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The Effect of Animal Protein MP-ASI & Visual Education on Stunted Children's Waist Circumference

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Abstract

Adequate nutrition is very important for the body, especially during the growth and development of children. Stunting is a condition of impaired growth in children under five years of age due to chronic malnutrition. This study aims to determine the effect of providing additional animal protein through complementary feeding (MP-ASI) and education based on visual media on the anthropometric parameter of waist circumference in children with stunting. This study used a quasi-experimental method with a pre-test and post-test design. The study involved a sample of 9 respondents who were children with stunting in the working area of the Jayengan Public Health Center, Surakarta City. The sample criteria included children with a waist circumference not appropriate for their age. Total sampling was used as the sampling technique, meaning all eligible individuals from the population were included in the study. The implications of this research indicate that the combination of providing additional animal protein through complementary feeding (MP-ASI) and visual media-based education is an effective strategy for improving the nutritional status of children with stunting. Specifically, this combined intervention significantly increased the children's waist circumference after the program. This demonstrates that the method successfully improved a crucial anthropometric parameter related to the nutritional status of stunted children. The practical implication is that this approach can be implemented by health workers in public health centers (puskesmas) or community health posts (posyandu) as a nutritional program model to accelerate stunting reduction, particularly in areas with high stunting prevalence and limited access to information.

INTRODUCTION

Nutrition is super important for our bodies, especially during those growth and development phases for children. (Amalia and Putri 2022). When a child's nutritional needs are met and their body can use it properly, their growth and development will be right on track for their age. However, if parents don't give their child enough food, they're at risk of nutritional deficiencies, malnutrition, or even obesity. This disrupted growth in children under five years old due to long-term lack of nutrition, which results in a child's height not matching their age, is known as stunting. In other words, stunting is when toddlers don't grow as they should because of complex nutritional problems, and is influenced by a lot of different things. (Hardani M and Zuraida R 2019).

So, stunting is a health thing that's figured out by checking someone's nutritional status using a specific way of doing it. To see how someone's doing nutritionally, they usually need to take some body measurements, which they call anthropometry. When they do this, they use clear guidelines so the results are spot-on. Measuring this stuff is pretty straightforward, and anyone can learn to do it with a bit of practice. When they're checking someone's nutritional health, there are a few measurements they usually take, like how long or tall they are, their waist size, the size of their upper arm, their belly size, and something called body mass index.

In Indonesia, the stunting rate in 2021 was around 24.4%, but it went down to 21.6% in 2022 (Kemenkes RI, 2023). Even though it's gone down, the standard set by the World Health Organization is still pretty high. Central Java had the highest stunting numbers in 2022, even more than West Java (20.2%), Banten (20.2%), Jakarta (14.8%), Yogyakarta (16.4%), and East Java (19.2%). One of the immediate bad things about stunting is that it makes children get sick

more often and can even lead to more deaths. It also messes with how children grow, like making it harder for them to think, move, and talk, and it makes healthcare costs go up. However, the long-term consequences of stunting include not having the ideal body size as adults; a higher chance of getting high blood pressure, heart disease, obesity, and other illnesses; problems with reproductive health; difficulty learning in school; and lower productivity and work capacity. Because stunting has such bad effects, the government has set a goal to bring the stunting rate down to 14% by 2024, which is in line with the World Health Organization's standard of being below 20%.

So, to tackle the issue of stunting, which is officially addressed in Presidential Regulation number 72 of 2021 concerning the Acceleration of Stunting Reduction, there's a five-pronged approach. This includes securing commitment from all parties, focusing on prevention strategies, ensuring collaboration across different sectors (convergence), guaranteeing access to good quality food, and fostering innovation alongside reliable data collection. Importantly, the effects of stunting can be improved in children up to the age of two. Regarding the availability of good food, which is a key pillar, exclusive breastfeeding or ASI is emphasized for the first six months of a baby's life, followed by complementary feeding or MP-ASI. Specifically, processed animal protein products are highly beneficial for children with stunting to maximize their nutrient intake. Animal-based foods contain essential nutrients vital for the growth and development of children under five, and generally, animal protein is considered superior to plant-based protein in terms of nutritional quality, playing a crucial role in building body cells necessary for the growth and development of young children. (Sholikhah and Dewi 2022). Besides using it in food, drinking animal milk has also been shown to lower the risk of becoming thin or wasted by up to 1.4% (Briliannita, Lestaluhu, and Supu 2022), and drinking around 300ml of milk every day could potentially prevent (Devianto, Dewi, and Yustiningsih 2022).

In Indonesia, the general protein intake level is still considered quite low, at under 80% of what's recommended. Around 36.1% of the population falls into the category of having a very low (AKP) Protein Adequacy Rate. (Hidayati 2023)Now, getting enough protein is a big deal, especially for a child dealing with stunting. There have been studies showing a connection between not getting enough protein, particularly from animal sources, and nutritional issues like stunting. Here in Surakarta City, Central Java, we've got kids who are affected by stunting. According to the Jayengan Public Health Center right here in Surakarta, up to August 2023, they recorded 21 children with stunting, and 9 of them had a waist circumference that wasn't quite right for their age or (LP/U). To successfully fight stunting, a main approach is making sure that lots of healthy, nutritious food is available. This is extremely important because not eating enough protein is strongly connected to a much greater chance of a child becoming stunted. For instance, research by (Putri 2024) Found that toddlers who don't get enough protein are 5.16 times more likely to be stunted than those who eat enough. This lines up with research showing that kids with stunting eat less protein than kids who are growing normally.(Samsuddin and Wildan Seni 2023). Research on protein intake and stunting also found that among the toddlers with stunting in their study, 80% had low protein intake, while only 20% had enough protein. (Sholikhah and Dewi 2022).

To make sure kids get good animal protein in their complementary feeding (MP-ASI), it's important to have the right knowledge about these food sources. However, not all parents have this understanding. We can boost their knowledge through education, and one way to do that is by using visual aids. A study showed that teaching with audio-visual media can really help people know more, change their attitudes, and improve their hands-on skills when it comes to health information. But, this kind of research hasn't been done yet in the area covered by the Jayengan Public Health Center here in Surakarta, so this study is important and something new.

That's why the goal of this research is to find out if giving kids with stunting processed animal protein in their MP-ASI, along with visual media education, can actually make a difference in their waist circumference. In research (Supriani 2021), video media in counseling offers significant advantages by providing excellent visualization, aiding information absorption, and boosting cognitive aspects. As an audio-visual tool, it engages both sight and hearing, improving perception, knowledge, and memory. Video-based information delivery, particularly via mobile phones, is more effective and cost-efficient than traditional methods, reaching a broader audience quickly. It also enhances learning interest and information reception, especially for those with low literacy levels. So, based on all of that, the main purpose of this research determine the effect of combining processed animal protein in MP-ASI with visual media education have an impact on the waist circumference of children with stunting.

RESEARCH METHODS

This study adopted a quasi-experimental method with a pre-test and post-test design to examine one of the indicators of stunting, namely, waist circumference based on age (LP/U). The population for this research was children with stunting in the working area of the Jayengan Public Health Center, Surakarta City. The research sample consisted of 9 child respondents with stunting from the same area. The sample criteria included children with a waist circumference that was not appropriate for their age. The sampling technique used was total sampling, meaning all eligible individuals from the population were included in the study. The independent variables or interventions in this study included the provision of processed animal protein in Complementary Feeding (MP-ASI) and visual media-based education for parents. Meanwhile, the dependent variable or parameter measured was the waist circumference of children with stunting. This waist circumference was measured based on age (LP/U) and served as one of the anthropometric indicators to assess nutritional status. Waist circumference data were obtained from direct measurements on children with stunting, using waist circumference as the indicator. The educational intervention used visual media containing recommendations on how to select protein-source food ingredients, how to process them, and how to provide appropriate MP-ASI for children. The audio-visual education was conducted for 45 minutes. The use of audio-visual media stimulates both sight and hearing, consisting of sound and images, which can enhance parents' perception, knowledge, and memory. The use of audio-visual aids can also increase the knowledge of parents caring for toddlers with stunting. The research timeline included several stages: first, the pre-intervention stage, where children's waist circumference was measured before the intervention began. The second stage covered the first 5 days, during which parents received daily training on how to serve animal protein dishes such as eggs, beef, chicken, fish, and other processed meats, with meal ideas provided by the research team. The third stage began on the 6th day, when parents started preparing the meals themselves with daily guidance from the research team. Animal protein MPASI is given 3 times a day as an accompaniment to breakfast, lunch, and dinner. The fourth stage occurred during the intervention (1 month), where children received protein-rich foods in their MP-ASI every day for one month, with waist circumference measurements taken on the 10th and 20th days during the intervention. The final stage was post-intervention, where children's waist circumference was measured again one month after the intervention concluded. Observation sheets were used to track how animal protein MP-ASI and visual media education were

provided. The children's ages were obtained from their Healthy Growth Chart. For statistical analysis, it was mentioned that normality testing was performed using the Kolmogorov-Smirnov test, and the statistical test used was the Paired t-test.

RESULT

The results of respondent characteristics, including age, gender, parents' education level, number of children, and parents' income level. This information is given to give you a general idea of who our respondents were, as these things can play a role in a child's health and growth, including whether or not they experience stunting.

Table 1. Frequency Distribution of Respondents by Age

Age	F	%
2 years old	1	11.1
2 years and 3 months old	2	22.2
2 years and 5 months old	1	11.1
2 years and 6 months old	1	11.1
2 years and 7 months old	2	22.2
3 years and 3 months old	1	11.1
3 years and 7 months old	1	11.1
Total	9	100

Table 1 shows that the children with stunting in the Jayengan Public Health Center area here in Surakarta are between 2 years old and 3 years and 7 months old. The most common age we saw was 2 years and 3 months (22.2%), and also 2 years and 7 months (another 22.2%).

Table 2. Frequency Distribution of Respondents by Gender and Education Level

Gender	F	%
Male	4	44.4
Female	5	55.6
Total	9	100
Parents' Education Level	F	%
Elementary	1	11.1
Middle school	4	44.4
High school	3	33.3
Collage	1	11.1
Total	9	100

Table 2 shows that the majority of the children with stunting in the Jayengan Public Health Center area here in Surakarta were girls, with 5 of them being female (that's 55.6%). The education level of the parents of a child with stunting in the Jayengan Public Health Center area here in Surakarta varies from elementary school to a bachelor's degree. The most common education level was junior high school, with 4 parents having that level of education (44.4%).

Table 3 shows that the most common number of children in the families of children with stunting in the Jayengan Public Health Center area here in Surakarta was 2 children, with 5 families having that many (that's 55.6%). The income of most of the parents of children with stunting in the Jayengan Public Health Center area here in Surakarta is below the regional minimum wage (UMR), with 6 parents (that's 66.7%) falling into that category.

Table 3. Frequency Distribution of Respondents by Number of Children and Income

How many children are in the family	F	%
2	5	55.6
3	2	22.2
4	1	11.1
8	1	11.1
Total	9	100
Income	F	%
< (Rp. 2.2690.070,-)	6	66.7
> (Rp. 2.2690.070,-)	3	33.3
Total	9	100

Table 4 shows the waist circumference of the children before getting the combination of processed animal protein in their complementary food or MP-ASI and visual media education, their waist circumference after getting it, the results of the normality test, and the Paired t-test analysis. The calculations using SPSS showed that we had a valid sample of 9, with an average waist circumference of 46.77 cm and a median of 47 cm. The smallest waist circumference was 43 cm, and the largest was 50 cm. The standard deviation was 2.27.

Table 4. Children's Waist Circumference Before and After Receiving the Combination of Processed Animal Protein in MP-ASI and Visual Media Education

	Before Intervention	After Intervention
Mean	46.77	48.44
Median	47.00	49.00
Std. Deviation	2.27	1.66
Minimum	43.00	46.00
Maximum	50.00	51.00

The calculations showed a valid sample of 9, with an average waist circumference of 48.44 cm and a median of 49 cm. The smallest waist circumference was 46 cm, and the largest was 51 cm. The standard deviation was 1.66.

Table 5 shows that almost all respondents increased their waist circumference before and after receiving the intervention. But there are 2 respondents who have the same waist circumference after the intervention (numbers 2 and 6).

Table 5. Frequency Distribution of Waist Circumference Before and After Giving Processed Animal Protein in MP-ASI and Visual Media Education

Number	Initial of Respondent	Waist size (CM)	
		Before	After
1	IM	43	46
2	AY	48	48
3	IW	47	49
4	Z	49	50
5	AA	44	46
6	ZS	48	48
7	JG	46	49
8	DC	50	51

9	AJ	46	49

Table 6. Normality Test Results

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre	.149	9	.200*	.964	9	.837
Post	.186	9	.200*	.925	9	.435

The data was normally distributed using the Kolmogorov-Smirnov test. If the significance value (sig.) is greater than 0.05, we can say the data follows a normal distribution. With our sample size of 9 children, the normality test results show that the waist circumference data before we did the combination of animal protein in MP-ASI and visual education had a significance value of 0.837, which means the data is normally distributed. The same goes for the waist circumference data after the intervention, which had a significance value of 0.435, so that's also normally distributed. So, both sets of data meet the assumption of normality.

Because the data is normally distributed according to the Kolmogorov-Smirnov test, we used the Paired t-test for our statistical analysis. Based on the Paired t-test analysis, the average waist circumference after the intervention (Mean = 48.44; SD = 1.66) was larger than before the intervention (Mean = 46.77; SD = 2.27), with an Effect Size (Cohen's d) of 0.50, and p = 0.004. This means the effect of the intervention in increasing weight is strong, and we can conclude that giving the combination therapy of processed animal protein in MP-ASI and visual media education is effective for increasing weight as an indicator of nutritional status in children with stunting.

Table 7. Paired t-test Analysis

	Average ±s.b.	Average difference ±s.b	IK 95%	p
Waist circumference before	46.77 ± 2.27	-1.66 ± 1.22	-2.60809 – -.72524	004
Waist circumference after	48.44± 1.66			

DISCUSSION

This study demonstrates a significant increase in the average waist circumference of children with stunting after our intervention, which involved providing them with processed animal protein in complementary feeding (MP-ASI) and educating their parents using visual aids. Based on statistical analysis using a Paired t-test, the average waist circumference increased from 46.77 cm before the intervention to 48.44 cm afterward, with a p-value of 0.004. This figure indicates a real statistical difference ($p<0.05$), allowing us to conclude that the combination of interventions had a positive effect on increasing the children's waist circumference. The research on combining processed animal protein in MP-ASI Animal protein MPASI is given 3 times a day as an accompaniment to breakfast, lunch, and dinner. Visual media education shows that providing animal protein with the correct daily dosage is effective in increasing waist circumference, which serves as an indicator of nutritional status

in children with stunting. This aligns with the research (Fitriyanti Thalib 2023) titled "Stunting Handling Patterns Through Meatball Food Intake (Processed Fish) at Bone Bolango Vocational School". Providing protein offers several significant benefits. Fish is a substantial energy source, with its protein content contributing 20% of the total animal protein. Research benefits a fish balls can help meet children's nutritional needs and support optimal growth if prepared and served in a way that preserves their nutrients, and if they are part of a balanced diet. With the correct dosage, children aged 6 to 12 months are recommended to consume 1.2 g/kg of protein daily. Meanwhile, children aged 1-3 years require 1.05 g/kg of protein daily.

Waist circumference is one of those body measurements that can tell us about a kid's nutritional status and how they're growing, especially when we're talking about stunting and long-term malnutrition. The fact that their waist size increased during our month-long program shows that the nutrition they were getting, especially from animal protein, was able to help improve their nutritional status. This backs up what (Sholikhah and Dewi 2022), which is that animal protein has essential amino acids that help build body tissue and make growth hormones like Human Growth Hormone (HGH) and thyroid hormones, which are super important for a child to grow taller and gain weight.

In this study, all the child we looked at had a waist circumference that wasn't right for their age before we even started. After we gave their parents some learning through visual aids and provided animal protein-based complementary food for 30 days, the measurements showed that not only did the average waist size go up, but the data also became more consistent. You can see this because the standard deviation went down from 2.27 to 1.66. This suggests that what we did wasn't just effective overall, but it also worked pretty consistently across all the children, even though they were different ages, genders, had parents with different education levels, and came from families with different numbers of children. This study lines up with research by (Amalia and Putri 2022), which found that preschool children who didn't eat enough animal protein were 6.1 times more likely to have stunting compared to those who got enough. It's also backed up by the findings of (Sindhughosa and Sidiartha 2023), who found a significant link between getting enough animal protein and stunting, but didn't find the same link with plant-based protein, really highlights that the quality of protein is key when we're trying to improve children's nutrition.

Besides just the food itself, the way we taught the parents using pictures and videos also played a big part in helping them change how they prepare good-quality complementary food or MP-ASI. The visual stuff made it easier for them to understand why nutrients are important, how to cook things right, and the different kinds of animal-based foods they can use that aren't too expensive. Visuals are more real and interesting, so they're easier to grasp compared to just talking or reading about it. This fits with a study, which found that teaching with visual aids can really boost people's knowledge, attitudes, and skills when it comes to family nutrition. Even though what we did seemed to work well, there were a few things we couldn't really control. We only had a small number of children in the study (just 9), and they were all from the same area around the Jayengan Public Health Center, so we can't really say for sure if this would work exactly the same everywhere else. Also, we only did the program for a month, so we don't know the long-term effects of eating more animal protein. Other things, like whether the child had other illnesses, their family's financial situation, and how clean their environment

was, weren't really looked at in this study, even though those things can also affect a child's nutritional health. Still, the fact that this program worked opens up some great possibilities for using similar approaches to speed up the reduction of stunting, especially in areas where it's common and where people don't have a lot of access to information. Effective nutrition programs in health centers and integrated health posts integrate animal protein complementary feeding, healthy local foods, and visual education for parents, which has been proven to improve the nutritional status of toddlers through growth monitoring and counseling (Wulandari *et al,* 2021).

CONCLUSION

So, this research wraps up by saying that giving children with stunting complementary food (MP-ASI) that's got animal protein in it, along with teaching their parents using visual aids, really does make a significant difference in the child's waist circumference. The program we ran for 30 days showed a statistically significant increase in their average waist size, which means their nutritional status was getting better. Combining the good food with the visual learning for parents turned out to be effective in helping them know more and get better at making animal protein-based meals. What this shows is that the quality of food they eat—especially animal protein—is super important for a child's growth. Plus, visual aids are a great way to teach and can actually help parents change their caregiving habits for the better. Based on these findings, we're suggesting that similar programs could be used more widely, especially in areas where stunting rates are high. For the future, it would be good to do more research with more children and for a longer time to see the long-term effects and how sustainable these kinds of programs are.

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