



## Synbiotic Structured Education (Probiotics And Prebiotics) In Order To Increase The Community's Resistance To The Spread Of Covid-19

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### ABSTRACT

*This study aims to provide an overview of community service carried out in the form of Synbiotic Structured Education (Probiotics and Prebiotics). The data analysis method uses a statistical test of hypothesis testing on changes in the Mac Nemar change test to ascertain whether or not there is a change in the behavior of the object of research. In this method, the change in state or response shown by the object is analyzed with the help of a table called a 2 x 2 frequency table. The table is used as a tool because this method is applied to 2 groups of paired samples. The conclusion of community service that has been carried out in the form of structured education of synbiotics (probiotics and prebiotics) in order to increase the community's resistance to the spread of COVID-19 is able to make changes in behavior by the community in general and families in particular in applying the use of synbiotics to increase the body's resistance to enteric cases, acute and respiratory infections.*

**Keywords :** covid-19, prebiotics, probiotics, synbiotics

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## INTRODUCTION

On March 11, 2020 it was declared by WHO that the Corona Virus (COVID-19) was a global pandemic (Cucinotta, 2020; Wiarghita, 2020). In Indonesia, the first two cases of COVID-19 infection were reported on March 2, 2020 by President Joko Widodo. Indonesia, seen from the case fatality rate (CFR) as of 19 September 2020, was ranked second in Asia Pacific and the highest in Southeast Asia and higher than the world average (Adamy & Rani, 2020).

The biggest health issue worldwide, including in Indonesia, is the Coronavirus Disease (Covid-19) outbreak. The Covid-19 outbreak has greatly affected all aspects of life. In order to minimize the spread of the Covid-19 pandemic, various quite massive efforts were made, one of which was extreme countermeasures such as locking an area or even a country (Zahrotunnimah, 2020). Covid-19 has become a major problem throughout the world that has developed in 2019 to date (Yuliana, 2020; Nurfurqon, 2020). The problem of Covid-19 is also a complicated homework for Pematang Rejang Regency.

There are 4 (four) categories of mention of Covid-19 in the WHO guidelines and the Stigma Research of Covid-19 Positive People, namely People Under Monitoring, Patients Under Supervision, People Without Symptoms, and Positive (Abdillah, 2020). On December 28, 2020 in Indonesia as many as 719,219 thousand people were confirmed to be Covid-19 and cases of death reached 21,000 people (JHU CSSE Covid-19, 2020). According to Tidora's research, groups at high risk of being infected with Covid-19 are those who have congenital diseases, are smokers, and the elderly (Siagian, 2020). In Indonesia, efforts have been made to slow the spread of Covid-19 by doing 3M, maintaining distance, wearing masks, and washing hands (Buana, 2020).

Regarding the conditions caused by the Covid-19 pandemic, the public is required to have a way or behavior to live a healthier life in order to cut the spread of Covid-19. One thing that can be done is to increase the level of each individual's immune system so as to minimize the effects that can be caused by the spread of Covid-19. In order to increase the body's resistance to disease or existing conditions, a way of daily living that involves synbiotics can be an alternative that can be used.

Therefore, the target of prebiotics is to selectively stimulate the growth of probiotic bacteria. In its development, between probiotics and prebiotics are two things that are both beneficial for human health. Probiotics and prebiotics that are given together and provide a beneficial effect for humans who consume them are called synbiotics. Synbiotics (eubiotics) are a combination of probiotics and prebiotics. The addition of live microorganisms (probiotics) and substrates (prebiotics) for bacterial growth, such as Fructooligosaccharide (FOS) with Bifidobacterium or Lactitol with Lactobacillus, can produce a very useful compound.

The advantage of this combination is to increase the survival of probiotic bacteria, because specific substrates are available for the fermentation process, so that the body gets more perfect benefits from this combination. This is based on several studies, Antarini's research (2011) concluded that a balance between probiotics and prebiotics will provide more optimal health effects. Several researchers have conducted research on the health benefits of consuming prebiotics and synbiotics (Roller et al., (2003); Bruggencate et al., (2006); Gallaher and Khil (1999); Olesen and Hoyer, (2006); Chouraqui et al. ., 2008). Consumption of synbiotics can boost the immune system, prevent colon cancer and other digestive tract disorders. The combination of probiotics and prebiotics can show more optimal results because prebiotics help the performance of probiotics so that they can increase the number of beneficial bacteria and suppress the number of pathogenic bacteria.

The role of synbiotics in the digestive tract is to keep the microorganism ecosystem in the intestines healthy through the role of probiotics and prebiotics. Currently, many studies have been carried out on the use and effects of synbiotics on body health. In cases of acute diarrhea, synbiotics have been shown to affect the duration, consistency, and volume of diarrhea in children. In addition, in the case of gastroenteritis, the use of synbiotics has also been developed to treat inflammatory bowel diseases and hepatoencephalopathy. This study refers to research by Wibawa (2017) which stated that synbiotics (a combination of prebiotics and probiotics) improve MHE, and reduce Gram-negative organisms in decompensated cirrhosis. The secondary end result for patients receiving symbiotic therapy is an

improvement in overall liver function. *Bifidobacterium longum* is used in cirrhotic patients to improve MHE and overt HE.

The term synbiotic is used for products that contain both probiotics and prebiotics. Synbiotic behavior implies synergism or cooperation. That is, the prebiotic used must be suitable or able to help the work of the existing probiotics. For example, products containing prebiotic FOS or lactulose and bifidobacterial probiotics. The prebiotic content in synbiotics will protect the prebiotics from stomach acid and stimulate the growth of these probiotics.

## **METHODS**

### **A. Location and Time of Implementation**

1. This research was conducted for 2 months starting from November 2021 to December 2021.
2. The location of this research is Pemalang Regency (Pemalang District, Taman District, and Comal District).

### **B. Data Collection Method**

Data collection techniques in this study will be carried out by several methods, namely distributing questionnaires, interviews, observation and documentation.

#### **1. Research population**

The population is all research subjects (Arikunto, 2002). The population used in this study were all related research subjects in Pemalang Regency.

#### **2. Research Sample**

The sample is part of the population that can be considered representative and reflects the state of the population (Sukamadinata, 2005). The sampling procedure in this study was random. The samples obtained include Pemalang sub-districts, Taman sub-districts, and Comal sub-districts. Research procedure

##### **a. Research procedure**

###### **1) Research preparation**

The preparations carried out in this study include the following steps:

- FGD (Forum Group Discussion) with a team of experts to develop

research instruments

- Develop research instruments
- Develop guidelines.
- Develop observation guidelines and observation sheets

## 2) Research Implementation

This activities was carried out in two stages, namely the preparation stage and the implementation stage.

### C. Data Analysis Method

The next step of the researcher after doing service in the form of structured education is to collect data. Data processing is done quantitatively through statistical and qualitative tests. For processing qualitative descriptive data, namely:

1. Data reduction, namely selecting the data collected and supporting it through categorizing data that is needed by researchers and not needed.
2. Presentation of data, namely researchers trying to compile relevant data so that it becomes information that can be concluded and has a certain meaning.
3. Data verification, namely the researcher draws conclusions based on the findings and triangulate between observations.

For quantitative data processing, statistical tests are used, namely: The test applied is hypothesis testing on changes in the Mac Nemar change test to ensure whether or not there is a change in the behavior of the object of research. In this method, the change in state or response shown by the object is analyzed with the help of a table called a 2 x 2 frequency table. The table is used as a tool because this method is applied to 2 groups of paired samples. When described, the outline of a 2 x 2 table is as follows:

**Table 1. Mac Nemar Change**

	The State After the Stimulus Is Given	
The state before the stimulus is given	-	+
+	A	B
-	C	D

In the table, positive (+) and negative (-) signs are given to indicate differences in answers, responses or attitudes given by the object. Changes to the first and second answers can be seen at the top left of the table cells (from the positive sign to the negative sign) and at the bottom right of the table cell (from the negative sign to the positive sign). The formulation of the final conclusion is based on calculations to determine the khai-square value, namely:

$$x^2 = \frac{\left[A - \left(\frac{A+D}{2}\right)\right]^2}{\frac{A+D}{2}} + \frac{\left[D - \left(\frac{A+D}{2}\right)\right]^2}{\frac{A+D}{2}}$$

Where X<sup>2</sup> is the khai-squared value calculated, A is a number of objects that display changes in answers from positive to negative, D is a number of objects that display changes in answers from negative to positive, and 2 is a constant.

## RESULTS AND DISCUSSION

### Synbiotic Structured Educational Activities (Probiotics and Prebiotics)

#### 1. Synbiotic Mechanism of Action

The microbiota in the human colon may confer health benefits on the host or potential pathogen. At present, various studies have been carried out and are being carried out to manipulate the composition of the colonic microbiota in an effort to obtain potential aspects that benefit the host. Approach through prebiotic, which is a non-viable food component that is specifically fermented in the colon by probiotic bacteria (eg Lactobacilli or Bifidobacteria).

In fact, every food ingredient that enters the large intestine is a candidate for prebiotics. However, for effectiveness, selective fermentation itself is a very important condition. Materials that have received a lot of attention and are often used for this purpose are non-digestible oligosaccharides (undigested oligosaccharides) which include fructose, xylose, soy, galactose, glucose, and mannose. Oligosaccharides containing natural fructose can be obtained from onions, asparagus, and bananas. These foods meet the criteria as prebiotics.

Research data indicate that Fructooligosaccharide (FOS) can be fermented specifically by Bifidobacteria. Consuming prebiotics can also significantly modulate

the composition of the colonic microbiota, which causes Bifidobacteria to be more dominant in the colon and are found in feces. Giving FOS as much as 4 grams / day can act as a prebiotic that meets health standards.

## 2. Synbiotic Pharmacokinetics

Probiotics that are part of synbiotics must be able to live in all parts of the gastrointestinal tract (can also be detected in feces). In fact, the amount must still be high enough even if the body does not get the intake of antibiotics, in order to function effectively in the body. Probiotics can only function effectively if they can survive gastric and pancreatic secretions. In addition, normal intestinal flora or pathogenic bacteria must not have antibiotic resistance.

## 3. Synbiotic Pharmacodynamics

The mechanism of action of synbiotics will increase intestinal resistance. Here are some of the benefits of the synbiotic mechanism of action:

- a) Changing the environment of the intestinal tract, both pH and oxygen levels, thus creating an acidic environment, where "bad" germs cannot grow. In the study, Bifidobacteria will ferment FOS - a type of prebiotic - and produce acidic substances, including short chain fatty acids. This type of fatty acid improves the integrity of the intestinal wall and ultimately stimulates the growth of "good" germs.
- b) Compete with bad bacteria in fighting over nutrients (carbohydrates, Fe, short chain fatty acid).
- c) Stimulates the release of intestinal fluids that are useful for digestion.
- d) Stimulates the immune system, both cellular and humoral, thereby increasing the gastrointestinal immune system.
- e) Producing antibacterial substances.
- f) Compete with bad bacteria to stick to the intestinal lining, thereby reducing the chance for bad bacteria to multiply.
- g) Smooth digestion by producing various digestive enzymes and vitamins.
- h) Affects resistance in mucous membrane tissue, including mucous membranes in the reproductive tract, respiratory tract, skin, and in the nasal passages. Bifidobacterium and Lactobacillus strains that have been widely studied for the

treatment and prevention of eczema/dermatitis in infants and children.

#### 4. Long Term Use

Long-term use of synbiotics as immunomodulatory agents has been shown to be useful in children with autoimmune and allergic disorders, such as inflammatory bowel disease and atopic dermatitis. In addition, research has also proven the synbiotic ability to increase the body's resistance to cases of acute enteric and respiratory infections. With these various benefits, synbiotics are now starting to be added to various foodstuffs, especially products made from milk.

Prebiotics as living organisms have the ability to infect their hosts. This has been reported in various studies, although its occurrence is rare. Some special considerations are needed to use synbiotics, especially in immunocompromised conditions or the occurrence of intestinal bleeding. Doctors should also pay attention to whether immune stimulation by synbiotics is really necessary in the case of people who are prone to arthritis.

#### **Community Service Achievements**

The achievement of synbiotic structured education services (probiotics and prebiotics) in order to increase the community's resistance to the spread of COVID-19 in the form of behavioral changes by the community in general and families in particular in applying the use of synbiotics to increase the body's resistance to acute enteric cases and respiratory infections. Changes in behavior were tested using the Mac Nemar test on the people who were the object of this service which included 3 (three) areas. The following are the stages of testing carried out:

For the Mac Nemar change test to ensure whether or not there is a change in community behavior in applying the use of synbiotics to increase body resistance in Pematang Regency, before and after community service (before and after treatment research design is explained as follows:



**Table 2. Hypothesis Testing on Changes in the Mac Nemar change test in Pemalang District**

No.	Respondent	State of Community Behavior before Service	State of Community Behavior after Service
1	Responden 1	Apply	Apply
2	Responden 2	Not Apply	Apply
3	Responden 3	Apply	Not Apply
4	Responden 4	Not Apply	Apply
5	Responden 5	Not Apply	Apply
6	Responden 6	Not Apply	Apply
7	Responden 7	Not Apply	Apply
8	Responden 8	Not Apply	Apply
9	Responden 9	Not Apply	Apply
10	Responden 10	Not Apply	Apply
11	Responden 11	Not Apply	Not Apply
12	Responden 12	Apply	Apply
13	Responden 13	Apply	Apply
14	Responden 14	Apply	Apply
15	Responden 15	Apply	Apply
16	Responden 16	Apply	Apply
17	Responden 17	Apply	Apply
18	Responden 18	Apply	Apply

**Table 3. Hypothesis Testing on Changes in the Mac Nemar change test in Taman District**

No.	Respondent Name	State of Community Behavior before Service	State of Community Behavior after Service
1	Responden 1	Not Apply	Apply
2	Responden 2	Not Apply	Apply
3	Responden 3	Not Apply	Apply
4	Responden 4	Not Apply	Not Apply
5	Responden 5	Not Apply	Apply
6	Responden 6	Not Apply	Apply
7	Responden 7	Apply	Apply
8	Responden 8	Not Apply	Not Apply
9	Responden 9	Not Apply	Apply
10	Responden 10	Apply	Apply
11	Responden 11	Apply	Apply
12	Responden 12	Apply	Apply
13	Responden 13	Apply	Not Apply
14	Responden 14	Not Apply	Apply
15	Responden 15	Not Apply	Apply
16	Responden 16	Not Apply	Apply
17	Responden 17	Apply	Apply
18	Responden 18	Apply	Apply
19	Responden 19	Not Apply	Apply
20	Responden 20	Not Apply	Apply

**Table 4. Hypothesis Testing on Changes in the Mac Nemar change test in Comal District**

No.	Respondent Name	State of Community Behavior before Service	State of Community Behavior after Service
1	Responden 1	Not Apply	Not Apply
2	Responden 2	Not Apply	Apply
3	Responden 3	Not Apply	Apply
4	Responden 4	Not Apply	Apply
5	Responden 5	Apply	Apply
6	Responden 6	Not Apply	Apply
7	Responden 7	Not Apply	Apply
8	Responden 8	Not Apply	Apply
9	Responden 9	Apply	Apply
10	Responden 10	Not Apply	Apply
11	Responden 11	Not Apply	Apply
12	Responden 12	Not Apply	Not Apply
13	Responden 13	Not Apply	Apply
14	Responden 14	Not Apply	Apply
15	Responden 15	Not Apply	Apply
16	Responden 16	Not Apply	Apply
17	Responden 17	Apply	Apply
18	Responden 18	Apply	Apply

From the appearance of the data listed in the table, several hypothesis testing steps that must be carried out include:

Formulate the null hypothesis and alternative hypothesis. The null hypothesis basically states that there is no change in community behavior in applying the use of synbiotics to increase body resistance in Pemalang Regency after the implementation of community service in the form of synbiotic structured education (probiotics and prebiotics). While the alternative hypothesis states that there is a change in community behavior in applying the use of synbiotics to increase body resistance in Pemalang Regency after the implementation of community service in the form of synbiotic structured education (probiotics and prebiotics). Therefore, in this case the null hypothesis and the alternative hypothesis are formulated symbolically as follows:

$H_0$  :  $P_{\text{there is a change in people's behavior}} = P_{\text{there is no change in people's behavior}}$

$H_a$  :  $P_{\text{there is a change in people's behavior}} \neq P_{\text{there is no change in people's behavior}}$

In this case, the significance level applied is 5% or 0.05. In the chi-square table, the chi-square value for the degree of freedom is 1 and the significance level of 0.05 is 3.841. The chi-squared value in the table of 3.841 becomes the basis for formulating test criteria and final conclusions. Therefore, the hypothesis testing criteria applied is that the null hypothesis is accepted if

$$x^2 \leq 3,841$$

While the null hypothesis is rejected if

$$x^2 > 3,841$$

If the hypothesis testing procedure carried out in this case has reached the stage of calculating the chi-square value, previously several calculation steps must be taken. The results are briefly presented in the 2 x 2 table below.

**Table 5. Changes in Behavioral Conditions Before and After Community Service in Pematang District**

The state of community behavior before the implementation of community service	The state of community behavior after the implementation of community service	
	Apply	Not Apply
Not Apply	8	1
Apply	8	1

Then, based on the data display in table 5, the chi-squared value is calculated through the application of the following formula. In this case, the magnitude of the chi-squared value is:

$$x^2 = \frac{\left[A - \left(\frac{A+D}{2}\right)\right]^2}{\frac{A+D}{2}} + \frac{\left[D - \left(\frac{A+D}{2}\right)\right]^2}{\frac{A+D}{2}}$$

$$x^2 = \frac{\left[8 - \left(\frac{8+1}{2}\right)\right]^2}{\frac{8+1}{2}} + \frac{\left[1 - \left(\frac{8+1}{2}\right)\right]^2}{\frac{8+1}{2}} = \frac{12,25}{4,5} + \frac{12,25}{4,5} = 5,44$$

**Table 6. Changes in Behavioral Conditions Before and After Community Service in Taman District**

The state of community behavior before the implementation of community service	The state of community behavior after the implementation of community service	
	Apply	Not Apply
Not Apply	11	2
Apply	6	1

Then, based on the data display in table 6, the chi-squared value is calculated through the application of the following formula. In this case, the magnitude of the chi-squared value is:

$$x^2 = \frac{\left[A - \left(\frac{A+D}{2}\right)\right]^2}{\frac{A+D}{2}} + \frac{\left[D - \left(\frac{A+D}{2}\right)\right]^2}{\frac{A+D}{2}}$$

$$x^2 = \frac{\left[11 - \left(\frac{11+1}{2}\right)\right]^2}{\frac{11+1}{2}} + \frac{\left[1 - \left(\frac{11+1}{2}\right)\right]^2}{\frac{11+1}{2}} = \frac{25}{6} + \frac{25}{6} = 4,166$$

**Table 7. Changes in Behavioral Circumstances Before and After Community Service in Comal District**

The state of community behavior before the implementation of community service	The state of community behavior after the implementation of community service	
	Apply	Not Apply
Not Apply	12	2
Apply	4	0

Then, based on the data display in table 7, the chi-squared value is calculated through the application of the following formula. In this case, the magnitude of the chi-squared value is:

$$x^2 = \frac{\left[A - \left(\frac{A+D}{2}\right)\right]^2}{\frac{A+D}{2}} + \frac{\left[D - \left(\frac{A+D}{2}\right)\right]^2}{\frac{A+D}{2}}$$

$$x^2 = \frac{\left[12 - \left(\frac{12+0}{2}\right)\right]^2}{\frac{12+0}{2}} + \frac{\left[0 - \left(\frac{12+0}{2}\right)\right]^2}{\frac{12+0}{2}} = \frac{36}{6} + \frac{36}{6} = 12$$

Based on the results of the calculations in the previous stages based on Table 5, Table 6, and Table 7, the chi-squared values obtained are 5.44, 4.166, and 12, respectively. These three values are greater than the chi-squared values in table 3.841. Thus, the null hypothesis which states that there is no change in community behavior in applying the use of synbiotics to increase body resistance in Pemalang Regency after the implementation of community service in the form of synbiotic structured education (probiotics and prebiotics) is rejected. In contrast, the alternative hypothesis which states that there is a change in community behavior in applying the use of synbiotics to increase body resistance in Pemalang Regency after the implementation of community service in the form of synbiotic structured education (probiotics and prebiotics) is accepted.

## CONCLUSION

Based on the description above, it is stated that community service that has been carried out in the form of structured education of synbiotics (probiotics and prebiotics) in order to increase the community's resistance to the spread of COVID-19 is able to make changes in behavior by the community in general and families in particular in applying the use of synbiotics to increase resistance. body against cases of acute enteric and respiratory infections

This conclusion is obtained from statistical testing which states that from this study (1) the synbiotic structured education community empowerment program (probiotics and prebiotics) can improve community behavior in the form of awareness to apply the use of synbiotics in Pemalang Regency including Pemalang

District, Taman District, and Comal District, (2) there was a change in community behavior in the form of awareness to apply the use of synbiotics in Pemalang Regency including Pemalang District, Taman District, and Comal District after this community empowerment was carried out.

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