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The Relationship between Maternal Factors and the Timely Initiation of Complementary Feeding for Infants, in West Sumatera Province, Indonesia

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Abstract

Objective – This study looked into the relationship between maternal factors and the timely initiation of complementary feeding for infants. **Material and Methods** – A cross-sectional study was conducted from September to December 2022 on 196 mothers and their children aged 6-23 months. This study collected data through a questionnaire that included sociodemographic information, the Infant and Young Child Feeding Questionnaire for Child Care Providers (IYCF-CCPQ), the Iowa Infant Feeding Attitude Scale (IIFAS), and the time of initiation of complementary feeding. **Results** – This study included 196 mothers, with 128 (55.1%) having adequate knowledge of complementary feeding and 112 mothers (59.7%) had a negative view of infant feeding. The rate of timely initiation of complementary feeding was 71.4%. The mothers' knowledge of infant feeding did not predict the timely initiation of complementary feeding (OR=1.18; 95% CI=0.62-2.26). However, maternal attitudes toward infant feeding were linked to the timely initiation of complementary feeding (OR=2.14; 95% CI=1.14-4.02). **Conclusions** – Mothers with positive attitudes toward infant feeding were twice as likely to start complementary feeding on time as those with negative attitudes. Counseling mothers on the importance of timely initiation of complementary feeding is therefore required to improve mothers' attitudes toward providing complementary foods to their infants in accordance with health recommendations.

Key Words: Knowledge ▪ Attitude ▪ Infant Nutritional Physiological Phenomena ▪ Growth Disorder.

Introduction

Inadequate nutrition intake during pregnancy and early childhood can result in stunting and waste in children. Although the stunting rate in children under the age of five dropped from 31% in 2000 to 22% in 2020, the high prevalence of stunting must be addressed. In 2020, approximately 149.2 million children under the age of five were stunted worldwide, with nearly half (53%) living in Asia and nearly half (41%) in Africa (1)

According to data from the Ministry of Health's basic health survey, approximately 29% of Indonesian children under the age of five were stunted in 2015. In 2016, the prevalence fell to 27.5%, then increased to 29.6% in 2017. In 2017, 22 percent of infants aged six months suffered from stunting, which increased significantly to 38 percent by two years of age (2). West Sumatra was one of the provinces in Indonesia that had a high percentage of stunting of 10.64% and severe stunting at 18.22%. Meanwhile, Padang City, the capital of West Sumatera, had 10.45% and 12.29% cases of stunting and severe stunting, respectively (3).

Stunting during childhood is a predictor of underlying problems in early life, such as failure to thrive, developmental delays, and other health issues. Stunting can reduce children's survival rates, health status, learning capacity, and performance (2, 4, 5). A previous study discovered that stunting

reduces cognitive development by about 7% (6). Aside from that, a small number of children are predisposed to a variety of noncommunicable diseases in adulthood, including diabetes, obesity, and heart disease. This condition increases health-care costs and places an economic burden on the state (2).

A literature review discovered a link between feeding practices and the prevalence of stunting in children. Stunting is more likely in children who do not receive exclusive breastfeeding, who are introduced to complementary foods too early, do not receive the recommended dietary diversity, do not consume foods high in protein, and do not consume food on a regular basis (7).

In several African and Asian countries, including Ethiopia, Ghana, Kenya, India, Bangladesh and Pakistan, the practice of providing complementary feeding to children aged 6-24 months remains inappropriate (8, 9, 10, 11, 12, 13). In Ethiopia and Ghana, the optimal complementary feeding is practiced by less than 20% of the population, at 9.5% and 15.7%, respectively (14, 15). Only 2.9% of Bangladesh's children receive optimal complementary foods (16).

According to data from the Demographic Health Survey in Indonesia (17), the appropriate practice of complementary feeding remains low. According to the survey, nearly half the infants were introduced to complementary foods before the age of six months. Approximately 40% of children aged six months to two years did not receive adequate dietary diversity, and 28% did not have minimum meal frequency. Fourteen and 29 percent of children did not consume vitamin A or iron-rich foods on a daily basis, respectively.

The findings from Mumbai, India, identified four factors that pose a barrier to implementing complementary feeding for infants and children in accordance with health recommendations (18). These factors include: a lack of knowledge of and experience with infant feeding, various sources of information, a lack of social support, and the mother's self-efficacy in making decisions (19).

In addition to maternal knowledge and attitude, maternal characteristics, such as age, educational level, occupation, monthly income, antenatal care (ANC) visits, and postnatal check-ups (PNC), all play a role in providing complementary food to infants and young children (20). However, research on the relationship between maternal factors and the timing of the introduction of complementary feeding remains limited in Indonesia, particularly in the study area.

Therefore, this study was conducted with a community-based cross-sectional approach to investigate the relationship between maternal factors and the timely initiation of complementary feeding to infants in Agam Regency, in the West Sumatera Province of Indonesia.

Material and Methods

Research Design, Setting and Study Population

From September to December 2022, a cross-sectional study was carried out in the IV Koto District Regency of West Sumatra, Indonesia, to collect data on maternal factors associated with the timely initiation of complementary feeding. Mothers of reproductive age from Agam Regency with children aged 6-23 months who had lived in the study area for more than six months, and who could write and read in Indonesian, were considered eligible for this study. This study excluded mothers who had a doctor-diagnosed mental disorder.

Sample Size and Sampling Procedure

In this study the sample size was calculated using a simple rule of thumb. The sample size formula was N=100 + xi, where x is an integer and i represents the number of independent variables in the final model (21). This formula yielded 190 samples, assuming x=10 and i=9. To account for drop outs, the sample size was increased by 10% to 209. Only 196 of the 209 respondents provided complete data, and 13 respondents' data were incomplete. A two-stage clustered sampling method was used to select study participants, followed by simple random sampling. In the first stage, the researcher used a research randomizer to select four

villages randomly from seven. The next step was to determine which mothers met the criteria. The researcher randomly chose participants using a systematic sampling technique.

Study Variables

The time of initiation of complementary feeding was the outcome variable in the current study. The World Health Organization (WHO) defines complementary feeding as providing additional food when breast milk or formula alone is no longer sufficient for the infant's nutritional needs, and it usually starts at six months of age and continues until 23 months. This study divided untimely initiation of complementary feeding into two categories: early initiation and late initiation of complementary feeding. Early initiation of complementary feeding occurs when mothers introduce it to their infants before six months of age. It is late if it begins after eight months of age. The independent variables were maternal factors such as: age, educational level, occupation, parity, monthly income, ANC, PNC, knowledge, and attitude.

Measurements Sociodemographic Data

This questionnaire collects data on children and mothers, as well as family socioeconomic data. The children's demographic data include information such as their age (date of birth), gender, disease status, number of siblings, and position in the family. The mothers' demographic data include their age, education, occupation, marital status, antenatal visits, delivery location, and postpartum care. Family socioeconomic data include family income, residence location, ethnicity, information sources, and media exposure.

Infant and Young Child Feeding Questionnaire for Child Care Providers (IYCF-CCPQ)

The IYCF-CCPQ section B, which deals with knowledge of complementary feeding, is used to assess maternal knowledge. The knowledge questionnaire contains 35 question items. The response to the question item consists of three options: "false," "true," and "don't know." The correct answer receives a one-point score, whereas incorrect and unknown answers receive zero points. Thus, the possible knowledge domain score ranges from 0 to 35. The knowledge score is then calculated and converted to a percentage score by dividing it by the maximum possible score, multiplied by 100. A high percentage score indicates superior knowledge. The IYCF-CCPQ section B on knowledge of complementary feeding has good construct validity, with a marginal reliability value of 0.74 (22). This study divided knowledge levels into two categories: adequate (knowledge score ≥70) and inadequate (knowledge score < 70) (23).

The Iowa Infant Feeding Attitude Scale (IIFAS)

The IIFAS questionnaire was developed by La Mora and Russell in 1999. This questionnaire contains 17 question items scored on a Likert scale from 1 to 5, with 1 indicating "strongly disagree", 2 indicating "disagree", 3 indicating "not sure", 4 indicating "agreement", and 5 indicating "strongly agree". There are eight positive and nine negative questions. Questions 1, 2, 4, 6, 8, 10, 11, 14, and 17 are negative, with the opposite value. The score range is 17 to 85. A high score reflects a positive attitude. This questionnaire seeks to determine mothers' attitudes toward infant feeding. The IIFAS questionnaire is valid and reliable for measuring mothers' attitudes toward infant feeding, with a reliability coefficient of 0.79 (24). According to Fautsch Macías et al. (2014), mothers scoring 70 or higher have a positive attitude, while those scoring less than 70 have a negative attitude.

Initiation of Complementary Feeding

Mothers were asked when it was appropriate to begin complementary feeding for their infant. The issue to be addressed is: "At what age are solid, semi-solid, or soft foods introduced?" (Please record the months). The introduction of complementary feeding is divided into three stages: early (before 6 months), timely (6 months), and late (after 6 months).

Data Collection

Data were gathered by trained data collectors using a structured questionnaire. Data collectors were health cadres who worked voluntarily to assist health professionals in providing health services at each study area's integrated health services post (Posyandu). Health cadres were required to have at least a secondary education, more than two years of cadre experience, and a data collector training certificate. Before collecting the data, the researcher went through a one-day data collection training session. The cadres were chosen by the health officer in charge of the IV Koto Community Health Service (Puskesmas). Data were collected at Posyandu for about 15 to 30 minutes. If the mother had limited time, the data collectors and participants reached an agreement on a time for home visits. The data collectors ensured that the questionnaires were completed and reassessed to confirm with the participants any questions that the data collectors had overlooked. The principal investigator checked the completeness and consistency of filling out the questionnaires daily, to maintain quality and ensure that the data collectors collected the data in the intended manner.

Statistical Analyses

The data were analyzed using SPSS version 24. The mean, standard deviation, and range for each variable were examined descriptively. Categorical variables were represented as frequencies and percentages. The chi-square test ($p < 0.05$) was used to analyze the correlation between knowledge, attitude, and timely initiation of complementary feeding. The result was significant.

Ethical Considerations

The Health Research Ethics Committee of RSUP Dr. M. Djamil Padang approved this study (number LB.02.02/5.7/500/2022). Before collecting data, the researchers inquired about the mother's willingness to participate in the study. The cadres assisted researchers in explaining the research being conducted, its purpose, and how the data were collected. Once the respondents had understood, they were asked to sign a consent form for participation in the study.

Results

Characteristics of the Respondents

The majority of mothers (91.3%) were over the age of 25, and more than half were multiparous (80.1%). More than half of the mothers (82.7%) had had four or more ANC visits during pregnancy, and 20.4% had had four or more PNCs. In terms of the mother's education and occupation, 68.9% had completed secondary school and 62.8% were unemployed. The majority of the mothers (81.6%) had an average monthly family income less than West Sumatra's minimum wage. Sixty-five point three percent of the mothers had good (adequate) knowledge about complementary feeding. Moreover, 59.7% of mothers had a positive attitude towards infant feeding (Table 1).

Timely Initiation of Complementary Feeding

The rate of timely initiation of complementary feeding was 71.4%. Thirty-four (17.3%) of the children started eating complementary foods before six months, while 22 children (11.2%) started eating complementary foods after six months (Table 2).

The Relationship between Maternal Factors and Timely Initiation of Complementary Feeding

Table 3 shows the relationship between maternal factors and the timely initiation of complementary feeding. Only maternal attitude was associated with the timely initiation of complementary feeding. Other factors did not have a significant relationship with the timely initiation of complementary feeding. Further analysis revealed that mothers with a positive attitude were 2.1 times more likely to initiate complementary feeding on time than mothers with a negative attitude (OR=2.143, 95% CI=1.142–4.025).

Table 1. The Mother's Characteristics, Maternal Knowledge and Attitudes toward Infant Feeding (N=196)

Characteristics	Frequency	Percentage
Mothers age (Mean ±SD)	32.29±5.78	
Mother's age category		
Young mother (< 25 years)	17	8.7
Older mother (≥ 25 years)	179	91.3
Parity of mother		
Primipara	39	19.9
Multipara	157	80.1
Antenatal care visit		
Less than 4 times	34	17.3
4 times or more	182	82.7
Postnatal check-up		
Less than 4 times	156	79.6
4 times or more	40	20.4
Education level		
Below secondary education	61	31.1
Secondary education and above	135	68.9
Occupation		
Unemployed	123	62.8
Working mother	73	37.2
Monthly income		
Low income	160	81.6
High income	36	18.4
Maternal Knowledge		
Poor	68	34.7
Good	128	65.3
Maternal Attitude		
Negative	79	40.3
Positive	117	59.7

Table 2. The Prevalence of Timely Initiation of Complementary Feeding (N=196)

Characteristics	N (%)
The time of initiation of complementary feeding	
Early (< 6 months)	34 (17.3)
Timely (6-8 months)	140 (71.4)
Late (>8 months)	22 (11.2)
Timely initiation of complementary feeding	
Untimely	56 (28.6)
Timely	140 (71.4)

Table 3. The Relationship between Maternal Factors and the Timely Initiation of Complementary Feeding

Maternal Factors	ICF*		OR (95% CI)	P†
	Untimely	Timely		
	N (%)	N (%)		
Maternal Knowledge				
Poor	21 (37.5)	47 (33.6)	1.18	0.602
Good	35 (62.5)	93 (66.4)	(0.62 – 2.26)	
Maternal Attitude				
Negative	30 (53.6)	49 (35.0)	2.14	0.017
Positive	26 (46.4)	91 (65.0)	(1.14 – 4.02)	
Mother's age				
Young mother (≤ 25 years)	5 (8.1)	12 (8.6)	1.04	0.936
Older mother (>25 years)	51 (91.1)	128 (91.4)	(0.35 – 3.11)	
Parity of mother				
Primipara	9 (16.1)	30 (21.4)	0.70	0.396
Multipara	47 (83.9)	110 (78.6)	(0.30 – 1.59)	
Antenatal care visit				
< 4 times	9 (16.1)	25 (17.9)	0.88	0.766
4 times or more	47 (83.9)	116 (82.1)	(0.38 – 2.02)	
Postnatal check-up				
< 4 times	47 (83.9)	109 (77.9)	1.48	0.341
4 times or more	9 (16.1)	31 (22.1)	(0.65 – 3.36)	
Education Level				
Below secondary education	21 (37.5	40 (28.6)	1.50	0.223
Secondary education and above	35 (62.5)	100 (71.4)	(0.78 – 2.88)	
Occupation				
Unemployed	31 (55.4)	92 (65.7)	0.64	0.175
Working mother	25 (44.6)	48 (34.3)	(0.34 – 1.21)	
Monthly Income				
Low income	46 (82.1)	114 (81.4)	1.04	0.907
High income	10 (17.9)	26 (18.6)	(0.46 – 2.34)	

*Initiation of Complementary feeding, †Chi-square test

Discussion

The current study looked into the relationship between maternal factors and the timely initiation of complementary feeding for infants and young children in Indonesia. The overall rate of timely initiation of complementary feeding was 71.4%. This figure is higher than those reported in Ethiopia (52.2%) (25), India (50.3%) (26)), and two other Indonesian studies, in Aceh (49.7%) and Central Java (34.6%) (27, 28). This figure is slightly higher than a national survey in Indonesia, which discovered that 86% of children aged 6 to 8 months had been introduced to solid, semi-solid, and soft foods (17). Nonetheless, the indicator for introducing complementary feeding outperformed other similar studies. The explanation for this is related to maternal health services, such as antenatal care and postnatal check-ups, as well as improved delivery service utilization in the study area. Furthermore, extensive efforts by health extension workers (HEWs) to provide health education on complementary feeding guidelines can increase maternal awareness and adherence to the timely introduction of complementary feeding. This distinction could also be explained by differences in time and sociocultural dimensions.

The current study demonstrates a strong link between maternal attitudes and the timely initiation of complementary feeding. Mothers who had a positive attitude toward infant feeding were twice as likely to initiate complementary feeding on time as mothers with a negative attitude. In line with these findings, researchers in Ethiopia and Uganda discovered that positive maternal attitudes were significantly associated with appropriate complementary feeding practices (25, 29).

Positive attitudes about the benefits of complementary feeding can encourage mothers to follow complementary feeding guidelines. This finding is supported by a study conducted in Madagascar. Participants in the study revealed that complementary foods promote children's overall growth and health, provide energy, and improve brain development (30). Infant growth and development are heavily influenced by the mother's ability to feed her child. This competency encompasses both knowledge and behavior, to ensure optimal nutritional intake (31). Nurses can help mothers improve their infant feeding competence by teaching them the necessary knowledge and skills.

The current finding is similar to the one from Madagascar. That study found that having a negative attitude toward breastfeeding and complementary feeding is a barrier to providing optimal complementary feeding (30). Mothers who begin complementary feeding early believe that their breast milk is insufficient to meet their infants' needs, and they also believe that their children require food (32).

Aside from food restrictions caused by sociocultural influences, mothers' beliefs about introducing complementary feeding early, the notion that children do not require a variety of foods, and misperceptions about animal-based protein, require special attention from healthcare professionals. The mother's positive attitude could be attributed to the counseling she received during visits to health facilities for antenatal care, delivery, postnatal checkups, and child health monitoring.

A positive attitude toward complementary feeding can boost the mother's confidence in delivering complementary foods at the appropriate time. As a result, health professionals must assist and counsel mothers during antenatal and postnatal visits, about the timing of the introduction of complementary foods for infants, in order to raise mothers' awareness of the importance of providing optimal complementary foods for their infants.

Strengths and Limitations

This study examines the maternal factors influencing the timely initiation of complementary feeding in a specific area. It uses stratified random sampling to recruit participants, providing a representative sample. The findings contribute to current evidence on the relationship between maternal factors

and the timely initiation of complementary feeding practices, and can be used to develop intervention strategies. However, the study has limitations, such as the assessment being based on the mothers' recall memory, potentially leading to social desirability bias, and its limited applicability to the entire Indonesian population of mothers with children aged 6-23 months.

Implications for Practice and Future Research

Since our research design was cross-sectional, we only found relationships between the variables of interest and did not look into their causal relationships. In the future, well-designed longitudinal studies will be required to investigate the factors associated with the timely initiation of complementary feeding over time, as well as their impact on children's health, growth, and development.

Individual counseling from health professionals can help mothers decide when to introduce complementary foods for their infants. Mothers are encouraged during the counseling sessions to follow complementary feeding guidelines. Health professionals must also identify difficulties and barriers to the timely introduction of complementary feeding, and discuss strategies that can be used to overcome some of these difficulties.

Conclusion

In the IV Koto sub-district of Agam Regency, mothers with children aged 6-23 months initiate complementary feeding on time. Only the maternal attitude was associated with the timely initiation of complementary feeding. Other factors, including maternal knowledge, age, educational level, occupation, parity, ANC, and PNC, were not linked to the timely initiation of complementary feeding. Mothers with a positive attitude toward infant feeding were more likely to start complementary feeding on time. Health education about complementary feeding is required during ANC and PNC, with an emphasis on the importance of providing food at the appropriate time. Encouraging mothers to attend ANC and PNC, and child health monitoring will make it easier for mothers to contact health professionals and obtain the necessary information about their infants' and young children's nutrition. A well-designed longitudinal study is required in future research to investigate the predictors of timely initiation of complementary feeding.

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Conflict of Interest: The authors declare that they have no conflict of interest.

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