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Research Article

**THE EFFECTS OF TRAINING MOTHERS ABOUT
COMPLEMENTARY FEEDING ON GROWTH INDICATORS
OF INFANTS IN DEZFUL, IRAN**Zaynab Bakhtiari¹, Shahnaz Rostami^{2*}, Bijan Keikhaei³, Bahman Cheraghian⁴,¹MSc Student of Nursing, Faculty of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran² PhD, Assistant Professor, Nursing Care Research Center in Chronic Disease, Nursing & Midwifery School, Ahvaz Jundishapur University of medical Sciences, Ahvaz, Iran.³ Professor, Health Research Institute, Research Centre of Thalassemia and Hemoglobinopathies, Ahvaz Jundishapur University of medical Sciences, Ahvaz, Iran.⁴ Professor, Health Research Institute, Research Centre of Thalassemia and Hemoglobinopathies, Ahvaz Jundishapur University of medical Sciences, Ahvaz, Iran.**Abstract:**

Background: Lack of awareness of mothers on the nutrition of infants' is a major cause of malnutrition. Therefore, this study attempted to investigate the effect of training mothers about complementary feeding on the growth indicators of 4 to 8 month-old infants in Dezful.

Materials and Methods: This semi experimental enrolled 270 infants and their mothers from healthcare centers in Dezful, in 2015. The mothers were randomly assigned to intervention [n=135] and control [n=135] groups. Participants in the intervention group in three one-hour sessions received training programs on process of complementary feeding, familiarizing with growth and growth curves. The control group received none training programs. Anthropometric measures [body weight, height and head circumference] were assessed at baseline and after three months. Data were analyzed using paired and unpaired t-test with $p \leq 0.05$.

Results: A percentage of 46.4% of mothers in the intervention group and 42.4% of mothers in the control group fall within the age range of 25 to 35 years. Similarly, loss to follow up was observed in the two studied groups [10 participants]. Compared with baseline, the body weight, height and head circumference increased more in the intervention group than in the control group, but changes were statistically significant for body weight and height [$p \leq 0.05$].

Conclusion: The findings of the current study suggest that training programs can result in an increase in body weight and height but not head circumference. Therefore, it is recommended that educational programs should be allocated in healthcare centers to increase growth indicators and improve the health of children.

Keywords: Complementary feeding, growth indicators, infancy.

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INTRODUCTION:

Providing, maintaining, and promoting infants' level of health as well as providing health services for them are amongst the pillars of social justice and are given special consideration in various communities [1]. It is obvious that the period from birth to two years old is the critical age period to promote the desirable growth, health, and evolution of behavior.

Infancy is one of the outstanding periods in terms of rapid growth and high nutritional needs which are not proportional to body weight. Adequate nutrition during infancy and early childhood is the basis of development of infants to reach the full capacity of human beings. In this period, if food intake is insufficient or food is inappropriate, there will be a high risk of impaired growth, which can have unfavorable neurocognitive outcomes on growth. Short height in infants for a lifetime is another risk which has irreversible consequences [2, 3, & 4]. Despite the fact that statistics in 2010 show a reduction in the mortality rate of children under 5 years all over the world, malnutrition is still considered as a key factor in the loss of lives of children in the world, particularly in developing countries [5]. Studies conducted in 2011 show that 19.4% of children younger than 5 years in developing countries undergo body weight loss and 29.9% of them have short height.

In addition, different studies conducted in Iran have shown that the prevalence of underweight according to the weight-for-age indicator for males is approximately 15% and is 16.3% for females in 1995. In 1998, the prevalence of stunting in males was 16.8% and was 13.9% in females. On the basis of the weight-for-height indicator, males are 11.9% and females are 9.7% underweight. The prevalence of underweight cases, according to the weight-for-height indicator, in males is 5.1% and is 4.7% in females. It should be mentioned that the growth typically begins between the ages of 4-6 months and continues until the first 18 months of life, which coincides with the time that food substances are added to the diet of children. If children in this age are weaned onto poor nutrition with a high level of carbohydrate and insufficient protein, they will lose weight in this period [6-10]. Therefore, guiding children to the correct nutritional practices in childhood is very important because it helps them to prevent malnutrition, impaired growth, feeding problems and subsequently severe and chronic diseases, cardiovascular diseases, type II diabetes, cancer, obesity, and osteoporosis [11].

Accordingly, one of the factors influencing the growth of children is the time to begin complementary feeding in the first year of life, which is affected by many factors such as family cultural characteristics, personality traits of mothers, parent's age, family income, parental education, maternal occupation, birth order, and

being a wanted or an unwanted child [12, 13]. Due to lack of complete physical and mental development, children require particular care and support for their feeding by their parents and health workers; thus, an appropriate training system in healthcare centers can provide proper nutrition and eating habits for children to intervene in accelerating their desirable growth [2, 14, & 15]. In this regard, nurses as the main foundations of the healthcare systems in the world are the largest health care providers who can play different roles including training in order to help and support parents. Hence, nurses with considerable knowledge and skills required for transmission of information through training can increase mothers' awareness, which in turn may lead to better quality in children's growth [1 & 16]. The aim of this study, was to investigate the effects of training mothers about the complementary feeding on infants' growth indicators.

METHODS:**Study Design**

The semi experimental was conducted on 270 infants aged 4-8 months and their mothers who were undergoing health care visits during September to December 2015 in Dezful Health Care Centers, Ahvaz, Iran. The study was approved by the Ethical Board Committee of Ahvaz Jundishapur University of Medical Sciences with the ethical code of 1394.363.

Study population

Entry criteria were structured to enroll infants who must not be suffering from diseases such as liver, kidney, cardiac, blood, gastrointestinal, metabolic, brain, and respiratory complications at the time of the research; children who are not on a special diet or medication; children who have birth weight of 2500 to 4000 grams and gestational age of 37 to 42 weeks at birth, and have complete immunization records registered in their growth monitoring card. The mothers signed an informed consent form before entering the study. The mothers were assigned at random to one of two intervention groups with a ratio of 1:1. Randomization is generated and stratified in blocks of six.

Intervention

Mothers in the intervention group in three one-hour sessions received training programs on the subject of healthy eating in infants, familiarizing with growth and growth curves, the way to start complementary feeding, the order of administering food, the number of meals, and the type of food consumed by mothers. The programs included training methods such as lecturing, question and answer sessions using training materials such as whiteboard and pamphlets. The control group received none training programs.

Outcome measures

At baseline, the participants in the two groups were interviewed by a researcher made questionnaire. The questionnaire provided information on the infants' age, sex, record of vaccination, their status in terms of being wanted or unwanted child, the age gap between the infants and their previous sibling, the health of infants, age of starting complementary feeding, the first type of food administered in the complementary feeding period, parental education, parental occupation, etc.]. The content validity of the questionnaire was evaluated by 10 faculty members.

The reliability of the questionnaire was assessed through test-retest method based on which 20 mothers of 4 to 12-month-old infants who did not participate in the main phase of the study were given the questionnaire and after two weeks, the entire process was repeated with the previous participants. In general, the questionnaire was acceptable and enjoyed high reliability.

After conducting the intervention in three months follow up, anthropometric measures including the body weight, height and head circumference were assessed in the two groups. The body weight of infants was measured using the SECA height measuring systems and scales made in Germany with an accuracy of 10 grams for weight. The control weight of 500 grams was used for the reliability of the scale. To measure infants' head

circumference, the tape measure was used and the height of infants lying down from head to heels was measured at the beginning of the study.

Statistical analysis

The paired t-test was used to compare the mean scores of each group before and after training and an independent sample t-test was used to compare the mean of changes of the two groups before and after training. To control the effect of potential confounding factors, ANCOVA was used. The significance level of less than 0.05 was considered. SPSS version 21 was used to analyze the data.

RESULTS:

Each group included 135 participants as the sample size. Due to succumbing to diarrhea and pneumonia and failure to complete the questionnaire, 10 participants from the experimental group and 10 from the control group were omitted. Finally, the data analysis was conducted on 250 participants.

The analysis of descriptive proportion of illiterate or self-employed parents in the intervention group is higher than in control groups. The proportion of types of infant's nutrition and onset time of complementary feeding in both groups was relatively equal [Table 1].

Table 1: Descriptive characteristics of participants

Variables	Intervention group [n=125]	Control group [n=125]
Mother's age	29.4 [6.8]	31.5 [6.9]
Mother's education		
Illiterate	16 [12.8]	4 [3.2]
Primary	11 [8.8]	15 [12]
High school diploma	17 [13.6]	24 [19.2]
Bachelor	37 [29.6]	30 [24]
master	40 [32]	50 [40]
	4 [3.2]	2 [1.6]
Father's education		
Illiterate	15 [12]	7 [5.6]
Primary	14 [11.2]	12 [9.6]
High school diploma	9 [7.2]	14 [11.2]
Bachelor	35 [28]	37 [29.6]
master	45 [36]	51 [40.8]
	7 [5.6]	4 [3.2]
Father's employment		
Employee	41 [32.8]	49 [39.2]
Working	19 [15.2]	21 [16.8]
Self-employment	61 [48.8]	54 [43.2]
Unemployment	4 [3.2]	1 [0.8]
Mother's employment		
Employee	26 [20.8]	25 [20]
Working	8 [6.4]	1 [0.8]
Self-employment	91 [72.8]	12 [9.6]
Unemployment	-	87 [69.6]

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Type of infant's nutrition

Breast milk	92 [73.6]	93 [74.4]
Milk powder	16 [12.8]	19 [15.2]
Breast milk and milk powder	17 [13.6]	13 [10.4]

Onset of complementary feeding

Under 4 months	5 [4]	1 [0.8]
4 to 6 months	49 [39.2]	44 [35.2]
6 to 9 months	53 [42.2]	59 [47.2]
9 to 12 month	1 [0.8]	2 [1.6]
Not logged in	17 [13.6]	19 [15.2]

Data indicates that before the training program, the average weight of the intervention group was $1246 \pm 8347 \pm 1246$ grams and the control group was 8457 ± 1306 grams. After the training intervention, the average weight of the intervention group was 9657 ± 1172 grams and the control group was 9357 ± 1274 grams. The paired t-test shows that before and after the intervention, there was a significant difference between the two groups in terms of weight [$P < 0.001$]. After training, the mean of body weight changes in the intervention group was 1309 ± 602 grams and in the control group was 899 ± 479 grams [Figure 1]. Based on the independent samples t-test, body weight changes after the training intervention compared to before the training had significantly increased [$P < 0.001$].

Before training, the average height in the intervention group was 69.9 ± 4.73 cm and was 70.76 ± 4.86 cm in the control group. After the training intervention, the average height in the intervention group was 74.3 ± 4.12 cm and was 74.90 ± 4.10 cm in the control group. The paired t-test shows that there is a statistically significant difference between the two groups in terms of height before and after the intervention [$P < 0.001$]. The changes in average height after the training program in the intervention group was 4.69 ± 1.9 cm and was 4.13 ± 2.02 cm in the control group [Figure 2]. According to the independent samples t-test, changes in height after the intervention are statistically significant [$P = 0.025$].

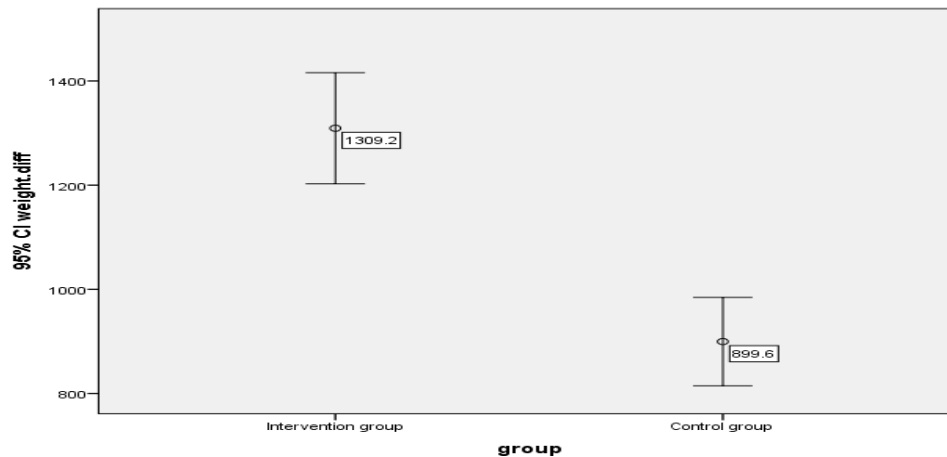


Fig 1: Body weight changes in both intervention and control groups

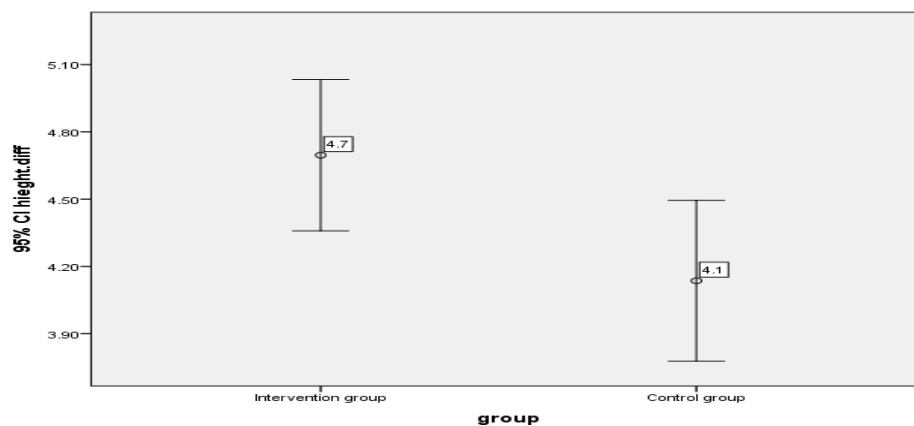


Fig 2: Height changes in two intervention and control groups

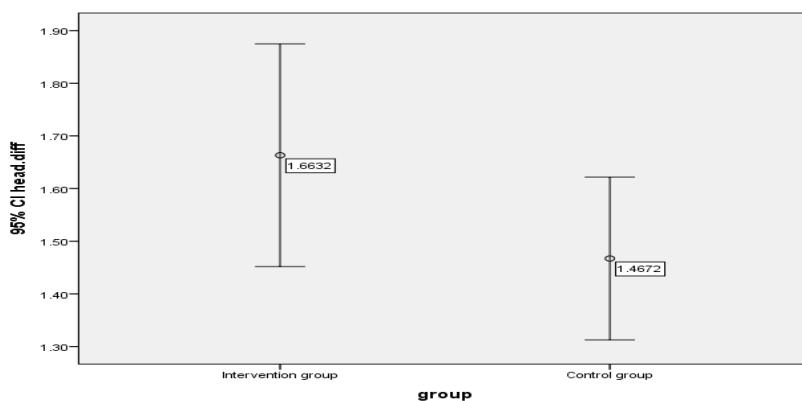


Fig 3: Head circumference changes in both intervention and control groups

Before training, the average head circumference in the intervention group was 44.09 ± 2.32 cm and was 44.27 ± 1.97 cm in the control group. After the intervention, the average head circumference in the intervention group was 45.7 ± 2 cm and was 45.74 ± 1.55 cm in the control group. The paired t-test shows that before and after the intervention, the means of head circumference of both groups were statistically significant [$P < 0.001$]. The average changes in the head circumference after the training in the intervention group was 1.66 ± 1.19 cm and in the control group was 1.46 ± 0.837 cm [Figure 3]. In line with the independent samples t-tests, changes in the head circumference after the training intervention, despite some increases, is not statistically significant [$P = 0.140$].

DISCUSSION:

The present study suggests that training may increase the infants' body weight and height in the training group so that, compared with baseline, the body weight, height and head circumference significantly increased more in the intervention group than in the control group, but changes were statistically significant for body weight and height. The growth and development of infants include several stages such as tissue formation, enlargement of organs, increased strength, and muscle control; thus, the recognition of natural growth and development of infants can help us to identify any deviations from normal patterns [17]. If developmental delay occurs, the growth of infants would be less than the expected and normal rate based on the body weight, height, and head circumference curve for their age and sex. The most important reason to measure the growth failure is weight loss [sometimes both weight and height], which occurs when infants' body weight on admission falls below the third percentile. Undoubtedly, it is important to pay much attention to percentile changes over time [18].

The quasi-experimental study by Vitolo *et al* confirms the present study results. They note that there is a statistically significant difference between body weight and height of experimental and control groups after the training intervention

[16]. Bandara *et al* scrutinize the effect of feeding practices of 6 to 12 months infants on their growth and concluded that the growth indicators and awareness of complementary feeding in the case group research was not satisfactory ; thus, healthcare centers personnel should identify poor nutritional factors to improve the children's feeding patterns [19]. According to the study of Kulwa *et al* which determines the effectiveness of the nutrition education package in improving feeding practices, dietary adequacy, and growth of 6 to 15 months infants shows that performing a training process leads to the growth of length-for-age and weight-for-length [20]. In a quasi-experimental study by Babazade *et al* to show the effect of educational intervention on the empowerment of mothers on proper nutrition for children in Tehran, the results show that educational interventions increase the awareness, improve the attitude, and change the behavior of the trained group [2]. Moreover, in a bid to confirm the results of the current study, Alidosti *et al* conducted a study in the city of Shiraz in 2003 to determine the effect of mothers' training on complementary feeding and developmental skills in the growth and development of 5-7 months infants. They found that training on complementary feeding for lead to an increase in the infants' body weight [21].

Our study has some strengths and limitations. The major strength of present study is related to efficient design of our study and on the other hand, our sample size was statistically large in order to detect small differences between two groups. The main limitation of current study is the short follow up time so that, in a repeated measure trial, the true and long term effect of training programs on anthropometric measure can be determined.

CONCLUSION:

In conclusion, the results of the current study show that mothers' training on complementary feeding affects the infants' body weight and height, but does not affect their head circumference. It should be noted that a long-term complementary feeding training may affect infants' head circumference, so further long-term studies are necessary to discover

the intricacies of this phenomenon. It is also recommended to assign group training programs in healthcare centers to increase the growth indicators and improve the health of infants.

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