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Abstract

Stunted toddlers experience chronic malnutrition, which causes a decrease in their immune system, resulting in a higher risk of developing acute and chronic infectious diseases as well as recurrent infections and suffering death. Giving VCO to stunted toddlers is aimed at improving metabolic function to increase immunity, optimize growth and development, and improve the quality of health status of little toddlers. This research aims to determine the effectiveness of VCO in increasing the immunity of stunted toddlers. This research used a Quasi-Experimental method with 32 stunted toddlers as respondents. The instrument used was a questionnaire given pre-and post-intervention. Data analysis used the Paired t-test. The research results showed that before administering VCO, the immunity level of most of the respondents was poor (62.5%), whereas after administering VCO, the immunity level of most of the respondents was sufficient (46.9%), with a p-value = 0.01, which means that the administration of VCO proven effective in increasing immunity in toddlers. It is recommended that the public include VCO as a functional nutrition in therapy for stunting toddlers

Keywords: effectiveness, stunting, virgin coconut oil

1. Introduction

Stunting is a chronic nutritional problem caused by a lack of nutritional intake over a long period, resulting in growth disorders in children, namely the child's height is shorter (stunted) than the age standard. According to the Indonesian Ministry of Health, short or stunted toddlers are known by having their length or height measured, then compared with the standard, and the results of this measurement are in the below normal range (Sandjojo, 2017). The problem of stunting hurts health problems because the impact of stunting on children is immediate and long-term, including: poor child development, decreased intellectual function which affects children's learning process at school and at home, as well as making it difficult for them to socialize and play with peers. peers, apart from that, in stunted children there is an increased risk of infection and decreased productivity. The long-term impact of stunting is that children are at higher risk of developing degenerative diseases, such as cancer, diabetes and obesity. This is because the need for micro and macro nutrients in the body is not fulfilled optimally so that the formation of body cell and other functions is not perfect (Beal et al., 2018)

The World Health Organization (WHO) ranked Indonesia as the third country with the highest stunting prevalence rate in Asia in 2017, the figure reached 36.4%. In 2018, Basic Health Research (Riskesdas) reported that this data had decreased, from 30.8% of stunted toddlers to 27.67% in 2019, which means a decrease of 3.13%. This figure does not meet the WHO target, which recommends reducing stunting by 3.9% per year in order to meet the target of 40% reduction in stunting by 2025 (Rahmadhita, 2020). In stunted toddlers, there is chronic malnutrition, which causes a decrease in the body's immune system so that they have a higher risk of developing acute and chronic infectious diseases as well as recurrent infections, and suffering death from infectious diseases (Sahitarani et al., 2020).

In their research, Dewi and Widari reported that in the last 3 months, 58% of stunted clowns had infectious diseases, while 73% of non-stunting clowns did not experience illness (Dewi & Widari, 2018). Infection occurs when germs enter the body, increase in number, and

cause a body reaction. The body has a defense against microorganisms called immunity. The collection of cells, tissues and molecules that play a role in defending infection is called the immune system. Infection will reduce appetite so that food intake is reduced, disrupt the absorption of nutrients, and increase metabolic needs to fight infection. Nutrients such as amino acids, oligosaccharides and short chain fatty acids play a role in forming the immune system. Micronutrient homeostasis is a key factor in maintaining immune system health (Adila, 2021).

One of the food processes currently being developed is the processing of virgin coconut oil. The benefits of virgin coconut oil for human health are increasing the body's immunity, curing several diseases caused by bacteria, viruses and fungi. VCO contains $\pm 10\%$ unsaturated fatty acids and $\pm 90\%$ saturated fatty acids, which are dominated by lauric fatty acids, which is around 50-70%. The saturated fatty acids in VCO are medium chain fatty acids (MCFA) which are more easily dissolved and are not stored in the body as fat tissue. In the human body, lauric acid is converted into monolaurin which is antiviral, antibacterial and antiprotozoal and other acids such as caprylic acid, which in the human body is converted into monocaprin which is useful for diseases caused by HSV-2 and HIV-1 viruses and bacteria. *Neisseria gonorrhoeae*. Virgin Coconut Oil also does not burden the pancreas and provides energy for diabetes sufferers and overcomes the problem of overweight/obesity (Mariandayani et al., 2018) The chemical content of VCO apart from fatty acids which are the major components, VCO also contains minor components (micronutrients) (Muis, 2019). VCO is known as a supplement drink that functions as anti-bacterial, anti-stress and anti-cancer. Virgin coconut oil also contains antioxidants such as phenols and vitamin E, namely tocopherols and tocotrienols, which are very good for supporting human health (Hambakodu et al., 2020). Giving VCO to stunted toddlers is aimed at improving metabolic function so that it can increase immunity, optimize growth and development and the quality of health status of stunted toddlers (Berawi et al., 2020). The aim of this research is to determine the effectiveness of Virgin Coconut Oil (VCO) in increasing the immunity of stunted toddlers.

2. Methods

This study employed a Quasi Experimental design, specifically a non-equivalent control group design, to assess the potential of Virgin Coconut Oil (VCO) in enhancing both the immune system and the growth and development of stunted toddlers. The research was conducted within the operational area of the Krembung Community Health Center, focusing on toddlers aged 1 to 5 years. The population for this study included all toddlers within the specified age range, and a purposive sampling technique was applied to select samples based on predefined inclusion and exclusion criteria. The final sample comprised 32 stunted toddlers. Data collection involved a pre- and post-administration questionnaire with 9 closed questions, assessing aspects of immunity. The intervention consisted of providing VCO at a dosage of 1 X 5 ml before the morning meal over a period of 30 days. The analysis was carried out using the paired t-test to evaluate the effectiveness of the intervention. The results of this research contribute to our understanding of the potential benefits of VCO in enhancing immunity and addressing growth and development issues in stunted toddlers. The findings may inform future interventions and health strategies aimed at improving the well-being of toddlers within this age group.

3. Results and Discussion

Research result

1. Respondent Characteristics

Table 1

Characteristics of responden based on gender, birth weight, nutritional status and stunting category

| Characteristics | Number of Respondents | |
|-------------------|-----------------------|------|
| | n | % |
| Gender | | |
| Male | 16 | 50 |
| Female | 16 | 50 |
| Birth Weight | | |
| ≥ 2500 grams | 26 | 81,2 |
| < 2500 grams | 6 | 18,8 |
| Nutrition Status | | |
| Undernourished | 29 | 90,6 |
| Malnutrition | 3 | 9,4 |
| Stunting Category | | |
| Short | 24 | 75 |
| Very Short | 8 | 25 |
| Total | 32 | 100 |

The Table 1 shows that the 32 respondents with stunted toddlers were male (50%) and female (50%), whereas based on birth weight, the results showed that the majority of stunted toddlers had a birth weight of ≥ 2500 grams (81.2%). The research results also showed that of the 32 stunted toddler respondents, they experienced undernourished status (90.6%). Judging from the stunting category, the majority of respondents were in the short stunting category (75%).

2. Imunity level data

Table 2

Frequency Distribution of Immunity Levels Before and After Giving VCO

| Imunity Level | Pretest | | Posttest | | P value | |
|---------------|---------|------|----------|----|---------|------|
| | n | % | Mean | n | | % |
| Good | 1 | 3,1 | | 7 | 21,9 | |
| Simply | 11 | 34,4 | 1,63 | 15 | 46,9 | 2,88 |
| Less | 20 | 62,5 | | 10 | 31,2 | |
| Total | 32 | 100 | | 32 | 100 | |

Table 2 shows the results of measuring the level of immunity of respondents before being given VCO intake, mostly in the poor category (62.5%), while the results of measuring the level of immunity of respondents after being given VCO intake at a dose of 1 X 5 ml before eating in the morning for 30 days were obtained. The results of the respondents' immunity levels were mostly in the sufficient category (46.9%). Data analysis using the paired t-test resulted in a p value = 0.01, which means that giving VCO has been proven to be effective in increasing immunity in toddlers.

Discussion

Stunting in toddlers is a condition of chronic malnutrition, which results in a decrease in immune system. Toddlers with malnutrition are very susceptible to infection. The entry of microorganisms into the body will stimulate inflammation as the body's immune response. The

body's immune system defense response and cell repair processes require nutrients. Nutrient content such as amino acids, short chain fatty acids and oligosaccharides play a role in forming the immune system. Micronutrient balance is a key factor in maintaining healthy body immunity (Adila, 2021).

The results of this study show that giving VCO is effective in significantly increasing the immunity of stunted toddlers. This happens because VCO contains lauric acid, a type of saturated fatty acid which in the body is broken down into monolaurin. Monolaurin has antimicrobial properties, meaning it kills viruses, fungi, microbes, protozoa and bacteria by penetrating the outer lip of the virus and damaging the cell walls. Monolaurin also plays a role in increasing CD4 helper T cells, thereby increasing immunity and reducing the incidence of infection. VCO contains saturated fatty acids or MCFA (medium chain fatty acids) which function to repair the body's fatty acids and are synergistic with essential fatty acids. Consuming VCO will increase the efficiency of essential fatty acids by 100%. The MCFA content is equivalent to breast milk, which increases immunity and provides nutrients. The energy produced from consuming VCO is used to improve body cells and activate the body's metabolism, body tissues and endocrine gland system and increase the body's immunity (Asmi, 2021).

In stunted toddlers, there is a chronic deficiency of various micronutrients, causing increased oxidative stress and a decrease in the body's defense system. Intake of VCO which contains bioactive compounds, including polyphenols, tocopherols and tocotrienols and is rich in monolaurin is known to modulate the inflammatory process and is immunomodulatory. The results of research conducted by Sebayang & Hasibuan (2021) reported that VCO has an immunomodulatory effect on increasing phagocytosis. Giving VCO to a group of experimental animals at a dose of 15 ml/kgBW/day for 14 days was proven to increase immune cell antibody titers and phagocytic activity more strongly than doses of 5 ml/kgBW and 10 ml/kgBW (Sebayang & Hasibuan, 2021). Other research also states that VCO has anti-inflammatory, antioxidant and immunostimulant properties. VCO intake affects various aspects of the immune system with the role of MCFA which stimulates neutrophil aggregation - stimulates the immune response and induces cytokine production (Joshi et al., 2020) and (Komatsuzaki et al., 2021).

4. Conclusion

Our study concludes that administering VCO has proven to be effective in significantly boosting the immunity of stunted toddlers. The intake of VCO containing monolaurin contributes to the elevation of CD4 helper T cells, stimulating neutrophil aggregation, thereby enhancing the immune response and inducing cytokine production. This, in turn, increases overall immunity and reduces the incidence of infections. Further research is warranted to incorporate VCO as a functional nutrition in the therapeutic regimen for toddlers experiencing stunting. These findings lay the groundwork for the development of improved health strategies and the implementation of more effective nutritional interventions in addressing delayed growth in children.

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