown that natural synbiotic administration has a significant effect ($P<0,05$) on the condition of the gut microflora, increases the number of lactic acid bacteria, and decreases the amount of Escherichia colli) whereas the administration of natural synbiological treatments has a real effect on the high histology and width of the bowel vili. The conclusion of the study is that the use of Natural Synbiotics 2% can increase, the number of lactic acid bacteria in the duodenum, genus and ileum, decreases the bacteria Escherichia colli in the ileum. The use of commercial synbiotics 4% increases, the elevation of the intestinal vili of the duodene, geneus andyleum, and the width of the vili in theyleum.

The novelty of this study is the object of research, namely probiotics and synbiotics as potential biotics in nutrition to improve gut health, which have never been studied simultaneously before. This study makes an important contribution to understanding the role of probiotics and synbiotics in nutrition and gut health. The results strengthen the evidence that probiotics and synbiotics have a

positive impact on the body's microbiota balance and may help reduce the risk of gut health disorders. The aim of this study was to investigate the potential of probiotics and synbiotics as potential biotics in nutrition to improve gut health.

RESEARCH METHODS

This research uses qualitative research methods. Qualitative research method is a way to examine a problem in more depth, which requires a longer time to complete. This method is different from quantitative research methods, which test hypotheses and require more respondents. The data collection technique in this is a literature study. The literature study data collection method is a technique used to collect information from previously published sources (Sari & Asmendri, 2020). In the literature study data collection method, researchers collect information from various sources, such as journals, books, research reports, and documentation, which are relevant to the problem to be studied. The data that has been collected is then analyzed in three stages, namely data reduction, data presentation and conclusion drawing.

RESULTS AND DISCUSSION

Gut health is of vital importance to humans as it not only plays a role in digesting food and absorbing nutrients, but also influences the immune response, protects the body from infection, and sends important signals to the brain. Two main aspects that are essential in maintaining gut health are the gut barrier and the gut microbiota (Wan et al., 2019). The intestinal barrier refers to the layer of cells that line the intestinal wall and serves as a physical fortress to prevent harmful substances or pathogens from entering the bloodstream. Optimal functioning of the intestinal barrier is essential to prevent inflammation and various other health problems that can result from the penetration of harmful substances through the gut. On the other hand, the gut microbiota plays an important role in the development and maturation of the immune system, especially in the development of tolerance to ingested antigens in the gut. This tolerance is important to ensure that harmless antigens do not trigger an inflammatory response in the gut. Failure to develop tolerance can lead to inflammation-related diseases in the gut in the future (Kartjito et al., 2023).

The gut microbiota refers to the diverse population of microorganisms that reside in the human gut, including bacteria, viruses, fungi and other organisms. The gut is a rich environment for microorganisms, with the number and type varying depending on the particular part of the gut. The colon, which is the last part of the large intestine, is where the most microorganisms thrive. Research shows that the colon can harbor a very large number of microorganisms, estimated between 10^{13} to 10^{14} microorganisms (Power et al., 2014).

"Probiotics and Synbiotics as Potential Biotics in Gut Health-Promoting Nutrition"

Microorganisms inhabiting the human gastrointestinal tract play an important role in maintaining human health, especially in the digestive system. The microbiota provides a number of benefits to its host through various physiological functions, such as strengthening gut integrity or structure, harvesting energy from food, providing protection against pathogens, and regulating immune responses. This means that a balanced state of the microbiota in the gut plays a major role in a variety of important processes, including food digestion, vitamin K synthesis, and immune system function. However, there is potential for disruption of these mechanisms, due to changes in microbial composition, known as dysbiosis. Dysbiosis refers to an imbalance in the number of microorganisms in the human gastrointestinal tract (Thursby & Juge, 2017).

Dysbiosis, or an imbalance in gut bacterial composition, in patients or animal models can be the cause of various health problems such as allergies, inflammatory bowel disease (IBD), obesity, diabetes and even cancer. The composition of bacteria in the gut can be a potential indicator to assess the risk of developing diseases in each individual (Zhang et al., 2015). A focus on maintaining a balanced gut microbiota is crucial to prevent potentially serious health problems. In fact, pediatricians in Indonesia recognize the importance of balanced gut microbiota in supporting the immune system, growth and development of premature infants (Sitorus et al., 2021).

One way to prevent this is through the use of potential biotics, which include probiotics and synbiotics (Dahiya & Nigam, 2022). These findings are in line with research by (Darma et al., 2024), explaining that alleviation of gut microbiota dysbiosis by utilizing the role of nutrition and the introduction of host-friendly bacteria contained in fermented milk products. This aims to improve the health of the gut microbiome in order to achieve optimal balance, known as eubiosis. The nutrients are now known as prebiotics, the host-friendly bacteria are known as probiotics, and the combination of the two is known as synbiotics.

Probiotics are types of live microorganisms that, when consumed, have the potential to provide health benefits. These benefits can occur either through direct interaction with the human body, or indirectly through their influence on other bacterial species in the digestive system (Brahe et al., 2016). Probiotics are usually available in the form of processed foods or dietary supplements. Yogurt is one of the most common foods that contain probiotics; however, there are also a variety of other foods that can be a source of probiotics. These include cheese, fermented and unfermented milk, juices, smoothies, cereals, nutrition bars, and even infant and toddler formula. All of these foods have the potential to contain probiotics and can be a good option to increase the intake of microorganisms beneficial to gut health (Putri et al., 2021).

Probiotic bacteria have the ability to maintain the balance of microflora in the gut. Probiotic drinks are drinks that contain beneficial bacteria such as lactic acid bacteria (LAB). These bacteria have benefits for the digestive tract because they can improve the balance of intestinal microflora and survive in the acidic environment of the stomach, so they are able to occupy the intestines in large

enough quantities (Tanggapo, 2019). Then probiotics have the function of increasing the production of vitamins, minerals and increasing the digestibility of protein and fat. In addition, probiotics can also prevent digestive tract diseases. The mechanism of action is to protect or improve the host and inhibit the growth of pathogenic bacteria and other inhibitory bacteria (Septiani & Sari, 2023). Based on this information, it means that probiotic drinks can help prevent digestive disorders such as typhoid, diarrhea, and dysentery that often occur in Indonesian society (Tanggapo, 2019).

Furthermore, besides probiotics, there are other biotics, namely synbiotics. Synbiotics are a combination of probiotics and prebiotics. As explained, probiotics are bacteria that have an important role in digestion and health and immunity, while prebiotics are substances in fiber that provide nutrients for probiotics. Synbiotics combine these two components to aid the growth of good bacteria in the gut (Kearney & Gibbons, 2018). Synbiotics then have the potential to exert more significant effects on gut microbiota and human health than the intake of prebiotics or probiotics separately. This is due to the co-administration of probiotic bacteria with prebiotics, which helps maintain the viability of probiotic bacteria in the gastrointestinal tract (Brahe et al., 2016).

According to Gibson cited in (Niazy & Hassan, 2022), underlines that probiotics and prebiotics taken separately may not be as effective in preventing digestive disorders as their combination. Therefore, synbiotics were developed as an alternative, where probiotic bacteria are supported to survive and thrive by prebiotic components. Prebiotics act as a source of nutrients for probiotics, allowing them to remain in the digestive tract longer than they would otherwise. This is supported by data showing an increase in probiotic bacteria survival after passing through the upper digestive tract.

In addition, prebiotic foods serve as nutrients for probiotic bacteria and can also inhibit the growth of pathogenic bacteria in the gut (Senditya et al., 2014). This means that the combination of probiotics and prebiotics has the potential to provide beneficial effects on human health. This combination has the potential to reduce the risk of diseases caused by pathogenic bacteria by strengthening the gut microflora and inhibiting the growth of pathogenic bacteria in it.

Consumption of foods containing synbiotics can have a positive impact on the digestive system, particularly in relation to the normal microflora in the gut. Synbiotics play an important role in balancing the microbiota in the gastrointestinal tract by increasing the number of good bacteria such as Bifidobacterium and Lactobacillus (Petreska et al., 2014). In addition, synbiotics can increase endurance and beneficial microbial composition (Markowiak & Sli ̇zewska, 2017). Recent research has also shown that synbiotics have the ability to improve the microbial environment in the gut and activate immune function, which can help prevent the transfer of unwanted bacteria (Bandyopadhyay & Mandal, 2014).

Research results show that probiotics and synbiotics are potential biotics in nutrition that have the potential to improve gut health. The consumption of probiotics, which are live microorganisms that are beneficial to the body, as well as synbiotics, a combination of probiotics and prebiotics, has been

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shown to provide various benefits to gut health. By taking probiotics and synbiotics regularly, individuals can help improve their gut health. Both types of biotics can help improve the balance of gut microflora, promote the growth of good bacteria, such as Bifidobacterium and Lactobacillus, and inhibit the growth of pathogenic bacteria in the digestive tract.

CONCLUSION

Probiotics and synbiotics have an important role as potential biotics in nutrition to improve gut health. Probiotics and synbiotics are able to positively influence the composition of the body's microbiota. Probiotics and synbiotics help in regulating the balance of good microbes in the gut by reducing the number of potentially harmful pathogenic bacteria. In addition, the consumption of probiotics and synbiotics has also been shown to reduce chronic inflammation in the gut, which is an important factor in maintaining the balance of beneficial microbiota. These findings provide a strong basis for considering the use of probiotics and synbiotics as a nutritional strategy to improve gut health and overall support body health.

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