The Relationship between the Timing of Complementary Feeding and Maternal Knowledge of Responsive Feeding and the Incidence of Stunting in Children Aged 6-24 Months

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ABSTRACT

In 2021, the prevalence of stunting among toddlers in Wani Primary Health Care (Puskesmas) was still high at 18.2%. Delayed introduction of complementary feeding (MP-ASI) and inappropriate feeding practices, such as lack of responsive feeding, contribute to the occurrence of stunting. The objective of this study was to investigate the relationship between the timing of MP-ASI introduction and maternal knowledge of responsive feeding with the occurrence of stunting among children aged 6 to 24 months. This research employed a cross-sectional design using quantitative analytic observational methods. Simple random sampling was used to select the sample, and data were collected through questionnaire surveys from 126 mothers with children between the ages of 6 and 24 months. The study was conducted in the communities of Nupa Bomba, Bale, and Wani Lumbumpetigo, all located within the working area of Wani Primary Health Care. The results showed that 80.2% of the timing of MP-ASI introduction was inappropriate, and 62.7% of the mothers had insufficient knowledge of responsive feeding. The chi-square test revealed a significant association between the timing of MP-ASI introduction and the occurrence of stunting (p value = 0.047, OR = 0.290), as well as between the occurrence of stunting and maternal knowledge of responsive feeding (p value = 0.008, OR = 0.298). In conclusion, there is a relationship between the occurrence of stunting and the timing of MP-ASI introduction, as well as maternal knowledge of responsive feeding. It is recommended to enhance parental knowledge and attitudes and prevent stunting by providing nutrition education through counseling on proper complementary feeding and responsible childcare practices. This study highlights the importance of improving education and support for mothers to prevent stunting.

Keywords: Stunting, Complementary feeding, Knowledge, Responsive feeding.

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INTRODUCTION

A child who is stunted experiences slow body and brain growth due to long-term malnutrition. As a result, children face difficulties in thinking and are shorter than their average peers¹. Stunting in children is a serious problem that remains challenging to address and is caused by various factors² including maternal and child health history³-⁷, maternal height (≤150 cm)⁸, inadequate nutrition during pregnancy, poor sanitation⁹-¹¹, family economic status¹²,¹³, and Low Birth Weight (LBW)¹⁴. The prevalence of stunting in Indonesia has decreased from 24.4% in 2021 to 21.6%¹⁵.

Data from the Indonesian Nutritional Status Survey (SSGI) in 2022 showed a decline in the prevalence of stunting over the past 3 years: 27.7% in 2019, 24.4% in 2021 and 21.6% in 2022. Central Sulawesi ranks seventh highest...
among provinces in terms of stunting prevalence in toddlers, with a rate of 28.2%. Among the districts/cities in Central Sulawesi, Donggala district ranks fourth with a prevalence of 32.4%. The prevalence of stunting in children under five has decreased with a frequency of 16.2% over the past three years in Central Sulawesi: 25.2% in 2018, 21.4% in 2019, and 21.4% in 2020. The Ministry of Health Performance Report for 2020 stated that Central Sulawesi has been declining each year but still ranks eleventh highest in Indonesia\(^6\). In 2020, the highest frequency of stunting, 27.1%, was found in Donggala district. One of the community health centers in Donggala district, specifically Puskesmas Wani, had a number of stunted toddlers in 2021, with a prevalence of 18.2% and a total of 193 children. There were 154 toddlers classified as short and 39 toddlers classified as very short in the work area of Puskesmas Wani\(^17\).

Stunting and child development are closely related, both indirectly through brain development and directly through physical growth, motor development, and increased physical activity. Anthropometry, which measures a child's height and weight to determine Body Mass Index (BMI), can be used to assess their nutritional health\(^18\). Inadequate nutritional intake is one of the causes of stunting. Insufficient nutrition can be influenced by a mother's caregiving practices, including providing inappropriate food to her child through responsive feeding. Mothers with insufficient knowledge of responsive feeding are 6.2 times more likely to have stunted children\(^19\). Mothers with good knowledge will provide appropriate complementary feeding according to the child's age and timing. Having good knowledge of responsive feeding principles can improve the quality of infant feeding. Most mothers believe that responsive feeding is the ability to feed infants in a responsive and active manner\(^20\).

Starting from six months of age, Complementary Feeding, also known as Solid Food Introduction (SFI), should be provided properly. This is because Complementary Feeding, the food or drink given to infants alongside breastfeeding until the child reaches 24 months of age, contains significant energy and nutrients. Introducing complementary foods early can influence the growth and development of children, which can affect their nutritional status, resulting in stunting, severe stunting, and underweight\(^21\). Children who receive their first complementary food before six months of age are 6.83 times more likely to experience stunting compared to children who receive their first complementary food at the appropriate age\(^22\). Considering that the mismatch between the child's age and the introduction of complementary feeding can increase the likelihood of stunting by 2.8 times, the timing of complementary feeding significantly impacts the occurrence of stunting\(^23\). Therefore, mothers need to pay attention to the accuracy of providing complementary feeding to their infants.

This study differs from previous research, as it aims to examine the timing of complementary feeding in toddlers and the maternal knowledge of responsive feeding in relation to stunting. Providing complementary feeding to toddlers should be accompanied by the mother's knowledge of how to recognize signs of hunger and fullness. The literature review results from the same title and the same statistical test but different sample sizes, along with several other journals that only focus on one variable in relation to the incidence of stunting, mostly highlight determinants of behavior and practices related to complementary feeding. Based on the above description, the objective of this research is to determine the relationship between the incidence of stunting in children aged 6-24 months and the timing of complementary feeding and maternal knowledge of responsive feeding.

**METHOD**

This research was conducted from April 18, 2022 to June 20, 2022, using a cross sectional study design in 3 villages within the working area of Puskesmas Wani, namely Nupa Bomba, Bale, and Wani Lumbumpetigo villages due to the high stunting rate in these villages. The population of this study consisted of all mothers with toddlers living in the three villages in Puskesmas Wani, Donggala Regency, totaling 186 toddlers in 2021. The sample of this study consisted of 126 mother respondents, and the sampling method used was simple random sampling, with a breakdown of 79 individuals from Nupa Bomba Village, 29 individuals from Bale Village, and 26 individuals from Wani Lumbumpetigo Village.

The variables in this study were the timing of complementary feeding and knowledge of Responsive Feeding as
independent variables, and the incidence of stunting as the dependent variable. The appropriate timing of complementary feeding was considered when the introduction of complementary foods followed the schedule starting from 6 months of age. It was considered inappropriate if the introduction of complementary feeding occurred before 6 months or after 6 months of age. Responsive feeding knowledge referred to everything a mother knows about feeding her child in a responsive manner, including recognizing and responding to hunger and satiety cues in the child. A respondent's score in the questionnaire was considered adequate if it was ≥50%. Stunting data were collected by directly measuring length and weight using a length board and weighing scale. Stunting was categorized as a measurement result below -3 SD to ≤ 2 SD, as classified in the WHO Anthro application. This study utilized questionnaires and interviews to gather information on the timing of complementary feeding and maternal knowledge of responsive feeding. The Chi-square test was used as the statistical method.

RESULT

Table 1. Characteristics of Mother Respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>N=126</th>
<th>Present (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>57</td>
<td>45.4</td>
</tr>
<tr>
<td>Female</td>
<td>69</td>
<td>54.8</td>
</tr>
<tr>
<td>Mother’s Highest Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incomplete Primary School</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Primary School</td>
<td>22</td>
<td>17.5</td>
</tr>
<tr>
<td>Juniors High School</td>
<td>34</td>
<td>27.0</td>
</tr>
<tr>
<td>Senior High School</td>
<td>64</td>
<td>50.8</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>5</td>
<td>4.0</td>
</tr>
<tr>
<td>Mother’s Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>6</td>
<td>4.8</td>
</tr>
<tr>
<td>Unemployed</td>
<td>120</td>
<td>95.2</td>
</tr>
<tr>
<td>Monthly Family Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1,000,000-3,270,000</td>
<td>126</td>
<td>100</td>
</tr>
<tr>
<td>Timing of Complementary Feeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Appropriate</td>
<td>40</td>
<td>39.6</td>
</tr>
<tr>
<td>Appropriate</td>
<td>86</td>
<td>70.4</td>
</tr>
<tr>
<td>Maternal Knowledge of responsive feeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate Knowledge</td>
<td>79</td>
<td>62.7</td>
</tr>
<tr>
<td>Sufficient Knowledge</td>
<td>47</td>
<td>37.3</td>
</tr>
<tr>
<td>Incidence of Stunting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stunted</td>
<td>44</td>
<td>34.9</td>
</tr>
<tr>
<td>Not Stunted</td>
<td>82</td>
<td>65.1</td>
</tr>
</tbody>
</table>

Table 1 shows that out of 126 respondents, the majority of the children were female (54.8%), the highest educational attainment of the mothers was high school completion (50.8%), the mothers were unemployed (95.2%), and the monthly family income ranged from <1,000,000-3,270,000 with a percentage value of 100%. The timing of complementary feeding for children aged 6-24 months was not appropriate for 101 children (80.2%), maternal knowledge of responsive feeding was insufficient for 79 individuals (62.7%), and there were 82 individuals (65.1%) who were not stunted.

Table 2. Bivariate Analysis with the Incidence of Stunting

<table>
<thead>
<tr>
<th>Variable</th>
<th>Incidence of Stunting</th>
<th>Total</th>
<th>p value</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stunting</td>
<td>Not Stunting</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Timing of complementary feeding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate</td>
<td>4</td>
<td>16.0</td>
<td>21</td>
<td>84.0</td>
</tr>
<tr>
<td>Not appropriate</td>
<td>40</td>
<td>39.6</td>
<td>61</td>
<td>60.4</td>
</tr>
</tbody>
</table>
Maternal Knowledge of responsive feeding

|         | Sufficient | Inadequate | N |
|---------|------------|------------|---|---|
| 9       | 19.1       | 38         | 80.9 | 47 | 100 | 0.008 | 0.298 |
| 35      | 44.3       | 44         | 55.7 | 79 | 100 |
| 44      | 34.9       | 82         | 65.1 | 126 | 100 |

Table 2 shows that there were 40 individuals (39.6%) with inappropriate timing of complementary feeding among the stunted children, with a p-value of 0.047 and an odds ratio (OR) of 0.290, indicating a significant association between the timing of complementary feeding and the occurrence of stunting. Mothers who provided complementary feeding at the appropriate time had a risk of 0.290 for having stunted children. Additionally, there were 35 individuals (44.3%) with stunting among mothers with insufficient knowledge of responsive feeding, with a p-value of 0.008 and an OR of 0.298, suggesting a significant relationship between maternal knowledge of responsive feeding and the occurrence of stunting. Mothers with good knowledge of responsive feeding had a risk of 0.298 for having stunted children.

DISCUSSION

The Timing of Complementary Feeding in Children Aged 6-24 Months.

According to the research findings, many mothers introduce complementary foods such as honey, formula milk, or soft porridge to infants under the age of six months who are not ready for them. Due to the misconception that their babies are often fussy and crying due to hunger or insufficient breast milk, they frequently provide additional food besides breast milk at inappropriate times. On the other hand, some mothers believe that the ideal age for their child to start eating is when they are older than six months. When the baby reaches six months of age, complementary feeding should be initiated. Complementary Feeding (CF) is the food or drink given to infants or children aged between 6 and 24 months to complement breastfeeding and meet their nutritional needs.

The improper introduction of complementary feeding can have an impact on the child. Early introduction of CF can lead to gastrointestinal problems such as diarrhea, vomiting, and constipation. This is due to the limited digestive capacity of the child's system to handle solid foods. However, if the introduction of complementary feeding is delayed, the baby will have difficulty learning to chew, dislike solid foods, and experience nutritional deficiencies. Based on additional information, the majority of children aged 6 to 24 months who start CF before 6 months use formula milk or plain water as a substitute for breast milk.

Mother’s Knowledge of Responsive Feeding.

Based on the respondents' answers, it can be observed that the majority of mothers are aware of the correct way to feed their children, which is slowly and patiently. However, many respondents lack knowledge about how to feed their children when they refuse to eat and mothers stop feeding them until the child appears hungry again. The lack of knowledge among mothers about responsive feeding in Puskesmas Wani, Donggala Regency, indicates that there are more mothers with insufficient knowledge compared to those with good knowledge. The first step in changing someone's attitude and behavior is knowledge. The attitude and behavior of mothers in providing the appropriate types and amounts of food to their children will depend on their knowledge of nutrition.

The mother's knowledge of responsive feeding is crucial as it impacts the nutritional well-being of the child. Knowledge of feeding practices is important in influencing the attitudes and behaviors of mothers in terms of feeding their children, as it has been proven to enhance the quality of meals. The attitudes and behaviors of mothers in feeding infants and children are influenced by their knowledge of adequate complementary feeding, and anthropometric indicators such as length/height-for-age are used to assess nutritional status and indicate stunting. Having parents who feed their children with inappropriate food is one of the causes of nutritional problems. Knowledge and child-rearing practices are closely interconnected.

When providing complementary feeding to children, their nutritional needs should be adjusted according to their age. The amount of food consumed by the child increases as they grow older. Providing one plate of food every day, such as fruits, green bean porridge, or other alternative foods, helps infants aged 6-9 months to continue breastfeeding. For children aged 12 to 24 months, breastfeeding should still be continued but the amount of breast milk...
decreases. Additionally, continue to serve family meals at least three times a day, with each portion being half of an adult's portion.25

The Relationship between the Timing of Complementary Feeding and the Incidence of Stunting.

According to the research findings, a larger number of children were given complementary feeding before six months of age or after six months of age (not appropriate) compared to the number of children who were given complementary feeding at six months of age (appropriate). This is consistent with recent studies showing that the occurrence of stunting increases 2.8 times with the timing of the first introduction of complementary foods.23,31

However, other studies state that there is no relationship between the timing of introducing complementary feeding and stunting because mothers introduce complementary feeding after the child reaches six months of age.32 In this study, the timing of complementary feeding indicates that the majority of mothers provided complementary foods to their children for the first time when they were younger or older than six months (not appropriate), which resulted in stunting. According to the respondents’ responses, mothers gave complementary feeding to their infants when they were less than six months old due to frequent fussiness, insufficient breast milk supply, and delayed milk production. On the other hand, mothers who introduced complementary feeding after six months believed it was the appropriate age because early introduction could lead to illness.33,34

The Relationship between Maternal Knowledge of Responsive Feeding and the Incidence of Stunting.

According to research findings, mothers with inadequate knowledge of responsive feeding have a higher prevalence of stunted children. The analysis shows that mothers with limited knowledge of responsive feeding are more likely to have stunted children, consistent with previous studies indicating a higher frequency of stunting among mothers with insufficient knowledge of responsive feeding.20,35

Based on the research findings from respondents with stunted children, the majority of mothers mistakenly believe that responsive feeding means forcefully feeding their children to ensure optimal growth. However, the true meaning of responsive feeding is the mother's ability to actively and responsively feed her child. In general, mothers are unaware of hunger and satiety cues in their children. Increased food acceptance and self-regulated eating are outcomes of responsive feeding.36

Establishing good eating patterns will result in children experiencing feelings of hunger and satiety. When a mother recognizes signs of hunger in her child, she will promptly provide food. Conversely, if a mother observes signs of fullness in her child, she will stop providing food. This enables mothers to easily regulate their children's eating patterns and plan their meals correctly based on their needs and age. Eating behavior is one of the factors influencing nutritional status. The caregiver's ability to actively and responsively feed the child, including age-appropriate feeding, role modeling healthy eating habits, motivating children to eat, responding to a lack of appetite, providing meals in a safe environment, and using enjoyable interactions, defines responsive feeding.37

Maternal knowledge of responsive feeding is crucial in recognizing hunger and satiety cues in children for nutritional fulfillment. Based on Latifah et al’s (2020) study, increased knowledge has the potential to improve the quality of feeding practices, indicating the value of knowledge in influencing caregiver attitudes and feeding-related behaviors. The practice of responsive feeding in children aged six months and above is only implemented by 30% of caregivers in Indonesia, posing a barrier to reducing stunting issues.38

CONCLUSION

There is a relationship between the timing of complementary feeding (MP-ASI) and the occurrence of stunting, as well as a connection between maternal knowledge of responsive feeding and stunting incidence in the Puskesmas Wani region of Donggala Regency. It is hoped that healthcare professionals can enhance education through counseling on appropriate complementary feeding practices and appropriate caregiving methods to improve parental knowledge and attitudes, thereby preventing the impact of stunting. This research is expected to educate individuals about stunting and serve as a reference for further studies, such as environmental sanitation, attitudes and behaviors.
related to responsive feeding. Additionally, expanding the sample size of the research can yield more accurate results.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES


