Research Paper

The Effect of a Nutrition Education Program on Learning During Pregnancy: Comparing Group Discussions and Multimedia Methods

Mahdi Moshki[1,2], Seyede Khadije Seyedesani[1*], Khosro Shafaghi[3], Samaneh Najafi[4]

1. Department of Health Education and Health Promotion, School of Health Sciences, Gonabad University of Medical Sciences, Gonabad, Iran.
2. Social Determinants of Health Research Center, Gonabad University of Medical Sciences, Gonabad, Iran.
3. Technology Incubator Center for Herbal Medicine, Medical Equipment Research Centers, Gonabad University of Medical Sciences, Gonabad, Iran.
4. Department of Medical Surgical Nursing, School of Nursing, Social Development and Health Promotion Research Center, Gonabad University of Medical Sciences, Gonabad, Iran.

Use your device to scan and read the article online

Citation Moshki M, Seyedesani SK, Najafi S. The Effect of a Nutrition Education Program on Learning During Pregnancy: Comparing Group Discussions and Multimedia Methods. Journal of Research & Health. 2022; 12(2):103-112. http://dx.doi.org/10.32598/JRH.12.2.3.7

http://dx.doi.org/10.32598/JRH.12.2.3.7

Article info:
Received: 23 Oct 2021
Accepted: 24 Jan 2022
Publish: 01 Mar 2022

Keywords:
Pregnancy nutrition, Educational program, Learning, Group discussion, Multimedia

ABSTRACT

Background: The prerequisite of effective nutrition intervention is an appropriate education. This study aimed to evaluate the effectiveness of nutrition education based on discussion and multimedia in the learning of pregnant women.

Methods: This randomized educational trial was conducted on 174 pregnant women in Gonabad City, northeast Iran. The study participants were randomly assigned into three groups (58, 57, and 59 women in the multimedia group, discussion group, and control group, respectively). The demographic information form and assessment of learning questionnaire were completed before the study for all three groups. In the intervention group, training was based on the discussion and multimedia packages. Multimedia packages were given to mothers in the intervention group for 2 weeks. In the discussion group, mothers were divided into subgroups of 8 to 12 members, and educational subjects were presented over three 90 min sessions. One month after the intervention, a post-test was administered to all groups.

Results: The mean gestational ages in the multimedia group, discussion group, and control group were 9.66, 9.54, and 9.40 weeks, respectively. The results showed that the difference between the multimedia and discussion groups ($P<0.001$) regarding the cognitive scores was significant before and after the intervention. There were significant differences between groups regarding affective domain scores before and after the intervention ($P=0.03$).

Conclusion: The effectiveness of multimedia learning in the cognitive domain and discussion in the affective domain was confirmed. Therefore, it is recommended to use innovative and effective methods such as multimedia packages for educating pregnant women.

*** Corresponding Author:**
Khadijeh Seyedi
Address: *Department of Health Education and Health Promotion, School of Health Sciences, Gonabad University of Medical Sciences, Gonabad, Iran.*
Phone: *+98 (51) 57225027*
E-mail: *khadijesayede@yahoo.com*

1. Introduction

Pregnancy, as a special period in the life of mothers, is characterized by increased nutritional needs [1]. Physical and physiological changes during pregnancy may interrupt the intake of nutrients [2-4]. The health status of pregnant women came under the spotlight when it was reported that 8% to 10% of babies were born with low birth weight [5-7]. Maternal and infant health is one of the priorities of public health projects in 2020 [8]. Preventing the effects of malnutrition on mothers and infants is the safest way to ensure their health [9]. Recent research suggests that heart disease, hypertension, diabetes, and other disorders result from defective fetal and infant growth and development [10]. Studies on the nutritional status of pregnant women in rural and urban areas suggest their improper intake of food groups [11]. Previous research suggests that the daily nutrient intake of pregnant women is similar to non-pregnant women, and little attention is paid to the special dietary requirements of pregnancy [12].

Extreme nutrient constraints in the first trimester of pregnancy can lead to growth retardation, abnormalities, or fetal death. The first trimester of pregnancy is a sensitive age for forming vital organs, including the brain, heart, and kidneys. On the other hand, the prevalence of nutritional problems during this period, such as morning sickness, heartburn, nausea, and vomiting, highlights the importance of mothers' receiving more training in proper nutrition [13].

Modifying nutrition behaviors and increasing the level of knowledge, attitude, and practice of mothers at the beginning of pregnancy is part of the risk reduction strategy [14]. The first trimester of pregnancy is an apt time to change nutrition behavior because, during this period, mothers seek nutritional information for various reasons [15, 16]. This opportunity can be grasped to raise public awareness about nutrition, which can influence the nutritional behavior of mothers and their families in the future. Given the positive direct or indirect effect of improving nutritional behavior on pregnant women and the nutritional status of society, even the low impact of interventions aimed at improving nutrition during pregnancy can be economically effective and essential. Several studies have shown a lack of awareness about the nutritional requirements of pregnancy among pregnant women [17]. Anjomshoa and Dehghan [18] and Kapil et al. [19] reported that pregnant women are poorly informed about the proper diet for optimum weight gain.

Together with raising the family's nutritional knowledge, especially mothers, education serves as one of the major strategies incorporated in the development program to improve the nutrition status of society. In their educational study, Amirmolaei et al. discovered significant differences between the intervention and control groups regarding maternal nutritional behavior [20].

The effectiveness of nutrition intervention is mainly dependent on adopting a proper method of education. The education program can be delivered by lectures, face-to-face dialogue, group discussions, audiovisual materials, videos, and online sources. Researchers have shown a statistically significant difference between face-to-face and distance education in the first 6 months of pregnancy [21]. In the same vein, some researchers demonstrated a significant difference in mean awareness scores in subjects attending workshop and booklet groups [22].

Multimedia as a form of distant education has contributed to the increasing development of education in recent decades. Multimedia comprises three features of screen, image, and sound. In multimedia, all functionalities are utilized to produce software, and various educational concepts are taught interactively to the audience in an appealing atmosphere [23-25].

The group discussion is a valuable learning method among conventional educational methods, in which participants are given equal opportunity to express their ideas and exchange thoughts freely. This method is a kind of collective thinking process for problem-solving. In a group discussion, the personal and social skills of participants are fostered, and their perception, thinking, and learning ability, as well as retention of content in mind, are increased [26-28]. Further, it allows learning content in three cognitive, affective, and psychomotor domains [29].

Given the importance of nutrition during pregnancy, the effect of teaching behavior modification programs on pregnant women is investigated. The intervention based on these methods plays a vital role in encouraging healthy behavior and preventing maternal malnutrition. This study attempts to compare the effect of a nutrition education program on learning among Iranian pregnant women using multimedia and group discussion teaching method.

2. Methods

Study design and participants

This study was a randomized educational trial. The study participants included 174 pregnant women at-

tending urban health centers in northeast Iran. Based on information recorded in the registration sheet of pregnant women and the inclusion criteria, the samples were randomly selected by stratified sampling method. Since there were three health centers (all existing centers), the selection of the participants in each center was performed randomly.

After obtaining written informed consent, the mothers were randomly allocated to the intervention and control groups. Considering a similar study [30], a sample size of 50 was initially determined for each group. Nevertheless, given the likely dropout of participants, 60 participants were allocated to each group. The inclusion criteria were defined as follows: be at 6 to 10 weeks of pregnancy, have access to multimedia content at home, no participation in any other training or healthcare program related to nutrition in pregnancy during the study, have basic literacy, and no experience of stressful events during the last two months. The exclusion criteria were as follows: having intense cravings for a particular food, suffering from a specific disease under treatment by a prescribed regimen, irregular participation in training and educational programs, lack of participation in the follow-up, and exposure to a stressful event during the study. Stressful life events are those events that cause changes in the pattern of life or an individual's behavior, lead to a lack of trust in the person, and cause uncertainty. Events such as job change or loss, immigration, the death of a close relative or family member, accidents, and natural disasters such as floods and earthquakes. Finally, three participants in the multimedia group were excluded from the trial due to irregular attendance in sessions, one in the control group due to the incidence of stress events, and two in the control group withdrew from the study. Finally, 59 participants remained in the multimedia group, 57 in the discussion group, and 58 in the control group.

Study instruments

The research instrument was a self-administered questionnaire in two parts: demographic information and learning assessment. The first part was designed to gather demographic information such as age, gestational age, level of education, job, spouse's job, and income level. The second part assessed women's knowledge about nutrition during pregnancy. Items were divided into cognitive (6 items), affective (6 items), and psychomotor (5 items) domains. Items were designed using recently-published texts and articles in the field of nutrition during pregnancy. The cognitive items aimed at assessing maternal knowledge in relation to dos and don'ts of nutrition, such as intake of supplements, average weight gain in pregnancy, and morning sickness. Total scores in the cognitive domain ranged from 0 to 6. A higher score indicates higher knowledge. Items in the affective domain explored mothers' attitudes toward the importance of consuming food groups and supplements during pregnancy and observance of an appropriate diet. These questions were answered on a 5-point Likert scale, including "strongly agree," "agree," "neither agree nor disagree," "disagree," and "strongly disagree." Total scores in the affective domain ranged from 6 to 30. The items in the psychomotor category addressed measures taken by mothers to tackle problems such as urinary tract infection, heartburn, and regular intake of supplements during pregnancy. Items in the psychomotor domain were reported based on the frequency of each action.

Content Validity Ratio (CVR) and Content Validity Index (CVI) were used to measure the content validity of the questionnaire. For this purpose, the research instrument was evaluated by 10 gynecologists, obstetricians, midwives, health education specialists, physiologists, and nutritionists, and their comments and feedback were regarded to optimize the questionnaire. Based on the results of content validity, CVR and CVI were obtained at 0.75 and 0.98, respectively. To assess the reliability, the test-retest method and the Cronbach α coefficient were applied. In the test-retest method, the self-administered questionnaire was completed by 10 pregnant women before the study and then 2 weeks after the study. Regarding the Cronbach α coefficient, the questionnaire was filled out by 30 women. The Pearson correlation coefficient computed for the total questionnaire in the test-retest method (r=0.80) and the Cronbach α coefficient (r=0.86) confirmed the reliability of the questionnaire.

Data collection

Grouping and supplementing tools for both groups were prepared. The syllabus was developed, and the multimedia package was designed in the form of Auto player software version 2.8, following the collection of educational films, books, and slides. After obtaining permission from the medical universities and coordinating with medical health centers, training sessions were organized. In the first meeting held in medical centers, the pretest questionnaire was distributed among 3 groups of women. At the end of the session, mothers in the multimedia group received educational DVDs. After providing guidelines on how to watch the DVDs to mothers, they were taught about the time of studying each subject with respect to intervals between training sessions. For example, two topics should be studied during the first three days. Multimedia DVDs were given to mothers for

2 weeks. Mothers in the discussion group were divided into subgroups of 8 to 12 members, and educational subjects were presented over three 90-min sessions. Educational nutrition topics during pregnancy were included in both multimedia and discussion groups. These topics were main food groups for pregnant women, principles of proper nutrition in pregnant women, food pyramid, necessary nutrients and supplements during pregnancy and breastfeeding, changing eating habits, and recommendations regarding the most common pregnancy complaints. According to the same articles [31-33] and recommendations of the experts, one month after the intervention, a post-test was administered to three groups. All groups received routine prenatal care (Figure 1).

Data analysis

Finally, data were analyzed using SPSS software, v. 16. For data analysis, descriptive statistics (Mean±SD, Relative Frequency, and Percentage) and inferential statistics (the Fisher exact test, Chi-square, Wilcoxon signed-rank test, McNemar's, and ANOVA) were performed. P values less than 0.05 were considered statistically significant.

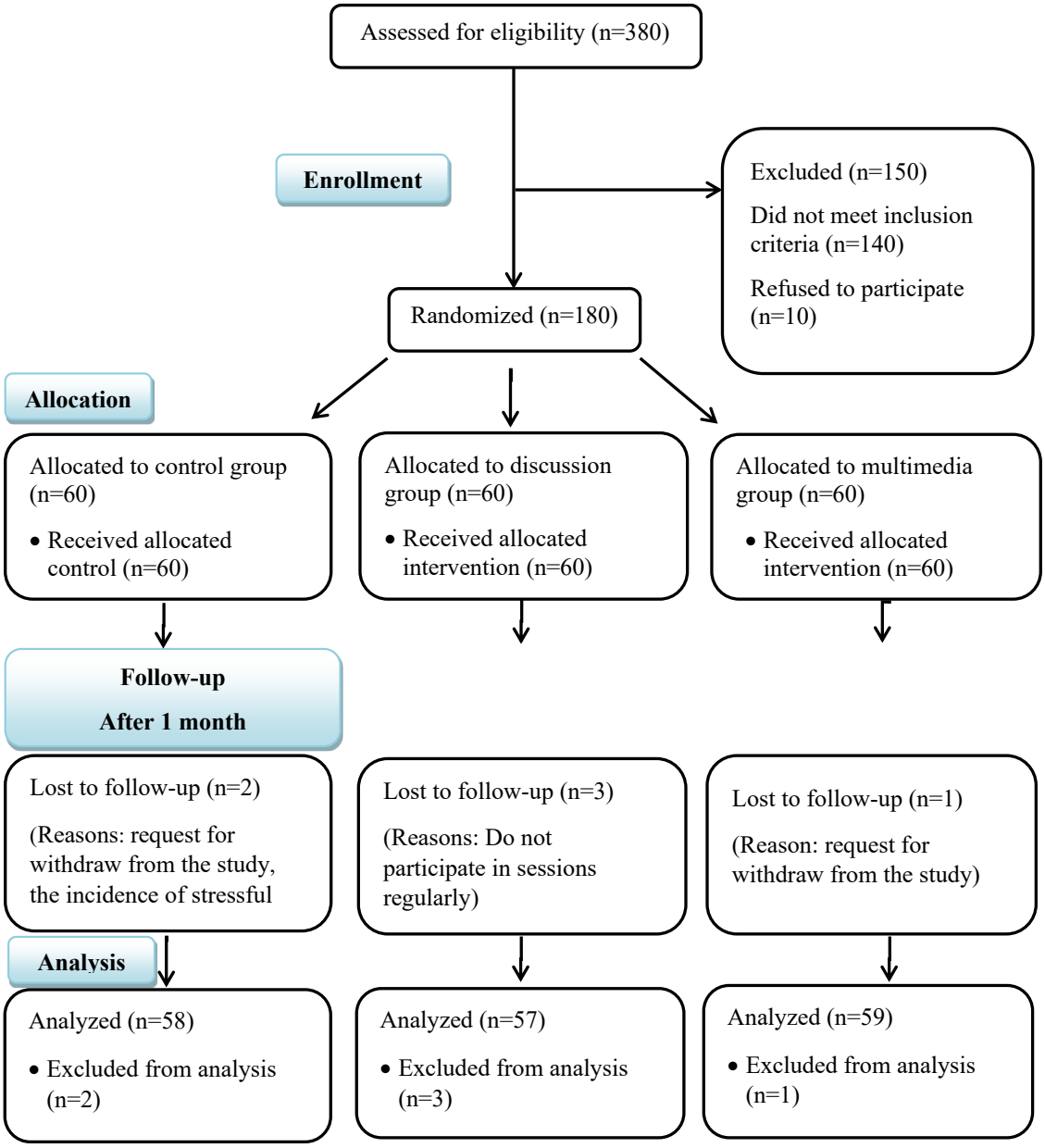

Figure 1. Assessed for eligibility

3. Results

The comparison of demographic characteristics among the three groups revealed their congruity. The results of the Kruskal-Wallis test showed that the mean age of mothers and gestational ages in the three groups were not significantly different (P>0.05). Also, according to the results of the Fisher exact test, there was no statistically significant difference between the three groups in terms of education status, family income, and mother's job (P>0.05) (Table 1).

Table 2 compares the Mean±SD difference of the cognitive domain of pregnant women before and after the intervention. Table 3 compares the Mean±SD difference of the affective domain of pregnant women before and after the intervention.

Before the intervention, the cognitive score did not differ significantly between the three groups (P=0.58). The assumption regarding the equality of cognitive score before and after the intervention was rejected for the multimedia group, and the difference was significant (P<0.001). The cognitive score for mothers participating in the discussion group before and after the intervention was drastically different (P<0.001). In the control group, the cognitive score did not change after the intervention (P=0.33), whereas the score of the cognitive domain was significantly different between the three groups after the intervention (P<0.001). Regarding the intergroup comparison, the mean score of the multimedia group was higher than other groups, and the control group obtained the lowest score in the cognitive domain. The score of the affective domain before the intervention was different between the three groups (P=0.01).

With regard to the affective domain, the multimedia group scored higher than the other two groups. In the multimedia group, the score of the affective domain was the same before and after the intervention (P=0.57). In the case of the discussion group, there were significant differences between groups in terms of affective domain scores before and after the intervention (P=0.03). In the control group, the score of the affective domain was not significantly different before and after the intervention (P=0.17). The score of the affective domain was similar in the three groups after the intervention (P=0.06).

The frequency distribution of the psychomotor domain in pregnant women before and after the interven-

Table 1. Demographic characteristics in three groups (n=174)

Demographic Characteristics		No.(%)/Mean±SD			P
		Multimedia	Discussion	Control	
Age (Y)		28.02±5.68	26.14±5.79	27.31±5.36	Kruskal-Wallis P=0.07
Gestational age (wk)		9.66±0.80	9.54±0.92	9.40±1.18	Kruskal-Wallis P=0.44
Education	Diploma>	17(28.8)	33(57.90)	25(43.10)	Fisher exact P=0.07
	Diploma & upon diploma	33(55.9)	18(31 .6)	31(53.40)	
	BSc.	8(13.60)	6(10.50)	2(3.50)	
	Upon BSc.<	1(1.70)	0(0.00)	0(0.00)	
Income for household (Monthly)	<$155	24(40.70)	23(40.30)	22(37.90)	Fisher exact P=0.23
	$155-$310	28(47.50)	27(47.30)	26(44.80)	
	>$310	7(11.80)	7(12.40)	10(17.30)	
Job	Housewife	52(88.10)	52(91.20)	45(77.60)	Fisher exact P=0.06
	Self-employed at home	1(1.70)	1(1.80)	4(6.90)	
	Self-employed outside the home	4(6.80)	0(0.0)	8(13.80)	
	Employee	2(3.40)	4(7.0)	1(1.70)	

Table 2. Comparing Mean±SD of cognitive domain in pregnant women before and after the intervention (n=174)

Study Phase		Mean±SD			Study Phase	P**
		Discussion	Multimedia	Control		
Cognitive Domain	Before	3.02±1.30	3.34±0.99	3.19±1.18	Before	0.58
	After	3.96±1.15	4.07±1.06	3.31±1.09		
P*		<0.001	<0.001	0.33	After	<0.001
Z		-3.85	-4.18	-0.97		

* The Wilcoxon signed-rank test.

** The Kruskal-Wallis test.

tion and its comparison between groups are presented in Table 4. Considering the psychomotor domain, the comparison was conducted before and after the intervention. The prevalence of urinary tract infection (P=0.001), heartburn and dyspepsia (P=0.22), and constipation (P=0.001) before and after the intervention was significantly different for the multimedia group. As for the group discussion, the prevalence of urinary tract infection (P=0.68), heartburn and dyspepsia (P=0.33), and constipation (P=0.50) were different before and after the intervention. Similarly, in the control group, urinary tract infection (P=0.001), heartburn, dyspepsia (P=0.21), and constipation (P=0.68) were significantly different before and after the intervention.

4. Discussion

The most important outcome of this study was the significant difference between multimedia and discussion groups before and after the intervention regarding the cognitive domain. Arab et al. [34] also found that the two educational methods significantly increased students' cognitive learning. The results were consistent with the study of Zendetlab et al. [35] on the effectiveness of face-to-face and discussion methods in improving patients' quality of life. The present study was similar to that of Zendetlab et al. in that both compared two educational methods with group discussion being one part of the equation in both studies and a significant score difference was observed in both studies after the intervention. However, the main difference is that this study focused on learning domains and nutrition, whereas Zendetlab et al. studied the patients' quality of life. Moreover, while this study compared group discussion with the multimedia method, Zendetlab et al. compared it with the face-to-face method. Based on the results of this study, the hypothesis regarding the equality of cognitive scores before and after the intervention in the multimedia group was rejected, and the difference was significant. The mean score of the cognitive domain for the discussion group was also significantly different both before and after the intervention, which was in agreement with the study of Ennis et al. [36] and Stephen et al. [37]. In this study, the control and multimedia groups were not significantly different regarding affective domain scores before and after the intervention. However, the significant increase in scores of the affective domain after the intervention in the discussion group and multimedia group indicated the effectiveness of training in both methods. These results

Table 3. Comparing Mean±SD of affective domain in pregnant women before and after the intervention (n=174)

Study Phase		Mean±SD			Study Phase	P**
		Discussion	Multimedia	Control		
Affective domain	Before	22.88±2.73	24.41±2.97	22.67±2.75	Before	0.01
	After	23.63±3.05	24.49±2.98	23.03±2.88	After	
P*		0.03	0.57	0.17	Before	0.06
Z		-2.13	-0.56	-1.36	After	

* The Wilcoxon signed-rank test. ** The Kruskal-Wallis test.

Table 4. Comparing psychomotor domain in each group

Study Phase		No. (%)		P*		
		After	Before	Control	Multimedia	Discussion
Faced with urinary tract infection	Avoid using irritants	2(1.11)	13(7.51)	0.001	0.001	0.68
	Increase consumption of fruit & vegetables	13(7.53)	18(10.32)			
	Use of urine acidifying agents such as citrus	5(2.94)	4(2.34)			
	Increase fluid intake by at least 2 liters daily	34(19.52)	32(17.80)			
Faced with heartburn	Increase the number of meals	32(18.40)	32(18.43)	0.21	0.22	0.33
	Good chewing food	6(3.45)	9(5.20)			
	Slow eating	17(9.86)	20(11.57)			
	Avoid lying on your back after a meal	39(22.44)	53(30.57)			
Faced with constipation	Increase consumption of fruit & vegetables	52(29.90)	56(32.20)	0.68	0.001	0.50
	Increase consumption of fluids	24(13.80)	20(11.50)			
	Walking	4(2.30)	1(0.60)			
	Refer to a physician and receive the medication	6(3.40)	16(9.20)			
	Treatment with traditional methods	11(6.30)	12(6.90)			

JRH

* Intragroup comparison before and after intervention for each problem (urinary tract infection, heartburn, and constipation) with the paired samples t test.

agreed with those of Mohammadi et al. [38] and Vahabi et al. [39].

As for the affective domain, the control and multimedia groups were not significantly different before and after the intervention. However, in the discussion group, the mean difference before and after the intervention was statistically significant. Similar to Vahabi et al., the mean scores after the intervention in the discussion group were higher than in the multimedia group. In the study of Pirzadeh et al. [40] on the effectiveness of two educational methods after the intervention and significant increase in mean scores of knowledge, attitude, and performance compared to the baseline, the results agreed with the findings of this study.

Moreover, the results of this study showed that in three groups under study, i.e., multimedia, discussion, and control groups, there were no significant differences in terms of the prevalence of urinary tract infections, exposure to constipation, and heartburn after the intervention. With regard to the measures taken to deal with urinary tract infections, exposure to constipation, and heartburn after the intervention, the multimedia, discussion, and control groups were homogenous. Also, in terms of the psychomotor domain, the multimedia and group discussion were equally effective. In a similar study, Chen et al. [41] and Ascher et al. [42] reported equal effectiveness of lecturing and video-aided teaching. Ardalan et al. [43] found that in the group trained by video instructions, the learning experience was highly satisfactory, whereas, in the control group trained by the traditional lecturing method, such learning experience was at the average level. These findings are consistent with this study.

5. Conclusion

Regarding the higher average of multimedia methods in the cognitive domain, the effectiveness of the multimedia method in the cognitive domain was confirmed. The results suggested that traditional training programs in the national health system have failed to exert the desirable effect on the cognitive domain of learning in relation to nutrition during pregnancy, and major interventions, including the use of innovative teaching methods such as multimedia, are required. Moreover, the discussion

group training method was more effective than the multimedia method in terms of the affective domain of learning. Thus, in the nutrition education of pregnant women, attempts should be made to adopt methods that facilitate the participation of all subjects. Considering the results, further studies are recommended on health service provision systems. It is suggested to conduct similar studies over longer follow-ups and on wider groups to obtain more accurate results.

The main study limitations were difficult access to samples considering the inclusion and exclusion criteria, problems related to the necessary arrangements with samples and health centers to implement the intervention in northeast Iran, access of samples in both intervention and control groups to other educational resources, the short follow-up period, and a lack of outcomes assessing maternal behavior throughout pregnancy and impact on the health of the baby and mother. One of the strengths of this study is the consideration of pregnant women as a target population group, as a natural and successful pregnancy requires the intake of sufficient nutrients. Furthermore, the inclusion of the discussion teaching method and multimedia method in the educational intervention are strengths of this study.

Ethical Considerations

Compliance with ethical guidelines

Local Ethics Committee of Gonabad University of Medical Sciences (Registration Number: 92/S/45), approved the research with medical centers. An informed written consent obtained from participants, ensuring confidential sampling, data, and general presentation of results, reminding the participants that the study is voluntary and that they can leave the trial at any time, informing participants about their equal chance of being assigned to control or intervention groups. The subjects were provided a multi-package media to control group. At the end of the intervention, the study was recorded in a clinical trial (Code: IRCT2016091117800N3).

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Authors' contributions

Methodology: Moshki Mahdi; Investigation: Khadijeh Seyedi; Data collection and Data analysis: Moshki Mahdi and Samaneh Najafi; Writing - original draft, and Writing - review and editing: Moshki Mahdi, Khadijeh Seyedi, and Samaneh Najafi.

Conflict of interest

The authors declared no conflict of interests.

Acknowledgments

The authors would like to acknowledge and thank the participants at Gonabad University of Medical Sciences for their contribution to this research.

References

[1] Teixeira JA, Castro TG, Grant CC, Wall CR, Castro ALDS, Francisco RPV, et al. Dietary patterns are influenced by socio-demographic conditions of women in childbearing age: A cohort study of pregnant women. BMC Public Health. 2018; 18(1):301. [DOI:10.1186/s12889-018-5184-4] [PMID] [PMCID]

[2] Dalrymple KV, Martyni-Orenowicz J, Flynn AC, Poston L, O'Keeffe M. Can antenatal diet and lifestyle interventions influence childhood obesity? A systematic review. Maternal & Child Nutrition. 2018; 14(4):e12628. [DOI:10.1111/mcn.12628] [PMID] [PMCID]

[3] Whitaker KM, Wilcox S, Liu J, Blair SN, Pate RR. Provider advice and women's intentions to meet weight gain, physical activity, and nutrition guidelines during pregnancy. Maternal and Child Health Journal. 2016; 20(11):2309-17. [DOI:10.1007/s10995-016-2054-5] [PMID] [PMCID]

[4] Katleen L, Mahan S, Cott S. Translated by Shidfar F, Kholdi N. Krause's Food and Nutrition. 2nd ed. Tehran: Jamenegar pub; 2007, pp. 68-9.

[5] Nyamasege CK, Kimani-Murage EW, Wanjohi M, Kaindi DWM, Ma E, Fukushige M, Wagatsuma Y. Determinants of low birth weight in the context of maternal nutrition education in urban informal settlements, Kenya. Journal of Developmental Origins of Health and Disease. 2019; 10(2):237-45. [DOI:10.1017/S2040174418000715] [PMID] [PMCID]

[6] Huberty J, Dinkel D, Beets MW, Coleman J. Describing the use of the internet for health, physical activity, and nutrition information in pregnant women. Maternal and Child Health Journal. 2013; 17(8):1363-72. [DOI:10.1007/s10995-012-1160-2] [PMID]

[7] de Smit DJ, Weinreich SS, Cornel MC. Effects of a simple educational intervention in well-baby clinics on women's knowledge about and intake of folic acid supplements in the periconceptional period: A controlled trial. Public Health Nutrition. 2015; 18(6):1119-26. [DOI:10.1017/S1368980014000986] [PMID]

[8] Adams RJ. Improving health outcomes with better patient understanding and education. Risk Management and Healthcare Policy. 2010; 3:61-72. [DOI:10.2147/RMHP.S7500] [PMID] [PMCID]

[9] Koletzko B, Godfrey KM, Poston L, Szajewska H, van Goudoever JB, de Waard M, et al. Nutrition during pregnancy, lactation and early childhood and its implications for maternal and long-term child health: The early nutrition project recommendations. Annals of Nutrition & Metabolism. 2019; 74(2):93-106. [DOI:10.1159/000496471] [PMID] [PMCID]

[10] Prado EL, Ashorn U, Phuka J, Maleta K, Sadalaki J, Oaks BM, et al. Associations of maternal nutrition during pregnancy and post-partum with maternal cognition and caregiving. Maternal & Child Nutrition. 2018; 14(2):e12546. [DOI:10.1111/mcn.12546]

[11] McGowan CA, McAuliffe FM. Maternal dietary patterns and associated nutrient intakes during each trimester of pregnancy. Public Health Nutrition. 2013; 16(1):97-107. [DOI:10.1017/S1368980012000997] [PMID]

[12] Grantham-McGregor SM, Fernald LC, Kagawa RM, Walker S. Effects of integrated child development and nutrition interventions on child development and nutritional status. Annals of the New York Academy of Sciences. 2014; 1308:11-32. [DOI:10.1111/nyas.12284] [PMID]

[13] Shirazi M, Azadi F, Shariat M, Niromanesh S, Shirazi M. [Effectiveness of stress management training on stress reduction in pregnant women (Persian)]. Tehran University Medical Journal. 2016; 74(7):493-9. http://tumj.tums.ac.ir/article-1-7704-en.html

[14] Mohammad Alizadeh Charandabi S, Kamali Fard M, Ebrahimi Mamqani M, Asghari Jafarabadi M, Omidi F. [Evaluation of the Nutritional Behavior of Women in First Trimester of Pregnancy and Its Relationship with Some Socio-Demographic Characteristics of Whom Referred to Health Centers in Karaj (Persian)]. The Iranian Journal of Obstetrics Cynecology and Infertility. 2012; 15(18):10-8. [DOI:10.22038/IJOGI.2012.5665]

[15] Mohammadpour A, Najafi S, Tavakkolizadeh J, Mohammadzadeh F. [The effect of intervention based on "Roy" adaptation model on personal self- concept in primi-gravida women (Persian)]. Journal of Sabzevar University of Medical Sciences. 2015; 22(6):999-1007. http://jsums.sinaweb.net/article_780.html?lang=en

[16] Mohammadpour A, Najafi S, Tavakkolizadeh J, Mohammadzade F. The effects of the roy's adaptation model on primigravida women's self-concept: A randomized controlled trial. Asian Journal of Pharmaceutical Research and Health Care. 2016; 8(S1):17-23. [DOI:10.18311/ajprhc/2016/7717]

[17] Mohammad Alizadeh Charandabi S, Kamali Fard M, Ebrahimi Mamqani M, Asghari Jafarabadi M, Omidi F. [The effect of educational package on nutritional knowledge and behavior toward the coping with complication and supplement consumption (Persian)]. Armaghane-Danesh. 2013; 18(3):228-40. https://www.sid.ir/en/Journal/ViewPaper.aspx?ID=344973

[18] Anjomshoa H, Dehghan A. [Investigating the knowledge, attitude and performance of pregnant women in Kerman abouttaking supplements-1393 (Persian)]. Nursing Journal of the Vulnerable. 2016; 2(5):52-62. http://njv.bpums.ac.ir/article-1-676-fa.html

[19] Kapil U, Bhasin S, Manocha S. Knowledge amongst adolescent girls about nutritive value of foods and diet during diseases, pregnancy and lactation. Indian Pediatrics. 1991; 28(10):1135-9. [PMID]

[20] Mirmolaei S, Moshrefi M, Kazemnejad A, Farivar F, Morteza H. [The effect of nutrition education on nutritional behaviors in pregnant women (Persian)]. Hayat. 2010; 15(4):35-42. http://hayat.tums.ac.ir/article-1-103-en.html

[21] Kaufman J, Synnot A, Ryan R, Hill S, Horey D, Willis N, et al. Face to face interventions for informing or educating parents about early childhood vaccination. The Cochrane Database of Systematic Reviews. 2013; (5):CD010038. [DOI:10.1002/14651858.CD010038.pub2] [PMID]

[22] Bahri N, Bagheri S, Erfani M, Rahmani R, Tolidehi H. The comparison of workshop-training and booklet-offering on knowledge, health beliefs and behavior of breastfeeding after delivery. The Iranian Journal of Obstetrics, Gynecology and Infertility. 2012; 15(32):14-22. http://ijogi.mums.ac.ir/article_155.html

[23] Harasim L. Learning theory and online technologies. New York: Routledge; 2017. [DOI:10.4324/9781315716831]

[24] Vaona A, Banzi R, Kwag KH, Rigon G, Cereda D, Pecoraro V, et al. E-learning for health professionals. The Cochrane Database of Systematic Reviews. 2018; 1(1):CD011736. [DOI:10.1002/14651858.CD011736.pub2] [PMID] [PMCID]

[25] Kellams AL, Gurka KK, Hornsby PP, Drake E, Riffon M, Gellerson D, et al. The impact of a prenatal education video on rates of breastfeeding initiation and exclusivity during the Newborn Hospital stay in a low-income population. Journal of Human Lactation. 2016; 32(1):152-9. [DOI:10.1177/0890334415599402] [PMID]

[26] Malav A, Ahuja NJ. Machine Learning Techniques for Effective Facilitation of Teaching and Learning: A Narrative Review. i-Manager's Journal on Computer Science. 2018; 6(2):42. [DOI:10.26634/jcom.6.2.15032]

[27] Adib-Hajbaghery M, Rafiee S. [Comparing the effectiveness of group discussion and lecture methods on the learning of medical sciences students: A review study (Persian)]. Iranian Journal of Medical Education. 2016; 16(6):53-62. http://ijme.mui.ac.ir/article-1-3883-en.html

[28] Joshi KP, Padugupati S, Robins M. Assessment of educational outcomes of small group discussion versus traditional lecture format among undergraduate medical students. International Journal of Community Medicine and Public Health. 2018; 5(7):2766-9. [DOI:10.18203/2394-6040.ijcmph20182419]

[29] Wu WH, Kao HY, Wu SH, Wei CW. Development and evaluation of affective domain using student's feedback in entrepreneurial massive open online courses. Frontiers in Psychology. 2019; 10:1109. [DOI:10.3389/fpsyg.2019.01109] [PMID] [PMCID]

[30] Sharifirad G, Mohebi S, Shahsiah M. [Effectiveness of nutrition education program Based on health belief model compared with training on the recommended weight gain during pregnancy (Persian)]. Health System Research. 2010; 6(3):480-9. https://www.sid.ir/en/journal/ViewPaper.aspx?ID=208530

[31] Zareban E, Hydarnia A, Rakhshan F, Jabari H, Abd Elahi Mohammad AAG. [Efficacy Of Aids prevention training program on knowledge, attitude and practice of Chabahar Sailors, Iran (Persian)]. Zahedan Journal of Research in Medical Sciences. 2006; 8(1):29-36. https://www.sid.ir/en/journal/ViewPaper.aspx?ID=83893

[32] GholamniaShirvani Z, AminShokravi F, Ardestani MS. [Effect of designed health education program on knowledge, attitude, practice and the rate Pediculosis Capitis in female primary school students in Chabahar city (Persian)]. Journal of Shahrekord University of Medical Sciences. 2011; 13(3):25-35. http://78.39.35.44/article-1-742-en.html

[33] Lotfi Mainbolagh B, Rakhshani F, Zareban I, Alizadeh Sivaki H, Parvizi Z. [The effect of peer education based on health belief model on nutrition behaviors in primary school boys (Persian)]. Journal of Research & Health. 2012; 2(2):214-26. http://jrh.gmu.ac.ir/article-1-86-en.html

[34] Arab Z, Borhani F, Abasszade A. A comparison of the small group discussion and conventional teaching to cognitive achievement and the satisfaction of learning in teaching bioethical in nursing students [MSc. Thesis]. Kerman: Kerman University of Medical Sciences; 2013.

[35] Zendetlab H. [Comparing the effect of face to face and group discussion teaching methods on quality of life improvement among patients suffering from multiple sclerosis (Persian)]. Iranian Journal of Medical Education. 2013; 13(9):711-20. http://ijme.mui.ac.ir/article-1-2595-en.html

[36] Ennis M, Thain J, Boggild M, Baker GA, Young CA. A randomized controlled trial of a health promotion education program for people with multiple sclerosis. Clinical Rehabilitation. 2006; 20(9):783-92. [DOI:10.1177/0269215506070805] [PMID]

[37] Pintauro SJ, Regimbald S, Burczy SA, Nickerson A, Buzzell PR, Berlin L. Evaluation of a nutrition and health educational online computer program for older adults. Journal of Nutrition & Food Sciences. 2011; 1:5. [DOI:10.4172/2155-9600.1000117]

[38] Mohammadi B, Valizadeh S, Lak Dizeji S. [The impact of teaching on knowledge, attitude and practice of nursing and midwifery instructors in regard to clinical education effective behaviors, Tabriz University of Medical Sciences, 2002 (Persian)]. Iranian Journal of Medical Education. 2003; 3(1):61-9. http://ijme.mui.ac.ir/article-1-179-en.html

[39] Vahabi Y, Tadrisi D, Ghayem S, Ebadi A, Daneshmandi M, Saghafi Nia M. [Comparing the effect of triage education in lecture and multimedia software on nurses learning (Persian)]. Iranian Journal of Critical Care Nursing. 2011; 4(1):7-12. https://www.sid.ir/en/journal/ViewPaper.aspx?id=213436

[40] Pirzadeh A, Hazavei M, Entezari MH, Hasanzadeh A. The effect of educational intervention on girl's behavior regarding nutrition: Applying the beliefs, attitudes, subjective norms, and enabling factors. Journal of Education and Health Promotion. 2014; 3:79. https://www.jehp.net/article.asp?issn=2277-9531;year=2014;volume=3;issue=1;spag=79;aulast=Pirzadeh

[41] Chen CM, Wu CH. Effects of different video lecture types on sustained attention, emotion, cognitive load, and learning performance. Computers & Education. 2015; 80:108-21. https://doi.org/10.1016/j.compedu.2014.08.015

[42] Ascher GJ. Teaching" Ladino Language and Culture" and" Aspects of the Sephardic Tradition": Hopes, Fruits, Experiences. Shofar: An Interdisciplinary Journal of Jewish Studies. 2001; 19(4):77-84. https://muse.jhu.edu/article/31365/summary

[43] Ardalan M, Vahedi MS, Salehnejad G. Comparing the effects of traditional and combined teaching methods on nursing students' learning skills of wound care. Life Science Journal. 2013; 10(SPEC.):156-9. http://www.lifesciencesite.com/lsj/life1009s/018_19790life1009s_156_159.pdf