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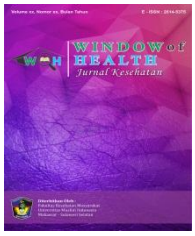

ARTICLE RESEARCH
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Utilization of Nata De Durio as a Constipation Preventive (Preliminary Animal Studies)

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ABSTRACT

Constipation is a symptom/problem that arises in the process of defecation, which is not smooth and irregular due to a lack of fiber intake in the body. Nata de durio is an extracellular cellulose made from durian seeds and formed from the activity of the bacterium Acetobacter xylinum, which contains high enough fiber so that it can regulate and maintain intestinal function in the defecation process. The purpose of this study is to assess the effect of using nata de durio as a natural fiber in the defecation process in vivo and to assess its effect on the transition time of feces in the small intestine of mice. The current study was an experimental study using male mice that were given distilled water as a negative control, inulin as a positive control, and nata seed de durio with doses of 0.02 gram, 0.04 gram, and 0.08 gram as a treatment group for 5 weeks. According to the findings of this study, the administration of nata de durio had a better effect on the amount of feces, weight of feces, frequency of defecation, and consistency of feces compared to the control group. The study's conclusion is that nata de durio can be used as a natural fiber in improving the defecation pattern of BALB/c male mice.

Keywords: Constipation; defecation; fiber; nata de durio

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INTRODUCTION

Almost all people often experience digestive disorders, especially constipation. Constipation is a symptom/problem that arises in the process of defecation, which is not smooth and irregular due to a lack of fiber intake in the body.[1] This condition is characterized by a decrease in the frequency of defecation, changes in stool consistency, and stool size.[2] When experiencing constipation, the defecation process will cause pain in the stomach, causing discomfort and torture for the sufferer, because the feces that will be excreted are hard, so that they can cause wounds on the walls of the anus, which, if left untreated, can cause chronic diseases.[1,3] Low fiber intake is associated with constipation, and therefore, everyone with or without constipation needs a normal daily fiber intake. One effort that can be done to prevent constipation is to consume fiber according to need.[4]

Dietary fiber is very important for body health. However, knowledge about the importance of dietary fiber is still low in the community. People still often ignore fiber in their daily food. Good fiber consumption is natural fiber that can be obtained from vegetables and fruits. However, some people prefer fast food containing fiber rather than consuming vegetables and fruits. Nata is one of the fast foods that can function as an alternative source of dietary fiber.[5] According to several studies that have been conducted, nata has a high crude fiber content and sufficient nutritional value so that it is expected to improve poor defecation patterns and increase intestinal mass. Crude fiber is the result of the breakdown of sugar in the fermentation medium due to the activity of Acetobacter xylinum.[6] Its jelly-like, clear, and chewy characteristics make nata an attractive source of dietary fiber for all age groups.[7]

Durian seeds are a waste product that is quite abundant when the durian season begins. Inside the durian seeds, there are nutritional elements that can be used as a basic ingredient for making nata. One way to reduce durian seed waste is to process it into food ingredients, such as making nata with the help of Acetobacter xylinum bacteria, with the final product named nata de durio. Nata de durio is extracellular cellulose made from durian seeds and formed from the activity of Acetobacter xylinum bacteria, which contains quite high fiber, so that it can be used to regulate and maintain intestinal function in the defecation process. In the digestive tract, nata fiber will bind all residual elements from combustion that are not absorbed by the body, and are excreted in the form of feces through the anus.[8,9] Research on the benefits of nata de durio as a natural fiber has never been conducted before, this is the basis for researchers in conducting a Case Preliminary Study which aims to assess the effects of using nata de durio as a natural fiber in the defecation process in vivo and assess its effects on the transition time of feces in the small intestine of mice, so that it becomes the basis for real research in an effort to apply it to humans in the future.

METHOD

The research was conducted at the Faculty of Medicine, Hasanuddin University. The making of nata de durio was carried out at the Biotechnology Laboratory of LPPM, Hasanuddin University, and

animal husbandry and treatment were carried out at the Biochemistry Laboratory, Faculty of Medicine, Hasanuddin University. This research uses BALB/C mice as experimental animals with a protocol that has received ethical approval from the Animal Ethics Committee of the Faculty of Medicine Ethics Commission, Universitas Hasanuddin, with letter number 835/UN4.6.4.5.31/PP36/2021.

This study used the Completely Randomized Design (CRD) Method. From the design, 5 treatments were obtained, and each treatment was repeated 5 times. The animals used were male mice aged 20-26 weeks with a body weight of around 18-30 grams. 5 mice were then divided into 5 groups randomly, including the 0.5 ml aquades group, the 0.04 gram inulin group, the 0.02 gram nata de durio group, the 0.04 gram nata de durio group, and the 0.08 gram nata de durio group. Nata de durio, inulin, and aquades were given orally using a sonde to mice for 5 weeks. After being given orally to mice, observations were made on each mouse for each treatment. Observations were made by looking at the feces that came out, then weighing the feces, calculating the amount of feces and the frequency of defecation, and measuring the consistency organoleptically. Research observations were carried out for 24 hours, calculated after the treatment was given for 5 weeks.

RESULTS

Figure 1. Shape and size of mouse feces given (a) Aquades, (b) inulin, (c) 0.02 grams of nata de durio, (d) 0.04 grams of nata de durio, (e) 0.08 grams of nata de durio.

It can be seen in Figure 1 that the administration of 0.08 nata de durio produces larger feces in shape and size compared to the administration of distilled water and insulin.

Based on table 1above shows that giving 0.08 grams of nata de durio has the highest average number of feces, namely 90.51.

Table 1. The number of mouse feces produced during the defecation process within 5 weeks.

Treatment	Time					Average
	Week 1	Week 2	Week 3	Week 4	Week 5	
Aquadest	94.57	81.43	87.43	84.57	96.00	88.8
Inulin	81.57	88.43	86.71	81.29	78.00	83.2
Nata De Durio 0.02 grams	82.29	87.71	83.29	81.00	74.29	81.72
Nata De Durio 0.04 grams	73.57	58.71	52.86	60.71	74.71	64.11
Nata De Durio 0.08 grams	80.86	96.14	97.57	93.14	84.86	90.51

Based on Table 2, the highest average feces weight was found in the administration of 0.04 grams of nata de durio, namely 1.82. While the lowest average value was found in the administration of distilled water as a negative control, namely, 0.83.

Table 2. The weight of mouse feces produced during the defecation process within 5 weeks

Treatment	Time					Average
	Week 1	Week 2	Week 3	Week 4	Week 5	
Aquadest	0.94	0.98	1.03	0.70	0.49	0.83
Inulin	2.00	1.99	1.61	1.07	0.96	1.53
Nata De Durio 0.02 grams	1.62	1.4	1.51	1.97	1.83	1.67
Nata De Durio 0.04 grams	1.84	1.61	2.00	1.81	1.83	1.82
Nata De Durio 0.08 grams	2.29	2.31	1.23	1.58	1.65	1.81

Based on Table 3 above, the frequency of defecation with the highest average was found in the administration of 0.04 grams of nata de durio, namely 1.82. While the lowest average value was found in the administration of distilled water as a negative control, namely 0.83

Table 3. The frequency of mouse defecation that occurred during 5 weeks

Treatment	Time					Average
	Week 1	Week 2	Week 3	Week 4	Week 5	
Aquadest	9.00	8.86	10.86	8.29	6.14	8.63
Inulin	10.71	8.71	8.14	10.86	11.00	9.88
Nata De Durio 0.02 grams	13.71	12.00	13.14	12.14	10.57	1.29
Nata De Durio 0.04 grams	12.57	11.14	17.14	14.00	14.14	1.80
Nata De Durio 0.08 grams	16.14	15.00	14.86	15.29	16.14	12.39

Administration of nata de durio at a dose of 0.08 grams had a significant effect on the frequency of defecation, the amount of feces and the weight of feces produced during the defecation process compared to the control group.

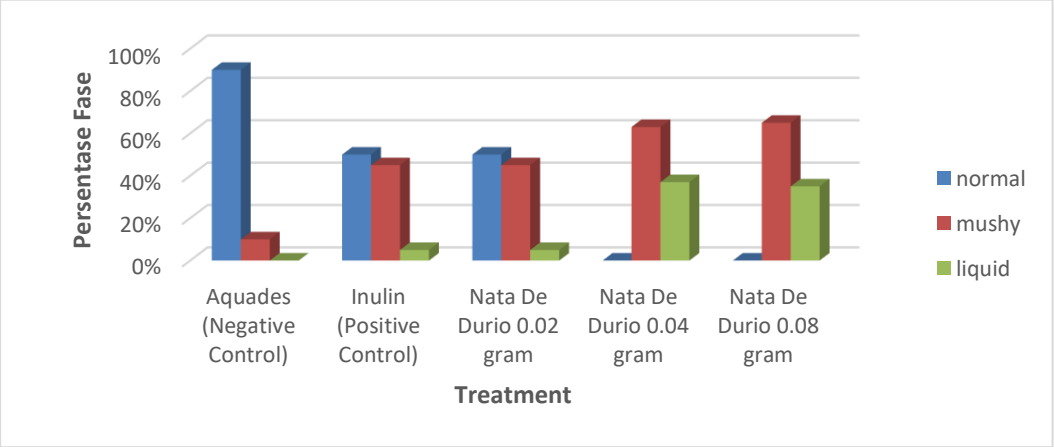

Figure 2. Average consistency of mouse feces for each treatment

Based on Figure 2, it can be concluded that the consistency of liquid and soft feces from the 0.04-gram Nata de durio and 0.08-gram Nata de durio treatment groups was higher than that of the positive control group or the negative control group.

DISCUSSION

In the research of Hua et al. (2021),[10] 24 6-week-old male rats were divided into 4 groups given different treatments, namely the control group, the low-dose group of 200/kg ginseng soluble dietary fiber (GSDF), the medium-dose group of 400/kg GSDF, and the high-dose group of 800/kg GSDF which were intervened for 15 days. The results showed that ginseng soluble dietary fiber can increase the water content in rat feces and improve the intestinal environment by promoting the proliferation and metabolism of specific probiotics and ultimately have a positive impact on the metabolism of rats. ginseng soluble dietary fiber can also change the structure of intestinal flora thereby improving colon health.

Ardini and Pujiawati (2013)[11] have also conducted a study using guava juice filtrate and tomato juice given to Swiss-Webster mice which were divided into 6 different groups, namely positive control group, negative control group, group given 100 g of tomatoes, group given 200 g of tomatoes, group given 100 g of guava, group given 200 g of guava. The results showed that 200 gr of guava juice and 200 gr of tomato juice had the ability to increase the frequency of defecation and feces weight. While the consistency of the feces became softer than the negative control. So it can be concluded that 200 gr of guava juice and 200 gr of tomato juice have the ability as a laxative. Research by Yang et al. (2012).[12] also stated the same thing that fiber intake is positively correlated with defecation frequency.

In the case we presented above, although using different sources of dietary fiber, the results are almost the same as the research of Hua et al. where there was an increase in water content in the feces produced by mice during the defecation process after being given nata de durio so that the feces produced became soft and had a heavier volume than the control group. The ability of dietary fiber to bind water in the colon makes the volume of feces larger so that it can stimulate the nerves in the rectum which

causes the desire to defecate.[13,14] Higher water content in the intestinal area tends to produce larger, softer stools.[15,16]

Nata is a type of insoluble fiber that can be fermented more quickly by some intestinal microbiota.[17] Consuming insoluble fiber (nata) can help move food through the digestive tract and support regular bowel movements.[18,19] Dadda research on the benefits of fiber for intestinal health usually uses extracts from fruits and vegetables, but in this study we used nata de durio made from durian seeds. This is based on the fact that there has never been any research on the use of nata as a source of dietary fiber that can improve defecation patterns and maintain intestinal health. The study used nata de durio because nata contains quite high fiber and is popular with the public and the manufacturing process is quite easy.

This preliminary study used nata de durio as a source of fiber because nata contains fiber in the form of cellulose, which is the highest content after water in nata, which has an important role in facilitating bowel movements and preventing constipation.[20,21,22] Nata contains fiber in the form of cellulose around 35-62% which is the result of the accumulation of extracellular polysaccharides.[23] Apart from the high fiber content, nata also contains 98% water, 0.2% fat, 0.012% Calcium, 0.002% Phosphorus and 0.017% Vitamin B3.[24] So consuming nata de durio as dietary fiber can help meet the body's fiber needs so that it can improve defecation patterns and maintain intestinal health. In the human digestive tract, nata fiber (cellulose) will absorb fluids and bind all residual elements in the digestive tract which are formed into feces which will then be excreted through the anus.[25]

CONCLUSION AND RECOMMENDATIONS

This preliminary study shows that nata de durio can be used as an anti-constipation in people who experience symptoms/problems with difficulty defecating (defecation) because nata de durio is a natural fiber that can be used as an alternative to help improve defecation patterns, thereby helping to maintain intestinal health.The lack of a minimal number of samples in this study means that it needs to be done on a larger sample, and due to the lack of certain facilities and skills, the author cannot present the histological picture. However, considering that the case we present is still a preliminary study, it can strengthen the determination to conduct tests with a larger number of samples and lay the foundation for its application to human defecation patterns.

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