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The Effect of Education on Nutrition Behavioral Intention and Self-Efficacy in Women

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ABSTRACT

Background: Maternal nutrition behavior under health education/health promotion programs and optimal control prior to conception, beneficially serves to mothers and their fetuses. In fact adequate micronutrients intake such as iron and folic acid meet the least risk of harm to the unborn child.
Objectives: The present study examines the impact of a pre-pregnancy workshop focused on iron and folic acid intake on behavioral intention and nutrition self-efficacy among women planning pregnancy.
Patients and Methods: In this study, a randomized controlled trial design was used. One hundred and four women were recruited from premarital counseling clinics authorized by Iran University of Medical Sciences and allocated to two groups of experimental and control by blocking randomization. Data collection instrument was a questionnaire. Data analysis were performed by descriptive and inferential statistics.
Results: Compared to the control group, the results revealed that there was a significant post –interventional difference in the score of behavioral intention ($P < 0.001$) , whereas no significant difference was found in the scores of nutrition self-efficacy after the intervention.
Conclusion: It is concluded that short-term pre-pregnancy health education in the form of a one –day healthy nutrition workshop leads to increase behavioral intention on iron and folic acid intake among women planning pregnancy. However, further studies on strategies of health education might be performed to influence women's nutrition self-efficacy.

Implication for health policy/practice/research/medical education:
This study has clinical application as it offers support for nutrition education among women before planned pregnancy. Therefore, the study's educational intervention is recommended to nurses, midwives, and specialists of health education/health promotion.

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1. Background

It is well documented that adopting healthy lifestyle in women with reproductive age can promote their physical, psychological, and social well-being (1). Moreover, women with unhealthy lifestyle associated with inappropriate nutrition will be at risk for complicated pregnancy and adverse pregnancy outcomes such as low birth weight and neural tube defects (2-4). In fact maternal nutrition behavior under optimal control prior to conception benefits the fetus and meets the least risk of harm to an unborn child (5). Poor maternal nutritional intake before pregnancy, particularly in iron and folic acid,, is one of the most common causes of micronutrient deficiencies often associated with adverse effects both in mother and fetus (6, 7). Although supplements such as ferrous sulphate and folates are standard treatments for iron and folic acid deficiency anemia, respectively, these compounds could be poorly tolerated in pregnancy (8).

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Preconception nutrition education and counseling women in reproductive age could be an ideal opportunity to adjust their daily iron and folic acid intake (9). Unfortunately, despite growing insight to the importance and benefits of pre-pregnancy counseling as a part of preconception care, implementation of this form of preventive medicine in form of health education (workshop) is still lacking in Iran. To date, no effective preconception education was conducted in Iranian women as a preventive strategy to focus on iron and folic acid intake. In public health education, theories predict consequences of programs and provide a framework to plan education intervention that is more likely to succeed or help us to analyze its success or failure (10). In the current study, nutrition behavior intention and self-efficacy (SE) were of interest and were frameworks to predict health behaviors in education programs for healthy diet. We utilized behavior intention, a construct of Theory of Planned Behavior (TPB), as the study framework. TPB is often used to study health related decision making behavior (11). It has been reported that behavioral intentions are one of the most important immediate determinant of healthy behavior (12). Besides, self-efficacy (13) has also emerged as a central integrating concept in health research, and in etiology of health and disease (14). Self-efficacy has been identified as an important predictor of behavior change in the management of eating habits, smoking cessation, and weight control (15-17). Self-efficacy, a central construct of Bandura's social cognitive theory, represents the confidence one has in being able to enact a certain behavior (18). Therefore, investigation and recognition the interventions on predictor variables of health promoting behaviors in women of child bearing age could offer some practice implications for improving health and pregnancy outcomes.

2. Patients and Methods

A randomized controlled trial with a prospective experimental design was used in this study. Two premarital counseling clinics (PMC) at the area of the West of Tehran authorized by Iran University of Medical Sciences (IUMS) were considered as the study settings. The routine services offered in premarital counseling clinics has provided in such a way that guarantees a good and healthy marriage. Currently, for official marriage registration in Iran, all couples have to pass few medical controls such as genetic screening for Beta-thalassaemia and drug addiction, and are recommended to participate in family planning sessions. A consecutive sampling method was applied to select subjects among Iranian women who attended premarital counseling clinics. The entire group was estimated to consist of 104 subjects (52 women in each group of experimental and control) based on the difference on the self-efficacy and a related study (19) with consideration of 95% confidence level and power test of 80%.

Women conform to the following criteria were included in this study (inclusion criteria):

1) Women in childbearing age (18-35 year), an easily recognizable and accessible group as per feasibility of the study

2) Healthy women with no self-expressed identified health risk factor

3) Women with intention to conceive and plan pregnancy within first year of marriage:

4) Literate women fluent in Persian language

Subjects having any medical or health problems within one month of intervention or not attending in post-intervention test were excluded (exclusion criteria). Identified women were invited to participate and briefed about the study, shortly. All participants were volunteers and signed a written informed consent prior to taking part in the study and were randomly assigned into 2 groups by using a block randomization method (20). When excluded women considered, initial size of entire population of study reduced from 104 subjects (52 women in each group) to 99 subjects (50 and 49 women in experimental and control groups, respectively). The study was carried out in premarital clinics in Tehran between April 2007 and February 2008. Ethics of the study was approved by Ethics Committee of Research and Technology Department of Iran University of Medical Sciences (IUMS). Data collection instrument was a questionnaire consisting of socio-demographic as well as 3 behavior intention items based on studies of Wim *et al*., 2005 (21) and Miry *et al*., 2005 (22) and Persian Adaptation of General Self-Efficacy Scale (23). In demographic variables, body mass index (BMI) was considered, a measurement index of body fat based on height and weight applicable for both adult men and women. BMI (measured as kg/m^2) is defined as individual's body mass (in kilogram) divided by square of his or her height (in meter) and is used universally in medicinepractice. BMI categorizes people as follows:

- Underweight: BMI ≤ 18.5
- Normal weight: BMI = 18.5–24.9
- Overweight: BMI = 25–29.9
- Obesity: BMI ≥ 30

There were no economic status and menstruation bleeding variables considered in this study for anyspecific classification . In other words, data gathered from women's economic status and menstruation bleeding, were self-explanatory according to perception of the participants (24). The questionnaires were completed in two phases; one prior to, and another at 4 weeks after completion of educational intervention. The reason behind pre- and post-intervention interval design was based on a previous study in Iran in regards to premarital health counseling intervention (25).

Self-efficacy scale consists of 10 items, each of which is rated on a four-point Likert scale and it has also been

previously tested for acceptable reliability and validity in Iranian studies (26). Moreover, before conducting the study, the scale was tested on 20 Iranian women in order to determine validity, clarity and understandability. To establish internal consistency of the questionnaire, Cronbach's coefficient alpha was calculated for the questionnaire, resulted in 0.79 and 0.88 for "behavior intention" and "nutrition self-efficacy", respectively. Content validity of the scales was established by an extensive review by experts of 10 faculty members who were qualified in obstetric and gynecologic medicine and women's health in the Department of Health in IUMS. The intervention as independent variable was performed as one day "pre-pregnancy nutrition workshop" for 52 subjects in experimental group, participating 8-12 women in each workshop. The control group received only routine clinic-based education (with no lifestyle education). The workshops were scheduled considering suitable time for participants. During the training, women were seated in a quiet room in premarital counseling clinics and took part in a one-day workshop presented by investigators who were expert and qualified in health education and women's health. Furthermore, women in experimental group attended individualized meetings (face to face), too. Meetings were scheduled to startone hour before workshop for each participant to receive advices on healthy lifestyle focused on benefits of healthy diet, and also to address participant's initial concerns and questions, and to guide her in identifying key issues in the workshop. Workshops consisted of the following topics: [1] introduction concerning healthy lifestyle, [2] benefits of healthy nutrition in view of physical, psychological and emotional health aspects in women, [3] correlations between unhealthy diet (focused on iron and folic acid) and morbidity and mortality, and [4] consequences of maternal malnutrition in pregnancy and pregnancy outcomes. The education was aimed at empowering women to understand risks of unhealthy nutrition for future. Outcomes expected were the increase in nutrition behavior intention and as well as increase inself-efficacy focused on intake of foods rich in iron and folic acid in women who plan pregnancy. The learning outcomes associated with the workshops are described in *Table 1*. For data analysis, the results were processed in SPSS 14.0 (Statistical Package for the Social Sciences, Chicago, Illinois) for Windows. Data collected from the subjects were entered twice into SPSS data file and were mainly presented as mean and standard deviation. Data from some participants in both experimental and control groups were excluded from the analysis at post-intervention test because of the exclusion criteria. The difference between baseline and follow-up scores was compared by using Student's t-test. Change scores computed by subtracting baseline scores from follow-up scores were created to assess differences between two groups having level of significance ($\alpha = 0.05$). In this study all variables displayed a normal distribution by using Kolmogrove Smirenove test.

Table 1. Titles and Learning Outcomes of Pre-Pregnancy Nutrition Education

Title of Workshop's Contents	Educational Learning Outcomes
Let's learn	Understand that healthy nutrition focused on Iron and Folic acid intake is a message of the Ministry of Health and Medical Education Know the importance of healthy diet in pregnancy for healthy of their fetus Know that Iron and Folic acid intake prevents neural tube defects (NTDs) Understand the importance of dietary habits to choose active lifestyles for overall health
Unhealthy dietary habits	Unhealthy dietary Habits leads to adverse pregnancy outcomes Understand the role of pre-pregnancy education in adopting and supporting healthy pregnancy/neonatal outcomes Become familiar with healthy nutrition in pre-pregnancy period as healthy lifestyles in women at pre-pregnancy
Food & fun	Demonstrate appropriate activities that will encourage and support Women's intention and self-efficacy regarding food-related behaviors Implement lessons or learning experiences designed to combine food-related knowledge and how to prepare healthy foods based on the recipe rich in Iron and Folic acid to practice and support healthy eating to discuss healthy eating experiences of women
Consumption of foods, fruits and vegetables	Identify foods by reading and interpreting nutrition labels Analyze fruits and vegetables and some menu/recipe to determine whether it provides adequate Iron and Folic acid Discuss ways to cook and eat foods for high absorption of Iron and Folic acid Practice and remember foods, fruits, and vegetables contain Iron and Folic acid List the appropriate fruits and vegetables rich in Iron and Folic acid Recognize the importance of fruits and vegetables consumption (5 times a day)

3. Results

All 104 healthy women who were attending premarital clinics were participated in randomized controlled trial at the baseline. At the post intervention phase, 5 respondent participants (2 from experimental and 3 from control groups) did not complete the questionnaire due to exclusion criteria such as physical illnesses, or personal reasons (response rate: 94%). The non-respondents at the post-intervention phase were not statistically different with that of respondents. Therefore, in both groups non-respondent participants (n = 5) were excluded in statistical analysis and total 99 women were considered as participants in the trial rather than 104 women. According to the obtained descriptive information about the women's socio-demographic data characteristics (*Table 2*), the result of the t-test and chi square tests revealed no significant differences between experimental and control groups in terms of age (t = -0.56, $P = 0.57$), educational level ($\chi^2 = 0.61$, $P = 0.43$), occupation ($\chi^2 = 0.94$, $P = 0.33$), economic status ($\chi^2 = 0.18$, $P = 0.66$), menstruation bleeding ($\chi^2 = 0.06$, $P = 0.51$), and body mass index (BMI) ($\chi^2 = 0.04$, $P = 0.51$). The majority of the participants (58.8%) had higher (college/university) educational level, 69.8% were unemployed or housewives, 59.5 % had a moderate menstruation bleeding each period and 79.2% had a normal BMI. The categorization of the economic status was performed based on the subjects' self-explanations. *Table 3*, represents the means and standard deviations of experimental and control groups in terms of behavioral intention and nutrition self-efficacy variables at pre- and post-interventions. The result of t-tests showed that there is no significant differences between experimental and control groups in nutrition behavioral intention and nutrition self-efficacy at pre-intervention (*Table 4*). However, at post-intervention the results on behavior intention variable revealed that there was a significant difference between experimental and control groups ($P < 0.001$),

Table 2. Demographic Characteristics of the Study Subjects at the Baseline (Pre-Intervention)

	Experimental Group, NO. (%)	Control Group, NO. (%)	Total Population, NO. (%)
Age, y			
18-23	22 (66)	21(62.9)	43(43.4)
24-29	21 (42)	20 (40.8)	41(41.4)
30-35	7 (16)	8 (16.3)	15(15.2)
Educational level			
Primary/guidance school	2 (4.1)	2 (4.1)	4 (4.1)
High school	16 (32.7)	20 (41.7)	36 (37.1)
Higher education	31 (57.6)	26 (42.4)	57 (58.8)
Employment Status			
Employed	17 (34.7)	12 (25.5)	29(30.2)
Not employed	32 (65.3)	35 (74.5)	67(69.8)
Economic status			
Good	11 (22.4)	9(18.4)	20 (20.4)
Moderate	36(73.5)	38 (77.6)	74 (75.5)
Bad	2 (4.1)	2(4.1)	4 (4.1)
Menstruation Bleeding			
Low	17 (34)	16 (33.3)	33 (33.7)
Moderate	18 (36)	20 (41.7)	28 (38.8)
High	15 (30)	12 (25)	27 (27.6)
Body Mass Index (BMI)			
Normal	40 (80)	36 (78.3)	76 (79.2)
Abnormal	10 (20)	10 (21.7)	20 (20.8)

Table 3. Comparison Mean and Standard Deviation of Behavioral Intention and Nutrition Self Efficacy Scores Between Two Groups

Control Group, M ±SD	Experiment Group, M ±SD [b]	Variables	*P* - Value
		Pre-intervention	
3.87 ± 2.11	3.94 ± 2.41	Nutrition behavior intention	0.89
8.67 ± 1.92	8.76 ± 1.67	Nutrition self efficacy	0.81
		Post-intervention	
4.06 ± 2.06	7.88 ± 2. 3	Nutrition behavior intention	0.000 [a]
8.79 ± 2.11	268.98 ± 1.8	Nutrition self efficacy	0.64

[a] Significant
[b] Mean and Standard Deviation

Table 4. Comparison Mean and Standard Deviation of Change (Difference) Scores of Dependent Variables in Experimental and Control Groups

Dependent Variables	Experimental Group (n = 51) , Mean ± SD	Control Group (n = 48), Mean ±SD	t-Test Results
Nutrition behavior Intention	3.94 ± 3.44	0.18 ± 0.66	T = 7.5 [a] Df = 97 *P* = 0.000
Nutrition self efficacy	0. 22 ± 0.78	0. 12 ± 1.05	T = 0.52 Df = 97 *P* = 0.60

[a] significant

whereas no significant difference was found on the nutrition self-efficacy variable. As shown in *Table 4*, there was only a significant increase in the score of the nutrition behavior intention variable in experimental group compared to control group ($P < 0.001$); in variable of nutrition self-efficacy, however, the difference between two groups was not statistically significant ($P = 0.60$). Accordingly, the first hypothesis predicting that compared to control group, nutritional behavior intention will be increased in experimental group after educational intervention, was supported by the results , but the second hypothesis stating the same for nutritional self-efficacy failed.

4. Discussion

Preconception (pre-pregnancy) care, including education and counseling, focuses not only on physical health issues, but also on psychosocial health (27). In fact, important lifestyle factors, including prenatal nutrition, could be subject to health intervention before pregnancy (28). Therefore, pre-marital and pre-pregnancy education/ counseling programs are ideal opportunity to address the healthy lifestyles and provide services to help women achieve optimal health in their reproductive age (27). Based on the results, the study subjects were homogeneous and no significant differences were found between the experimental and control groups in relation to the women's socio-demographic status.

Socio-demographic status is a profound and consistent predictor of health status at both population and individual levels (29). In addition, behavior intention and self-efficacy variables were considered in this study as predictors of health behaviors (15, 18). The findings of our study showed that in dependent variables, there were no differences but at post-intervention, a significant difference was found in variable of behavior intention (*Table 2* and *Table 3*). This finding is consistent with Parsons' study which concluded that behavioral intentions are the most important and immediate determinant of healthy behavior (16). Behavior intention as a construct for Theory of Planned Behavior (TPB) is related to individuals' decision making behavior (15).

In this study, the first hypothesis was supported ($P = 0.000$) but the second hypothesis that stated "nutritional self-efficacy will be increased in the experimental group after educational intervention, compared to the control group" was rejected ($P = 0.64$). Indeed, no significant difference was found in nutrition self-efficacy analysis in experimental and control groups. This result differs from those of other studies that used a theory based education program to increase self-efficacy in women (30, 31). Self-efficacy is defined as an individual's perceived ability to successfully perform a particular behavior (32). During the last few decades, healthy behaviors with regard to food consumption has been heavily promoted (21, 33), but people's willingness and ability to adopt healthy lifestyle and behavior change is a complex issue that may be correlated with socioeconomic factors (21), though, there was no significant correlation between socio-demographic variables and self-efficacy. To interpret findings, we acknowledged limitations in their generalization. Although selected group and design of study were appropriate for generalization to a healthier women population, it did not include enough diversity to make complete generalizations. In other words, most women in this study (58.8%) were highly educated and motivated to learn healthy lifestyle, because they were planning to be pregnant in their first year of marriage as an inclusion criterion, therefore, the results cannot be extrapolated to less educated women. Also, all participants were married and most of them were unemployed (69.8%), therefore, results may differ for unmarried women or in those with different occupational backgrounds. Nonetheless, this study demonstrated that independent variable (health education intervention as a form of one-day workshop) had a positive impact on behavior intention as a factor for decision making in healthy diet in a short term. For most topics of interest to women, group teaching like workshop is very effective and costs less than one-on-one teaching that might have a role on improvement of nutritional status both in quantity and quality. Therefore, finding of this study adds to the existing knowledge the insight to positive outcomes of health education/health promotion intervention at pre-pregnancy period.

In conclusion, acknowledging the limitations, we still believe that our results could offer practical implications that could increase empowerment of Iranian women to adopt healthy diet focused on iron and folic acid intake. It also is concluded that a short-term nutrition workshop leads to favorable behavior intention. However, the in-

crease in nutritional self-efficacy in women, needs further studies on preconception educational interventions and this type of investigation should be replicated in a more diverse sample.

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Authors' Contribution

Author contributed 100% to prepare this article.

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