

PROCEEDING

4th ICoHPJam

International Conference Health Polytechnic of Jambi
Jambi, October 24th - 25th, 2024

**“Strengthening Non-Communicable Diseases
Prevention Using Research-Based Technology”**

Title : Proceeding International Conference Health Polytechnic of Jambi

ISSN : 2988 – 7356 (Online)

Volume 4, Desember 2024

Publisher : Health Polytechnic of Health Ministry of Jambi

Editorial Office : Health Polytechnic of Health Ministry of Jambi, Jl. H. Agus Salim No. 8

Jambi City 36129, Indonesia

Email : icon@poltekkesjambi.ac.id

Available Online at <https://journal.poltekkesjambi.ac.id/index.php/ICoHPJ/>

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P R E F A C E

Assalamuallaikum Wr Wb, Good Morning

Your excellency, Director Health Polytechnic of Jambi, Dr. Rusmimpong, S.Pd, Vice Director One, Dr. Pahrur Razi MKM, Vice Director Two, Dr. Netha Damayanthie M.Kep, Vice Director Three Dr. Gusti Lestari Handayani, M.Kes. Respectful invited speakers My Profesor Ari Probandari, Dr Laura From Finland, Thailand, Ass.Profesor Yupawan Thontanunam From Filipin, From Malaysia Dr Nurwahida Zulkifli, and guests from the Jambi provincial and Jambi city health services, as well as professional organizations., attending, and then all academics of Jambi Health Polytechnic and beloved participants from all over the world attending on-site and via Zoom meeting.

Thank you for joining today's conference Invited all academics Health Polytechnic of Jambi and beloved participants from all over the world attending on-site and via Zoom meeting Thank you for joining today's conference. Ladies and gentlemen, the conference is themed **Strengthening Non-Communicable Diseases Prevention Research Based Technology Non-Communicable Diseases (NCDs)**, such as cardiovascular diseases, diabetes, cancer, and chronic respiratory illnesses, are now among the leading causes of death worldwide. According to the World Health Organization (WHO), NCDs account for over 70% of global mortality each year, posing significant challenges not only to public health systems but also to global economies. With the burden of NCDs continuing to rise, especially in low- and middle-income countries, effective prevention strategies are crucial.

Technology-based approaches to NCD prevention offer promising solutions to address this growing challenge. Advancements in digital health tools, big data analytics, artificial intelligence (AI), and mobile health (mHealth) have revolutionized the way researchers and healthcare providers can monitor, analyze, and intervene in NCD risk factors. These tools enable earlier detection of risk patterns, enhance real-time data collection, and support personalized interventions that are more efficient and scalable. For instance, AI-driven predictive models can help identify individuals at high risk of developing NCDs based on their genetic, lifestyle, and environmental factors. Mobile health applications and wearable devices also empower individuals to monitor their own health and make informed decisions about their lifestyles. Moreover, big data analytics allow researchers to process large-scale datasets, revealing trends and insights that are critical for designing public health policies and interventions aimed at reducing the incidence of NCDs.

However, the success of technology-driven research in NCD prevention relies on collaboration across sectors. Governments, healthcare providers, research institutions, and tech companies must work together to ensure that technological advancements are accessible, equitable, and sustainable. By harnessing the power of technology in NCD research and prevention, there is a greater potential to mitigate the global impact of these diseases and promote healthier populations worldwide.

Ladies and gentleman, At this conference, the participants come from Indonesia, Thailand, Malaysia, and the Philippines, with a total of around 1000 attendees. Seventeen individuals and teams from Thailand and Indonesia are participating in oral presentations, while four teams are participating in the poster presentations.

At this conference several articles that have been reviewed will be recommended in Scopus indexed journals such as The Indonesian Journal of Public Health and amerta nutrition from universitas airlangga, surabaya. Sinta indexed journals including Jurnal Ilmu Kesehatan dan Bidan Cerdas (Health Polytechnic, Ministry of Health Palu), AcTion Journal (Health Polytechni of Aceh, Ministry of Health), Jurnal Manarang Kesehatan (Health Polytechnic of Mamuju, Ministry of Health) Jurnal teknologi laboratorium (Health Polytechnic, Ministry of Health Yogyakarta), Jurnal Gema Lingkungan Kesehatan (Health Polytechnic, Ministry of Health Surabaya), Journal of Health Promotion and Behavior, and then Journal of Epidemiology and Public Health (Universitas Sebelas Maret).

We hope to provide an inspirational and educational platform for all attendees through this seminar. We will discuss various relevant topics related to [the seminar theme] with the experts. We hope this event can offer a deep understanding and spark productive discussions. On this occasion, let us make this seminar a valuable learning event. Let us absorb new knowledge, share experiences, and enrich our insights together.

Ladies and gentlemen, before I conclude this speech, allow me to express my gratitude to all parties who have contributed. Thank you to the speakers who have agreed to be here, to the committee that has worked hard to prepare the event, and of course, thank you to the attendees present here.

Enjoy this conference.

Chairperson

Egy Sunanda Putra., M.Gz

WELCOME REMARK

Assalamualaikum wr wb,

Distinguished guests, esteemed speakers, and fellow participants, It is with great pleasure and honor that I welcome you all to the fourth International Conference of Jambi Health Polytechnic. Under the theme, **“Strengthening Non Communicable disease prevention using research based technology,”**

All Praise to Allah SWT who give us mercy and blessing to be gathered here in this International Conference. Then, sholawat and salam to our prophet Muhammad SAW and we hope that we will be blessed with his Syafaat in the Yaumil Akhir.

Aamiin ya Robbal Alamin

On behalf of Jambi Health Polytechnic, I would like to express our deepest gratitude to all of the invited speakers

1. Prof. dr. Ari Natalia Probandari, MPH., Ph.D. from Faculty of Medicine, Universitas Sebelas Maret, Indonesia
2. Dr. Laura Räisänen, PhD. from Finland, Tampere University, Faculty of Medicine and Health Technology
3. Ethel May F Onas, Ph.D from Centro Escolar University, Philippines
4. Dr. Nurwahida Zulkifli from Faculty of Pharmacy, University Teknologi Mara, Malaysia
5. Asst. Prof. Dr. Yupawan Thontanunam from Praboromarajchanok Institute, Thailand
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This international conference is also held in collaboration with the Human Resources Development Unit (UPKSDMK) Jambi, which is accredited A and integrated with the Ministry of Health's Learning Management System (LMS).

Ladies and gentlemen, this conference is an excellent platform for us to share knowledge and ideas that will drive progress in global health research. I am confident that the discussions and insights shared here will contribute to the growth and quality of global health research. Together, we can build a healthier future for all.

So once again I sincerely welcome you all and please enjoy all the conference activity. With that, I am honored to officially open the fourth International Conference of Jambi Health Polytechnic. I wish you all a successful and inspiring event.

Thank you. Wabillahi taufiq wal hidayah
Wassalamualaikum wr wb.

Director of Health Polytechnic of Jambi

Dr. Rusmimpong, S.Pd., M.Kes

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THE EFFECTIVENESS OF MOTION GRAPHIC MEDIA IN ENHANCING ADOLESCENTS' KNOWLEDGE AND ATTITUDES REGARDING DIABETES MELLITUS

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ABSTRACT

Background: Diabetes mellitus is a chronic condition that arises when the body is unable to regulate blood glucose levels effectively. The causes of diabetes mellitus are multifactorial, encompassing factors such as age, weight, family history, and lifestyle choices. A lack of knowledge and awareness among adolescents regarding diabetes mellitus may contribute to the rising incidence of the disease. Motion graphic media, as an audiovisual medium, presents information in a format that can be both seen and heard, making it a potentially effective tool for education. This study aims to assess the effectiveness of motion graphic media in enhancing the knowledge and attitudes of students at SMA Negeri 6 Surakarta towards diabetes mellitus.

Methods: This research employs a quantitative design with a control group pre-test post-test approach. The study uses cluster random sampling, and data analysis is conducted using Paired T-tests and One-Way ANOVA.

Results: The intervention group demonstrated a significant increase in knowledge, with a mean improvement of 5.13 (Paired T-test p -value = 0.000, <0.05), while the control group showed a smaller increase of 0.43 (Paired T-test p -value = 0.018, <0.05). For attitude, the One-Way ANOVA test indicated no significant difference in pre-test results between the intervention and control groups (p -value = 0.634, >0.05). However, post-test results revealed a significant difference between the two groups (p -value = 0.000, <0.05).

Conclusion: Motion graphic media is an effective tool for enhancing the knowledge and attitudes of students at SMA Negeri 6 Surakarta regarding diabetes mellitus.

Keywords: Diabetes mellitus, Motion Graphic, Knowledge, Attitude

INTRODUCTION

Diabetes mellitus among adolescents has emerged as a significant health concern, driven by various contributing factors, including unhealthy dietary practices, insufficient physical activity, and rising obesity rates. Research indicates that modern lifestyles, particularly the consumption of fast food, play a critical role in the increasing prevalence of diabetes cases within this population. A study has demonstrated that adolescents who regularly consume fast food are at a heightened risk of developing metabolic disorders, including diabetes mellitus. Furthermore, the prevalence of obesity among adolescents is closely linked to elevated blood glucose levels, which are primary indicators of diabetes (Sartika, 2023). These findings underscore the

urgent need for public health interventions aimed at promoting healthier eating habits and encouraging physical activity to mitigate the rising incidence of diabetes among adolescents (Prihaningtyas, 2020).

The Indonesian Pediatrician Association has reported a concerning 70-fold increase in the prevalence of diabetes among children from 2010 to January 2023, with a total of 1,645 affected children in Indonesia, translating to a prevalence rate of 2 cases per 100,000 children. Notably, approximately 60% of those diagnosed are girls, and age distribution reveals that 46% of cases occur in children aged 10-14 years, while 31% are in those aged 14 years and older. The rising incidence of diabetes in children and adolescents is indicative of a serious public health issue, largely attributed to unhealthy modern lifestyles (Ulya, 2023).

Given the potential negative consequences associated with diabetes, it is imperative to enhance prevention efforts through educational initiatives focused on healthy dietary practices and the importance of regular physical activity (Silalahi, 2019). Furthermore, for adolescents already diagnosed with diabetes, consistent monitoring and appropriate treatment are essential to mitigate complications and improve their overall quality of life (Wicklow, 2021).

The efficacy of motion graphics in health education has garnered increasing recognition as a potent tool for enhancing learning outcomes and improving knowledge retention across diverse populations. Characterized by animated visuals and engaging narratives, motion graphics have demonstrated significant improvements in educational experiences compared to traditional methodologies.

Empirical evidence supports this assertion; for instance, conducted a study that underscored the effectiveness of educational videos, including those incorporating motion graphics, in augmenting short-term knowledge acquisition among patients, particularly in the context of self-care practices during the COVID-19 pandemic (Khorammakan et al, 2023). This finding corroborates the research of Wiana et al. (2018), which revealed that students exposed to interactive multimedia based on motion graphics exhibited superior learning outcomes compared to their counterparts who received conventional instruction. These studies collectively underscore the potential of motion graphics as a valuable pedagogical tool in health education, capable of facilitating more effective knowledge dissemination and retention.

In a preliminary study conducted at SMA Negeri 6 Surakarta through interviews with several students, it was found that many students had limited exposure to information about diabetes and engaged in behaviors that posed significant risk factors for the disease. These high-risk behaviors included consuming

more than four tablespoons of sugar per day, drinking less than two liters of water daily, engaging in less than 150 minutes of physical activity per week, and, in some cases, having family members with diabetes. These findings suggest that students at SMA Negeri 6 Surakarta are at a relatively high risk of developing diabetes mellitus. Given this background, the researcher is interested in investigating the effectiveness of audiovisual motion graphic media in enhancing students' knowledge and attitudes towards diabetes mellitus. High school students were selected as respondents for this study due to the rising prevalence of diabetes among adolescents, positioning them as an important target group for educational interventions aimed at preventing further increases in diabetes incidence in this population.

METHODS

This research utilizes a quantitative approach with a quasi-experimental method, specifically employing a control group pre-test post-test design. The study population comprises 790 students from the 10th and 11th grades of SMA Negeri 6 Surakarta. Cluster random sampling was employed to select a minimum of 89 respondents, as determined by the Slovin formula with a 10% error margin.

The school offers a comprehensive three-year curriculum encompassing Natural Sciences (MIPA), Social Sciences (IPS), and Language (IBB) classes. From a total population of 1,167 students (n=448 male, 38.4%; n=719 female, 61.6%), a sample of 90 participants from grades X and XI was selected using cluster random sampling. The sample was equally divided into control and intervention groups (n=45 each) from both 10th and 11th grades. The study investigates motion graphic media as the independent variable and students' knowledge and attitudes towards diabetes mellitus as dependent variables. Data collection

involved pre-test and post-test questionnaires for primary data, supplemented by secondary data from relevant institutions.

The intervention consisted of a one-minute motion graphic video on diabetes mellitus prevention, produced by the Ministry of Health. Knowledge assessment utilized 15 true-false questions, with results categorized into four levels: good (76-100%), adequate (56-75%), poor (40-55%), and very poor (<40%). Attitude evaluation employed 19 statements, with outcomes classified as positive or negative based on median values. All research instruments underwent rigorous validity and reliability testing prior to implementation.

The data analysis process encompassed four crucial stages: editing to verify questionnaire completeness, coding to convert textual data to numerical format, processing to prepare data for analysis, and cleaning to ensure data accuracy. Statistical analysis employed a paired T-test for knowledge assessment and a One-Way ANOVA test for attitude analysis, given the non-parametric nature of the latter. The significance level was set at $\alpha=0.05$, with the research hypothesis accepted if the α value fell below this threshold, indicating a significant difference between treatment and control groups.

Data processing was conducted using SPSS software, followed by comprehensive descriptive and analytical discussions to provide a thorough interpretation of the research findings. This methodological approach ensures a robust examination of the impact of motion graphic media on students' knowledge and attitudes regarding diabetes mellitus, contributing valuable insights to the field of health education and intervention strategies.

RESULTS AND DISCUSSION

Study Setting and Participant Characteristics

Demographic analysis revealed the following distribution: age, gender and grade level (table 1).

Table 1. Age Distribution of Participants

Group	Age				n
	15	16	17	18	
Control	7	28	10	0	45
Intervention	4	33	7	1	45
Total	11	61	17	1	90
(Percentage)	(12.2)	(67.8)	(18.9)	(0.01)	(100)

The majority of participants in both groups are 16 years old (67.8%), which is consistent across the Control and Intervention groups. The chi-square analysis resulted in a *p-value* of 0.43, which is higher than the common significance level of 0.05. This means that there is no statistically significant difference in age distribution between the Control and Intervention groups. Each age group's distribution across the two groups aligns closely with the expected values, indicating that the age distribution is well-balanced between the groups.

Table 2. Gender Distribution of Participants

Group	Gender		n
	Male	Female	
Control	14	31	45
Intervention	20	25	45
Total	34	56	90
(Percentage)	(37.78)	(62.22)	(100)

The overall gender distribution shows that there are more females than males in both groups, but this difference is more pronounced in the Control group (69% female vs. 31% male) compared to the Intervention group (56% female vs. 44% male) (Table 2). While there is a slight imbalance in gender distribution, the overall group makeup is still fairly even, and this difference is unlikely to have a significant impact on the study outcomes.

Table 3. Grade Distribution of Participants

Group	Grade		n
	X	XI	
Control	30	15	45
Intervention	32	13	45
Total	34	56	90
(Percentage)	(37.78)	(62.22)	(100)

The distribution across grades is nearly identical between the Control and Intervention groups (Table 3). Both groups are dominated by Grade X participants (approximately two-thirds of each group). This distribution suggests that there is no significant imbalance between the two groups in terms of grade levels. Therefore, the participants are likely to have similar academic backgrounds and levels of experience.

The demographic analysis reveals that the Control and Intervention groups are well-matched, with no significant differences across age, gender, or grade distribution. This balanced distribution ensures that any results from the study can be confidently attributed to the interventions or factors being tested, rather than demographic imbalances. The study is set up for fair comparison, allowing for robust conclusions to be drawn from the data.

Knowledge Assessment

In this study, a paired T-test was employed to analyze the knowledge test data. The data, although ordinal in nature and measured using a true/false scale, were treated as parametric, as they met the assumptions required for parametric testing. The paired T-test was selected because it is appropriate for comparing two related groups, such as pre- and post-intervention knowledge scores. This approach was used to determine whether there was a statistically significant difference in participants' knowledge following the intervention. The use of this test is justified given the design of the study and the characteristics of the data, allowing for a rigorous evaluation of the intervention's impact on knowledge acquisition.

Table 4. Results for Knowledge Assessment

Group	Knowledge Test Result				n
	Good	Adequate	Poor	Very Poor	
Pre Test					
Control	6	11	18	10	45
Intervention	8	9	16	12	45
Sub total	14	20	34	22	90
Post Test					
Control	9	9	19	8	45
Intervention	38	6	1	0	45
Sub total	47	15	20	8	90

The findings from the knowledge assessment clearly highlight the significant impact of the intervention on improving participants' knowledge. Prior to the intervention, both the control and intervention groups exhibited relatively low knowledge levels, as reflected in their pre-test scores. Following the intervention, the results show a stark contrast between the two groups (Table 4.). The intervention group experienced a substantial improvement, with 84.4% of participants achieving a "Good" score in the post-test. This represents a dramatic increase from the pre-test, where only 17.8% of participants in the intervention group had scored "Good." In comparison, the control group showed only marginal improvement. While the percentage of participants scoring "Good" increased slightly from 13.3% in the pre-test to 20% in the post-test, the majority of participants remained within the "Poor" and "Very Poor" categories.

Table 5. Paired T-Test Results for Knowledge Assessment

Group	Mean	n	Std. Dev	Std. Err. Mean	Sig. (2-Tailed)
<i>Control</i>					
Pre Test	8.84	45	2.504	.373	0.018
Post Test	9.27	45	2.879	.429	
<i>Intervention</i>					
Pre Test	8.78	45	3.103	.463	0.000
Post Test	13.91	45	1.459	.217	

The table 5 above demonstrates a notable increase in the mean knowledge score within the intervention group, with a rise of 5.13 points from a pre-test score of 8.78 to a post-test score of 13.91. The paired T-test analysis yielded a p-value of 0.000 ($p < 0.05$), indicating statistical significance and supporting the acceptance of

the alternative hypothesis (H1). Consequently, it can be concluded that there is a significant difference in knowledge before and after the intervention using motion graphic media in the intervention group. In contrast, the control group exhibited a smaller increase in mean knowledge score, with an improvement of 0.43 points, from 8.84 in the pre-test to 9.27 in the post-test. The paired T-test for the control group yielded a p-value of 0.018 ($p < 0.05$), suggesting a difference in knowledge before and after testing. However, the magnitude of this change is minimal, with only a 0.43-point increase in mean score, indicating that the knowledge improvement in the control group is not substantial.

Table 6. Independent Sample T-test Results for Intervention and Control Groups

	F	Sig.	t	df	Sig. (2-Tailed)
Equal variance assumed	15.857	.000	9.652	88	.000
Equal variance not assumed			9.652	65.193	.000

Table 6 demonstrate that the use of motion graphic media as an educational tool significantly enhances students' knowledge about diabetes mellitus. The intervention group showed a substantial increase in mean knowledge scores, with a statistically significant improvement of 5.13 points after the intervention, as confirmed by the paired T-test ($p < 0.000$). This contrasts with the control group, where only a modest gain of 0.43 points was observed, despite the statistical significance of the result ($p = 0.018$). Furthermore, the independent samples T-test revealed a significant difference between the post-test scores of the intervention and control groups ($p < 0.000$), underscoring the superior effectiveness of motion graphic media in promoting knowledge acquisition.

The effectiveness of motion graphics in health education has garnered increasing attention in recent years, particularly in its ability to enhance knowledge retention and engagement among adolescents. Motion

graphics, characterized by animated visuals and dynamic presentations, have been shown to significantly improve learning outcomes compared to traditional educational methods. For instance, a study by Hapsari et al. demonstrated that elementary school students who learned through motion graphic animation videos exhibited better learning outcomes than those who received conventional instruction Hapsari et al. (2019). This aligns with findings from Wiana et al., which indicated that interactive multimedia based on motion graphics led to higher achievement in mastering concepts and skills among students compared to traditional learning methods (Wiana et al., 2018).

Moreover, the use of motion graphics has been linked to increased knowledge retention in various health education contexts. Puspita and Syahida found that participants who engaged with motion graphic content scored significantly higher in knowledge assessments compared to those who utilized leaflet-based materials (Puspita & Syahida, 2020). This suggests that motion graphics can effectively convey complex health information in a more digestible and engaging format, thereby enhancing understanding and retention. Similarly, the systematic review by González-Argote et al. highlighted the positive impact of real-time graphics, including motion graphics, on skill development and knowledge acquisition in health education settings (González-Argote et al., 2023).

The tailored design of motion graphics can lead to improved understanding of complex information. Lonsdale and Liao's research revealed that user-centered motion graphics significantly impacted the understanding of health-related information, suggesting that the aesthetic and functional aspects of motion graphics play a crucial role in knowledge retention (Lonsdale & Liao, 2018). Similarly, Oktanizar and Kurniawan highlighted the successful development of motion graphics for educational purposes, emphasizing the

importance of balancing information density with viewer engagement to optimize learning experiences (Oktanizar & Kurniawan, 2021). This is further supported by Nurhayati, who found that audio-visual media, including animations, significantly enhanced knowledge and skills in health education, demonstrating the broader applicability of motion graphics in various educational settings (Nurhayati, 2023)

These findings strongly suggest that motion graphic media offers a highly effective method for enhancing educational outcomes, particularly in conveying complex health-related information, and should be considered for wider implementation in educational strategies.

Attitude Assessment

The attitude assessment in this study utilized ordinal data measured on a Likert scale, which is classified as non-parametric data according to Jamieson (2004). Given this classification, the One-Way ANOVA was selected as the appropriate statistical test to analyze the data. This method was chosen because it allows for the comparison of mean differences across multiple groups, even when dealing with ordinal scales, providing insights into whether there are significant differences in participants' attitudes across the groups studied. The use of One-Way ANOVA ensures a robust approach to analyzing non-parametric data in this context, aligning with the study's design and objectives.

Table 7. Results for Attitude Assessment

Group	Attitude Test Result		n
	Positive	Negative	
Pre Test			
Control	25	20	45
Intervention	24	21	45
Sub total	49	41	90
Post Test			
Control	29	16	45
Intervention	45	0	45
Sub total	74	16	90

Attitudes were categorized as positive (score 39-76) or negative (score 19-38) (Table 8). The post-test results indicate that the

intervention had a significant impact on improving participants' attitudes. The intervention group experienced a complete transformation, with all participants shifting from a mix of positive and negative attitudes to entirely positive attitudes post-intervention. This stark contrast to the control group, where a notable portion of participants still held negative attitudes, suggests that the intervention was highly effective in fostering positive attitude change. The modest improvement in the control group, from 55.6% to 64.4% positive attitudes, indicates that without the intervention, the shift in attitudes was relatively small.

Table 8. One_Way ANOVA Results for Attitude Assessment

Group	Sum of Squares	df	Mean Square	F	Sig
Pre Test					
Between Groups	16.044	1	16.044	.228	.634
Within Groups	6192.58	88	70.370		
Sub Total	6208.622	89			
Post Test					
Between Groups	6417.78	1	6417.778	112.943	.000
Within Groups	5000.44	88	56.823		
Sub Total	11418.22	89			

The results of the One-Way ANOVA test conducted to assess attitudes in this study reveal significant findings regarding the impact of the intervention. The data in Table 8 compares the pre-test and post-test attitudes between the intervention and control groups, providing evidence of how the intervention influenced participants' attitudes. The pre-test results indicate no significant difference between the intervention and control groups prior to the intervention.

The One-Way ANOVA yielded a p-value of 0.634 ($p > 0.05$), suggesting that both groups started with relatively similar attitudes toward the subject matter, and no statistical difference existed between them at the beginning of the study. Following the intervention, the One-Way ANOVA test results revealed a highly significant difference between the two groups, with a p-value of 0.000

($p < 0.05$). This indicates that the intervention group, which received education through motion graphic media, experienced a substantial positive shift in attitudes compared to the control group, which did not receive the same media intervention.

The impact of motion graphics on health attitudes has received considerable attention in recent research, particularly regarding their efficacy in conveying health-related messages. Motion graphics, which integrate visual elements with dynamic movement, enhance the communication of health information by making it more engaging and easier to understand. This is especially important in addressing the fragmented attention spans of audiences, particularly adolescents, who are frequently exposed to information in digital environments. For example, Lazard (2021) highlights that visual elements can facilitate the positive reception and comprehension of critical health information, illustrating key concepts that promote message processing, which is essential for effective communication in today's fast-paced digital landscape.

The quality of infographic design plays a crucial role in the effectiveness of health messages. This media emphasizes that while health organizations increasingly utilize infographics, the quality of their design varies significantly (Baxter, 2023). By employing motion graphics as an educational tool, this study seeks to improve the application of research-based design principles among individuals with limited design expertise, thereby enhancing the effectiveness of public health messaging. This is consistent with findings by Cho et al. (2018), who demonstrate that different types of graphics, including gist-based designs, significantly influence the understanding of health messages and decision-making, suggesting that well-designed motion graphics can contribute to improved health outcomes.

The emotional impact of graphic health messages is another critical factor influencing

health attitudes. Research indicates that graphic warnings can evoke strong emotional responses, such as fear, which are associated with an increased intention to change health behaviors. For instance, studies have shown that graphic messages about vaping significantly reduced adolescents' susceptibility to future vaping, demonstrating the effectiveness of emotionally charged visual content in health communication (Cartujano-Barrera et al., 2022). Similarly, Hammond et al. (2012) found that negative emotions elicited by pictorial health warnings could mediate their effectiveness, leading to greater awareness and intentions to modify health-related behaviors.

The acceptance of the alternative hypothesis (H1) and rejection of the null hypothesis (H0) further reinforce the conclusion that motion graphic media serves as an effective educational tool in influencing and enhancing students' attitudes. The intervention not only succeeded in improving knowledge but also had a profound impact on shaping positive attitudes toward the subject matter. These findings provide robust evidence for the utility of multimedia-based interventions in educational settings, particularly for health education, where attitude change is a critical component of behavior modification. The significant impact observed in the intervention group underscores the potential of motion graphic media to engage learners and foster meaningful attitude changes, supporting its broader application in similar educational contexts.

CONCLUSION

In conclusion, this study demonstrates that motion graphic media is an effective tool for improving both the knowledge and attitudes of high school students towards diabetes mellitus. The intervention group, which viewed the motion graphic media, showed a significant increase in knowledge, with the majority of

students scoring "good" in the post-test compared to their pre-test scores. This group's knowledge improvement was notably higher than that of the control group, which showed only minimal gains. Additionally, the intervention successfully transformed the students' attitudes, with all participants in the intervention group shifting to positive attitudes after exposure to the media, contrasting the modest improvement in the control group.

However, this study has several limitations. First, it was conducted in a single school with a specific age group, which may limit the generalizability of the findings to other populations or age groups. Additionally, the study focused solely on knowledge and attitudes without assessing long-term behavioral changes, which are crucial in diabetes prevention. Future research should explore the long-term impact of motion graphic interventions on actual behavior change and expand the study to include diverse age groups and settings to enhance generalizability. It would also be beneficial to compare different types of educational media to determine which methods are most effective in health education.

ACKNOWLEDGMENT

The researcher would like to extend their sincere gratitude to the Chancellor of Kusuma Husada University, Surakarta, for their invaluable support in facilitating this research. Additionally, heartfelt thanks are due to the Principal of SMA Negeri 6 Surakarta for granting permission to conduct this study with the students at the school. The researcher also wishes to express deep appreciation to the lecturers of the Health Promotion Study Program for their valuable suggestions and contributions to the success of this research.

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THE RELATIONSHIP BETWEEN HEMOGLOBIN LEVELS AND LEUKOCYTE COUNT ON STUNTING INCIDENCE IN TANJUNG AGUNG PUSKESMAS, MUARA ENIM 2024

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ABSTRACT

Background: Stunting, defined as a condition where a child's height is significantly below the average for their age due to chronic malnutrition or recurring infections, remains a critical public health issue in Indonesia. This condition can lead to long-term cognitive and physical development challenges. This study explores the relationship between hemoglobin levels and leukocyte counts with stunting in the working area of Puskesmas Tanjung Agung, Muara Enim, in 2024.

Method: This study was conducted an observational analytic study with a cross-sectional design. Data on hemoglobin levels, leukocyte counts, and stunting incidence were collected from a sample of 79 children aged 24-60 months. Statistical analysis used the chi-square test to determine significant associations between variables.

Result: The study found that 64% of children with low hemoglobin levels and 66% of those with high leukocyte counts experienced stunting. The chi-square test indicated significant associations between low hemoglobin levels ($p=0.003$) and high leukocyte counts ($p=0.001$) with stunting.

Conclusion: The findings suggest a strong relationship between low hemoglobin levels, high leukocyte counts, and stunting incidence. These results highlight the need for integrated nutrition and health interventions to reduce stunting in rural areas.

Keywords: Stunting, Hemoglobin, Leukocytes, Nutrition, Indonesia

INTRODUCTION

Stunting is a critical global health issue, particularly in low- and middle-income countries. It is characterized by impaired growth and development in children under five years old, resulting from chronic malnutrition and repeated infections (World Health Organization, 2020). Stunting not only affects physical growth but also impairs cognitive development, leading to long-term consequences in adulthood, including a higher risk of chronic diseases. In Indonesia, stunting remains a significant concern, with the country ranking among those with the highest prevalence of stunting in Southeast Asia. The 2021 Indonesia Health Profile reported a stunting prevalence of 24.4% in children under five years old (Kemenkes RI, 2021). This issue

is particularly pronounced in rural areas, such as the Muara Enim district, where various factors, including nutritional deficiencies and infections, contribute to the high stunting rates (Sanatang et al., 2022).

Previous studies have established that stunting is often linked to nutritional deficiencies, especially in terms of iron and protein intake. Hemoglobin, a protein in red blood cells responsible for oxygen transport, is a key indicator of nutritional status and plays a crucial role in growth and development (Rahmawati et al., 2020). Low hemoglobin levels, indicative of iron deficiency anemia, are commonly observed in children with stunting. Similarly, leukocyte levels, which reflect the body's immune response to infections, are often elevated in children suffering from chronic malnutrition and infections (Gunawan &

Yuliati, 2019). Infections can exacerbate malnutrition by reducing appetite, impairing nutrient absorption, and increasing nutrient losses (Rahman et al., 2019). However, while the relationship between malnutrition, anemia, and infections is well-documented, studies specifically examining the role of hemoglobin and leukocyte levels in stunting in rural Indonesia remain scarce (Sanatang et al., 2022; Rahmawati et al., 2020).

The novelty of this study lies in its focus on the physiological indicators, particularly hemoglobin and leukocyte levels, and their association with stunting in a rural Indonesian setting. While most previous research has primarily focused on dietary intake and socioeconomic factors, this study adds to the existing literature by investigating the direct relationship between these blood parameters and stunting in children. This research aims to fill the gap in current knowledge by providing empirical evidence on how hemoglobin and leukocyte levels correlate with stunting among children in the working area of Puskesmas Tanjung Agung, Muara Enim (Sanatang et al., 2022). This focus on physiological indicators offers new insights that could contribute to more effective health interventions targeting stunting in rural areas.

This study hypothesizes that low hemoglobin levels and elevated leukocyte counts are significantly associated with higher stunting incidence among children aged 24-60 months. This hypothesis is grounded in the understanding that hemoglobin deficiency can lead to insufficient oxygen supply to tissues, impairing growth, while elevated leukocyte levels indicate the presence of infections, which can further exacerbate malnutrition (Gunawan & Yuliati, 2019; Rahmawati et al., 2020). The study aims to test these hypotheses through statistical analysis, using data collected from children in the working area of Puskesmas Tanjung Agung. By examining these variables, the study seeks to uncover whether addressing anemia and infections in children could be a

viable strategy for reducing stunting rates in rural Indonesia.

The purpose of this study is to investigate the relationship between hemoglobin levels, leukocyte counts, and the incidence of stunting in children aged 24-60 months in the Puskesmas Tanjung Agung area. The findings are expected to provide valuable insights into the role of physiological factors in stunting, which could inform public health policies and interventions aimed at reducing stunting in rural and underserved areas. Additionally, this research aims to contribute to the growing body of literature on stunting by offering new perspectives on the importance of addressing both nutritional and infection-related factors in combating this public health issue.

METHODS

This study used observational analytic design with a cross-sectional approach, conducted from June to July 2024. The sample consisted of 79 children aged 24-60 months selected through purposive sampling from a population of 434. Hemoglobin levels and leukocyte counts were measured using the Hematology Analyzer. Data were analyzed using descriptive statistics and chi-square tests.

RESULTS AND DISCUSSION

This study aimed to explore the relationship between hemoglobin levels, leukocyte counts, and the incidence of stunting in children aged 24-60 months in the working area of Puskesmas Tanjung Agung. The results indicate a significant association between both low hemoglobin levels and elevated leukocyte counts with stunting.

Relationship between Hemoglobin Levels and Stunting

The data analysis revealed that 64% of children with low hemoglobin levels (≤ 11 g/dL) were stunted, compared to 27% of

children with normal hemoglobin levels. The statistical analysis using the chi-square test demonstrated a significant relationship between low hemoglobin levels and stunting ($p=0.003$) (Table 1). Low hemoglobin, indicative of iron-deficiency anemia, is known to impair oxygen transport, leading to reduced growth and cognitive function. The findings of this study align with prior research showing that children with low hemoglobin levels are at greater risk of stunted growth due to prolonged malnutrition (Gunawan & Yuliati, 2019).

This result emphasizes the critical role of anemia in growth restriction, suggesting that interventions aimed at addressing anemia could significantly reduce stunting rates. Previous studies support this, indicating that anemia in early childhood contributes to long-term physical and cognitive deficits (Rahmawati et al., 2020). This study adds novelty by confirming these findings within a rural Indonesian context, where anemia is prevalent, and access to adequate nutrition may be limited.

Table 1. Relationship between Hemoglobin Levels and Stunting

Hemoglobin levels	Incidence		Total	<i>p-value</i>
	<i>stunting</i>	<i>non stunting</i>		
Low	18 (64%)	10 (36%)	28 (100%)	0,003
Normal	14 (27%)	37 (73%)	51 (100%)	
Total	32 (100%)	47 (100%)	79 (100%)	

Relationship between Leukocyte Counts and Stunting

Similarly, 66% of children with elevated leukocyte counts ($>10,000/\mu\text{L}$) were stunted, compared to 26% of children with normal leukocyte counts. The chi-square test confirmed a significant association between high leukocyte counts and stunting ($p=0.001$) (Table 2). Elevated leukocyte counts indicate the presence of infections, which can worsen malnutrition and further impair growth. Chronic infections lead to increased metabolic demand, reduced appetite, and impaired

nutrient absorption, contributing to stunted growth (Rahman et al., 2019).

These findings suggest that addressing infections alongside improving nutritional intake is crucial for preventing stunting. Children in rural areas are more susceptible to infections due to poor sanitation and limited access to healthcare, which compounds the effects of malnutrition. The novelty of this study lies in its identification of leukocyte count as a significant factor, expanding the focus beyond nutritional deficits to include infection-related contributors to stunting in children.

Table 2. Relationship between Leukocyte Counts and Stunting

Leukocyte Count	Incidence		Total	<i>p-value</i>
	<i>Stunting</i>	<i>non Stunting</i>		
High	19 (64%)	10 (36%)	29 (100%)	0,001
Normal	13 (26%)	37 (74%)	50 (100%)	
Total	32 (100%)	47 (100%)	79 (100%)	

The results of this study offer valuable insights for both theory and practical applications. The findings emphasize that stunting is influenced not only by nutrition but also by immune health. While previous research has largely focused on dietary factors, this study highlights the importance of considering physiological markers such as hemoglobin and leukocyte levels. This suggests that healthcare providers should consider incorporating routine blood tests for these markers during early childhood screenings to identify children at risk of stunting and provide timely interventions. Moreover, public health initiatives aimed at reducing stunting should extend beyond improving nutrition to also include infection control, particularly in rural areas. By addressing both nutrition and infection prevention, we can more effectively reduce stunting and improve both the short- and long-term health outcomes for children in these communities.

CONCLUSION

This study demonstrated a significant relationship between hemoglobin levels and leukocyte counts with the incidence of stunting in children aged 24-60 months in the working area of Puskesmas Tanjung Agung. Children with low hemoglobin levels and elevated leukocyte counts were more likely to experience stunting.

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ACKNOWLEDGMENT

The author would like to express sincere gratitude to Lecturer of Laboratory Technology Department, for the invaluable guidance and advice throughout this writing.

CONFLICT OF INTEREST

All authors declared that there was no conflict of interest.

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CHARACTERIZATION AND STANDARDIZATION OF SCOBY (SYMBIOTIC CULTURE OF BACTERIA AND YEAST) FERMENTATION USING MANGO LEAVES (*Mangifera indica* L.) AS A RAW MATERIAL FOR TOPICAL APPLICATIONS

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ABSTRACT

Background: Fermentation using SCOBY (Symbiotic Culture of Bacteria and Yeast) represents an innovative bioprocess with significant potential for producing active ingredients suitable for topical applications. In this study, mango leaves (*Mangifera indica* L.), recognized for their rich content of secondary metabolites such as polyphenols, were utilized as a substrate to enhance the profile of bioactive compounds through fermentation. The primary objective was to characterize and standardize the chemical composition of SCOBY-fermented mango leaves via organoleptic evaluation and quantification of total phenolic and flavonoid content

Methods: Characterization and standardization of SCOBY fermentation using mango leaves (*Mangifera indica* L.) were conducted through organoleptic evaluation and quantification of total phenolic and flavonoid content in accordance with Indonesian Herbal Pharmacopeia

Result: The fermented product exhibited a dark brown color, a distinct fermented aroma, a sour and mildly bitter taste, and a pH reduction to 3. Chemical analyses revealed a total phenolic content of 3.79% GAE (gram equivalent of gallic acid) and a total flavonoid content of 1.94% QE (gram equivalent of quercetin), with an IC₅₀ antioxidant activity value of 1.89 mg/mL. Given its enriched polyphenol content, the SCOBY-fermented mango leaf extract demonstrates substantial potential as an active ingredient in topical formulations, specifically due to its antioxidant properties, wound healing capabilities, and UV protective (Sun Protection Factor, SPF) effects. This study highlights the potential value of fermented mango leaves as a key component in natural skincare and therapeutic formulations, offering sustainable, bioactive-rich alternatives for product development in the cosmetic industry.

Keywords: SCOBY fermentation; Mango leaves (*Mangifera indica* L.); Topical formulations; Phenolic content; Flavonoid content; antioxidant

INTRODUCTION

Growing public awareness of healthy lifestyles has fueled interest in foods and beverages that offer both refreshment and health benefits. Among these functional fermented products, kombucha has become increasingly popular for its potential to support microbiota balance and provide a rich source of antioxidants (Ecklu-Mensah et al., 2024; Huang, 2024). Kombucha is typically produced by fermenting tea and sugar, facilitated by a

Symbiotic Culture of Bacteria and Yeast (SCOBY) (Huang, 2024). During fermentation, the SCOBY converts sugars and phenolic compounds in tea into various bioactive compounds, including organic acids, polyphenols, and antioxidants (Shi et al., 2023; Su et al., 2023).

To diversify fermentation substrates, researchers have explored other natural ingredients, such as fruits, herbs, and agricultural by-products, as alternatives to tea (Barakat et al., 2023). In this study, mango

leaves (*Mangifera indica* L.), recognized for their high content of bioactive compounds like mangiferin and quercetin with potent antioxidant activity (Shah et al., 2024), were selected as the SCOBY fermentation substrate. Unlike traditional kombucha, primarily consumed orally, this research aims to characterize and standardize SCOBY fermentation using mango leaves for the production of topical skincare products, introducing a novel approach in skincare applications.

This study will evaluate the bioactive components, particularly antioxidants, in the fermented product for their potential to protect skin from free radical damage. The goal is to develop a standardized mango leaf-based product that is both safe and effective for skincare use. Thus, this research seeks to develop and standardize SCOBY fermentation with mango leaves (*Mangifera indica* L.) as an innovative, antioxidant-rich raw material for topical applications, offering potential benefits for skin protection and health.

METHODS

Instruments

The equipment used in this study includes an analytical balance, water bath, oven, and UV-Vis spectrophotometer.

Materials

The samples used in this study are mango leaves (*Mangifera indica* L.). Additional materials include distilled water, kombucha starter, gallic acid, sugar, methanol (analytical grade), Folin-Ciocalteu reagent, Aluminum chloride, DPPH (1,1-diphenyl-2-picrylhydrazyl), sodium hydroxide, and sodium acetate.

Collection, Identification, and Preparation of Samples

Mango leaves weighing 5 kg were collected from East Tanjab Regency, Jambi Province. The samples were identified at the Plant Taxonomy Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran. The mango leaves were dried using an oven at 50 °C for approximately three days, resulting in mango leaf simplicia.

Preparation of Mango Leaf Infusion and Fermentation

A total of 125 grams of mango leaf powder was added to 500 mL of distilled water at 100 °C. The infusion was then filtered, and the volume was adjusted to 500 mL by passing hot water over the sample residue. The infusion was placed in a glass container and cooled to approximately 27 °C, after which 3 grams of SCOBY (Symbiotic Culture of Bacteria and Yeast) was added. The glass container was covered with a clean white cloth, secured with a rubber band, allowing air to enter while protecting the infusion. Fermentation was carried out for 14 days at room temperature (27 °C) and stored in a safe place, away from direct sunlight.

Organoleptic Evaluation

The mango leaf infusion and SCOBY fermentation products were analyzed organoleptically by evaluating taste, aroma, and color. Additionally, pH parameters were measured before and after fermentation.

Total Phenol and Flavonoid Assay

The total phenol and flavonoid content of the fermented mango leaf SCOBY products was analyzed according to standard procedures outlined in the Indonesian Herbal Pharmacopoeia (Kementerian Kesehatan RI, 2017).

Antioxidant Assay

The antioxidant activity of the fermented mango leaf SCOBY products was tested using the DPPH method, in accordance with procedures developed by (Zou et al., 2021).

RESULTS AND DISCUSSION

This study utilized mango leaves (*Mangifera indica* L.) sourced from Bunga Tanjung, East Tanjung Jabung Regency, Jambi Province. Taxonomic identification was conducted to verify the authenticity and accuracy of the plant material, encompassing its scientific name, synonyms, local names, and family characteristics. The identification process took place at the Plant Taxonomy Laboratory, Department of Biology, FMIPA, Universitas Padjadjaran (No. 53/HB/01/2024), confirming the sample as *Mangifera indica* L. This step was critical for ensuring the validity of the study and consistency of data.

The preparation process began with drying mango leaves at 50 °C in an oven, which aimed to reduce moisture content, prevent microbial growth, and ensure the stability of the material during storage. The dried leaves were then processed into a uniform powder of mango leaf simplicia through cutting and grinding, thereby increasing the surface area for better solvent interaction during extraction, enhancing the yield of active compounds (Alshammaa, 2016).

The selection of the hot infusion method using distilled water as the solvent for extracting active compounds from mango leaves is based on its effective ability to dissolve bioactive substances such as xanthone glycosides and mangiferin. However, this method does have limitations compared to more advanced techniques, such as ultrasonic extraction or the use of organic solvents (Castro-Muñoz et al., 2024; Loan et al., 2021), which generally offer higher efficiency in extracting bioactive compounds. Despite this, distilled water remains an economical, safe, and environmentally friendly choice, though further

optimization of the extraction process may be necessary to achieve maximal compound yield. The infusion process facilitated the growth of microorganisms within the SCOBY culture, a key element in the fermentation process. Fermentation results indicated notable changes in organoleptic characteristics, including a distinctive fermented aroma, a sour taste with a hint of bitterness, and a pH reduction from 4 to 3. This pH decrease suggested the production of organic acids during fermentation, contributing to the product's functional properties.

The table summarizes the changes in mango leaf infusion characteristics before and after SCOBY fermentation (Table 1). Quantitative analysis of total phenolic and flavonoid content was conducted to standardize the fermented mango leaf product. The phenolic content, expressed as gram equivalents of gallic acid (GAE) per 100 grams of sample, was found to be 3.79%, while the flavonoid content, expressed as gram equivalents of quercetin (QE) per 100 grams of sample, was measured at 1.94%.

Table 1. Characteristics of fermented SCOBY mango leaves.

Characteristic	mango leaf Infusion	Fermented of mango Leaf
color	Blackish brown	Yellowish Brown
Aroma	Distinctive aroma	Distinctive aroma
Taste	Bitter	Sour with a little bitter
pH	4	3

These high levels of phenols and flavonoids highlight the significant potential of the fermentation product as a raw material for topical applications. Phenolic and flavonoid compounds possess a wide spectrum of biological activities, notably strong antioxidant properties, demonstrated by an IC₅₀ value of SCOBY fermented mango leaves was 1.89 mg/mL, which helps protect skin from free radicals, and anti-inflammatory effects that promote wound healing. Together, these properties make the SCOBY-fermented mango leaf extract a promising candidate for use in

antioxidant creams, wound-healing gels, and other skin-protective formulations.

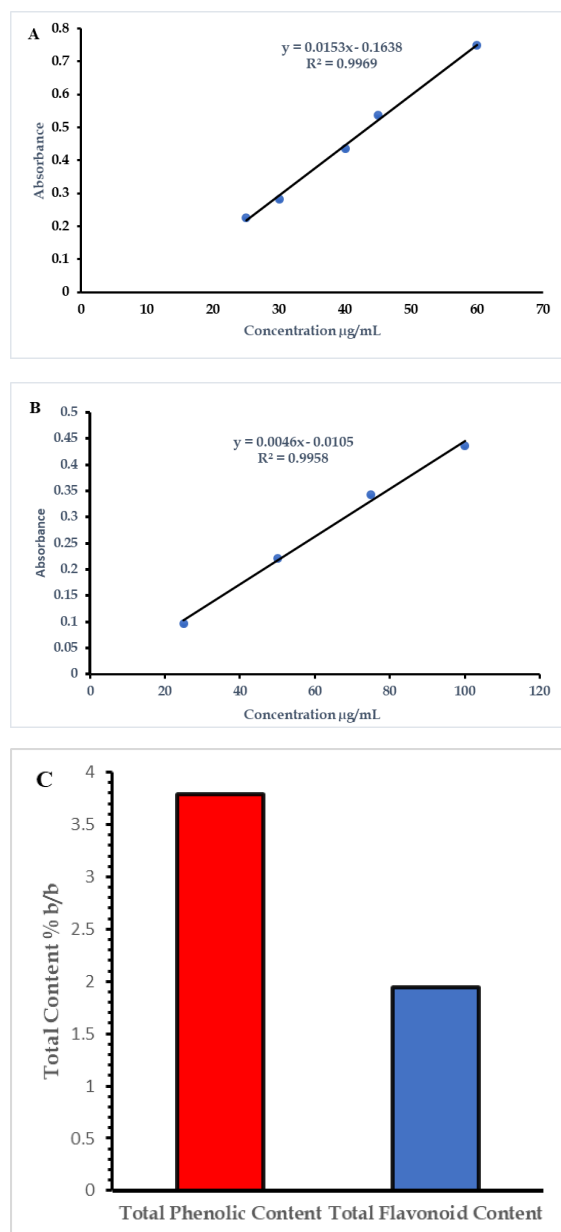


Figure 1. Determination of the total flavonoid and phenolic content in fermented SCOBY mango leaves. (A) Standard curve of Total Phenolic Content (TPC) using gallic acid as standard; (B) Standard curve of Total Flavonoid Content (TFC) using quercetin as standard; (C) TPC and TFC of fermented SCOBY mango leaves.

Thus, the application of SCOBY fermentation to mango leaves not only adds value to this natural material but also offers an innovative solution for the development of safe,

nature-based cosmetic and topical formulations. The potential demonstrated here highlights that microbial fermentation can be a sustainable and effective approach to enhancing the therapeutic benefits of bioactive compounds derived from local plants.

CONCLUSION

The fermentation of mango leaves (*Mangifera indica* L.) using SCOBY cultures resulted in significant changes, such as color alterations, the distinctive aroma of fermentation, a sour taste, and a decrease in pH. The high phenol (3.79%) and flavonoid (1.94%) content observed in the fermented product indicates potential antioxidant and anti-inflammatory activity. Consequently, the fermented mango leaf has considerable potential as a raw material for topical formulations, such as antioxidant creams and other skincare products, based on natural, value-added ingredients.

ACKNOWLEDGMENT

This research was funded by the DIPAPNBP Grant of the Faculty of Medicine and Health Sciences, Universitas Jambi, under the Basic Research Scheme, Contract No. 203/UN21.11/PT.01.05/SPK/2024. We extend our gratitude for the support provided, which enabled the completion of this study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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THE EFFECT OF OXYTOCIN MASSAGE ON BREAST MILK PRODUCTION IN BREASTFEEDING MOTHERS IN THE WORKING AREA OF PUSKESMAS SUNGAI BULIAN IN 2024

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ABSTRACT

Background: Infants who receive optimal breastfeeding can avoid mortality, with approximately 800,000 children under five avoiding death each year. Proper breastfeeding can help maintain milk production. It is recommended that mothers breastfeed within one hour after birth. However, not all postpartum mothers are able to produce milk immediately due to the process being influenced by various hormones, stimuli, and nerves impacting oxytocin release. In Indonesia, only 37.3% of infants aged 0-5 months are exclusively breastfed, which is significantly lower than the national target of 80%

Method: This study is a quantitative research with a pre-experimental design, using one group pretest-posttest with a paired t-test. The aim of this study is to compare the differences before and after the intervention on breastfeeding mothers aged 7 days to 1 month, in order to explain the effect of oxytocin massage on increasing breast milk production in breastfeeding mothers.

Result: Based on the distribution of the amount of breast milk production before oxytocin massage, the average milk production of the respondents was 5.07 ml with a minimum of 2 ml and a maximum of 10 ml. After the oxytocin massage, the average milk production was 20.67 ml with a minimum of 10 ml and a maximum of 28 ml. The analysis results conclude that performing oxytocin massage on breastfeeding mothers can increase breast milk production, with an increase of 15.6 ml. The statistical test results show a p-value of 0.000.

Conclusion: Breast milk production in breastfeeding mothers before receiving oxytocin massage averaged 5.07 ml in the working area of Puskesmas Sungai Bulian in 2024. Breast milk production in breastfeeding mothers after receiving oxytocin massage averaged 20.67 ml in the working area of Puskesmas Sungai Bulian in 2024. Statistically, it is proven that oxytocin massage has a significant effect on increasing breast milk production in breastfeeding mothers of infants aged 7 days to 1 month in the working area of Puskesmas Sungai Bulian in 2024

Keywords: oxytocin massage; breast milk production; breastfeeding mothers.

INTRODUCTION

Infants who receive optimal breastfeeding significantly reduce the risk of mortality, preventing approximately 800,000 deaths annually among children under five. Early breastfeeding, within one hour after birth, is crucial for maintaining milk production. However, not all postpartum mothers can produce milk immediately due to hormonal, neural, and stimulus-related factors influencing oxytocin release. In Indonesia, only 37.3% of infants aged 0-5 months are exclusively

breastfed, falling far short of the 80% national target (Riskesdas, 2018).

In 2022, the exclusive breastfeeding rate was 27.14%, below the program target of 50%. District-level variations ranged from 8.08% in Kerinci District to 72.04% in Tanjung Jabung Barat, with only the latter meeting the target (Jambi Provincial Health Office, 2022). Breastfeeding challenges often stem from issues within the mothers themselves, including problems with milk production before and after childbirth.

Oxytocin massage is a proven solution for improving milk production. This massage,

performed twice daily during the first two postpartum days, targets the spine along the costae (fifth and sixth ribs) to the scapula, stimulating parasympathetic nerves and oxytocin hormone release. This process enhances the contractility of breast myoepithelial cells, increasing milk volume (Mintaningtyas and Isnaini, 2022).

Studies, including those by Indriyani and Triyana (2022), demonstrate significant increases in milk production post-massage. Similarly, Rifa and Fifi (2021) and Azizah (2020) confirm the effectiveness of oxytocin massage. Addressing psychological and hormonal changes postpartum through techniques like oxytocin massage, nutritious diets, proper rest, and breast care can improve breastfeeding outcomes.

METHODS

This study is a quantitative research with a pre-experimental design, using one group pretest-posttest with a paired t-test. The aim of this study is to compare the differences before and after the intervention on breastfeeding mothers aged 7 days to 1 month in order to explain the effect of oxytocin massage on increasing breast milk production in breastfeeding mothers.

A sample is a portion of the characteristics possessed by the population (Sugiyono, 2013). In this study, the technique used for sampling was “random sampling,” which is a method to determine samples from a population with certain characteristics until the desired quota is reached, totaling 30 breastfeeding mothers. The inclusion criteria are the characteristics that need to be met by every member of the population who can be taken as a sample. Meanwhile, the exclusion criteria are the characteristics of the population members who cannot be taken as samples.

Univariate analysis was conducted using frequency distribution and descriptive statistics

to observe breast milk production in breastfeeding mothers who received and did not receive oxytocin massage. Bivariate analysis using paired t-test was employed because the data distribution before and after the intervention was normal (Shapiro-Wilk test $P > 0.05$).

RESULTS AND DISCUSSION

Before the oxytocin massage, the respondents' average breast milk production was 5.07 ml, ranging from 2 ml to 10 ml. After the massage, the average increased to 20.67 ml, with a range of 10 ml to 28 ml (Table 1).

Table 1. Frequency Distribution of Breast Milk Production of Breastfeeding Mothers (n=30)

Breast Milk Production	Average (mL)	Min	Max
Before Oxytocin Massage	5.07	2	10
After Oxytocin Massage	20.67	10	28

Table 2. Breast milk production in relation to oxytocin massage (n=30)

Breast Milk Production	Average	Dif.	95% CI	p-value
Before Oxytocin Massage	5.07	15.6	17.222-	0.0
After Oxytocin Massage	20.67		13.978	00*

The analysis found that oxytocin massage significantly increases breast milk production, with an average increase of 15.6 ml. Statistical tests showed a p-value of $0.000 < 0.005$ (table 2), confirming a significant effect of oxytocin massage on breast milk production among breastfeeding mothers with infants aged 7 days to 1 month in the working area of Puskesmas Sungai Bulian in 2024.

Before the massage, the average milk production was 5.07 ml, ranging from 2 ml to 10 ml. Low milk production on the first day is common, as colostrum is typically produced during the first 1–5 days after birth (IDAI, 2021).

Several factors influence breast milk production, including food intake (47.5%), rest patterns (69.5%), breastfeeding frequency (94.9%), and breast care (100%) (Vemelya,

2014). Among these, breast care, breastfeeding frequency, and sufficient rest are critical.

Cultural myths about specific foods can lead to inadequate nutrition for breastfeeding mothers. Smooth breast milk production requires a balanced, nutrient-rich diet accompanied by regular eating habits (Maritalia, 2017). Proper care and attention to these factors are essential to support breastfeeding mothers and ensure adequate milk supply.

CONCLUSION

Breast milk production in breastfeeding mothers averaged 5.07 ml before receiving an oxytocin massage. After the massage, the average production increased significantly to 20.67 ml. Statistical analysis confirmed that oxytocin massage has a significant effect on enhancing breast milk production in mothers of infants aged 7 days to 1 month.

ACKNOWLEDGMENT

We extend our heartfelt gratitude to the respondents for their willingness to participate and to the Head of Bulian Primary Healthcare for granting permission to conduct this research within its working area.

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THE EFFECT OF HEALTH EDUCATION MEDIA WITH THE CONTENTS OF MY PLATE TO IMPROVE KNOWLEDGE AND BEHAVIOR IN PREVENTING ANEMIA IN GRADE VIII ADOLESCENT FEMALES OF SMPN 20 KOTA JAMBI IN 2024

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ABSTRACT

Background: Anemia is a state of lack of red blood cells, Generally as a result of iron deficiency from food consumption or excess blood loss and unable to be replaced through food consumption, Anemia is a public health condition that occurs a lot in adolescent girls, one of the causes is because adolescent girls experience a menstrual cycle every month.

Method: The benefits of research are expected to be information and knowledge about health. The design of this study is with One Group Experiment. The method of data collection was obtained from questionnaires before and after research was carried out with the media of my plate about the prevention of anemia. Data analysis using wilcoxon.

Result: The results showed that the knowledge and behavior of the respondents increased after being given education using media of my plate, with a significance value of $p = 0.000$ ($p < 0.05$).

Conclusion: When given education, there was a significant and meaningful influence where there was an increase in knowledge and behavior in adolescent girls in grade VIII of SMPN 20 Jambi City.

Keywords: My Plate Media, Increasing Knowledge, Anemia Prevention Behavior

INTRODUCTION

Anemia is one of the main nutritional problems in Indonesia with a high prevalence, especially in adolescent girls. According to the World Health Organization, anemia is one of the biggest health problems in the modern century, with high-risk groups including women of childbearing age, pregnant women, school-age children, and adolescents. Adolescent girls during puberty are susceptible to anemia due to irregular eating patterns and drinking habits that inhibit iron absorption (Kemenkes, 2018).

Based on data from the 2013 Riskesdas, the prevalence of anemia in adolescent girls

was 22.7%, increasing to 32% in the 2018 Riskesdas, with the proportion of anemia in the 15-24 age group. (Ministry of Health, 2018). One of the programs of the Ministry of Health to overcome anemia in adolescent girls is to run a program to provide iron tablets to adolescent girls with a target of 52% in 2021. (Rencana Aksi Kegiatan Direktorat Gizi Masyarakat Tahun 2020-2025, 2020).

According to WHO, anemia is a condition in which the body has abnormal hemoglobin levels. Hemoglobin (Hb) is needed to transport oxygen, if the concentration is less than normal, the capacity of the blood to transport oxygen also decreases, causing fatigue, weakness, lethargy, dizziness and shortness of breath.

The need for hemoglobin depends on age, gender, altitude, smoking habits, and pregnancy. Anemia can also be caused by nutritional deficiencies such as Fe, vitamin B9, vitamin B12 and vitamin A.

Iron deficiency anemia is a condition when the body suffers from a lack of iron (Fe) intake which functions as the core of the hemoglobin molecule as the first source of red blood cells. If there is a lack of iron, it will cause a decrease in the size of hemoglobin, low hemoglobin levels, and reduce the concentration of red blood cells. This anemia occurs when there is a lack of iron and the size of red blood cells is smaller (microcytosis), this causes decreased activity (Citrakesumasari, 2012).

Adolescents must be trained to be able to improve their healthy lives, adolescence is a transition period to adulthood so that physical, emotional and mental growth is very fast (Proverawati, 2017).

According to WHO, anemia is a condition in which the body has abnormal hemoglobin levels. Hemoglobin (Hb) is needed to transport oxygen, if the concentration is less than normal, the capacity of the blood to transport oxygen also decreases, causing fatigue, weakness, lethargy, dizziness and shortness of breath. The need for hemoglobin depends on age, gender, altitude, smoking habits, and pregnancy. Anemia can also be caused by The incidence of anemia in the world is estimated to reach 1.32 billion people or 25% and in fertile women 30.4% suffer from anemia, the incidence in the African continent is 44.4%, the Asian continent is 25% to 33% and the smallest in the North American continent is 7.6%, thus anemia is one of the health problems in various countries in the world, especially developing countries such as Indonesia. Anemia mostly occurs in adolescent girls and pregnant women, with a prevalence that increases every year (WHO 2015 in (Kasumawati et al., 2020).

Based on Basic Health Research data from 2007-2018, there is an increase in the number of adolescents experiencing anemia. In 2007, the number of adolescents experiencing anemia was 6.90%, increasing in 2013 to 18.40%, and finally increasing sharply in 2018 to 22.7%. This means that 22.7% of women of childbearing age in Indonesia experience anemia and are at risk of experiencing obstacles in their growth and development, cognitive abilities and are susceptible to other infectious diseases. Meanwhile, in Jambi Province, 23.9% of adolescent girls experienced anemia in 2018 (Humas Setda Kota Jambi, 2021).

Blood-boosting tablets (TTD) are nutritional supplements to increase blood in the form of tablets/caplets/capsules that can be obtained from the Program or independently. TTD The program is provided by the Government and distributed to target groups through government health service facilities in 2023 (SKI, 2023)

Anemia is often experienced by adolescents due to rapid growth and physical activity. The causative factors include lack of iron and nutrients, as well as errors in consuming iron. Symptoms include loss of appetite, pale face, and reduced focus. Anemia can reduce focus, fitness, and optimal growth in adolescents (Nasruddin et al., 2021)

Adolescence is defined as a period of transition development from childhood to adulthood, which includes biological, cognitive and social changes that take place from the age of 10 to 19 years. The level of achievement of a teenager's biological potential is the result of the interaction between genetic and environmental factors, where during the development towards adulthood, growth and development are continuous (Aesyah, 2019). Several health problems experienced and threatening the future of Indonesian teenagers. The four health problems that are considered most often experienced by Indonesian teenagers include iron deficiency (anemia), short stature

(stunting), chronic lack of energy (thin), and obesity (Kementerian Kesehatan RI, 2020).

One of the efforts to improve the knowledge and behavior of school children is by providing counseling on the prevention of anemia which can be done with the help of media because the messages given can generate interest and make it easier to understand the provision of information (Uce, 2019).

One of the educational media that is easily accepted by school children is by using the “Fill My Plate” media. My plate media can provide information by activating children's eyes and concentration during teaching and learning time. This ability is also considered more interesting and better because it contains two elements, namely eyes and concentration of mind (Uce, 2018).

Jambi City has 73 Junior High Schools (SMP) one of which is SMP N 20 Jambi City in 2024. During the initial survey on Wednesday, January 31, 2024, I directly interviewed the UKS teacher that there were many cases of teenagers who often fainted and had stomach aches during study hours because they did not have breakfast before they were going to study and some fainted because of anemia.

METHOD

This study uses a type of Quasi Experiment Design, namely a quasi-experimental design with a one-group research with a pre-test and post-test experiment. The population of this study was 61 female adolescents in class VIII of SMPN 20 Kota Jambi. The sampling method was Simple Random Sampling. The research instrument was a pre-test and post-test questionnaire. The method of collecting data was obtained from questionnaires before and after the research was conducted with the media isi piringku about prevention using Wilcoxon.

RESULTS AND DISCUSSION

Distribution of the average value of knowledge of anemia prevention pre-test and post-test using the media of “My plate”

Table 1. Distribution of Mean Pre-Test and Post-Test Anemia Prevention Knowledge

Variabel	n		Mean	SD	Min-Max
Anemia Knowledge	61	Pre-Test	6.09	4.40	6-10
		Post-Test	9.97	3.49	8-10

Source : Primary Data (2024)

Based on table 1, it shows that the total value (pre-test) obtained a minimum knowledge score of 6 and a maximum knowledge score of 10, with a mean value of (6.09) while the knowledge results (post-test) obtained a minimum knowledge score of 8 and a maximum knowledge score of 10, with a mean value of (9.97).

This means that systematically there is an increase in knowledge of anemia prevention after being given education before using the My Plate media for class VIII students of SMPN 20 Jambi City.

Distribution of the average value of behavior of anemia prevention pre-test and post-test using the media of “My plate”

Table 2 . Distribution of Mean Pre-Test and Post-Test Anemia Prevention Behavior

Variabel	n		Mean	SD	Min-Max
Anemia Prevention Behavior	61	Pre-Test	37.73	4.40	27-49
		Post-Test	45.14	3.49	30-50

Source : Primary Data (2024)

Based on table 2, it shows that the total value (pre-test) with a minimum behavioral score of 27 and a maximum behavioral score of 49, with a mean value (37.73). while the behavioral results (post-test) with a minimum behavioral score of 30 and a maximum behavioral score of 50, with a mean value (45.14).

This means that it indicates that there is anemia prevention after being given education in a systematic manner before

increasing behavior and using the mediation of my plate in class VIII students of SMPN 20 Jambi City.

The influence of education using the media of “My plate” on the level of breakfast Knowledge

Table 3. Wilcoxon Test Results Variable Anemia Prevention Knowledge

Variable	treatment	Increasing knowledge	of n	p-value
Breakfast Knowledge	Media of My Plate	Pretest Posttest	3.88 61	0.000

Based on table 3 shows p-value = 0.000 ($p < 0.05$), which means there is a significant influence of counseling using the “Fill my plate” media on the level of knowledge of class VIII students of SMPN 20 Jambi City with an average increase of 3.88.

The influence of education using the media of “My plate” on the level of breakfast Behavior

Table 4. Wilcoxon Test Results Variable Anemia Prevention Behavior

Variable	treatment	Increasing knowledge	of n	p-value
Breakfast Behavior	Media of My Plate	Pretest Posttest	7.41 61	0.000

Based on the table 4 p-value=0.000 ($p < 0.05$), which means that there is a significant influence of counseling using the media fuzzle of my plate on the level of behavior of class VIII female students of SMP 20 Kota Jambi with an average increase of 7.41.

CONCLUSION

This study shows that the media counseling of isi piringku fuzzle has a positive effect on the knowledge and behavior of preventing anemia in grade VIII female students of SMPN 20 Jambi City. The average value of knowledge and behavior increased significantly after counseling. Teachers and students at SMPN 20 Jambi City were very

enthusiastic in receiving the results of this study.

ACKNOWLEDGMENT

The researchers would like to thank the Jambi City Health Department, SMPN 20 Jambi City and 61 student respondents of the research, as well as the Poltekkes Kemenkes Jambi for their contributions to provide support for this research.

CONFLICT OF INTEREST

All of the authors declared no conflict of interest regarding funding, including names in published articles, and the data collection process.

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IMPLEMENTATION OF THE E-PPGBM SYSTEM: AN OPPORTUNITY OR A CHALLENGE

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ABSTRACT

Background: Stunting is a chronic nutritional deficiency problem and has an impact on development, cognitive, motor, verbal, higher susceptibility to non-communicable diseases which of course affect productivity as well as become a burden on the country. non-communicable diseases which of course affect productivity as well as become a burden on the country. The prevalence of stunting in Indonesia is still quite high, although Indonesia has succeeded in reducing the prevalence of stunting from 37.6% (2013) to 21.6% (2022). Reducing the prevalence of stunting from 37.6% (2013) to 21.6% (2022). One of the one of the strategies for reducing stunting is carried out through recording and reporting based on the strategy for reducing stunting is carried out through recording and reporting based on the community by accurate nutritional surveillance, so that information on the problems is specific as a basis for considering interventions carried out on target. specific as a basis for considering interventions carried out on target.

Method: This study applies the explanatory trial approach of the CIPP Evaluation Model, which consists of Context Evaluation, Input Evaluation, Process Evaluation, and Product Evaluation.

Result: The results of the study formulate policy recommendations, including loading feedback systematically in the aspect of loading the e-PPGBM database, developing e-PPGBM application features through recording registration templates and determining risk factors, monitoring and evaluating the quality of e-PPGBM data through data analysis techniques, recording e-PPGBM interventions and evaluations, and building a network for utilizing the results of e-PPGBM data analysis as supporting data for planning toddler nutrition programs and interventions.

Conclusion: Optimizing the utilization of Optimizing the utilization of e-PPGBM at various stakeholder levels requires the active role and involvement of the parties, e-PPGBM at various stakeholder levels requires the active role and involvement of the parties, in order to ensure that the processed and produced data can be used as appropriate policy considerations in the community. appropriate policy considerations in the community.

Keywords: Stunting, Nutrition, e-PPGBM, CIPP Evaluation

INTRODUCTION

Nutrition is a key aspect for human resource development. One of the nutritional issues that is a global focus and a target of sustainable development goal 2.2 is toddler stunting.

Stunting occurs due to chronic malnutrition, especially inadequate nutritional intake. Stunting affects development,

cognitive, motoric, verbal, higher susceptibility to non-communicable diseases such as obesity, hypertension, diabetes, to cancer during adulthood which will later affect productivity, income potential, skills, thus increasing state expenditures in health insurance and economic losses, as well as the country's economic burden.

The global prevalence of stunting in 2022 was 22.3% with 148.1 million toddlers

in the world experiencing stunting. More than half of the world's stunted toddlers come from Asia (76.6 million) and around 42% (63.1 million) come from Africa.

The ASEAN Snapshot Report shows that Cambodia, the Philippines, Vietnam, and Myanmar experienced a decrease in stunting prevalence while Malaysia, Thailand, and Indonesia experienced an increase in stunting prevalence. The prevalence of stunting in Malaysia increased from 17.7% in 2016 to 21.8% in 2020. Similarly, Thailand's stunting prevalence increased from 10.5% (2016) to 13.3% (2020). Meanwhile, based on the report, Indonesia's prevalence tends to increase slightly from 27.5% (2016) to 27.7% (2020). The average stunting rate in Southeast Asia is 25.4%.

In 2022, Indonesia is estimated to contribute 4.7% of all stunting cases in the world (UNICEF, 2023). Jambi Province has a fluctuating prevalence of stunting in 2013 (37.2%), 2018 (30.1%), 2020 (21.03%), increasing in 2021 (22.4%), 2022 (18%), and 2024 by 13.5% with a provincial target of 12% in 2024, meaning below the RPJMN target of 14% in 2024.

This decreasing trend in prevalence briefly illustrates the success of the programs that have been carried out by the government, because the results of the Basic Health Research or now renamed the Indonesian Health Survey have been utilized by program implementers in developing policy plans, monitoring, and evaluating evidence-based health programs.

One strategy in efforts to reduce stunting is to emphasize the importance of accurate electronic data for community-based recording and reporting by nutritional surveillance, so that the information obtained is appropriate and interventions are carried out on target (Zulaikha et al., 2021). The accuracy of reliable data and information is influenced by a good health information system. In fact, if the system is examined further at the district/city, provincial and

central levels, this e-PPGBM information system still has not contributed to producing accurate and timely data and information (Sugianti, 2020).

Input indicators are inputs used to run the system. Evaluation of input is used to ensure that resources are in accordance with the problem. Input can affect the process and have an impact on output so that evaluation of input is the initial stage that needs to be carried out before moving on to the next evaluation stage (Solehuddin, 2022). Input indicators are known to affect problems in recording e-PPGBM, namely delays in the reporting process. One of them is the lack of supporting facilities such as laptops, internet networks and personnel entering data (Febrianto et al., 2022).

This requires an evaluation of the input indicators or resources needed in the e-PPGBM surveillance system (Meidiawani et al., 2021). Data and information that have the potential to be used for nutritional surveillance still need to be considered in terms of quality. This is because the existing data has often been used to provide an overview of the nutritional status and risk factors in the community.

Available and accessible data for nutritional surveillance purposes at all levels of government administration, namely: data on the results of monitoring the growth of individual toddlers and at the community level, data on the height of new school children, anthropometric measurement data during the distribution of vitamin A in February and August, and data on weighing months (in several provinces). For the purposes of risk factor analysis, routine reports from government institutions (such as health, agriculture, social, public works) can be utilized. There are several data that have been entered in the e-PPGBM format.

Studies related to the use of the above data for nutritional surveillance purposes, in the sense of the 3A concept (Assessment, Analysis, Action) have not been conducted.

There are several questions about how the data is used for nutritional surveillance.

A good Health Information System is an information system that is able to produce accurate and timely data/information. Facts show that health management at the district/city, provincial and central levels, related to the e-PPGBM application Information System has not played a big role because it has not produced accurate and timely data/information. This has an impact on incomplete nutritional status information, resulting in inaccuracies in identifying nutritional problems and resulting in the formulation of incorrect policies in dealing with nutritional problems.

Therefore, we need to see the opportunities, challenges and gaps that are important and strategic substances for the sustainability of the e-PPGBM system.

METHOD

This study applies the explanatory trial approach of the CIPP Evaluation Model, which consists of Context Evaluation, Input Evaluation, Process Evaluation, and Product Evaluation. Service design is a human-centered design approach that aims to improve the quality of interactions between services and their users, by comprehensively considering the end-to-end processes and resources (people, infrastructure, protocols) required for services to run and generate value.

RESULTS AND DISCUSSION

1. The Role of District/City/Provincial Governments in Creating the e-PPGBM System Database in Jambi Province

The District/City Health Office places the position in the role of monitoring and evaluation as well as analysis of e-PPGBM data (95.2%). The District/City Health

Office carries out monitoring of health centers (69.0%), in the monitoring aspect, in order to maintain the accuracy of data input according to the specified deadline.

e-PPGBM data is used by the District/City/Provincial Health Office, especially related to the nutritional status of toddlers, for early identification of health problems in the community. In addition to the role of monitoring, evaluation, and data analysis, the District/City/Provincial Health Office also plays a role in providing orientation to nutrition program holders and e-PPGBM applications.

2. Provision and Management of Resources for the Implementation of the e-PPGBM System

The implementation of the e-PPGBM system is realized in the form of optimizing the role of nutrition officers in managing the e-PPGBM system, including recapitulation of posyandu data and verification of data entry into the e-PPGBM system (84.1%), information management and data analysis (73.2%), and advocacy of analysis results as recommendations for alternative solutions and forms of follow-up to handling toddler nutritional status problems (56.1%).

Nutrition officers as the person in charge of the e-PPGBM system every month said that as individuals they feel burdened with carrying out e-PPGBM data entry (16.0%), one of the reasons is because they hold more than 1 position. Even the positions held reach 5 positions, of course it is a highlight regarding job analysis and the workload of an employee.

The extension of the Nutrition Officer at the Health Center is a health cadre who has been trained and empowered, through workshop activities and direct assistance in integrated health post activities and toddler anthropometry.

Increasing the capacity of health workers in Community Health Centers is balanced with increasing information technology capabilities and the implementation of e-

PPGBM system monitoring from the Community Health Center, Regency/City, and Provincial levels.

3. Data Collection and Dissemination Practices in the e-PPGBM System

Toddler anthropometric data were obtained based on Posyandu visits that were coordinated and implemented every month. However, the recorded manual forms required verification to ensure that the data entered was correct and precise. Data entry in the e-PPGBM system included toddler identity (55.4%), anthropometric measurements (94.0%), Additional Food Provision (PMT) (48.2%), measurements of pregnant women (19.3%), infant mortality (4.8%), vitamin A consumption (69.9%), and monthly reports based on these indicators.

The input of anthropometric and health data of toddlers in the e-PPGBM application is assisted by Posyandu (62.2%), although it must go through verification and validation from the Health Center to minimize data deviations. However, several areas do not involve Posyandu in the application data entry for various reasons, including health cadres are not yet proficient in inputting e-PPGBM application data (69.3%), at the Posyandu level, health cadres only need to manually record anthropometric data of toddlers and pregnant women (48.0%), and it is considered efficient if health center officers do it themselves (25.3%).

4. Constraints and Obstacles to Utilizing e-PPGBM

The survey results accompanied by elaboration from nutrition officers conveyed that there were obstacles and barriers that were often faced in accessing the e-PPGBM system, including the application often experiencing disruption/maintenance (65.0%), the strength of the internet network needed to access the e-PPGBM system in several Puskesmas/Posyandu locations was very limited (62.5%), limited health human resources as data verification and validation officers at the Puskesmas level (45.0%), and

technically incomplete data entry from each Posyandu (50.0%).

This hypothesis is reinforced by the argument of nutrition officers that data correction is often done because of data input errors or the verification and validation process of measurement data that has not been completed. At times, officers submit data that is not recorded in the e-PPGBM application, thus requiring re-entry and of course requiring more time and effort. Incidents like this hinder officers in carrying out their functions, thus impacting the accumulation of other work.

Alternatives offered in the development of the e-PPGBM application include the addition of control and feedback features by the District/City/Province Office, so that the Health Center can verify that the data is recorded by the District/City/Province.

5. Flow of e-PPGBM Utilization at Health Center and Regency/City/Province Levels

The e-PPGBM application system is an instrument for surveillance as well as monitoring and evaluation of the nutritional status of toddlers in the region. The availability of e-PPGBM at the Health Center is used to find out information on the growth and development of toddlers (87.8%), provide an accurate picture of the nutritional status of individuals (86.6%), and obtain target data for individual toddlers by name by address (78.0%).

Processed e-PPGBM data becomes the basis for consideration in formulating health policies and programs. At the Regency/City/Province level, the data utilization stage enters the concept of analysis and information dissemination as a basic form of policy recommendations or alternative solutions to the problem of toddler nutritional status. Achieving good data quality for quality policies certainly requires solutions to the roots of the problems in the field, such as the provision of facilities and infrastructure, the

provision of health human resources based on workload analysis, the preparation of effective and efficient role models for Posyandu technical services that are in line with e-PPGBM data records.

The implementation of e-PPGBM data has the potential to produce accurate and real-time nutritional data, which will facilitate the identification of nutritional problems and the planning of targeted nutritional interventions. Furthermore, the e-PPGBM system supports digital health transformation through integrated data.

CONCLUSION

The study shows that optimizing the use of e-PPGBM at various stakeholder levels requires the active role and involvement of parties to ensure that the data processed and produced can be used as a consideration for appropriate policies in the community.

ACKNOWLEDGMENT

The researchers would like to thank the Indonesian Ministry of Health through the Health Development Policy Agency, the Jambi Provincial Health Office, and the Jambi Ministry of Health Health Polytechnic for their contribution in providing support for this research.

CONFLICT OF INTEREST

All of the authors declared no conflict of interest regarding funding, including names in published articles, and the data collection process.

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THE ROLE OF ENUMERATOR SSGI IN ENSURING ACCURATE AND CONSISTENT MEASUREMENTS DURING ANTHROPOMETRIC ASSESSMENTS AT POSYANDU

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ABSTRACT

Background: The prevalence of stunting in Indonesia in 2022 is 21.6%, which in the 2014 medium-term development plan is 14%, while in 2022 the prevalence of stunting in Jambi Province is 18% lower than the national prevalence. One of the risk factors is technically related, namely the skills of posyandu cadres in measuring. The operational research carried out focuses on intervention studies which aim to test a service improvement effort that is specifically directed at solving certain problems, namely improving services in anthropometric measurements.

Method: Operational research was carried out from October to December, starting with focus group discussions, mentoring model interventions, and monitoring and evaluation of the mentoring. The intervention was carried out in October and November, and monitoring and evaluation related to cadre anthropometric measurement skills was carried out in November and December 2023.

Result: The anthropometry used in measurements at posyandu consists of 3 types of tools, namely Inno, Saga, Metris. Cadres receive training, but the training is not yet standardized and certified, especially skills in anthropometric measurements. Cadres' skills in measuring body weight have improved from before mentoring and after mentoring, especially in practicing measurement procedures related to preparation for weighing (80%), procedures for weighing the bodies of toddlers who are already standing (97%), procedures for weighing toddlers who cannot yet stand or children who do not want to be weighed themselves (100%), as well as reading and writing weighing results (99%).

Conclusion: Efforts to increase the precision and accuracy of anthropometric measurements of toddlers can be done by strengthening the role and existence of SSGI/SKI enumerator alumni as cadre companions in carrying out anthropometric measurements at Posyandu. It is hoped that the presence of SSGI/SKI enumerator alumni can have an impact on the results of anthropometric measurements of toddlers, one of which is by increasing the precision and accuracy of measurements. Furthermore, it is hoped that it can reduce and control the incidence of stunting in toddlers.

Keywords: Enumerator, SSGI, Measurement, Anthropometric, Posyandu

INTRODUCTION

Nutrition is a major investment in human resources for nation development. Nutritional problems among toddlers from 2007 to 2021 have not shown much change.

The prevalence of malnourished children under five has fluctuated, namely in 2007 (17.9%), 2010 (19.6%), 2013 (17.7%), 2018 (7.4%), 2021 (7.1%)), and 7.7% in 2022 with a Medium Term Development Plan (RPJMN) target of 6.8 – 7.3%. Attention must also be

given to handling nutritional problems in Jambi City in 2021 with a prevalence of undernutrition of 8.85 and an increase of 13.5% in 2022, so that the 2019-2024 RPJMN target has not been achieved (Kemenkes, 2022).

The nutritional problem that is currently a priority is stunting because it can pose a risk of decreased study concentration, academic achievement, low work productivity, increased risk of obesity, degenerative diseases, increased economic burden for financing care and treatment. The prevalence of stunting in Indonesia in 2022 is 21.6%, which in the 2014 medium-term development plan is 14%, while in 2022 the prevalence of stunting in Jambi Province is 18% lower than the national prevalence.

Malnutrition during childhood is irreversible (Beal et al., 2018). Several studies have shown that the factors causing malnutrition in toddlers include low parental education, family income, low birth weight, birth length, breast milk for less than 6 months, poor practice of providing MP-ASI, the incidence of infections, visits clinics are disorganized, and do not get advice from health workers (Laksono et al., 2022; Yuniar et al., 2020).

Cadres are the main foundation in implementing posyandu. One of the cadres' tasks is to carry out anthropometric measurements on babies and toddlers, the results of these measurements can be used to describe and carry out early detection of children's growth. Measurements must be carried out correctly or according to standard operating procedures to produce correct data.

The ability and expertise of cadres in carrying out anthropometric measurements is very important, because this is related to incorrect interpretation of nutritional status and is also related to errors in decision making and planning for subsequent program handling of nutritional problems (Budiman et al., 2021). However, there are still many posyandu cadres who do not have sufficient

skills to carry out anthropometric measurements correctly. The inaccuracy of posyandu cadres in carrying out anthropometric measurements can cause errors in interpretation of the results of anthropometric measurements.

Providing training and assistance to cadres directly during the posyandu process focuses on skills related to anthropometric measurements. According to Hara et al. (2014), a person's knowledge will form attitudes, which then give rise to behavior that will be realized in everyday life. Direct assistance from enumerators is an effort to improve cadres' skills in carrying out anthropometric measurements (Darmiyanti & Adiputri, 2020).

Mentoring is an activity that can encourage optimal community empowerment (Siswanti, Muadi, & Chawa, 2016). Mentoring is carried out with the aim of ensuring whether the anthropometric measurement activities at the posyandu are in accordance with the material provided during the training or there are no changes, as well as uniting trust and ability in solving various problems at the posyandu.

The Government of the Republic of Indonesia is committed to accelerating stunting reduction through the issuance of Presidential Regulation (Perpres) Number 72 of 2021 concerning the Acceleration of Stunting Reduction as a legal umbrella for the National Strategy for the Acceleration of Stunting Reduction. As a follow-up, a National Action Plan was prepared to strengthen convergence between stunting control programs through a family approach. In the managerial sector, the Vice President together with the Coordinating Minister for Human Development and Culture, as Directors and the National Population and Family Planning Agency as Implementers of Stunting Handling, including the formation of Stunting Reduction Acceleration Teams at the Provincial to Village/District Levels.

The incidence of toddler stunting is the result of various risk factors, both internal and external, related to toddler growth, including monitoring toddler growth and development. Anthropometric measurements of toddlers using measuring instruments must have a measurement precision of 0.1 cm (Supriasa et al, 2013). The risk of inaccurate measurements in monitoring the growth and development of toddlers results in errors in assessing nutritional status and can be more fatal in handling nutritional problems in toddlers. In an effort to minimize this risk, it is necessary to develop standards and guidelines for the use and measurement of toddler anthropometry as a reference for nutrition implementers and health cadres at Posyandu.

METHOD

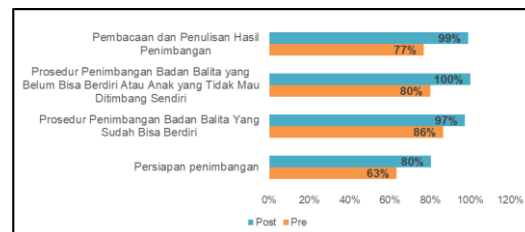
The operational research carried out focuses on intervention studies which aim to test a service improvement effort that is specifically directed at solving certain problems, namely improving services in anthropometric measurements.

The research was conducted in East Tanjung Jabung Regency. The selection is higher than the prevalence in Jambi province. Research implementation time October – December 2023.

RESULTS AND DISCUSSION

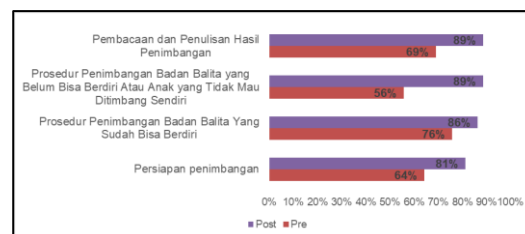
The results of the study through focus group discussions obtained anthropometric information used in measurements at posyandu consisting of 3 types of tools, namely Inno, Saga, Metris. Cadres receive training that is not yet standardized and certified, especially skills in anthropometric measurements. Calibration of anthropometric tools is still a concern because it has never been carried out. Monitoring of anthropometric measurements is still limited

due to limited personnel in the field, so it needs to be strengthened by experts, one of whom is SSGI/SKI enumerator alumni.



Gambar 1. Praktik Pengukuran Berat Badan yang Dilakukan Kader

The skills of cadres in measuring body weight have improved from before mentoring and after mentoring, especially in practicing measurement procedures related to preparation for weighing, from 63% to 80%, procedures for weighing the bodies of toddlers who have been established before 86% to 97%, procedures for weighing the weight of toddlers who have not yet able to stand or children who do not want to be weighed themselves before assistance is 80% to 100%, and reading and writing of weighing results is 77% to 99%.

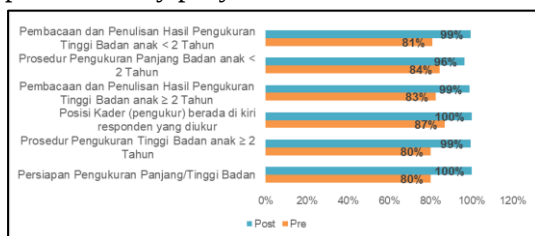


Gambar 2. Prosedur Pengukuran Berat Badan yang Dilakukan Kader

The measurement procedure experienced improvements in the 4 measurement criteria in the observation form after being provided with assistance, especially in practicing measurement procedures related to preparation for weighing, which was originally 64% to 81%, the procedure for weighing the body of toddlers who were already standing before 76% became 86%, the procedure for weighing the weight of toddlers who unable to stand or children who do not want to be weighed themselves before assistance, 56%

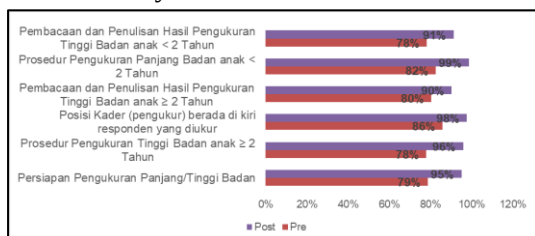
to 89%, and reading and writing the weighing results, namely 69% to 89%.

In anthropometric measurements of body length and height, there are 6 criteria that must be practiced and according to procedures by posyandu cadres.



Gambar 3. Praktik Pengukuran Panjang dan Tinggi yang Dilakukan Kader

Through the assistance provided by the enumerator alumni, cadres experienced an increase in measurement practice, including preparation from previously 80% to 100%, height measurement procedures > 2 years from 80% to 99%, cadre position during measurement from 87% to 100%, reading and writing of height measurement results the body of children > 2 years, namely 83% to 99%, measurement procedures in children < 2 years 84% to 96%, reading and writing in children < 2 years 81% to 99%.



Gambar 4. Prosedur Pengukuran Panjang dan Tinggi yang Dilakukan Kader

Through the assistance provided by the enumerator alumni, cadres experienced an increase in measurement practice, including preparation from previously 79% to 95%, height measurement procedures > 2 years from 78% to 96%, cadre position during measurement from 86% to 98%, reading and writing of height measurement results. the body of children > 2 years is 80% to 90%, measurement procedures for children < 2 years 82% to 99%, reading and writing for children < 2 years 78% to 91%.

Mentoring and practice provide

benefits in increasing knowledge because the research results show that there is a significant difference in the knowledge and skills of cadres before and after anthropometric training including weighing toddlers with dacin.

Common errors that occur in all anthropometric measurements include children being restless, errors when reading measurement results, scales not being calibrated to zero, subjects wearing thick clothing, and subjects moving or being anxious as a result of previous incidents. The errors that occur are caused by several factors such as measurement errors, equipment errors, and errors by the measuring force.

CONCLUSION

Policy recommendations based on the results to increase the precision and accuracy of anthropometric measurements of toddlers can be carried out by strengthening the role and existence of SSGI/SKI enumerator alumni as cadre companions in carrying out anthropometric measurements at Posyandu. It is hoped that the presence of SSGI/SKI enumerator alumni can have an impact on the results of anthropometric measurements of toddlers, one of which is by increasing the precision and accuracy of measurements. Furthermore, it is hoped that it can reduce and control the incidence of toddler stunting.

ACKNOWLEDGMENT

The researchers would like to thank the Indonesian Ministry of Health through the Health Policy Agency, the Jambi Provincial Health Office, and the Jambi Ministry of Health Health Polytechnic for their contribution in providing support for this research.

CONFLICT OF INTEREST

All of the authors declared no conflict of interest regarding funding, including names in published articles, and the data collection process.

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THE RELATIONSHIP BETWEEN FAMILY INCOME AND THE INCIDENCE OF STUNTING IN CHILDREN AGED 6 - 59 MONTHS

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ABSTRACT

Background: Stunting is a nutritional problem in the world, there are 165 million toddlers in the world in a short condition (stunting). Stunting is not only caused by internal factors but stunting is also caused by external factors, one of which is family income. Low-income levels result in a lack of household food purchasing power. The purpose of this study was to analyze the relationship between family income and the incidence of stunting.

Method: This research method uses a cross-sectional research design. This research was conducted at the Health Center of Sorong City Region, Southwest Papua Province. This research was conducted from July to August 2024.

Result: The population is all mothers who have toddlers aged 6-59 months at the Sorong City Regional Health Center of Southwest Papua Province as many as 106 people. Data collection techniques were obtained through primary data, namely by questionnaire, secondary data in the form of reports from the Health Center. Data analysis in this study was carried out by computerization consisting of Univariate Analysis and Bivariate Analysis. Result: analysis test using Chi Square Test and Correlation Coefficient Using SPSS showed that p value .914 which is smaller than 0.05 so that H0 is rejected and Ha is accepted.

Conclusion: there is a relationship between family income and the incidence of stunting in children aged 6-59 months.

Keywords: Stunted Growth, Economic Level And Family Financing

INTRODUCTION

Stunting is a nutrition problem in the world, there are 165 million toddlers in the world in a short condition (stunting). About 80% of stunted toddlers are spread across 14 countries in the world including Indonesia (Nugroho, Sasongko, and Kristiawan 2021). Based on data from the Ministry of Health, the incidence of stunting in Indonesia in the last 10 years has decreased but still does not show a significant number. The incidence of stunting from 2007 to 2013 increased by 0.4% and from 2013 to 2018 decreased by 6.4%. (Ministry of Health 2018 in (Wahyudi, Kuswati, and Sumedi 2022).

According to WHO, stunting is when height for age is less than -2 SD. Children who are stunted will have impaired intelligence, susceptibility to disease and reduced productivity. Stunting begins to appear when the child is two years old but

begins when the fetus is still in the womb. (Satriawan 2018). Maternal nutritional status plays an important role in the failure of a child's growth from in utero to 1000 days of life. Pregnant mothers with poor nutrition and significant infections can give birth to stunted babies (Brownstone et al. 2020).

During pregnancy, pregnant women need increased nutritional intake to prevent micronutrient deficiencies, including by consuming foods that are high in protein. This is one of the internal factors for stunting (Abdullah et al. 2020).

Based on the results of a study conducted by Rina Zahra, 2023, it shows that stunting is not only caused by internal factors but stunting is also caused by external factors including knowledge factors, complementary feeding practices, infection history, immunization provision, clean water sources, and environmental sanitation affect the

incidence of stunting in toddlers aged 12-59 months in the working area of the Ranto Peureulak Puskesmas. (Zahra et al. 2023).

In addition, based on a study conducted by Sutarto et al, 2020, it shows that the mother's education level and family income are significantly related to the incidence of stunting in toddlers. Family income is closely related to the economic level, the higher the income, the better the economic level (Sutarto, Azqinar, and Puspita Sari 2020).

Low income levels result in a lack of household food purchasing power. This leads to a lack of fulfillment of the nutritional needs of toddlers. BPS data as of July 1, 2024 shows that the number of poor people in Southwest Papua in March 2024 was 102.27 thousand people (18.13%), with the highest poverty rate in rural areas (BPS 2019). The level of poverty is directly proportional to the income and purchasing power of the community in fulfilling daily needs as well as the nutritional needs of children.

Based on the above background, the researcher is interested in conducting research with the title "The Relationship between Family Income and the Incidence of Stunting in Children Aged 6 - 59 Months" The purpose of this study is to deeply analyze family income on the incidence of stunting. The results of this study are expected to be a benchmark and basis for further research.

METHODS

This study is a quantitative study using a cross-sectional research design. This study was conducted at the Health Center of Sorong City Region, Southwest Papua Province. This research was conducted from July to August 2024. Population is the entire object of research or the object to be studied.

The population in this study were mothers who had toddlers aged 6-59 months at the Sorong City Regional Health Center, Southwest Papua Province as many as 106 mothers who had stunted children. The population of more than 100, which amounted

to 106 people, then in this study using cluster area sampling technique, to determine the sample of objects to be studied or very broad data sources (sugiono 2017).

Data collection techniques were obtained through primary data, namely by questionnaire, secondary data in the form of reports from the Puskesmas. Data analysis in this study was carried out by computerization consisting of Univariate Analysis and Bivariate Analysis (Suwarjana 2018).

RESULTS

3.1. Responden Characteristic

Responden characteristic are categorized based on mother's age, occupation and number of children. More details can be seen in Table 1 below:

No	Characteristic	Frequency	Percentage
Mother's Age (Years)			
1	20-35	90	84,9
2	<20/>35	16	15,0
Total		106	100
Mother's job			
1	Civil Servant	1	0,94
2	Workers	1	0,94
3	Military/Police	0	0,00
4	Farmers	1	0,94
5	Private Employee	2	1,88
6	Merchant	5	4,71
7	Self-Employed	1	0,94
8	Not Working / Housewife	90	84,9
9	Other	5	4,71
Total		106	100
Number of Children (Person)			
1	1	29	27,35
2	2	34	32,07
3	3	24	22,64
4	4	9	8,49
5	> 5	10	9,43
Total		106	100

Based on Table 1 shows that the most respondents were aged 20-35 years as many as 90 respondents or 84.9%, while the lowest respondents were aged <20 />35 as many as 16 respondents or 15.0%. For characteristics based on the mother's occupation, most mothers are not working or housewives as

many as 90 respondents or 84.9%. The characteristics of respondents based on the number of children were most in the number of children 2 people as many as 34 respondents or 32.07% while the lowest with the number of children 4 people as many as 9 respondents or 8.49%.

3.2. Family Income

For family income data, the basis is the provincial minimum wage (UMP). The minimum wage for Southwest Papua province in 2024 is IDR 4,024,270. This amount is the same as the Papua UMP because Southwest Papua does not yet have a statistical office or wage board. More details can be seen in Table 1 below:

No	Category	Frequency	Percentage
Provincial Minimum Wage (IDR)			
1	< UMP	9	8,49
2	> UMP	97	91,50
Total		106	100

Table 2 shows that the dominant family income is less than the minimum wage as many as 97 families or 91.50% and family income above the minimum wage as many as 9 families or 8.47%.

3.3. The Relationship Between Family Income Level And The Incidence Of Stunting In Toddlers

The relationship between family income and the incidence of stunting can be seen in Table 3 below:

Family Income	Nutrition Status Stunting		p value
	n	%	
< UMP	97	91,50	.914
> UMP	9	8,49	

Table 3 shows that the p value of .914 is smaller than 0.05, so H0 is rejected and Ha is accepted, concluding that there is a significant relationship between family income that is less than the minimum wage and more than the minimum wage on the incidence of stunting. The economic status of the family greatly affects the nutritional status of the family. This is related to the amount of food supply available in the household. Family

income is very influential on the nutritional status of toddlers, especially on stunting toddlers. The reduction in stunting will be faster if all sectors are involved, such as empowerment in the field of small businesses for housewives who will be able to increase sources of income for the family and also increase the degree of family health, through the fulfillment of food needs in the household (Agustin and Rahmawati 2021).

In a family with a low income, plus a large number of family members, it will be difficult to provide quality food for the family. For this reason, family income is one of the factors that influence child growth and development (Kawulusan et al. 2019).

This is reinforced by a literature review study which shows that out of 10 journals consisting of 5 national and 5 international journals

The results of 9 journals show the relationship between family income and the incidence of stunting in toddlers while 1 journal shows the results that there is no relationship between family income and the incidence of stunting in toddlers (Friyayi and N 2021).

CONCLUSION

Conclusion section should provide brief and clear answer related to the purpose of study, and not repeat abstract section or results. Conclusion section should be written in Times New Roman 11 pt along with spacing of 1.15. Author should write the conclusion logically and orderly. Author can write the limitation of this research and suggestion for further research. Conclusion should be written in paragraph not in list/numbering

ACKNOWLEDGMENT

Thank you to the Ministry of Health for providing financial assistance for this research and for giving the opportunity to the Poltekkes Kemenkes Sorong to collaborate with the Poltekkes Kemenkes Bengkulu through PKPT Year 2024.

CONFLICT OF INTEREST

There are no conflicts arising from this research between either the funder or the researcher.

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