ORIGINAL ARTICLE

The Effect of Online Health Education Card (KMS) on Increasing the Knowledge of Mothers of Children under Two Years Old (Baduta): An Integrated Primary Health Care Approach

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ABSTRACT

Background. In Indonesia, the *Kartu Menuju Sehat* (KMS; Health Education Card) is a simple tool for monitoring the growth and development of children. Limited maternal knowledge of the KMS can impair accurate growth monitoring and timely interventions.

Objective. This study aimed to evaluate the effect of online KMS education on the knowledge of mothers with children under two years of age.

Methods. A descriptive-analytical, quasi-experimental study was conducted among 105 mothers with children under two years old at Kalisari Community Health Center, East Jakarta, from May to June 2021. Participants were selected using purposive sampling. Online education was delivered via video presentations and WhatsApp discussion. Data were collected using a structured questionnaire and analyzed using univariate and bivariate methods, with the Wilcoxon signed-rank test at a 95% confidence level ($\alpha = 0.05$).

Results. The mean maternal knowledge score increased from 51.56% before education to 78.20% after education, representing a 26.64% improvement. Online KMS education had a significant effect on maternal knowledge ($p < 0.001$).

Conclusion. Online KMS education significantly improves maternal knowledge regarding child growth and development. Health educators are encouraged to use video and WhatsApp-based interventions as alternative counseling methods to ensure continuous monitoring of children's growth and development.

Keywords: children under two years old, maternal knowledge, education, KMS

INTRODUCTION

The period of growth and development from birth to two years of age is critical, as rapid physical, cognitive, and brain development occurs during this time, exceeding that of subsequent life stages. Neurological studies indicate that at birth, a newborn's brain contains approximately 100 billion neurons, which rapidly form trillions of connections during early life.[1] This period, often referred to as the "golden age," strongly influences lifelong health and developmental outcomes.

The 0–24-month period is also considered a critical window for brain growth. Health or nutritional deficiencies during this time can have both short- and long-term consequences. Short-term impacts include impaired brain development, stunted growth, and disruptions in glucose, lipid, and protein metabolism, as well as hormonal and

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genetic expression. Long-term consequences may manifest as cognitive impairment, reduced learning achievement, decreased immunity, lower work capacity, and increased risk of degenerative diseases.[2]

Children's growth and development can be monitored through regular measurements of weight and length/height. These measurements serve as essential indicators for assessing short- and long-term nutritional status and identifying growth disorders, including stunting, wasting, and overweight.[3] Data from Indonesia's 2018 Health Profile show that the proportion of children aged 6–59 months weighed monthly remains low, with a national average of 68.37%. In urban areas such as DKI Jakarta, the proportion is slightly higher at 74.36%, yet more than one-quarter of children are still not monitored regularly.[4]

Early monitoring allows for timely intervention and prevention of malnutrition. Monthly weighing is typically conducted at integrated service posts (*Posyandu*), where caregivers can also receive guidance on child health. One of the primary tools used in this monitoring is the *Kartu Menuju Sehat* (KMS; Health Education Card), available at each community health center (*Puskesmas*). The KMS allows caregivers to track monthly changes in a child's weight, visually representing nutritional status and highlighting potential growth problems. This facilitates timely preventive or corrective action.[5]

However, poor maternal knowledge regarding KMS remains a barrier to effective growth monitoring. Previous research in Semarang reported that 63.8% of mothers lacked sufficient understanding of KMS, with maternal knowledge significantly associated with child growth.[6] Similarly, a study in Depok found that only 30.4% of mothers of under-five children had good KMS knowledge, despite 89.7% owning a KMS.[7]

Mothers with limited KMS knowledge may fail to identify growth issues early, delaying interventions and increasing the risk of malnutrition, including undernutrition, overnutrition, or stunting. Maternal understanding of KMS has been shown to positively influence child nutritional status.[8,9] Therefore, improving maternal knowledge is essential for enabling caregivers to monitor child growth independently and take timely action.

Education is a key strategy to enhance maternal understanding of KMS. In the context of the pandemic, large-scale national restrictions in Indonesia limited face-to-face education.[10] Consequently, this study implemented online education using videos, PowerPoint presentations, and WhatsApp discussions. This approach was selected because it aligns with mothers' familiarity with digital communication tools and ensures accessibility.

This research was conducted at Posyandu (Hamlet 01 and Hamlet 09) within the Kalisari Puskesmas service area in East Jakarta. These sites were selected based on prior reports indicating poor maternal knowledge of KMS and the presence of nutritional problems among under-five children. The study aims to evaluate the effect of online KMS education on maternal knowledge and their ability to monitor child growth and development effectively.

METHODS

Research Design

This study employed a quantitative, descriptive-analytic, quasi-experimental design to assess differences in maternal knowledge of the *Kartu Menuju Sehat* (KMS) before and after online education. Data were collected using a structured, closed-ended questionnaire administered via Google Forms. The questionnaire was developed by the researchers and subsequently validated through a validation test. Maternal knowledge was measured at two points: pre-education and post-education.

Study Setting and Participants

The study was conducted from May to June 2021 at Posyandu Hamlet 01 and Hamlet 09 within the Kalisari Community Health Center (*Puskesmas*) service area, East Jakarta. The sample consisted of 105 mothers with children under two years of age. Inclusion criteria were mothers with children under two, possession of a KMS, ownership of a mobile phone with WhatsApp, willingness to participate, and ability to access online communication tools. Mothers who did not meet these criteria were excluded. Purposive sampling was used to select participants.

Intervention

Online KMS education was delivered using video presentations, supported by PowerPoint slides and interactive discussions via WhatsApp. The sessions aimed to improve maternal understanding of the KMS, including its purpose, function, chart interpretation, growth monitoring, reading the growth curve, and scheduling vitamin A supplementation.

Data Collection

Data collected included maternal characteristics (age, education, occupation), child characteristics (age, gender, nutritional status), and maternal knowledge of KMS. The questionnaire assessed maternal understanding of KMS functions, chart interpretation, growth monitoring, reading growth curves, and other key components. Data collection was managed by the research team through WhatsApp. After collection, data were cleaned, recoded, and prepared for analysis.

Knowledge Measurement

Maternal knowledge was categorized using a qualitative scale adapted from Suharsimi Arikunto:[11]

1. Poor: <56% correct answers
2. Sufficient: 56%–75% correct answers
3. Good: 76%–100% correct answers

The knowledge score was calculated as the percentage of correct answers per respondent.

$$\text{Score} = \frac{\text{Number of correct answers}}{\text{Total number of questions}} \times 100\%$$

Data Analysis

Univariate analysis was performed to describe respondent characteristics, and bivariate analysis was conducted using the Wilcoxon signed-rank test to assess differences in knowledge before and after education. The significance level was set at $\alpha = 0.05$. The Wilcoxon test was chosen due to non-normal distribution of the data.

Ethical Considerations

Ethical approval was obtained from the Ethics Commission of UPN Veterans Jakarta (approval no. 310/VI/2021/KEPK). All participants provided informed consent prior to participation.

RESULTS

Characteristics of Children (Baduta)

The study included 105 children aged 6–23 months. Most children were aged 12–23 months (56.2%), slightly more were male (50.5%) than female (49.5%). Nutritional status assessment showed that 56.2% of children had normal nutrition, 4.8% were undernourished, and 39.0% experienced overnutrition (Table 1).

Characteristics of Mothers

The mothers were primarily aged 20–35 years (96.2%). Most had a high school education or equivalent (67.6%), and 65.7% were not working. Detailed characteristics are shown in Table 2.

Mothers' Knowledge of KMS Before and After Education

Before the educational intervention, most mothers (69.5%) had poor knowledge of KMS, 30.5% had sufficient knowledge, and none had good knowledge. Following online education delivered via video, PowerPoint, and WhatsApp discussions, maternal knowledge improved markedly: 48.6% achieved good knowledge, 41.9% sufficient knowledge, and only 9.5% remained in the poor category (Table 3).

Effect of Education on Mothers' KMS Knowledge

Wilcoxon signed-rank test analysis showed a significant increase in maternal knowledge after counseling. The mean knowledge score increased from 51.56 (SD = 9.579) before counseling to 78.20 (SD = 15.714) after counseling, with a p-value of 0.000 (<0.05), indicating a statistically significant difference (Table 4).

Table 1. Frequency Distribution of Children's Characteristics based on Age, Gender, and Nutritional Status (n = 105)

Characteristics of children	Total	Percentage (%)
Age (months)		
6-11	46	43.8
12-23	59	56.2
Gender		
Girls	52	49.5
Boys	53	50.5
Nutritional Status		
Under Nutrition	5	4.8
Over Nutrition	41	39.0
Normal	59	56.2

Primary Data Source 2021

Table 2. Frequency Distribution of Mothers' Characteristics based on Age, Education, and Occupation (n = 105)

Mother Characteristic	Total	Percentage (%)
Age (years)		
>35	4	3.8
20-35	101	96.2
Education		
High school/equivalent	71	67.6
Associate degree/ Bachelor	34	32.4
Work		
Does not work	69	65.7
Works	36	34.3

Primary Data Source 2021

Table 3. Frequency Distribution of Mothers' Knowledge before and after Education (n = 105)

Knowledge KMS	Before Education		After Education	
	Total	%	Total	%
Poor	73	69.5	10	9.5
Enough	32	30.5	44	41.9
Good	0	0	51	48.6

Primary Data Source 2021

Table 4. Differences in KMS Knowledge of Mothers before and after Counseling

Knowledge of KMS (card to Health) Baduta Mother Age 6-24 months	Mean	SD	*p*-value	N
Before Counseling	51.56	9.579	0.000	105
After Counseling	78.20	15.714		

Primary Data Source 2021

These results demonstrate that online education using video and WhatsApp significantly improved mothers' knowledge about KMS and their ability to monitor child growth and nutritional status.

DISCUSSION

Child Characteristics

The children in this study were classified as infants (0–11 months) and toddlers (12–23 months), in accordance with Indonesian Ministry of Health guidelines.[12] This age range corresponds to the "golden period" of growth and development, marked by rapid cognitive, physical, motor, language, and psychosocial development, especially in the brain.[1] Any deficiencies in nutrition or health during this critical period may result in permanent adverse effects that are difficult to reverse.

Nutritional factors play a crucial role in supporting growth and development, enhancing immunity, and fostering intellectual and emotional development. Adequate intake of diverse and balanced foods ensures optimal nutrient absorption and utilization, leading to good nutritional status. Conversely, insufficient or excessive nutrition can result in undernutrition, stunting, or overnutrition.[13,14]

For infants aged 0–6 months, exclusive breastfeeding is recommended as it provides optimal nutrition and immunity.[15,16] Colostrum, the first milk, contains antibodies that protect against infections and support the development of a strong mother–child bond. Exclusive breastfeeding has been shown to reduce infant morbidity and mortality, as well as the risk of stunting and obesity later in life.[17] In Indonesia, the proportion of infants <6 months receiving exclusive breastfeeding was 69.7%, surpassing the 2021 target of 45%.[16]

After six months of age, children require complementary feeding (MPASI) that is gradual, age-appropriate, and nutritionally balanced.[18] Failure to provide proper complementary feeding can result in malnutrition. Overnutrition may occur when caloric intake exceeds requirements, while undernutrition occurs when intake is insufficient.

In this study, 56.2% of children had normal nutritional status, 4.8% were undernourished, and 39% were overnourished. Overnutrition in some children may be attributed to early introduction of pre-lacteal foods such as formula milk, honey, and water, which are high in calories and disrupt recommended feeding guidelines.[4]

Maternal Characteristics

Maternal factors—including age, education, and occupation—play a significant role in child growth monitoring. Optimal maternal age for childbearing is 20–35 years, as mothers are physically and mentally prepared to care for children and are better able to provide effective breastfeeding.[19,20] In this study, 96.2% of mothers were aged 20–35 years.

Education also influences childcare quality. Higher maternal education is associated with better responsiveness to health information, including child nutrition, growth monitoring, and stimulation.[6,21] In this study, 67.6% of mothers had completed high school, suggesting sufficient capacity to understand health education messages.

Employment status impacts the time and attention mothers can dedicate to childcare. Working mothers may face challenges in providing exclusive breastfeeding and monitoring growth, potentially affecting child nutritional status.[21-25] In this study, 65.7% of mothers were not working, allowing greater involvement in childcare and health monitoring.

Maternal Knowledge of KMS

Maternal knowledge of the *Kartu Menuju Sehat* (KMS) is critical for monitoring child growth and detecting nutritional problems early. KMS provides a record of weight-for-age anthropometric data, growth curves differentiated by gender, health service history, vitamin A supplementation, immunization, and basic childcare guidance.[5,26]

Before the educational intervention, most mothers (69.5%) had poor knowledge of KMS, 30.5% had sufficient knowledge, and none had good knowledge. After online education delivered via video, PowerPoint, and WhatsApp discussions, maternal knowledge improved significantly: 48.6% of mothers achieved good knowledge, 41.9% sufficient knowledge, and only 9.5% remained in the poor category.

Education emphasized practical skills, such as plotting weight points on the KMS growth curve, connecting monthly measurements, and interpreting growth patterns. Mothers who understood KMS could accurately determine whether their child was growing normally (green line) or had growth disorders (yellow or red line).[5]

Factors that may have limited improvement in some mothers include unsuitable timing of education, lack of motivation, and an unsupportive environment. Addressing these issues may require collaboration with community health centers to schedule education sessions at convenient times and provide follow-up evaluations.

Relationship Between Maternal Knowledge and Child Nutrition

The study found that 39% of children experienced overnutrition, while 4.8% were undernourished. Maternal knowledge of KMS has been shown to correlate with the nutritional status of children, with higher maternal knowledge associated with better child nutrition.[8,9] Mothers with poor knowledge are less able to detect growth disorders, increasing the risk of malnutrition or overnutrition.[27]

Effect of Online Education

The Wilcoxon signed-rank test confirmed that online education significantly improved maternal knowledge, with an average increase of 26.64% (pre-education mean

= 51.56, SD = 9.579; post-education mean = 78.20, SD = 15.714; p = 0.000). These findings demonstrate that online KMS education is effective in improving mothers' knowledge and their ability to monitor child growth.

Limitations

This study was conducted entirely online, which may have introduced potential biases due to limited oversight by the research team. Future studies may consider hybrid or face-to-face interventions to ensure better engagement and evaluation.

CONCLUSION

There is a significant difference in the knowledge of mothers with children under two years old regarding KMS before and after the provision of education. Online education using videos, PowerPoint explanations, and discussions via WhatsApp effectively increases mothers' knowledge about KMS in the Kalisari Community Health Center work area.

Recommendations

The authors recommend the following: (1) Educators and health workers can provide online education using videos and PowerPoint explanations through WhatsApp as an alternative to in-person counseling, especially during situations such as the pandemic; (2) Education should be conducted regularly, ideally on a monthly basis, in line with the community health center's activity schedule; (3) Collaboration between researchers and the community health center is recommended to ensure the sustainability and continuity of maternal education on KMS; and (4) Monitoring and follow-up should be incorporated to assess the effectiveness of the education and support mothers in applying their knowledge to track children's growth and development consistently.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

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