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Effectiveness of Javanese Turmeric (*Curcuma Xanthorrhiza Roxb*) to Improve Eating Behavior Among Anorexia Children in Bogor

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Abstract
Anorexia or lack of desire to eat and loss of appetite is a common issue among children. Some herbs were successfully tested to increase eating behavior, including Javanese turmeric or *temulawak*. This study aimed to examine the effectiveness of Javanese turmeric on eating behavior scores among children with anorexia. The study was done in Bogor Regency in January 2024. There were 30 children aged 4 to 6 years included in this study who were selected by the non-probability sampling method. Among them, 15 children were categorized into intervention or case group, and the rest as control group. The intervention is giving Javanese turmeric pudding. Before and after giving the intervention, the parents were asked to answer the children's eating behavior questionnaire (CEBQ). The finding by using *paired and independent t-tests* in this study revealed that Javanese turmeric is significantly effective in improving eating behavior (*p-value <0.05)* comparing pre and post-tests. This study can encourage the policymakers to do more education and promote of effectiveness of Javanese turmeric for health at the village and school levels. Future studies can improve the food variety made from Javanese turmeric to be more interesting for children.

Keywords: Javanese Turmeric, Temulawak, Appetite, Anorexia, Children.

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1. INTRODUCTION

Eating behavior is a critical factor in the risk of stunting in children. Anorexia which is also one eating behavior issue is defined as lack of desire to eat or loss of appetite, which is a common cause of parental concern in pre-school and school-going children. Various aspects of eating behavior have been identified as contributing to stunting. Poor feeding practices, such as irregular eating patterns, inadequate nutrition, insufficient food intake during illness, and poor nutritional content, have been recognized as significant risk factors for stunting (Wijhati et al., 2020). Additionally, studies have shown that slower eating compared to peers, being accompanied by grandparents or non-lineal relatives, and being induced to eat are associated with an increased risk of stunting (Ma et al., 2022). Furthermore, research has explored the influence of eating concepts on eating behavior and stunting, highlighting cultural factors related to food, food taboos, and early feeding (Diana et al., 2022). Maternal feeding practices have also been linked to the incidence of stunting, emphasizing the importance of understanding the relationship between maternal behaviors and child nutrition (Novitasari & Wanda, 2020).

Various studies have been conducted to investigate the relationship between stunting and eating behavior in children. The study on identifying causal risk factors for stunting in children under five years of age in South Jakarta, Indonesia, shed light on factors related to eating behavior (Utami et al., 2019). Another study analyzed nutritional factors affecting toddler stunting in Malang Regency, Indonesia, exploring how dietary practices and eating habits impact stunting in young children (Supariasa et al., 2023). Related to eating behavior or anorexia, some herbs can be appetizers to boost eating behavior. One endemic herb in Indonesia is *temulawak* or Javanese Turmeric *(Curcuma Xanthorrhiza Roxb).*

The *Curcuma Xanthorrhiza Roxb*., commonly known as *Temulawak*, has been extensively used in Indonesia for its medicinal and nutritional properties for a long time (Rahmat et al., 2021). Temulawak is a beneficial herbal plant that is widely recognized in Indonesia (Minarni et al., 2023). It is a native Indonesian medicinal plant with high value and is traditionally used as an ingredient in jamu, which is an Indonesian herbal supplement and medicine (Suniarti et al., 2019). Studies have shown that Temulawak extract has potential as a sunscreen gel (Wilapangga et al., 2023). Additionally, Temulawak is known for its antioxidant, anti-inflammatory, and anti-aging properties (Panjaitan et al., 2022). The content of curcumin and curcuminoids in Temulawak is believed to inhibit the growth of disease-causing bacteria (Alfarisi et al., 2022). Temulawak has been found to have antibacterial activity, inhibiting the growth of *Staphylococcus epidermidis* (Warmasari et al., 2020). Furthermore, Temulawak has been processed into instant drinks and other products to enhance its consumption (Septiana, 2020). Consuming Temulawak-based products can help boost the immune system (Idham, 2021). Temulawak has been compared to Korean ginseng due to its potential benefits, leading to it being referred to as "Indonesian ginseng" (Hariadi et al., 2022).

Regarding the evidence that Javanese turmeric has an impact on appetite, this study aimed to examine the impact of Javanese Turmeric on Improving children's eating behavior in the specific setting area in Bogor Regency because of the high percentage of children who were stunting based on the previous study in Bogor Regency (Wulandary & Sudiarti, 2021).

2. RESEARCH METHOD

This study is quantitative with a quasi-experimental approach. This current research was designed as a pre and post-test control group. This study was done in Taman Raya Citayam Housing Complex, Rawa Panjang Village, Bojonggede sub-district, Bogor Regency, West Java Province, Indonesia. The data collection was done from 01 January to 30 January 2024. The population of this study was children with poor appetite and eating behavior.

There are case and control groups with some intervention given. The data collection started by requesting the children's caregiver to fill out the questionnaire. Both groups were asked some questions related to children's appetite and eating behavior. Then the intervention group was given the Javanese turmeric jelly and the control group was not. The jelly was given for 3 times a week for one month. After giving the jelly, both groups were given the questionnaire again to measure the eating behavior of the children.

The sample in this study was selected by non-probability purposive sampling with a total of 30 children aged 4 to 6 years old. Criteria inclusion consists of approval of the parent to be given intervention, parents agreeing to answer both questionnaire pre and post-test, children aged 4 to 6 years old, poor appetite, mother as primary caregiver, children had no disability and healthy during the data collection. The exclusion criteria included children who did not consume any drugs, vitamins, or specific congenital disorders. Among them, 15 children were categorized randomly into the intervention group and 15 children as a control group.

The dependent variable of this study was children's appetite and eating behavior. It followed the guidelines from the Child Eating Behavior Questionnaire (CEBQ). CEBQ consists of 35 items including responsiveness to food, enjoyment of food, satiety responsiveness, slow eating, fussiness, emotional overeating, emotional undereating, and desire for drinks (Guthrie et al., 2001). The independent variable included Javanese turmeric pudding. This questionnaire was tested for its validity using Pearson correlation and Cronbach's Alpha (r = 0.34) and reliability (score: 0.98), indicating that the instrument was valid and reliable. The data was tested for univariate (min, max, mean, and standard deviation), and bivariate using *paired t-test and independent t-test.*

This study including instruments and tools has been approved by the Ethical Committee University of Muhammadiyah Purwokerto with reference number: KEPK/UMP/12/I/2024. Moreover, before the pudding was made, Javanese turmeric was tested for extraction and antioxidants from the Center of Laboratorium of Studi Biofarmaka, Institute of Agriculture Bogor with number 405.028/LPSB-IPB/I/24.

3. RESULTS AND DISCUSSION

The solid Javanese turmeric was tested in the laboratory to check the ingredient content. By using HPLC (*High-Performance Liquid Chromatography)* analysis technique, for parameter *bisdesmetoksi curcumin* was .08 mg/g, *demetoksi curcumin* 0.60 mg/g, and *curcumin* 1.91 mg/g. All of those tests were done with solid Javanese turmeric. Table 1 below describes the general characteristics of the respondents. It shows that the highest percentage of the control and intervention group were children aged 6 years old, (40.00% and 46.67% respectively). In terms of sex, most of them were female for both the control and intervention groups (53.33% and 60.00%).

Table 1. The general characteristics of the respondents

Characteristics	**Control group (n = 15)**	**Intervention group (n = 15)**
Age (years old)		
4	4 (26.67%)	5 (33.33%)
5	5 (33.33%)	3 (20.00%)
6	6 (40.00%)	7 (46.67%)
Sex		
Male	7 (46.67%)	6 (40.00%)
Female	8 (53.33%)	9 (60.00%)
Knowledge (pre-test)		
Mean ±SD	91.53 ± 4.94	90.73 ± 3.24

Knowledge (post-test)		
Mean ±SD	93.40 ± 4.76	145.93 ± 4.32
Total	15 (100%)	15 (100%)

Table 2 below describes the score of eating behavior for the case or intervention group, the mean score for the pre-test was 90.73, and for the post-test was 145.93. Moreover, for the control group, the pre-test mean score was 91.53 and the post-test mean score was 93.40. Comparing the intervention and control groups, it was increasing scores from the pre-test and post-test. Moreover, it described the paired t-test result which revealed significant effectiveness between pre-test and post-test scores. Regarding that result, giving Javanese turmeric significantly improved the children's eating behavior.

Table 2. The Paired-t-test result of the impact of Javanese Turmeric on the Eating behavior of the children.

Group	**Pre-test (Mean±SD)**	**Post-test (Mean±SD)**	***p-value***
Intervention	90.73 ± 3.240	145.93 ± 4.317	0.000
Control	91.53 ± 4.94	93.40 ± 4.76	0.000

Table 3 below describes the independent t-test which revealed the significant differences in scores of eating behavior between pre and post-tests among the intervention group. However, it revealed insignificant differences in scores of eating behavior between pre and post-test among the control group. This finding supports the significant effectiveness of Javanese turmeric as an appetizer among children with anorexia or having a lack of appetite.

Table 3. The Independent t-test result of the impact of Javanese Turmeric on the Eating behavior of the children

Group	**Intervention**	**Control**	***Mean difference***	***p-value***
Pre-test	90.73 ± 3.240	91.53 ± 4.94	0.80	0.135
Post-test	145.93 ± 4.317	93.40 ± 4.76	52.53	0.000

The results in this study revealed the role of Javanese Turmeric in the process of responsiveness to food, enjoyment of food, satiety responsiveness, slowness in eating, fussiness, emotional overeating, emotional undereating, and desire for drinks. Javanese Turmeric is traditionally used to treat several ailments such as lack of appetite, stomach disorder, liver illness, constipation, bloody diarrhea, dysentery, arthritis, children's fevers, *hypotriglyceridaemia,* hemorrhoids, vaginal discharge, rheumatism, and skin eruptions (Rahmat et al., 2021). To date, over 40 active compounds, including terpenoids, curcuminoids, and other phenolic compounds, have been isolated and identified from *C. xanthorrhiza Roxb* (Khan et al., 2024).

Javanese turmeric with curcuminoids, is traditionally used in addressing issues like lack of appetite (Rahmat et al., 2021). Furthermore, research has demonstrated that turmeric can boost appetite, support the function of digestive organs, and enhance nutrient absorption in the body (Tugiyanti et al., 2022). Investigations on fish have revealed that curcumin found in turmeric can stimulate fish appetite and improve the absorption of nutrients (Cahyani et al., 2021). Additionally, studies have shown that curcumin in turmeric enhances palatability, thereby stimulating fish appetite and leading to increased growth (Purbomartono et al., 2023). Moreover, incorporating turmeric extract into feed has been proven effective in attracting fish and promoting their growth (Basuki et al., 2020).

Existing studies have shown that sensory processing issues, such as food fussiness, can limit the range of foods consumed and impact the social enjoyment of eating (Smith et al., 2020). Additionally, food preferences, particularly a preference for fruits or vegetables, have

been associated with increased enjoyment of food and decreased satiety responsiveness, slowness in eating, and food fussiness in children (Guzek et al., 2021).

Moreover, food fussiness has been linked to non-responsive parent feeding practices, like persuasive and instrumental feeding, which can further exacerbate picky eating behaviors (Markides et al., 2022). Maternal concern has been identified as a mediator in the relationship between child food fussiness and persuasive feeding, highlighting the role of parental attitudes in shaping children's eating behaviors (Harris et al., 2018). Furthermore, fussy eating has been associated with lower levels of food involvement among children, indicating that engaging children in meal preparation and grocery shopping may help reduce food fussiness (Broad et al., 2021).

In terms of emotional eating behaviors, studies have found that body mass index is positively correlated with emotional overeating, enjoyment of food, and food responsiveness while being negatively correlated with satiety responsiveness, emotional undereating, slowness in eating, and hunger (Dubois et al., 2022). This suggests that emotional eating tendencies can impact weight status and eating patterns.

The studies specifically focus on Javanese turmeric found to solve the anorexia issue. A systematic review and meta-analysis of herbal medicine for the treatment of anorexia in children indicates the potential of herbal remedies in managing anorexia symptoms (Lee et al., 2022). A study in Indonesia explored the sensory characteristics, chemical composition, and antioxidant activity of egg rolls with the addition of Javanese turmeric, highlighting the potential use of this herb in enhancing the sensory properties of food products (Rahman, 2023). These studies suggest that herbal medicines, including Javanese turmeric, may offer potential benefits in managing anorexia in children. These studies are relevant to the use of Temulawak *(Curcuma xanthorrhiza)* for increasing children's appetite. In the Indonesian context, a study on the training for making anti-stunting food for children in a fishing village, emphasized the importance of providing creative and varied foods, setting meal schedules, and giving appetite enhancers/vitamins (Rizkaprilisa et al., 2022). One study explored the implementation of complementary therapy for preventing stunting in health-integrated posts in the village, highlighting various efforts, including complementary therapy, to increase children's appetite (Hadi & Primasari, 2023). Furthermore, a study investigated the effect of giving papaya fruit to increase appetite in toddlers in the Tilango Health Center area, focusing on the impact of papaya consumption on enhancing children's appetite (Mulyaningsih et al., 2022).

According to findings in this study and several studies discussed above, Javanese turmeric effectively increases the eating behavior score among children with anorexia or lack of appetite.

4. CONCLUSION

Regarding to results of this study, Javanese turmeric effectively increases the eating behavior score among children with issues of appetite. Future studies can improve the taste, shape, and color of food made from Javanese turmeric to be more interesting for children. At the national level, there is a need for health promotion and education about the Javanese turmeric ingredients content, the cooking process to prevent loss of ingredients, and its usefulness for health, especially as an appetizer. It can start from the small unit of health integrated post in the village (*Pos Kesehatan Terpadu/Posyandu*) with training the cadres. At the school canteen, this food can be provided to prevent the children from consuming junk and fast food.

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