

The Effect of Mothers Training via Newsletter and Group Discussion on the Energy Intake of Preschool Children

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ABSTRACT

Background & aim: Mothers' training about suitable nutritional models plays an important role in the development of children's nutritional habits. These habits may continue into adulthood and promote the individual's lifestyle. In the present study, we aimed to compare the effects of mother's training via newsletter and discussion group on energy intake of preschool children.

Methods: This experimental study was performed on 192 mothers of preschool children. The convenience method of sampling was employed, and the subjects were randomly assigned to three groups: group discussion, newsletter, and control group. In the newsletter group, the subjects received newsletters over 4 weeks. In the discussion group, subjects were trained about the same educational content, as the newsletter group, in 1-hour classes for a total of 4 weeks; the control group received no intervention. Data collection was carried out before, immediately, and one month after the interventions, using questionnaires to measure maternal knowledge and children's dietary intake. Data were analyzed using SPSS version 16 with ANOVA, Kruskal-Wallis, and Friedman tests.

Results: Energy intake was similar before intervention in three groups. Immediately after intervention, no significant difference was observed between newsletter (5.7±2.10) and discussion group (0.8±2.10); however, it was significantly higher, compared to the control group (P=0.015). After one month follow-up, no significant difference was observed between newsletter (5.7±2.10) and discussion group; but the energy intake in both groups was significantly higher than the control group (P=0.003).

Conclusion: The study results showed that training via newsletters and group discussion has the same effect on children's energy intake. Therefore, it is recommended to use newsletter as an effective and simple alternative educational method.

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Introduction

Developing countries are undergoing an epidemiological and nutritional transition. Rapid changes in lifestyle toward unhealthy dietary patterns are accompanied by decreased physical activity and increased smoking habits;

these changes are also known as 'Lifestyle Syndrome' or 'New World Syndrome'.

The communities' vulnerability to non-communicable diseases is likely to increase in the coming years (1). Contrary to popular belief, this problem has affected both developed and developing countries, and has rapidly increased

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in third world countries, particularly in urban regions (2, 3).

High prevalence of malnutrition is associated with poverty. On the other hand, the increasing rate of chronic diseases such as cardiovascular diseases, obesity, hypertension, and other non-infectious diseases is related to lifestyle changes, high-energy diets, and overeating (4).

In 1997, World Health Organization (WHO) introduced obesity as an increasing common problem in many countries (5). In the past, weight gain and obesity only affected adults; however, over the past two decades, we have witnessed the increasing prevalence of these problems among children (6). Obesity has had a 2-fold increase among children and overweight rate has tripled among adolescents. Overweight and obesity have been reported in children of all races, ethnicities, and socioeconomic classes (7).

Almost 70% of malnourished children live in Asia, and there is a high prevalence of underweight in South Asia (8). Similar to other developing countries, we can see a rapid nutritional transition, urbanization, and lifestyle changes in Iran (9). Risk of conditions such as overweight, obesity, and cardiovascular diseases in children and adults will increase if no preventive measures are taken (10). WHO in 1998, by monitoring cardiovascular diseases, reported that Iran is one of the seven countries with the highest prevalence of childhood obesity (11).

Today, malnutrition is another growing problem among children. Malnutrition is defined as low intake of energy, fruits, vegetables, calcium, and dietary fiber; it also refers to a condition arising from unbalanced and excessive intake of nutrients (12). Underweight is a key indicator of a country's move towards millennium development goals. According to previous reports, more than a quarter of children, aged less than 5 years, are underweight. Prevalence of underweight is 26% in developing countries and 40% in South Asian regions (it is highly prevalent in developing countries).

In Iran, prevalence of malnutrition in children, aged 2-5 years, has improved over the last decade. The prevalence of underweight in Iran seems to have decreased since 1995 until 1998 and 2001; in fact, according to WHO classification, Iran is now classified among low-prevalence countries. However, rapid change of

dietary habits encumbers the achievement of millennium development goals, particularly stunting reduction, which requires improved living standards and high nutritional quality (13).

One of the most important goals of dietary promotion is achieving a healthy balance in the nutritional intake of children (14). Appropriate dietary patterns are of critical importance during childhood, and eating behaviors are directly affected by child-family interactions and family lifestyle (15).

Given the importance of mother's role in the development of healthy eating habits, her knowledge about suitable nutritional plans can significantly affect the child's eating behaviors (16-18). In addition, mother's nutritional education raises the awareness of other family members, and indirectly affects the eating habits of the family (19).

Children's health contributes to the stability of a society if health programs are properly implemented (20). Studies in developing countries have even shown a higher mortality rate among children whose mothers were inadequately informed about nutritional habits (21).

One of the most useful methods of teaching is group discussion, during which new ideas are evaluated and different attitudes are expressed. The basic principle of group discussion is sharing ideas, experiences, and knowledge. People can also influence the values and beliefs of other people during these sessions.

However, this method requires skills, experience, patience, and resourcefulness. Lack of facilities, equipments, and efficient work force, as well as discontinuation and lack of educational programs (supported by medical education authorities), are other limitations of this method (22, 23).

In addition, development of communication technology and various tools and methods has facilitated communication and use of media among people. Approaches toward education, training, and media (as a means of education) have changed over the years. One of the most important components of educational systems is learning approaches (22, 24, 25). Social media including printed materials is an important source of health information for learners. Newsletters, by providing a wide range of

information for the learners, are one of the tools, which can help individuals meet their personal learning goals. In fact, they can also provide an opportunity for illiterate people to learn new materials via pictures (and help of others) (22, 26).

According to the findings of various studies, parents prefer home-based learning to workshops (27, 28). In fact, home-based learning materials can change the knowledge, attitude, and behavior of people if prepared properly. Although this method of learning has several advantages, it is not without pitfalls; for instance, learners prefer face-to-face communication and immediate feedback, which are lacking in home-based learning. Unfortunately, considering the lack of home tutors, it is not possible for learners to be actively involved in the process of learning, receive feedback, and correct the probable mistakes; thus, learners are not able to achieve their educational goals (24).

Previous studies have mentioned nutritional education as the first measure of disease prevention. Unfortunately, no studies have been conducted on preschoolers in this regard. Also, no research has focused on the comparison between the effects of maternal training via newsletter and group discussion on energy intake of preschoolers. Therefore, this study aimed to compare the effects of maternal training via newsletter and group discussion on the energy intake of preschool children.

Materials and Methods

This experimental study included 192 mothers of preschool children (aged 3-6 years), who were referred to healthcare centers of Mashhad in 2011. Ethical permission for conducting the study was granted by the ethics committee of Mashhad University of Medical Sciences.

Two healthcare centers of Mashhad were selected via purposeful sampling. Then, based on the sample size estimation, 192 mothers were selected by easy sampling. The inclusion criteria were as follows: 1) consent to participate in the study, 2) minimum educational level, 3) living with the spouse (an employed husband); 3) mental health; 4) not being a graduate student of medical sciences; and 5) having 3-6-year-old breastfed children (not attending kindergartens) with normal physical growth,

without any systemic diseases or major organ failures.

The exclusion criteria were as follows: 1) chronic diseases in children; 2) drugs affecting mother's appetite or the infant; 3) undergoing surgery; 4) moving houses; 5) mother's absence from group discussions; 6) receiving no more than one newsletter; 7) mother's absence from one of the three tests; and 8) family's unwellness to continue the study.

Data collection tools included maternal nutritional knowledge and dietary questionnaires. The researcher-made questionnaire related to maternal nutritional knowledge consisted of 20 questions to determine mothers' weaknesses in child nutrition. The validity and reliability of the questionnaire were confirmed via content validity and internal consistency, using Cronbach's formula, respectively ($\alpha=86\%$).

The nutritional habit questionnaire was designed by the nutrition department of Mashhad University of Medical Sciences, and evaluated the adults in terms of child nutrition. The questionnaire was validated according to nutritional habits of Mashhad residents. The average rate of food intake in 3-6 year-old children (after reading the latest literature, consulting with faculty advisors, and conducting interviews with 50 women residing in Mashhad) was determined and the reliability of the questionnaire was confirmed by test-retest ($r=82\%$).

The dietary questionnaire was a semi-quantitative questionnaire about child nutrition, which was completed by mothers according to the daily food intake of children in the past three days. The questionnaire included four main columns: food, frequency of child food intake, moderate size of food intake (based on body weight), and the amount of food per meal.

The data were gathered in forms by the researcher, and then analyzed by FFQ software. Energy intake was calculated for each child according to food intake, and the software compared the values with the normal rate (90 kcal of energy per day, based on body weight). Then, children were scored based on their food intake: score 10: 15% more or less than the normal intake; score 5: 20% more or less than the normal intake; and score 0: not more or less than %20 of the normal intake.

This study aimed to educate the mothers in terms of child nutrition so that they could choose the best and most balanced diet for their children (including five major food groups necessary for the child, based on his/her need for meals and snacks). The mothers were trained to establish healthy eating habits for children, eliminate junk food from their daily diet, use available food supplies, and interact properly with children, while eating.

In the first session, demographic characteristics of mothers and children were collected and energy intake of children was recorded by mothers in the questionnaires. Before training, a test was designed to assess mothers' nutritional knowledge and determine their weaknesses; the educational content of each training session was based on the performed test.

After sampling, the subjects were randomly divided into three groups: discussion, newsletter, and control groups. The discussion group participated in one-hour sessions per week (for a 4-week period); the newsletter group weekly received newsletters via mail, over a 4-week period, and the control group received no formal training.

The discussion group included 10-15 participants, and the sessions were held for four consecutive weeks in classrooms at the health-care centers; the classes were managed by the researchers. The content of materials was determined by the pre-intervention test of mothers' nutritional knowledge. Assessment of mothers' learning was performed by comparing the nutritional knowledge questionnaires before and after training.

The content of newsletters was confirmed via content validity. The mothers received four color-printed newsletters in three pages, sent by mail over 4 weeks. By using maternal nutritional knowledge and dietary questionnaires, data were collected during three periods: pre-intervention, post-intervention, and follow-up (one month after the intervention) phases.

After excluding 23 mothers (due to meeting the exclusion criteria), statistical tests were performed on 169 participants (57 subjects in the discussion group, 56 subjects in the newsletter group, and 56 participants in the control group), using SPSS version 16. Kolmogorov-Smirnov and Shapiro-Wilk tests were performed

in order to determine if the variables were normally distributed. The data were described with measures of mean, standard deviation, and frequency distribution. Kruskal-Wallis, Chi-square, Fisher's exact test, two-way ANOVA, and Friedman test were also performed.

This study was in compliance with all ethical considerations, and the control group was provided with the training materials after the interventions; also, mothers and children were referred to healthcare centers if they had any diseases.

Results

The children were within the age range of 3 to 6 years (mean age of 4.9 ± 1.0 years). Most children (57.1%) were at the 50th percentile for weight, and 17.0% and 9.25% of children were above the 75th and below the 25th percentile, respectively. In terms of height, majority of children (70.0%) were at the 50th percentile, 10% were above the 75th percentile, and 20% were below the 25th percentile.

Most of the mothers were housewives (57.7%) and had university education (50.9%).

Pre-intervention maternal nutritional knowledge score was 11.2 ± 9.8 (of 20). The scores significantly increased after the intervention in the newsletter (16.5 ± 1.4) and discussion (16.6 ± 1.3) groups ($P=0.001$); however, no difference was observed in the control group. The mothers' main source of knowledge was self-training in 55.6% cases.

Mothers' body mass index (BMI) measurements showed that 21.3% of them were overweight and 18.3% were obese. Energy intake before the intervention was similar among the groups (4.2 ± 7.1 , 2.9 ± 5.6 , and 4.5 ± 7.5 in the discussion, newsletter, and control groups, respectively). Energy intake after the intervention was 10.2 ± 8.0 in the discussion group and 10.2 ± 7.5 in the newsletter group; there was no significant difference between these two groups, although the scores were significantly higher than the control group (5.9 ± 8.2) ($P=0.015$).

Energy score during the follow-up was 10.4 ± 7.6 in the discussion group and 10.2 ± 7.8 in the newsletter group, which was not signifi-

Table 1. Average energy intake in children before, immediately after, and one month after the intervention in discussion, newsletter, and control groups

Children's energy intake	Group						Kruskal-Wallis test results
	Discussion		Newsletter		Control		
	Mean± standard deviation	N	Mean± Standard deviation	N	Mean± standard deviation	N	
Pre-intervention phase	4.2±7.1	57	2.9±5.6	56	4.5±7.5	56	P=0.54 df=2
Post-intervention phase	10.2±8.0	57	10.2±7.5	56	5.9±8.2	56	P=0.015 df=2
One month after the intervention	10.4±7.6	57	10.2±7.8	56	5.7±8.1	56	P=0.003 df=2
Friedman results	x ² =19.3 df=2 P<0.05		x ² =0.000 df=2 P<0.05		x ² =0.282 df=2 P=0.282		

cantly different. However, compared to the control group (5.7±8.1), the scores were significantly higher (P=0.003). Also, comparison of mean energy intake by Friedman test showed a significant difference in the discussion group in pre-intervention, post-intervention, and follow-up (one month after the intervention) phases (P<0.05).

Friedman test showed a significant difference in the newsletter group in three stages of pre-intervention, post-intervention, and follow-up (P<0.05).

In addition, comparison within the group showed no significant difference in three stages (pre-intervention, post-intervention, and follow-up phases) (P=0.282) (Table 1).

Two-way ANOVA test results showed that average energy intake was not significantly associated with BMI, education level, occupation, or knowledge of mothers; also, there was not a significant difference between the mean score of children's energy intake and age, sex, weight, or height percentile. However, the energy intake of children and father's occupation were significantly associated (P=0.410); in fact, energy intake in children, whose fathers were self-employed (1.8±4.9), was higher than that of children, whose fathers were workers, employees, or retirees (3.5±4.2).

Discussion

The lowest rate of energy intake in children was observed in the pre-intervention phase (3.9±6.8) (20), which was related to unhealthy dietary habits. The mean daily energy intake of 700-800 calories was higher than the recommended intake, based on children's weight; this might be due to the consumption of

low-value, high-energy beverages and foods such as chips, cookies, sweets, and French fries.

Our study results were similar to those of Bridge et al. (2010), Birch & Wang et al. (2010) and Wang et al. (2009) (29, 30, 31). Although most of the mothers in this study had university education, children's energy intake was low and the maternal nutritional knowledge was insufficient. This indicates that women of all levels of education require training in terms of child nutrition.

In the current study, the mothers' nutritional knowledge and children's energy intake in the intervention groups (both newsletter and discussion groups) significantly increased, compared to the control group. Garg and Kashyap (2006) in their study showed that counseling and nutrition-related education can significantly improve the knowledge of Indian mothers about energy intake (P<0.001) (32). Since a combination of education and counseling is more effective, the obtained results of the mentioned study were not far from expectation.

Anderson and colleagues (2005), by training Scottish school children and parents via newsletters, reported no changes in energy intake of children, according to 3-day dietary records (33). This result might be related to the educational goal of the mentioned study, which aimed to increase fruit and vegetable consumption in a longer follow-up period (9 months). In addition, the mean age of children was different from that of the current study. In fact, in Anderson's study, friends influenced the dietary habits of children in this age group.

Vydga and Lewis (1999) concluded that nutritional education during pregnancy can cause a significant increase in total energy intake (431.2-269.2 kcal, P<0.05) in bread and

grain group (4.1 ± 4.3 to 5.1 ± 1.4 units per day) (34). Tarsi and colleagues (2000) showed that after training, there was not a significant change in energy intake among pregnant Thai women (35); these variations in the results might be related to differences in cultural and economical conditions.

The results of this study indicated that in the newsletter and discussion groups, mothers have the same impact on children's energy intake. Few studies have focused on the comparative evaluation of classroom and home-based learning. Boraz et al. (2007) stated that learning via lectures and home-based learning is equally effective in quality of life and physical problems of hemodialysis patients (36). Vaez-Zadeh et al. (2002) also reached a similar conclusion with regard to learning breast self-examination (37).

In addition, Karimi (2010) stated that face-to-face training and learning via video clips are equally effective in increasing compliance with dietary habits in patients undergoing hemodialysis (38). The study of Momeni and Malekzadeh (2001), which aimed to compare the effects of lectures and pamphlets on nutritional and health knowledge, showed that lecture and pamphlet groups were significantly different from the control group; however, no significant difference was observed between the pamphlet and lecture groups (39). The results of these studies demonstrated the effectiveness of face-to-face and home-based learning; however, home-based learning, which is preferred by mothers, is more simple and cost-effective.

In this study, father's occupation and energy intake were significantly related ($P=0.041$). Energy intake scores of children, whose fathers were self-employed, were higher than those whose fathers were workers, employees, or retirees; this association might be related to family income. In a study by Sadat Hossain et al., there was no significant relationship between father's occupation and child's nutritional quality (19). In other studies, this association has not been addressed, but the relationship between income and nutritional quality has been established. In this regard, Kearns et al. studied the overall quality of preschool children's diet, and indicated that higher family income was related to higher nutritional health (40).

In addition, in the study by Larson and Stewart (2009), the lower-income group had a less healthy diet; obesity and diet-related diseases were also more prevalent in this group (41). The results of this study showed no significant relationship between maternal education level and children's energy intake, which was similar to that of the study by Sadat Hosseini et al. (19). Contrarily, Vereecken's study (2004) showed that children of parents with higher education consume more fruits and vegetables, although eating sweets and high-sugar beverages was more prevalent among these children (42).

Bridge et al. in their study showed that children of mothers with high school education or less consumed more red meat and saturated fat; this was due to the consumption of fatty meat and milk. On the other hand, BMI of children, whose mothers were more educated, was higher than that of children whose mothers were less educated. In fact, working mothers (with higher education level) have less time to provide healthy food for their children, while mothers with less education are normally housewives and have more time to cook (29).

One of the limitations of this study was lack of physical activity measurement. However, by excluding hyperactive children and selective assignment of groups, the two intervention groups were matched in terms of physical activity.

Conclusion

The findings of this study showed that maternal training in discussion and newsletter groups similarly affected children's energy intake. Therefore, given the easy use of newsletters, it is recommended that newsletters be used as effective and simple educational materials for preschool children.

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Conflict of Interest

The authors declare no conflicts of interest.

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