RESEARCH ARTICLE

Improving complementary feeding practice and child growth in Indonesia through family empowerment intervention

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Abstract

Objective: This study aimed to evaluate the effectiveness of family empowerment intervention in improving complementary feeding practices and child growth in Indonesia.

Methods: A quasi-experimental design was used to gather data from 60 mothers and their youngest children, aged 6-11 months, who participated in this project from two urban areas in Surabaya, East Java, Indonesia. The independent variable was an eleven-week family empowerment intervention, including pre- and post-test. The dependent variable was complementary feeding practice and child growth. Complementary feeding practice indicators consist of minimum dietary diversity (MDD), meal frequency (MMF), acceptable diet (MAD), energy, protein, and zinc adequacy, assessed using a 3x24 hour food recall. Child growth indicators consist of weight-for-age (WAZ), length/height-for-age (HAZ), and weight-for-length/height (WHZ) measured using an infantometer and baby scales. The data obtained were then analysed using the McNemar test, the Wilcoxon Signed-Rank test, and the Mann Whitney U test, with a significance level of a<0.05.

Results: Family empowerment intervention significantly improved complementary feeding practice indicators, including MDD, MMF, MAD, energy, protein, and zinc adequacy. It also significantly increased the child's WAZ, HAZ, and WHZ scores (p<0.05).

Conclusion: The family empowerment intervention can be used as a nursing intervention to improve a family's ability to provide appropriate complementary feeding practices and support a child's optimal growth.

MeSH Keywords: Infant Nutritional Physiological Phenomena, Zinc, diet, feeding, child growth, early life nutrition, malnutrition. (JPMA 73: S-7 [Suppl. 2]; 2023) **DOI: https://doi.org/10.47391/JPMA.Ind-S2-2**

Introduction

Many countries are still facing a double or triple burden of malnutrition.[1] Inappropriate complementary feeding practice is one significant cause of childhood malnutrition in developing countries, including Indonesia.[2] As an infant and young children still depend on adults for food, the family plays a vital role in fulfilling appropriate nutrition for their children.[3] However, it is not easy for most families to ensure their child's nutrition as they face many internal and external barriers.

The first 1000 days of life is undebatable as a critical window for a child's rapid growth and development. Nutritional abnormalities during this period can have long-term health consequences, such as malnutrition.[4] Malnutrition can alter a child's developmental trajectories leading to delayed and impaired immunological, cognitive and physical development. This damage is irreversible and intergenerational [5].

Improving complementary feeding practice for children is the foundation to achieve the 2nd Sustainable Development Goals by 2030.[6] It is also essential to address World Health Assembly (WHA) targets to reduce childhood stunting, wasting, and overweight by 2025.[7] However, UNICEF-WHO-World Bank Joint Child Malnutrition Estimates reports that by 2020, 149.2 million children under 5 years old were stunted, 45.4 million wasted, and 38.9 million overweight globally. By 2021, data collection was not possible due to the COVID-19 pandemic.[1]

The Government of Indonesia targets to reduce the prevalence of wasting to <7% in the total number of children under five years by 2024, stunting <14%, underweight <12%, with no increase in the prevalence of obesity.[8] Nutritional Status Study in 2019 and 2021 recorded the proportion of decline in stunting from 27.7% in 2019 to 24.4% in 2021. The figures of wasting reduced from 7.4% to 7.1%. In contrast, the proportion of underweight improved from 16.3% to 17.0% [9].

Various programmes implemented on increasing families' knowledge and skills related to nutritional needs and child care, still have a low effectivity.[10] Family empowerment intervention involving the mother is the key factor in mediating intra-household resources to attain recommended complementary feeding practices and prevent childhood malnutrition [11,12].

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Empowerment means the process of changing behaviour in which individuals become aware of their health and gain a sense of control over it by acquiring skills and treatment.[13] Empowerment is needed to complete family commitments with a sense of control to overcome the barrier and competing demands, and elevate the expected health behaviour so that the changes are lasting. Improving family's complementary feeding practice requires a coherent package of solid commitment, support from all family members, and a high level of empowerment.[14] Previous studies revealed that the higher the family's level of empowerment, the better is the ability to provide appropriate feeding practices.[15] This study aimed to evaluate the effectiveness of family empowerment intervention in improving complementary feeding practices and child growth in Indonesia.

Material and methods

This study used a quasi-experiment control group pre-post-test design, conducted from March to May 2021. The study population comprised of mothers and their youngest child, aged 6-11 months, registered at the posyandu (integrated healthcare centre), caring for their children by themselves, providing exclusive breastfeeding, and with the ability to read and write. Sixty respondents were taken using the cluster sampling technique, divided into intervention and control groups (each group consisting of 30 people). Firstly, randomisation was conducted by entering urban areas across Surabaya City into a fishbowl. Then, two urban areas in Surabaya, East Java, Indonesia, were chosen as research locations. Secondly, the team asked for a list of children aged 6-11 months. Samples were then taken randomly from the list of names. The researcher performed a matching technique to ensure that the characteristics of the respondents in the two groups were homogeneous.

The independent variable in this study was family empowerment intervention based on health promotion. This was equipped with a module and booklet. The intervention was delivered in community settings, which encourage group participation. This model combines the concepts of Friedman's Family Health Care Nursing, Pender's Health Promotion Model, and Alhani's Family-Centred Empowerment Model13. There was a five-session intervention, as follows: 1) Helping family identify their present condition; 2) Increasing family awareness about childhood malnutrition and its effect; 3) Raising family self-efficacy in providing nutrition; 4) Enhancing family self-esteem in providing nutrition, and 5) Evaluating the family level of empowerment.[13] Each session was conducted for 45-90 minutes, once a week for nine weeks and comprised of 4-6 people living in one neighbourhood. The pre-test was conducted one week before the intervention and the post-test one week after the intervention.

The dependent variable was complementary feeding practice and child growth. The complementary feeding practices indicators were: 1) MDD; 2) MMF; 3) MAD; 4) the adequacy of energy; 5) protein, and 6) zinc. The MDD is defined as the proportion of children aged 6-11 months who receive nutrition from at least four of the seven food groups as follows: 1) grains, roots and tubers; 2) legumes and nuts; 3) dairy products; 4) flesh foods; 5) eggs; 6) vitamin-A rich fruits and vegetables; and 7) other fruits and vegetables. The MMF was defined as a child aged 6-11 months who received solid, semi-solid, or soft foods (including milk feeds for non-breastfed children) in minimum frequency in the last 24 hours before the interview, which differed by child's age and their breastfeeding status. The guide for MMF was as follows: 1) a breastfed 6-9 months old child should get solid/semi-solid food at least twice a day; 2) a breastfed 9-23 months old child should get solid/semi-solid food at least three times a day, and 3) a non-breastfed 6-23 months old child should get solid/semi-solid food at least four times a day. The MAD combines MDD and MMF with different criteria between breastfed and non-breastfed 6-11 months old children. Each indicator used dichotomous codes: (1) if the nutritional behaviour complies with the WHO guidelines, and (0) if the respondents did not comply.[16] The adequacy of energy, protein, and zinc is defined as the amount of energy, protein, and zinc content of food and drink consumed by a 6-11-month-old child compared to the Indonesian Dietary Recommendation (AKG). It was then categorised as follows: 1) excess (≥120%); 2) normal (90–119.9%); 3) mild deficit (80–89.9%); 4) moderate deficit (70–79.9%); and 5) severe deficit (≤70%).[17] The instrument used was a 3x24 hour food recall. In order to get an accurate representation of diet, food intake was recorded for two weekdays and one weekend day (eg., Monday, Thursday, and Saturday).[15] All instruments went through the process of back translation and were statistically tested for validity and reliability.

Child growth indicators were: 1) WAZ; 2) HAZ; and 3) WHZ. An infantometer and baby scales were used for measurement. The result was then compared to WHO Child Growth Standards using the WHO Anthro Software.[18]

The data obtained were then analysed statistically. Descriptive analyses used were frequency, percentage, mean, standard deviation (SD), and minimum and maximum values of each variable. Inferential analysis using McNemar statistical test was conducted to measure the difference in pre- and post-test scores in each group on variables with nominal data scales (MDD, MMF, MAD). The Wilcoxon Signed Rank Test was conducted to measure the difference in pre- and post-test scores in each group on variables with interval data scales that were not normally distributed (the adequacy of energy, protein, zinc, WAZ,

HAZ, and WHZ). The Mann Whitney statistical test measured the difference in post-test scores between both groups with a 95% level of significance (≤0.05).

Participation in this study was voluntary. The information regarding this study was provided, and written informed consent was sought from all respondents prior to participation. The Health Research Ethics Committee of the Faculty of Nursing, Universitas Airlangga, granted ethics approval for this study (2100-KEPK).

Results

A total of 60 respondents were included in the statistical analysis, divided into control and intervention group. Table 1 shows that the respondents' characteristics in both groups are homogeneous, including the mother's age, child's age, sex of the child, and child's birth order. Most respondents were a mother between 30-34 years, nine (30%) respondents in the control group and eight (26.7%) respondents in the intervention group. Most children in the control group were aged 6-8 months (16; 53.3%), while those in the intervention group were aged 9-11 months (17; 56.7%). There were 17(56.7%) male children in both groups. Most children were the first born in the family, 11 (36.7%) respondents in the control group and 12 (40.0%) respondents in the treatment group.

Table 2 shows significant differences in the control group's pre- and post-test scores in MMF (p=0.01) and MAD (p=0.02). Meanwhile, there were significant differences in pre- and post-test scores on MDD, MMF, and MAD in the intervention group (p=0.001). Statistical analysis tests revealed no significant differences in pre-test scores between the control and intervention groups in MDD, MMF, and MAD (p>0.05). However, post-test scores between both groups showed significant differences in MDD (*p*=0.00), MMF (*p*=0.00), and MAD (*p*=0.00).

Table 3 shows no significant differences between the mean score pre-post-test of the control group in the indicator of energy (*p*=0.30), protein (*p*=0.74), and zinc adequacy (*p*=0.13). Otherwise, statistical analysis found significant differences between the mean score pre-post-test of the intervention group in the indicator of energy, protein, and zinc adequacy (*p*=0.00). Mann Whitney statistical analysis revealed no significant differences in the pre-test mean of energy, protein, and zinc adequacy in both groups (*p*>0,05). In contrast, the post-test mean and pre-post-test score differences indicated significant differences between the two groups in the energy (*p*=0.001), protein (p=0.001), and zinc (*p*=0.01) adequacy.

The mean difference in child growth between the two groups before and after intervention can be seen in Table 3. The control group's mean Z-score during the pre-post-test was in the normal category. However, there were differences in the post-test mean Z-score in the indicator of WAZ +0.07 points and HAZ +0.62 points. WHZ showed differences in the mean Z-score as many as -0.30 points. Statistical analysis revealed no significant differences between the pre-post-test mean Z-score of the control group for WAZ. In contrast, there were significant differences between the pre-post-test mean Z-score for HAZ (farther away from mean reference population) and WHZ (closer to mean reference population).

The intervention group's mean Z-score during the pre-post-test was also in the normal category. After the intervention, there were differences in the mean Z-score of HAZ as many as +0.08 points. In contrast, the mean Z-score of WAZ changed by -0.53 points, and WHZ changed by -0.71 points. Statistical analysis revealed significant differences between the pre-post-test mean Z-score of the intervention group for WAZ, HAZ, and WHZ. The WAZ and WHZ are closer to the mean of the reference population, while the HAZ is farther away from the mean of the reference population.

Mann Whitney statistical analysis revealed no significant differences in the pre-test mean Z-score of WAZ, HAZ, and WHZ in both groups (p>0.05). The post-test mean Z-score in the two groups showed significant differences only for WAZ (p=0.02) and HAZ (p=0.00), while WHZ was not significant. The pre-post-test mean Z-scores in both groups were significantly different for WAZ, HAZ, and WHZ (p=0.001), where the intervention group's mean Z-scores were better than the control group.

Table-1: The distribution of respondent's characteristics

No	Characteristics	Control n (%)	Intervention n (%)	Homogeneity Test (*p*-value)
1	**Mother's age**(years)			
	20-24	7 (23.3)	7 (23.3)	0.94
	25-29	6 (20.0)	7 (23.3)	
	30-34	9 (30.0)	8 (26.7)	
	35-39	6 (20.0)	6 (20.0)	
	40-44	2 (6.7)	2 (6.7)	
	Total	30 (100)	30 (100)	
2	**Child's age** (months)			
	6-8	16 (53.3)	13 (43.3)	0.63
	9-11	14 (46.7)	17 (56.7)	
	Total	30 (100)	30 (100)	
3	**Sex of the child**			
	Male	17 (56.7)	17 (56.7)	1.00
	Female	13 (43.3)	13 (43.3)	
	Total	30 (100)	30 (100)	
4	**Child's birth order**			
	First	11 (36.7)	12 (40.0)	0.93
	Second	10 (33.3)	10 (33.3)	
	Third	8 (26.7)	7 (23.3)	
	≥ Fourth	1 (3.3)	1 (3.3)	
	Total	30 (100)	30 (100)	

Table-2: The difference in complementary feeding practice among the two groups before and after intervention.

No	Variables	Control			Intervention			Difference Test	
		Pre n (%)	Post n (%)	*p*-value	Pre n (%)	Post n (%)	*p*-value	Pre_Pre	Post_Post
1	MDD								
	Did not Comply	13 (43.3)	11 (36.7)	0.50	14 (46.7)	1 (3.3)	0.00	0.79	0.00
	Comply	17 (56.7)	19 (63.3)		16 (53.3)	29 (96.7)			
	Total	30 (100.0)	30 (100.0)		30 (100.0)	30 (100.0)			
2	MMF								
	Did not comply	9 (30.0)	17 (56.7)	0.01	14 (46.7)	1 (3.3)	0.00	0.19	0.00
	Comply	21 (70.0)	13 (43.3)		16 (53.3)	29 (96.7)			
	Total	30 (100.0)	30 (100.0)		30 (100.0)	30 (100.0)			
3	MAD								
	Did not comply	17 (56.7)	24 (80.0)	0.02	22 (73.3)	1 (3.3)	0.00	0.18	0.00
	Comply	13 (43.3)	6 (20.0)		8(26.7)	29 (96.7)			
	Total	30 (100.0)	30 (100.0)		30 (100.0)	30 (100.0)			

MDD: minimum dietary diversity MMF: meal frequency MAD: acceptable diet

Table-3: Mean difference of complementary feeding practice and child growth among the two groups before and after intervention.

No	Variables	Mean±SD Control			Mean±SD Intervention			Difference Test		
		Pre	Post	*p*-value	Pre	Post	*p*-value	Pre-Pre	Post-Post	Δ
1	Energy adequacy	99.77±36.79	95.97±26.70	0.30	90.97±26.06	107.16±14.73	0.00	0.47	0.00	0.00
2	Protein adequacy	138.27±53.18	135.13±39.67	0.74	130.8±48.11	174.10±38.60	0.00	0.66	0.00	0.00
3	Zinc adequacy	105.00±64.9	88.63±53.67	0.13	88.80±45.39	117.60±44.88	0.00	0.45	0.01	0.00
4	WAZ	-1.03±0.96	-1.10±1.20	0.31	-0.93±1.16	-0.40±1.14	0.00	0.86	0.02	0.00
5	HAZ	-0.77±0.69	-1.39±0.81	0.00	-0.66±0.74	-0.74±0.75	0.03	0.44	0.00	0.00
6	WHZ	-0.82±1.12	-0.52±1.24	0.00	-0.77±1.28	-0.06±1.23	0.00	0.95	0.29	0.00

WAZ: weight-for-age HAZ: length/height-for-age WHZ: weight-for-length/height

Discussion

This study found that family empowerment intervention significantly improved complementary feeding practices among families with children aged 6-11 months. It was also observed that respondents met MDD, MMF and MAD recommended by WHO after the intervention. Empowered families are confident and able to care for and provide a constructive environment for the growth and development of their children.[15] Empowering families, especially mothers, is essential to achieve infant and child feeding practices by WHO recommendations.[11,12] These findings were similar to previous studies, which mentioned that an increase in the family empowerment level was positively correlated with the achievement of nutritional adequacy and food diversity at the household level.[15,19] Other studies explained that family empowerment could improve nutritional behaviour, even for families with food insecurity.[20] Family empowerment intervention is a form of nursing care which enhances the family's knowledge and skill, motivation, awareness, self-efficacy and self-esteem. It aims to strengthen the system in the family to use their own resources to fulfil child nutrition appropriately. Strong motivation is needed to achieve the goal of implementing health promotion behaviour. The threat perceived by family also increases their awareness to implement the expected health promotion behaviour, to prevent health problems.Self-esteem raises positive feelings about themselves, thereby increasing creativity. All family members were empowered through every phase of the intervention, so they have strong commitment and control to perform nutritional behaviour as expected.

The present study also proves that family empowerment intervention significantly improved child growth. A higher mean Z-score for WAZ in the post-test of the control group represents a slow weight gain. Conversely, the mean Z-score for WAZ decreased in the intervention group's post-test, representing optimal child growth. Previous studies mentioned that mothers with a high level of empowerment could decide the right food to consume to meet a child's nutritional needs and optimally increase their child's weight.[21]

This study found an increase in the post-test mean Z-score for HAZ in both groups. It indicates that the graph of a child's body length is declining, below typical children of

the same age and sex. Body length indicates childhood stunting. Optimally, body length will increase for children aged 6-11 months by at least 1-1.5 cm per month. Inadequate intake and poor absorption of bone-forming minerals, such as zinc, may contribute to linear growth retardation. Rapid falling off in the child's growth, especially body length, usually happens in their first two years.[22] Significant pre-post-test mean Z-score differences showed that family empowerment intervention could prevent the rapid decrease in a child's growth. Previous studies revealed that an increase in family empowerment level positively correlated with a child's HAZ and reduced the likelihood of experiencing childhood stunting.[23] Empowered families have strong self-control and consistently provide appropriate complementary feeding for their children, using their resources to accelerate their optimal growth. This finding also emphasises the importance of stunting prevention, especially at 6-24 months.

Study findings showed no significant differences between pre- and post-test mean Z-scores for WHZ in both groups, which indicates that the child's weight gain is in line with their body length. However, significant pre-post-test mean Z-score differences showed that the intervention group is better than the control group in increasing the child's WHZ. Previous studies stated that child's weight and length were influenced by protein intake.[24] As child's protein intake is adequate, their weight and length are in line with the reference population. Study in Bangladesh found that mothers with a high level of empowerment provide appropriate calories and protein as needed by their children.[25] The family empowerment intervention allows all family members to gain knowledge and skills needed to optimally control the allocation of family food and improve a healthier lifestyle. It allows families in the intervention group to be more consistent in providing nutritional behaviour as recommended by WHO, to support the child's optimal growth.

The limitation of this study was the short time and its execution. Therefore, the intervention was held intensively, and recurrent follow-ups were not performed to confirm the sustainability of the results. Future studies should consider this limitation to increase generalising the findings.

Conclusion

Family empowerment intervention significantly improved complementary feeding practice and child growth. These findings can guide families to perform appropriate complementary feeding practices based on WHO recommendations and available resources. Family health nurses can use family empowerment as a nursing intervention to improve the family's nutritional behaviour and help the family boost the child's optimal growth.

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