N PAKISTAN JOURNAL OF UTRITION

Research Article
Baby Nutritional Status Improvement Through Mother Empowerment in Baby Care in South Sulawesi Indonesia

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Abstract
Background and Objective: The quality of baby growth at critical times is influenced both by genetic and environmental factors. One environmental factor is the role of the mother, who optimizes the innate potential of a child through care giving and stimulation. This study aimed to identify the effectiveness of mother empowerment in caring for babies of 0-6 months by providing health education with a modeling approach. **Materials and Methods:** This study used a quasi-experimental pre-post control group design. Statistical analyses were performed with the Wilcoxon test. The intervention was the provision of health education with a modeling approach of lactation management and baby growth stimulation. The sample was 81 people, consisting of 41 in the treatment group and 40 in the control group. **Results:** The results of this study at month 1 showed no significant difference in body weigh/shoulder length ($p = 0.53$), body weigh/age ($p = 0.33$), shoulder length/age ($p = 0.98$) and LK/U ($p = 0.12$). At 6 months old, there were significant differences in body weigh/shoulder length ($p = 0.02$), body weigh/age ($p = 0.04$) and shoulder length/age ($p = 0.03$), but there was no significant difference in the LK/U ($p = 0.67$). The effectiveness of mother empowerment in the care of babies through the provision of health education with a modeling approach showed an increase in baby anthropometric status. **Conclusion:** It is concluded that increasing mother empowerment through health education improves infant growth.

INTRODUCTION

From developing in the womb until the age of 2 years is a golden period and the so-called critical period for physical, mental and social development[1]. The quality of a baby's development at this critical time is influenced by genetic and environmental factors. Environmental factors will determine whether the existing genetic potential will be able to develop optimally[2]. The mother is the first and foremost environmental factor to contribute to the baby's growth and development. The role of mothers is in optimizing the innate potential of a child through parenting, care giving and stimulation. Therefore, empowering mothers to improve their ability to care for a baby becomes an important health effort, enabling survival, improving the life quality of children and achieving optimal growth and development in the physical, mental, emotional and social domains as well as supporting intelligence in accordance with the genetic potential[2].

Globally, 165 million children have stunted growth; malnutrition is a major cause of 3.1 million deaths in children aged less than 5 years[3].

The role of women in caring for and raising children is important and education for girls is especially significant. Different studies have shown a significant correlation between levels of maternal education and child nutritional status and life expectancy[4]. Based on research by Frost[5], any increase in the mother's education level allows stunting to be decreased in approximately 44% of children.

A woman's education level can also affect the health of her children by increasing the decision-making power of women in the family. Women in general are the primary health care providers in their home and they devote more time to the protection and care of their children than do men. Sometimes, the mother does not know the importance of variety and balance in the diet or the right amount and type of food needed by children to meet requirements. Without adequate knowledge, malnutrition and poor nutritional status can occur even in households with sufficient income, food and health services[6].

Shi and Zhang[7] reported that nutritional education increases the supplemental feeding behavior and growth of children. The effectiveness of nutrition education on child growth and anemia, especially through improved breastfeeding and complementary foods was noted by the lancet series on maternal and child nutrition, which explained that changes in eating behavior communication in babies and children are one of 15 evidence-based interventions that are effective for reducing global malnutrition[8].

Ten studies evaluated the effect of nutrition education and seven studies assessed the effect of additional complementary foods (a study with three intervention groups in those two categories). Studies of nutrition education in food-secure populations have shown a significant increase (the difference average standard (SMD) was 0.35, 95% CI 0.08-0.62, according to four studies and HAZ was 0.22, 0.01-0.43), whereas the stunting effect was not statistically significant (RR 0.70, 95% CI 0.49-1.01, four studies)[8]. Based on research by Abuya[9], nearly 40% of children are stunted and the mother's education is a strong predictor of a child's nutritional status in the city slums. Research by Jemide[10] shows that most mothers have insufficient nutritional knowledge when they fall into the sufficient knowledge category and are poor and most children eat sub-optimally. Therefore, it is not surprising that their nutritional status revealed a high prevalence of malnutrition.

There is an ongoing search for how best to combine the existing stimulation and nutrition interventions in health services to expand the program on a large scale[11]. Knowledge of maternal nutrition and child feeding practices are very important for the growth and development of children. Without knowledge of adequate nutrition and optimal feeding practices, children can have a poor nutritional status, even in households with adequate food and income, good sanitation and health services[10]. Nutritional status has been defined as individual evidence of nutrition, which can be determined by the quality of nutrients consumed and the body's ability to utilize nutrients for metabolic needs[10,12].

Based on observations in the field, there are still many baby care practices that are less rich in stimulation efforts. Therefore, efforts are necessary to empower mothers by providing health education to change the mother's ability to care for the baby, especially in stimulating baby growth and development. Several studies have shown that maternal empowerment through the provision of health education has a positive impact on the improvement of knowledge and skills in baby caring practice[13-17]. One of the learning approach theories used in health education is the social learning theory developed by Albert Bandura. Modeling is the basic concept of social learning theory, with a final focus on leveraging the power of a person through improving attention, retention, reproduction and motivation during learning[17]. Health education with a modeling approach is expected to improve the capability and competence of mothers in caring for babies, especially in stimulating their growth and development. The growth parameters used by Health Department RI[18] for babies 0-6 months old are weight, length and head circumference.

Weight measurements for body length can describe the state of child nutrition at the present time[19].

This study was conducted to identify the effectiveness of maternal empowerment through the provision of health education with a modeling approach to the anthropometric status of babies 0-6 months of age.

MATERIALS AND METHODS

This study was conducted in Maros. Overall, the maternal sample was 81 people, consisting of 41 people in the intervention group and 40 people in the control group. The methods used in health education were demonstration, re-demonstration and simulation, while the tools used were leaflets, flipcharts and pantom. The method in this study was a quasi-experimental pre-post with control group design. The empowerment of mothers was attained by providing health education. The treatment (intervention) was the provision of health education with a modeling approach. The health education used was health education with a modeling approach, which focused on activities. Health education in this study was held 3 times, with health education I using lactation management (breastfeeding) modules given at the end of the third trimester of pregnancy. Health education II, using the growth and development stimulation module 1 (babies 0-3 months), was given in the first week post-partum and health education III, using growth stimulation module 2 (babies 3-6 months) was given when the babies are aged (3 months). The modeling learning process had four phases: Attention, retention, reproduction and motivation. Most of the phase was the learner internal process in social learning. The research instruments used in this study were questionnaire and observation sheets. The measured variable was the baby anthropometric data, consisting of weight, body length and head circumference. Univariate and bivariate data analyses were performed to see the general description of each variable along with its distribution and frequency, such as gender and age and consider the relationship between nutrient intake and nutritional status. The results obtained were tested by the Wilcoxon test.

RESULTS

Sample characteristics: Table 1 shows the homogeneity of respondents according to age of mother, age of father, father's occupation and family income. The results showed that the treatment group and the control group had equality/homogeneity. Homogeneity test results between the treatment group and the control group in the mean maternal age obtained a value of p = 0.78, the average age of the father obtained a value of p = 0.49, the father's occupation obtained a value of p = 0.26 and family income obtained a value of p = 0.19.

Differences in baby growth: The differences of the growth of baby are presented in the Table 2. Based on Table 2, there are significant differences in birth weight between the treatment group and the control group in that the average birth weight in the treatment group was higher by 3.38±0.34 compared with a mean birth weight in babies in the control group of 3.12±0.57. An unpaired t-test between the two groups obtained a value of p = 0.01. This result means that there are differences in newborn weight between the treatment group and the control group. In considering the average length of the newborns, the results show that the average length of the baby's body in the treatment group was lower by 49.37±5.00 compared to the average body length of newborns in the control group, 51.10±1.83. An unpaired t-test between the two groups obtained a value of p = 0.043, meaning that there are differences in the body length of newborns between the treatment group and the control group.

The results showed that, in accordance with age, ranging from 1-6 months, for the weight indicator, body length, head circumference and nutritional status BB/PB, BB/U, PB/U and LK/U, in general there was no significant difference between the treatment group and control group, but in a particular month and for specific indicators, there was a significant difference between the treatment group and the control group. When the baby is 1 month old, there were significant

Table 1: Respondent characteristic analysis of treatment and control group

Variable	Groups		p-value
	Treatment (n = 41)	Control (n = 40)	
Average mother age (year)	25.15±4.59	25.1±5.46	0.78*
Average father age (year)	28.3±5.15	29.6±5.96	0.49*
Mother education			
Low	36 (87.8)	26 (65.0)	0.005**
High	5 (12.2)	14 (35.0)	
Father education			
Low	30 (73.2)	17 (42.5)	0.01**
High	11 (26.8)	23 (57.5)	
Father employment			
PNS/TNI/POLRI	2 (4.9)	5 (12.2)	0.26**
Entrepreneur	39 (95.1)	35 (87.5)	
Family income			
≤1 million	32 (78.0)	26 (65.0)	0.19**
>1 million	9 (22.0)	14 (35.0)	
Number of family members			
≤4	16 (39.0)	27 (67.5)	0.01**
>4	25 (61.0)	13 (32.5)	

*Unpaired t-test, **Chi-square test

Table 2: Achievement of body weight, body length and increase in the proportion of body weight and length of infants in the treatment group and the control

	Groups		
	Treatment (n = 41)	Control (n = 40)	p-value
Birth body weight (kg)	3.38±0.34	3.12±0.57	0.01
Body length (cm)	49.37±5.00	51.10±1.83	0.043
On first month			
Body weight (BB) (kg)	3.98±0.63	4.13±0.90	0.81
Body length (PB) (cm)	53.5±2.15	53.14±3.2	0.3
Head circle (LK) (cm)	36.48±1.46	36.86±1.20	0.2
Z Score BB/PB	-0.51±1.75	-0.81±2.44	0.53
Z Score BB/U	-0.69±1.44	-0.39±1.60	0.33
Z Score PB/U	-0.47±1.13	0.47±2.68	0.98
Z Score LK/U	-0.39±1.14	-0.02±1.06	0.12
Z Score BB/PB<-2 to, n (%)	9 (22.0)	9 (22.5)	
Z Score BB/U<-2 to, n (%)	4 (9.7)	6 (15.0)	
Z Score PB/U<-2 to, n (%)	5 (12.5)	9 (22.5)	
On sixth month			
Body weight (BB) (kg)	7.01±0.77	7.00±0.77	0.94
Body length (PB) (cm)	66.32±2.67	62.03±5.74	0.00
Head circle (LK) (cm)	42.62±1.16	42.50±2.16	0.75
Z Score BB/PB	-0.82±1.29	0.54±1.62	0.00
Z Score BB/U	-0.86±1.04	-0.72±1.02	0.54
Z Score PB/U	-0.31±1.23	-2.04±2.58	0.00
Z Score LK/U	-0.23±1.06	-0.17±1.69	0.84
Z Score BB/PB<-2 to, n (%)	6 (14.6)	2 (5.0)	
Z Score BB/U<-2 to, n (%)	8 (19.5)	4 (10.0)	
Z Score PB/U<-2 to, n (%)	3 (7.3)	17 (42.5)	
Changes (Δ)			
Baby age 1-6 month			
Body weight (BB) (kg)	3.03±0.80	2.87±1.00	
Body length (PB) (cm)	12.97±2.88	8.89±3.41	
Head circle (LK) (cm)	6.14±1.47	5.63±2.03	
Z Score BB/PB	0.31±1.97	-1.34±2.82	
Z Score BB/U	0.16±1.25	0.32±1.61	
Z Score PB/U	-0.19±1.41	1.59±1.59	

differences in the BB/PB (p = 0.53), BB/U (p = 0.33), PB/U (p = 0.98) and LK/U (p = 0.12). When the baby was 6 months old, there were significant differences in the BB/PB (p = 0.02), BB/U (p = 0.04), PB/U (p = 0.03) and LK/U (p = 0.67).

DISCUSSION

The role of a mother is essential, especially as the health agent for children and families to meet the needs of parenting, care giving and stimulating the baby. Therefore, every mother who has a baby requires knowledge, attitudes, skills and high confidence in her abilities. Nurses are one type of medical professional that have a responsibility to promote the health of families and children and provide services to clients that include support, health education and nursing services that can contribute to enhancing knowledge, attitudes and a mother's skills in caring for her baby[20].

Health education with a modeling approach can increase the knowledge, skills, abilities, family support and confidence of mothers in their role (based on maternal role attainment/MRA nursing theory) in optimizing baby growth and development through exclusive breastfeeding and stimulation. The research of Saleh[20] shows that health education with a modeling approach by nurses is effective in improving knowledge, practical skills and confidence in breastfeeding and stimulating babies, which optimizes baby growth. Knowledge is the result of stimulating noted and remembered information. Information can be obtained in a variety of forms, including formal and non-formal education, daily conversation, reading, listening to the radio, watching television and other life experiences[21]. Knowledge is gained from a planned and well-structured education as well as from information that is not well structured[22].

The conducted research showed a difference between the control group and the intervention group. The difference showed a significant difference in the nutritional status of babies at age 6 months in terms of their BB/PB (p = 0.02), BB/U (p = 0.04) and PB/U (p = 0.03). This result is in line with research by Nurhayati[26] who showed that the intervention group counseling effect significantly improved exclusive breastfeeding (p = 0.038), with an Odds Ratio (OR) value of 9.7 (95%; CI 1.1-83.7). This result is in line with some previous studies; counseling and education can increase knowledge of breastfeeding and duration of breastfeeding and can reduce diarrhea[23-25]. Research by Nurhayati[26] showed that mothers who received nutritional counseling have a 10-fold chance to provide exclusive breastfeeding for 6 months[26].

The WHO recommends exclusive breastfeeding for the first 6 months of life for growth, development and optimum health. Breastfeeding should be continued for up to 2 years or more and for adequate nutrition, the safe and proper eating of complementary foods should be introduced at the age of 6 months to meet the evolving needs of the baby's growth[27].

Inversely, the research of Dwi[4] showed that exclusive breastfeeding behavior was not significantly affected by the mother's knowledge and has a weak influence (p = 0.11, OR = 1.81 CI 95%: 0.88-3.74). Research by Kremer[28] also showed that there were no significant effects of a breastfeeding promotion trial intervention (The promotion of breastfeeding intervention trial) in terms of the height, body mass index, waist or hip circumference, triceps or sub-scapular skin fold thickness, or systolic or diastolic blood pressure.

Mother's milk is such an amazing natural substance that it has been given the nickname "The golden liquid". The basis for the baby's health begins with breastfeeding. In the short term and long term, breastfeeding has incredible benefits for the mother, the baby and the community. There is a

significant correlation between a lack of breastfeeding and increased health risks and thus it is important to encourage and maintain breastfeeding for all mothers and babies[29]. Breastfeeding prevents half of the deaths caused by infections in children aged 6-23 months. Protection against otitis media, a childhood disease prevalent throughout the world is also extended to 2 years or may be more[30]. In addition, exclusive breastfeeding from birth to 6 months is associated with catch-up growth and protects BBLR from more severe diarrhea and respiratory infections. Exclusive breastfeeding in low birth weight babies benefits both mothers and babies.

Breastfeeding achieves many sustainable development goals that will launch in 2030. Breastfeeding is clearly relevant to the third goal of sustainability (which includes not only the health of mothers and children but also non-communicable diseases such as breast cancer, diabetes and obesity). It is also relevant to the second goal (of nutrition). The effect of breastfeeding on intelligence and human capital is relevant to the 4th goal (education), the 1st goal (poverty) and the 8th goal (inclusive economy growth). Finally, breastfeeding can contribute to goal number 10, which is to reduce the gap between rich and poor[30].

Research by Dwi[4] shows that exclusive breastfeeding is effective for a baby's growth (Head circumference). Babies who are not exclusively breastfed have abnormal head circumference growth of 11.1%, whereas exclusively breastfed babies have head circumference measurement growth values that are all normal[4] at 59.25%. Breastfeeding babies and their growth is a dynamic process in which milk may affect growth[31], which states that in order to meet the needs of nutrition, breast milk is the perfect food for babies. Baby energy requirements during the first year of life vary greatly according to age and weight. If they obtain good nutrition in their first year, then babies gain 700-1000 g month^{-1} in the first trimester and 500-600 g month^{-1} in the second trimester[32,33].

According to Nadine[34], breast milk contains the proteins, fats, vitamins, minerals, water and enzymes that are needed by the body. Considering the nutritional content, breast milk is the best nourishment and meets 100% of the needs of babies aged 0-6 months. Additionally, it promotes emotional bonding between the mother and baby, so breast milk is sufficient for optimal physical and mental growth as well as intelligence[32]. Infancy is a very vulnerable period for babies, so further health care is required because the baby can easily become infected due to malnutrition[35]. The nutritional needs for babies begin with breastfeeding exclusively[4].

Depkes[18] stated that the purpose of the child's head circumference measurement is to determine whether the child's head circumference is in the normal range. By measuring and monitoring the growth of the baby's head circumference, abnormalities that may occur in the brain would immediately be detected, such as microcephaly, which is a head circumference that is smaller than the normal head circumference, or macrocephaly, where the size of the head circumference is larger than the normal head circumference size. Exclusive breastfeeding is effective for the growth of babies (Head circumference). Growth issues are related to major changes in the number, size or dimension level of cells, organs and individuals. The process of development is the learning of increasingly complex abilities (skills) and occurs in a regular and predictable pattern in the structure and function of the body as a result of the maturation process. Development also involves the differentiation process of the body's cells, tissues, organs and organ systems, which develop in such a way so that each can fulfill its functions, including emotional development, intellect and behavior as a result of interaction with the environment[20,36].

CONCLUSION

The effectiveness of mother empowerment on baby care through the provision of health education with a modeling approach showed an increase in baby anthropometric status, particularly in terms of nutritional status, body weight according to body length, body weight according to age and body length according to age. Therefore, mother empowerment in improving baby growth through health education needs to be improved.

ACKNOWLEDGMENTS

SIGNIFICANCE STATEMENTS

One of the necessities of mothers is caring for and raising children and education for their children, especially girls, is important. Thus, women's education can also affect the health of children by increasing the decision-making power of women in the family. Knowledge, particularly of maternal nutrition and child feeding practices is indispensable in the growth and development of children. Health education with

a modeling approach is expected to improve the capability and competence of mothers in caring for babies, especially in stimulating the growth and development of babies. The growth parameters used by the Health Department of the Republic of Indonesia for babies 0-6 months old are weight, length and head circumference. Thus, identifying the effectiveness of maternal empowerment through the provision of health education with a modeling approach to the anthropometric status of babies 0-6 months of age is an emerging requirement of all stakeholders to set a correlated policy.

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