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ORIGINAL RESEARCH

Improving maternal knowledge and children's eating pattern by a combination of a booklet and food journaling

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Abstract
Health education is a promising intervention to improve the mother's nutrition knowledge. However, a study focusing on using booklets and food journaling is limited in the literature. This study aims to assess the effectiveness of health education using a booklet and food journaling on the daily nutrition pattern of children. The study design is a pre-experiment pretest-posttest single group design using 19 participants who met the criteria. The participants received intervention one session of health education using a booklet and 14 days of food journaling activity for the children eating patterns. Data analysis used univariate analysis, and Wilcoxon signed rank. The study showed significant differences in maternal knowledge before and after intervention ($p<0.05$). However, there are no significant differences in children eating patterns ($p>0.05$). The findings suggest that health education using a booklet and food journaling book effectively increases maternal knowledge but does not change children's eating patterns.

Keywords: Health education; food journaling; booklet; eating pattern in children; nutritional status

Introduction

Stunting or dwarfs is a failure-to-thrive condition that happens to under five years old children due to chronic malnutrition and recurrence of infection, especially at 1000 early age (Vaivada et al., 2020). The etiology of this condition might vary, such as the mother's lack of nutrition knowledge, leading to children's inadequate nutrition-feeding practices (Simbolon, 2019). One research stated that maternal lack of knowledge about a child's nutrition becomes one of the risk factors for stunting, with the risk about 3,801 times (Hapsari, 2018). Health education could be one intervention to manage and elevate maternal knowledge and skills concerning child nutrition and eating habits to prevent stunting in the future. Health education is a behavioral change towards a healthy lifestyle based on self-awareness, whether on an individual or a community level (Patja et al., 2022). Health education aims to maintain and increase health in systemic and periodic ways (Pati, Chauhan, Mahapatra, Sinha, & Pati, 2017). The process of behavioral change is not only through a series of information and skills, but it's a long and continuous process of awareness raising, prevention, and rehabilitative and curative efforts (Ummah et al., 2021).

The effectiveness of health education implementation can be supported from various aspects, including media utilization. Proper, efficient, and attractive educational media facilitate information engagement processes and clients' understanding of the information provided (Stellefson, Paige, Chaney, & Chaney, 2020). A thin booklet with paper covers is one educational media that contains various information on a particular subject. These media have numerous advantages, including being easily carried, neat, not needing electricity when used, and designed as needed (Agustini, 2014). Research held by Lusiani, Prastyawati, and Nobita (2021) stated health education that uses a booklet as media showed an influence on maternal knowledge about stunting. Another study that examined the effectiveness of the use of booklet media concerning knowledge about balanced nutrition in mothers with malnourished children found that there was an average increase in the level of knowledge in the intervention group provided with education using booklets (Pratiwi & Puspitasari, 2017). Furthermore, one research using a booklet and audiovisual media proved that health education using a booklet is effective in increasing parental knowledge about stunting, as effective as the use of audiovisual media (Juniah et al., 2020).

Health education's effectiveness can also be assessed by its success in changing health behaviors. Behavioral change may occur if the client can access and retain the information and implement the suggested healthy lifestyle (Ummah et al., 2021). Besides the information in the booklet, journaling can encourage behavioral shifting through the experience of write and recording something important in a particular method and outline. The substance of journaling may differ from daily activity through daily meal intake (food journaling). Food journaling or daily meal intake reports support diet aims, including weight loss, healthy eating patterns, and a balanced diet for particular clinical conditions such as malnutrition, diabetes mellitus, and hypertension (Luo et al., 2021). Food journaling practices can be done by a single person or by an entire family to encourage families' healthy eating habits. Through food journaling, individuals or family members can evaluate their eating patterns and habits in a certain period so that they can arrange healthier eating habits. Food journaling can be used to record a child's daily meal intake to observe children eating habits and eating problems (Lukoff et al., 2018). Food journaling activities should perform consistently to evaluate children's eating habits.

The research team has conducted the prior study through interview sessions with several mothers in the Adipala district, Cilacap regency. Mothers said they were aware of child nutrition, but sometimes they fed the child with the food available in their home without considering the nutrition. They also said that they wanted to give their children nutritious food. Still, sometimes they were unsure whether the meals were healthy, and often they challenge by children's eating problems like refusing food, picky eating, or eating small portions. The mothers need more information about their child's nutrition and ways to overcome children's consumption problems to promote good eating habits. Therefore, mothers need effective health education to facilitate their necessities for comprehensive information about a child's nutrition. Based on the phenomenon, researchers developed a question of whether the booklet and food journaling book effectively promotes maternal knowledge about nutrition and encourages eating pattern changing. Therefore, researchers need to examine the effectiveness of health education using a booklet and food journaling book towards the maternal level of knowledge and children's eating pattern. This study aims to identify the health education implementation that uses a booklet and food journaling book is practical to increase the maternal level of knowledge and restore the children's eating patterns. Ultimately, the study's result will inform us whether health education using media like booklets and food journaling books could promote healthy lifestyle-changing behavior, mainly in children's nutritional fulfillment.

Method

The study is quantitative research with a pre-experiment pretest-posttest single group design. The designs were chosen because the research needs particular respondents with specific criteria, which are likely to be few, so it's becoming challenging to randomize subjects for two groups adequately. The sampling method used in the study is purposive sampling with the inclusion criteria of mothers with six months – 5 years old children with an eating problem. The researcher met 19 respondents who participated in this study based on the requirements. The instruments used in this study are a questionnaire, a food journaling book, and a booklet. A validity and reliability test was held before the questionnaire was used, with the Cronbach alpha value 0,8 (high reliability), and all 43 questions were valid.

The research process started with a coordination meeting with village midwives to identify potential respondents and give information about the research also asked the consent from respondents. The participants received intervention one session of health education using a booklet and 14 days of food journaling activity for the child's eating habits. The questionnaire was given before and after the health education session. Children's eating pattern was assessed before (day 0) and after (day 15) food journaling activity. Data analysis uses univariate analysis to analyze respondents' characteristics and bivariate analysis Wilcoxon Signed Rank to examine mean differences. The study protocol assessment and ethical clearance were gained before the study's outset.

Results

The study results consist of participants' characteristics, mean differences in maternal knowledge, and mean differences in children's eating patterns. Univariate analysis was used to analyze respondents' characteristics, including age and education frequency distribution. The univariate analysis was also used to analyze the frequency distribution of maternal level knowledge before and after the intervention, also the frequency distribution of the child's eating patterns before and after the intervention. The participants have an age range between 21 years old and

38 years old. The two most age ranges are 31 – 34 years old and 35 – 38 years old, with a percentage of 26.3% **(Table 1)**. All the age ranges are included in the age range of early adulthood based on the development of psychological aspects (Al-Faruq & Sukatin, 2021). The most participants' education level is Junior High School education level with 68.4% **(Table 2)**. The respondent's level of knowledge before intervention is in the average category, with 63.2%. Meanwhile, most respondents' level of knowledge after the intervention is also in the moderate categories at 57.9%, but the respondents' level of expertise in the high categories experienced an increase to 42.1% **(Table 3)**.

In this study, children's eating patterns are categorized into poor and good eating patterns. The poor eating pattern is when the children eat < 3 types of food with eating frequencies less than 3 times a day or the children only consume less than 2 types of food daily. A good eating pattern is when the children eat three or more types of food with eating frequency three times or more a day. A poor eating pattern is given "1" for the score, and a good eating pattern is assigned "0" for the score. This study showed that the number of children with poor eating patterns was 73,7% before the intervention, and after the intervention, the number of children with poor eating patterns increased to 78,9% **(Table 4)**.

Table 1. Frequencies Distribution of respondents' age (n=19)

No.	Age	Frequencies	Percentage
1	21 - 23 years	2	10.5
2	24 - 26 years	4	21.1
3	27 - 30 years	3	15.8
4	31 - 34 years	5	26.3
5	35 - 38 years	5	26.3
Total		19	100%

Table 2. Frequencies Distribution of Respondents' Education Level (n=19)

No.	Education Level	Frequencies	Percentage
1	Elementary School	5	26.3
2	Junior High School	13	68.4
3	Senior High School	1	5.3
Total		19	100

Table 3. Frequency Distribution of Respondent's Level of Knowledge (n=19)

Level of Knowledge	Before intervention		After intervention	
	Freq	Percentage	Freq	Percentage
Low	1	5.3	0	0
Average	12	63.2	11	57.9
High	6	31.5	8	42.1
Total	19	100	19	100

Table 4. Frequency distribution of Eating patterns from the respondents' children (n=19)

Eating pattern	Before intervention		After intervention	
	Freq	Percentage	Freq	Percentage
Poor	14	73.7	15	78.9
Good	5	26.3	4	21.1
Total	19	100	19	100

In addition, there are significant differences before and after the intervention in maternal knowledge among groups (p<0.05) **(Table 5)**. In contrast, there were no significant differences before and after the intervention in children's eating patterns (p>0.05) **(Table 6)**.

Table 5. Maternal level knowledge mean differences (n=19)

Level of Knowledge	Mean	*p*
Before	22.16	0.02
After	23.47	

Table 6. Children's eating pattern mean differences (n=19)

Eating pattern	Mean	*p*
Before	0.26	0.31
After	0.21	

Discussion

The study documented the age range of participants between 21 and 38 years old. This age range is included in the age range of early adulthood based on developmental psychology. The abstract cognitive process develops in adulthood. The adult can explain numerous concepts and comprehend the logical deductive process through this process. The adult can also connect and control analytical methods with emotional responses in specific contexts (Girgis, Lee, Goodarzi, & Ditterich, 2018). This cognitive process facilitates the adult to receive and comprehend new knowledge and also utilize the knowledge to manage various problems, including child nurturing and parenting problems (Al-Faruq & Sukatin, 2021). Table 2 shows that most participants' educational level is Junior High School, with 68.4%. Education becomes one factor that influences knowledge as the higher education person has higher knowledge because education is also a process to learn new knowledge and skills (Diaz-Quijano et al., 2018). Through education, a person also acquires and develops a thinking process that is beneficial to discover new knowledge. The mothers who are only skilled in writing and reading have a lower understanding than those who took secondary education, including junior and high school, and also at the university level (Pratiwi & Puspitasari, 2017).

Based on Table 5, the study showed significant differences in maternal knowledge before and after the intervention. The findings align with Juniah, Apriliawati, and Sulaiman's analysis which stated that there are significant mean differences in respondents' level of knowledge before and after health education using a booklet as educational media (Juniah et al., 2020). Listyarini and Fatmawati also stated in their study that there are meaningful differences in respondents' level of knowledge about children's nutrition before and after health education using a booklet (Listyarini & Fatmawati, 2020). All those findings, including this study, further strengthen that health education using booklets can improve maternal knowledge. Health education could be implemented through various methods, including lectures and demonstrations, using numerous media, including booklets, leaflets, back sheets, and audiovisual media (Ummah et al., 2021). Booklets have many advantages, like being easy to carry, practical/neat, not needing electricity when used, and can be designed as required. Booklet advantages could determine health education's effectiveness (Agustini, 2014). The booklet used in this study was created by the prior study conducted by the research team about the preference of color, fonts, and pictures from the mothers. Thus the booklet design is based on the findings of the study.

Table 6 shows no significant mean differences in the child's eating pattern before and after the intervention. In this study, the intervention held by team researchers consists of two activities: health education and children's food journaling (food menu, meal portion, and eating frequency) for 14 consecutive days. These interventions were chosen with the expectation that the mothers can observe and restore children's eating patterns based on the knowledge given through health education and daily food journaling activities. Nevertheless, the analysis showed that children's eating patterns do not experience significant changes, and there is even an increase in the number of children with poor diets or eating patterns. Children eating habits could be interfered with by various factors such as prenatal factors, genetic factors, early eating experiences, families' eating patterns, and families' surroundings or daily lifestyle (Scaglioni et al., 2018). Genetic factors related to genetic trait inheritance from parents to children, which can contribute to meal preference in the family in general, can continue the picky eating phenomenon. The genetic factor is an irreversible factor and impossible to manipulate. Another factor is the prenatal factor related to maternal eating habits during pregnancy, which becomes programming for the fetus's brain. Besides genetic and prenatal factors, early eating experiences also affect children eating patterns. Inadequate early eating experience may deteriorate children eating habits in the future. For example, in early eating, the child is more exposed to only sweets, then in the future, the child tends to eat sweet food and refuse foods with other tastes (Arisandi, 2019). The next factor is families' eating patterns. When the child begins to eat solid food, the child starts to feel new sensory experiences from the food and learns the parent/families' eating habits. The child tries to adapt to families' eating habits while adapting to their new

eating patterns. When the parent or sibling has poor eating habits, the child might imitate the habits. Another factor is the family's surroundings or daily lifestyle related to children's food supply, food and menu variation provided, and neighborhood food consumption habits. The children learn to eat, learn to know about food, learn the eating style, and learn the eating habits partially from the thing they meet every day. The children will imitate their surroundings' poor or good eating habits (Arisandi, 2019).

During the study process, we also identified several limitations: the researchers' team did not control and analyze the factors likely to affect the children's eating patterns. Based on the maternal report during 14 days of food journaling, they always try to change children's eating patterns. Still, many confounding factors affect the eating pattern, including sickness, daily busyness that affect eating time and refusing food. Some of these factors might become the etiology of a child's eating pattern unchanged. The implications of this study are the utilization of booklets and food journaling as health education media, whether in clinical or community settings. In clinical settings, healthcare workers such as nurses, midwives, or nutritionists can use the booklet and food journaling book to perform health education to the parents of children experiencing nutrition problems during hospitalization. Parents could reread the booklet and perform food journaling after their child's hospitalization to improve their children's nutrition intake at home. In community settings, healthcare workers such as community nurses or village midwives can utilize the booklet and food journaling book as health education media during health community services like integrated health community services for children under five years or "Posyandu."

Conclusion

The study found that this health education helps improve the mother's knowledge. The findings indicated that using a booklet and food journaling book as educational media effectively increases maternal knowledge about child nutrition and eating patterns. However, the study also finds that there are no significant differences in the children eating patterns before and after the intervention. Therefore, future research is needed to develop an approach to change children eating habits.

Author's declaration

The authors made substantial contributions to the conception and design of the study and took responsibility for data analysis, interpretation, and discussion of results. For manuscript preparation, all the authors read and approved the final version of the paper.

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Availability of data and materials

All data are available from the authors.

Competing interests

The authors declare no competing interest.

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