

## Supplementation Dadih Pudding as a Probiotic on the Psychosocial Problems of Children with COVID-19 Undergoing Isolation

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Previous studies have found that probiotic supplementation can positively affect mood and psychological symptoms such as stress and anxiety. Dadih is a traditional food from West Sumatera, Indonesia, derived from buffalo milk, a source of probiotics, and contains a lot of lactic acid bacteria, the type of *Lactobacillus*. This study aimed to prove the effect of giving dadih pudding as probiotics on psychosocial problems in children and adolescents with COVID-19 who underwent isolation treatment. This quasi-experimental research uses with post-test only with a control group. Among the respondents, 43 patients 5 – 18 years old with Covid 19 were isolated at the Quarantine Center. The respondents were divided into two groups, the experimental group gave dadih pudding (23 members), and the control group gave pudding only (20 members). Psychosocial problems determined with Pediatric Symptom Checklist 17 (PSC-17) checklist after two weeks of intervention with dadih pudding. There is a significantly different mean internalization between the control and intervention groups  $p < 0.05$ . Children given dadih pudding (intervention group) had lower psychosocial problems than those not given the dadih pudding/control group (12.5% vs 87.5%); otherwise, the control group had more significant psychosocial problems 62.9% than the intervention group 37.1% ( $p < 0.05$ ). Dadih pudding supplementation can significantly reduce the score of PSC-17 among children or adolescents during quarantine COVID-19. This supplementation can be used modulation microbiota in children who suffer from the psychosocial problems.

**Keywords:** Children; Covid 19; Dadih Pudding; Probiotic; Psychosocial Problems.

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The novel coronavirus (2019-nCoV) became a world health problem in early 2020. Clinical manifestations include symptoms of acute respiratory disorders such as fever, cough and shortness of breath. Covid-19 is transmitted through droplets and direct contact with infectious

secretions <sup>1</sup>. The COVID-19 pandemic has spread so fast and has also changed the lifestyle of children and adolescents <sup>2</sup>. To overcome/prevent the transmission of this disease, WHO recommends that apart from wearing masks and washing hands, social isolation, limiting human movement, and

quarantine are quite effective ways to reduce the spread of this disease<sup>3</sup>.

Several studies have seen the impact of isolation and social distancing during the COVID-19 pandemic affecting all aspects of life habits<sup>4</sup>, not only the physical part<sup>5,6</sup> but also aspects of psychological health<sup>7</sup>. Specific stress during quarantine occurs due to fear of infection, frustration and boredom, confusion of information, loss of livelihood, and stigma<sup>8</sup>. Previous research has found that quarantine in children causes the impact of physical and mental activities that contribute to the development of post-traumatic stress symptoms in children<sup>9</sup>. Research in China affects psychological problems in panic disorder, anxiety, and depression<sup>10</sup>. Clinging, inattention, and irritability are severe psychological problems<sup>11</sup>.

The most common symptom is difficulty in concentrating (76.6%), boredom (52%), restlessness (39%), nervousness (38%), feelings of loneliness (31.3%), uneasiness (30.4%), and worries (30.1%)<sup>12</sup>. Systematic review studies in various countries get the prevalence of anxiety among adolescents ranged between 19% and 64%, depression between 22.3% and 43.7%<sup>13</sup>. Among children 5-12 years old, the prevalence of anxiety varied between 19% and 78%, while depression was between 6.3% and 22.6%<sup>13</sup>. Children aged 7-10 years found many emotional problems such as fewer conduct problems and hyperactivity than children aged (3–6 years)<sup>14</sup>. In addition, social isolation can also cause a strong stressor. Research on experimental animals in social isolation found an increase in activation of the HPA axis and increased glucocorticoid and corticosterone levels<sup>15</sup>.

Two-thirds of the children and adolescents in Germany reported being highly burdened by the COVID-19 pandemic. They experienced significantly lower HRQoL (40.2% vs 15.3%), more mental health problems (17.8% vs 9.9%) and higher anxiety levels (24.1% vs 14.9%) than before the pandemic. Promotion and preventative interventions must be done to maintain children's and adolescents' mental health, improve HRQoL, and lessen the burden of COVID-19, particularly among the most vulnerable children<sup>16</sup>. The potential effect of gut microbiota on psychiatric problems via the gut-brain axis has been extensively studied. However, the effectiveness

of probiotic supplementation on psychiatric issues is still lacking. Studies give probiotics can reduce depressive symptoms significantly, but not all probiotics can cause psychobiotic effects on the central nervous system<sup>17</sup>.

One of the traditional foods that are very good and readily available in West Sumatra and contain lots of probiotic *Lactobacillus* is Dadih<sup>18</sup>. Dadiah has been studied to have good nutritional content for health, but the use of dadih as an additional food is still limited. The high digestibility of protein dadih (86.4 – 97.8%) and contains amino acids makes dadih as a nutritious food that is easily absorbed by the body. Dadih has the following nutritional composition: protein content ranging from 7.58-8.92%, fat content ranging from 5.60-6.18%, water content ranging from 72.43-74.86%, and pH ranging from 5.1-5.4<sup>19</sup>. Nutritional components of dadih per 100 grams are 160.62 Kal, protein 49.64 grams, fat 51.30 grams and carbohydrate 59.68 grams<sup>20</sup>. The main advantage of the dadih pudding content is the presence of bacteria that have the potential as probiotic bacteria. The nutritional content of 100 grams of ingredients used in making dadih pudding is 347.98 mg of calcium, 4.87 mg of zinc, and 6.53 mg of iron. The content of lactic acid bacteria (LAB) in dadih pudding is  $6.4 \times 10^y$ ,  $10y$  CFU/ml<sup>21</sup>. The study aimed to examine the effect of giving dadih pudding on psychosocial development in children with COVID-19 underwent isolation treatment.

## MATERIAL AND METHODS

### Design

This research was quasi-experimental with a posttest only nonequivalent groups design. In this design, participants in one group are exposed to a treatment, whereas individuals in a non-equivalent group are not, and the two groups are then compared. This study was conducted on positive Covid-19 pediatric patients undergoing isolation treatment at the Padang City Covid-19 Quarantine Center from November 2020 to May 2021. Informed consent and primary data collection were carried out using a google form sent via WhatsApp to parents/respondents, covering respondent characteristics, anthropometric measurements, eating patterns and psychosocial development.

### Patients recruitment

The study population consisted of all 5 to 18 year-old pediatric patients from COVID-19. Using inclusion and exclusion criteria, the number of samples was calculated. Total sampling techniques were used to collect the samples. The first group was the experimental group that received dadih pudding (n=23), whereas the control group was the group that only received pudding (n=20). The inclusion criteria include 1. agreeing to participate in the study, 2) Children aged 5-18 years positive for Covid-19 are undergoing isolation treatment, 3) not in a serious condition, 4). having normal nutritional status. The Exclusion criteria include 1) overweight/obese or malnourished) 2) and gastrointestinal disorders 3) Dadih consumption was insufficient for two weeks.

### Data collection

Subjects were divided into two groups: children received only pudding dadih (intervention group), whereas another group received only pudding (control group). Dadih pudding will be provided with the intervention with fruit flavours with a dose of 1 bottle (230 ml) per day with a nutritional value of 300 kcal of energy and 14 grams of protein, BAL as much as  $2,4 \times 10^9$  CFU/gram. Dadih pudding will be given every day during the two weeks of intervention. After two weeks of providing the intervention, the final data collection will be carried out to assess the psychological impact of covid 19 with the instrument Pediatric Symptom Checklist 17 (PSC-17). This instrument created by M. Jellinek & J. M. Murphy and has been translated into Indonesian in the form of a PSC-17 module<sup>22</sup>. PSC-17 contains 17 questions grouped into three subscales: Internalization, externalization, and attention. The questionnaire records responses according to a modified Likert Scale (never=0 points, sometimes=1 points, and often=2 points; questions left unanswered or blank were scored zero. The final result of the entire questionnaire is to add up the scores of all items. There are disturbances behavioural, emotional and psychosocial if, he number of internalized subscale scores is 5, sum of externalized subscale scores 7, attention subscale score 7 or total score of 12 and above

### Data analysis

All data were analyzed using SPSS statistical software package for windows.

Sociodemographic variables (age gender and education of the participants) and psychosocial problems are shown in frequency distribution, mean and standard deviation. The effect of giving dadih pudding on psychosocial development was assessed using a independent t-test with a significant level if the p-value <0.05

### Research ethics

This study was approved by the ethics committee of the Faculty of Medicine, Andalas University, number 147/UN.16.2/KEP-FK/2020. Procedures and protocols have met the ethical standards following the Declaration of Helsinki. Informed consent signed by the subject's parents. And also approval from the health office or local government. Participation is voluntary and may withdraw during the study.

## RESULTS AND DISCUSSION

Table 1 shows more respondents in the 12-18 year age group ( 58.2%) than the under 12-year-old ( 41.8%). When viewed from gender, the most significant proportion is male ( 60.4%), and in terms of education, respondents at the level of education at primary schools are more dominant (44.2%).

The study was conducted for five months, and 43 research subjects met the predetermined criteria. They were then divided into the control group (20 people) and the intervention group (23 people). All study subjects were aged 5 to 18 years and consisted of males and females. The proportion of research subjects of the male sex is more than the female (Table 1).

In table 2, in the intervention group, all aspects of Internalization, attention and externalization (psychosocial problems) were higher in the percentage of never and rarely compared to the control group.

Table (3) shows that children given the dadih pudding/intervention group experienced lower psychosocial problems than those not given the dadih pudding/control group (12.5% vs 87.5%). The intervention group that did not share psychosocial issues was higher than the control group (62.9 % vs 37.1%). There is a significant relationship between the provision of dadih pudding supplementation with psychosocial problems,  $p < 0.05$ . This relationship is not seen in

each aspect of Internalization, externalization, and attention.

Based on table 4, there is a significantly different mean internalization between the control and intervention groups,  $2.80 \pm 2.16$  vs  $1.65 \pm 1.11$  with  $p < 0.05$ .

In this study, the total PSC-17 score of the intervention group was  $6.30 \pm 3.45$ . Children given dadih pudding (intervention group) had lower psychosocial problems than those not given the dadih pudding /control group (12.5% vs 87.5%); otherwise, the control group had more significant psychosocial problems 62.9% than the intervention group 37.1%. Based on the average psychosocial problem, there was a significant difference in the aspect of Internalization between the control and intervention groups ( $2.80 \pm 2.16$  vs  $1.65 \pm 1.11$  with  $p < 0.05$ ). In the intervention group, almost all children never or rarely face internalization disorders such as anxiety, feeling hopeless, low self-confidence, worry a lot and having less fun. In contrast, in the control group, there are still children often experience psychosocial problems such as feeling hopeless (15%) and having less fun 10%. Internalizing symptoms include emotional and peer problems, such as anxiety, depression and social withdrawal, while externalizing symptoms are characterized by behavioural problems, such as anger, aggression, and hyperactivity<sup>23</sup>. Children respond to stress differently, depending on the stage of development<sup>24</sup>.

The gut microbiota can influence the CNS via the gut-brain axis. This theory founds the relationship between stress, mood and

gastrointestinal disease<sup>25</sup>. Using probiotics to modulate the microbiota-gut-brain axis (MGBA) has been investigated and positively impacted preclinical and clinical studies<sup>26</sup>. Research has found that *Lactobacillus* species as probiotics are beneficial in reducing stress levels and increasing immunity<sup>27</sup>. The role of probiotics in preventing depression and anxiety and mental health through gut microbiota balance pathways<sup>25</sup>. A double-blind, placebo-controlled, randomized study of probiotics (*B. longum* R0175 and *L. helveticus* R0052) may affect levels of anger and depression in healthy humans<sup>28</sup>. Other studies have found the effect of probiotics as anxiolytic and antidepressant<sup>29</sup>. The probiotic dietary supplement studied had a significant effect on stress management by enhancing sleep quality and mood<sup>30</sup>. Probiotic lactobacillus consumption improved cognitive performance as well as three mood subscales (Confusion-Bewilderment, Anger-Hostility, and Depression-Dejection<sup>31</sup>. Probiotics appear to be promise for treating depression and anxiety symptoms, especially given their anti-inflammatory properties<sup>32</sup>. Milk fermentation using lactic acid bacteria from Dadih, particularly *Lactiplantibacillus pentosus*, demonstrated antioxidant activity ranging from 25.04 to 37.71% and total phenols 38.32-67.20 mg GAE/gr<sup>33</sup>. But other studies also get different results. In a clinical trial study, it was found that there was no significant difference between the moods of the group given probiotics and the control group. But there was an improvement in mood in the depressed group compared to the healthy group<sup>34</sup>.

**Table 1.** Distribution of respondent characteristics according to individual variables

Characteristics	Control group		Intervention group		Total	
	n	(%)	n	(%)	n	%
Aged group						
< 12 year-old	8	44.4%	10	55.62%	18	41.8%
12-18 year old	12	48%	13	52%	25	58.2%
Gender						
Boys	12	46.2%	14	53.8%	26	60.4%
Girls	8	47%	9	53%	17	39.6%
Education						
Playgroup/primary school	9	47%	10	53.5%	19	44.2%
Yunior high school	8	57%	6	43%	14	32.6%
Senior high school	3	30%	7	70%	10	23.2%

**Table 2.** PSC-17 Questionnaire responses

Item PSC-17	Control		Intervention	
	Never (%)	Sometimes (%)	Never (%)	Sometimes (%)
<b>Internalization (I) score</b>				
Feels sad, Unhappy	7 (35.%)	12 (60.0%)	9 (31%)	12 (52.2%)
Feel hopeless	15 (75%)	2 (10%)	15 (65.2%)	8 (34.8%)
Is down on self (Low self-confidence)	13 (65%)	6 (30%)	12 (52.2%)	10 (43.5%)
Worries a lot	6 (30%)	13 (65%)	9 (39.1%)	14 (60.9%)
He seems to be having less fun.	11 (55%)	7 (35%)	15 (65.2%)	8 (34.8%)
<b>Attention(A) score</b>				
Fidgety, unable to sit still	11 (55%)	4 (20%)	14 (60.7%)	9 (39.3%)
Daydreams too much	17 (85%)	1 (5%)	17 (73.9%)	6 (26.1%)
Has trouble concentrating	9 (45%)	7 (35%)	11 (47.8%)	11 (47.8%)
Acts as if driven by a motor	14 (70%)	5 (25%)	22 (95.7%)	3 (4.3%)
Distracted easily	5 (25%)	11 (55%)	12 (52.2%)	11 (47.8%)
<b>Externalizing Subscale (E) score</b>				
Refuses to share	14 (70%)	5 (25%)	14 (60.9%)	9 (39.1%)
Does not understand other people's feelings	11 (55%)	6 (30%)	13 (56.5%)	10 (43.5%)
Fights with other children	11 (55%)	8 (8%)	15 (65.2%)	8 (34.8%)
Blames others for their troubles	13 (65%)	6 (30%)	17 (73.9%)	6 (26.1%)
Does not listen to rules	10 (50%)	9 (45%)	13 (56.8%)	10 (43.2%)
Teases others	11 (55%)	7 (35%)	21 (91.3%)	2 (8.7%)
Takes things that do not belong to them	16 (80%)	3 (15%)	21 (91.3%)	2 (8.7%)

**Table 3.** Aspects of psychosocial problems in control and intervention group

Psychosocial problems	Control group		Intervention group		P-value
	Count	Percentage	Count	Percentage	
Internalization					
Yes	2	100%	0	0%	0.21
No	18	43.9%	23	56.1%	
Externalizing					
Yes	4	100%	0	0%	0.39
No	16	41.0%	23	59.0%	
Attention					
Yes	2	100%	0	0%	0.21
No	18	43.9%	23	56.1%	
Total Score					
Yes	7	87.5%	1	12.5%	0.01
No	13	37.1%	22	62.9%	

**Table 4.** Comparison of psychosocial problems between control and intervention group

Psychosocial problems	Control group		Intervention group		P-value
	Mean	SD	Mean	SD	
Internalization	2.80	2.16	1.65	1.11	0.03
Externalizing	3.60	2.88	2.48	1.62	0.44
Attention	2.60	1.60	2.17	1.23	0.81
Total Score	8.70	5.72	6.30	3.45	0.36

One of the factors that most influence gut microbiota composition is diet<sup>35</sup>. Variations in microbiota composition are associated with alterations in the normal functioning of the nervous system<sup>36</sup>. The concept of the microbiota-brain axis concludes that modulation of the gut microbiota in the form of probiotic supplementation can be used as a therapeutic target and as a preventive measure for mood and anxiety disorders<sup>37</sup>. Through the microbiota-gut-brain axis mechanism, dadih pudding as probiotics can be used to overcome anxiety problems. Although there are still many differences in clinical trials, it is hoped that the administration of probiotics can be used as an effort in the treatment of anxiety problems and other psychiatric disorders<sup>38</sup>. Further research needs to be done with more samples and longer administration time because the differences in these studies may be due to differences in dosage, strains of probiotic bacteria and research design.

## CONCLUSION

Dadih pudding supplementation can significantly reduce the score of PSC-17 among children or adolescents during quarantine COVID-19, significantly reducing worry and distraction. This dadih pudding as probiotic supplementation can alter the microbiota in children with psychosocial issues via the microbiota-gut-brain axis. It is envisaged that in the future, the usage of probiotic dadih, a local probiotic from West Sumatra, can be developed to overcome psychosocial difficulties. Although not all psychological aspects provide statistically significant results, this may be related to the short number and duration of the studies, as well as the clinical diversity of the population. This probiotic can be utilized as an alternate supplement to assist isolated population groups in overcoming psychosocial difficulties. Creating food containing probiotic bacteria is an exciting possibility for food science research.

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### Conflict of interest

There are no conflict of interest.

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