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Original Article

The Effect of Educational Program on Dental Plaque and Caring Performance of Pregnant Mothers

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A B S T R A C T

Background: This study aimed to determine the effect of educational program on dental plaque and caring performance of pregnant mothers in the city of Rasht.

Methods: In this randomized controlled trial study, 110 pregnant mothers referring to 33 health centers in Rasht were randomly divided into experimental and control groups. The data regarding to the demographic characteristics of mothers, a validated questionnaire based on health belief model constructs, dental plaque index and caring performance of oral and dental hygiene were collected. After analyzing the pre-test data, experimental group received an educational intervention based on the health belief model (HBM). Three months after the intervention program, oral and dental hygiene were performed. The two groups were compared using analysis of covariance.

Results: At baseline, there was no significant difference in dental plaque index between intervention (Mean = 36.3, SD = 15.2) and control groups (mean = 37.4, SD = 17.5). Three months after the intervention the mean score of dental plaque index in the intervention group decreased to 21.3 (SD = 12.1) that was significantly lower than the control group (mean = 44.7, SD = 16.8). Post-baseline dental caring performance score in the intervention group (mean = 77.3, SD = 9.3) was significantly higher than the control group (mean = 49.6, SD = 14.4).

Conclusion: The findings of the study indicated that education and training can be very effective in marinating oral and dental health during pregnancy.

Keywords: Education, Dental plaque, Oral hygiene, Pregnant women

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A R T I C L E I N F O

Introduction

Oral and dental hygiene refers to all aspects of the health and functioning of the mouth, especially gingiva and teeth. Failure to follow behavior influencing oral and dental hygiene adversely affects nutrition, speaking, voice quality and speech. Oral and dental hygiene is also associated with the general health of the body. Losing teeth causes problems in chewing food and ultimately causes gastrointestinal problems. In addition, periodontal problems cause halitosis or bad breath, missing teeth and social problems (1). During pregnancy, the hormonal and physiological changes may more likely predispose women to dental disorders. Furthermore, Poor oral hygiene in pregnancy has a strong relationship with poor perinatal outcome. Gingival inflammation in pregnant women is an important risk factor for pre-term labor and low birth weight (2). Despite of the importance of oral hygiene during pregnancy, many women do not adhere to good oral health. The prevalence of tooth decay has been reported to be about 23 to 43 percent. The results of studies have showed that most mothers do not know about oral and dental care (3-6).

Lack of knowledge about oral hygiene, non-compliance with health and prevention of oral and dental diseases, frequent consumption of sugar and sticky foods and deficiency of fluoride in drinking water are among the leading causes of tooth decay (7). Health education is among the most important factor that can control most of these shortcomings. Health scientists prepared some health education models based on psychological and social patterns to improve the efficacy of health education. The Health Belief Model (HBM) is one of the most effective educational models for health improvement. This model was designed in the early 1950s and developed gradually. HBM is mainly used for disease prevention (8). This model uses the constructs of perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cue to action, and self-efficacy to predict the behavior (9). This model has been suggested as an effective model for oral health (10, 11). Therefore, according to the importance of oral hygiene during pregnancy, the present study aimed to evaluate the effect of educational program based on HBM on pregnant mothers' oral health. In this study, in addition to plaque index, the effect of educational program on caring performance and constructs of HBM among pregnant mothers were also evaluated.

Methods

Study population

This is a randomized controlled trial study that was conducted on 110 pregnant women referring to health centers in Rasht, north of Iran. The study protocol has been approved by research ethics committee of Guilan University of medical sciences. A total of 33 health centers were randomly assigned to the experimental and control group. At each center, a certain number of the participants proportional to the population coverage by the center were randomly selected using simple random sampling using population health record number. The pregnant women who were experiencing their first childbirth, had oral or teeth disease, had at least reading and writing skills were included. Those mother who were employed in the dentistry professions were excluded from the study. All eligible participants were taken informed consent to participate in the study.

Variables and questionnaires

The HBM constructs were collected using a modified version of psychometric questionnaire developed by Shamsi et al in Iran (12). To determine the reliability of the questionnaire, the modified questionnaire was distributed among 20 participants The Cronbach's alpha was calculated separately for different domains of the questionnaire. The values for all domain were higher than 0.7. The items of HBM constructs including sensitivity, severity, benefits, perceived barriers and self-efficacy were scored in a 5-point Likert scale from "totally disagree to totally agree. In performance part of questionnaire 1 point was given to each of the correct behavior and a zero was given to each of the wrong behaviors.

Dental care performance was measured using a questionnaire consisting of 14 items on the mothers' performance in brushing and dental flossing methods, regular visits to the dentist, using fluoride mouthwash after nausea and vomiting was developed. The data on the first two items were collected using direct observation of mother's performance on the tooth and mouth. Caring performance was evaluated by observing the suitable oral health practices as follows: The right angle of the movement of toothbrush on different parts of the tooth, use of vibrational movements on the gingival groove, horizontal movement on the gnawer surface and the vertical movement of tooth to separate the dental floss as much as possible, appropriate anterior and internal surface, the way of movement between the teeth, correct rolling of the dental floss around the fingers. Other functions of mothers were recorded as mothers' self-reports.

Dental plaque index evaluated according to standard protocol (13). The plaque index was checked using a detector material (disclosing tablet). The mothers chewed the tablet and spread the color of the tablet on all surfaces of the teeth with their tongue. The part of the tooth where the plaque accumulates becomes pink. As a result, the amount of plaque and its formation on the teeth were determined. In this way, each surface of tooth is divided into 4 parts of upper, back, and sides which is calculated based on the plaque index formula by O'Leary (number of colored parts) divided by (total teeth *4) and is presented in percentage. Written consent was obtained from the mothers; then the questionnaires were completed in the relevant centers by the mothers and dental plaque index were calculated.

Intervention program

To determine the educational needs and desired structure for training sessions in experimental group, the questionnaire were completed by the women at baseline of the study. Then using multivariate linear regression, the predictive power of HBM structures were determined and the suitable educational programs based on the results were designed. The results showed that the perceived benefits (B = 0.44) was the strongest predictor for dental plaque index followed by awareness (B = 0.382) and perceived barriers (B = 0.367). These structures were used to promote oral dental health among the pregnant women and the desired educational program was implemented according to the model as a combination of direct teaching which

Table 1. Baseline Characteristics of Pregnant Women in Rasht

Characteristics	Intervention group	Control group	P-value
	No. of persons (%)	No. of persons (%)	
Age of regnant mother			
Less than 30 years	46 (83.6)	52 (94.5)	0.06
Over 30 years	9 (16.4)	3 (5.5)	
Level of Education			0.07
Primary	9 (16.4)	6 (10.9)	
Intermediate	6 (10.9)	11 (20)	
High school	25 (45.5)	32 (58.2)	
graduate	15 (27.3)	6 (10.9)	
Gestational Week			0.151
14 week	15 (27.3)	12 (21.8)	
14-28 week	37 (67.3)	43 (78.2)	
28-42 week	3 (5.5)	-	
Monthly family income			0.8
Less than 5 million Rial	13 (23.6)	11 (20)	
5-10 million Rial	36 (65.5)	38 (69.1)	
More than 10 million Rial	6 (10.9)	6 (10.9)	
Insurance coverage			0.06
Yes	52 (94.5)	46 (83.6)	
No	3 (5.5)	9 (16.4)	

included group discussion, lectures, questions and answers, precipitations thoughts, practical presentation and indirect teaching which involved distributing pamphlets and booklets. Educational materials were provided for the implementation in the intervention based on educational goals derived from the authoritative sources of the Ministry of Health and Medical Education, and the materials that mothers should understand about the correct way of oral care during pregnancy. Three months after education the questionnaire were collected again from both the experimental and control groups. DMFT and dental plaque index were also measured again for both groups.

Statistical analysis

Data were described as mean with standard deviation for quantitative and frequency with percent for qualitative variables. The two groups were compared using independent t-test, Mann-Whitney and Chi-Square test based on the type of variables and the normality of the data. To estimate the mean with 95% confidence interval (CI) adjusted for baseline covariates the analysis of covariance was use. All analysis were performed in SPSS program version 21.

Results

A total of 110 pregnant women including 55 women in the intervention and 55 women in the control group were studied. The majority of mothers in both group had less than 30 years, between 14-28 weeks of gestation, had high school education, family income between 5 to 10 million Rial and benefited from insurance coverage. Table 1 shows the baseline characteristics of study population. There were no significant difference in terms of age group, education level, gestational week, family income, and insurance coverage between the two groups.

The results of HBM constructs in the two groups are illustrated in table 2.

Before the intervention, there was no significant difference in the score of HBM constructs between the two groups. Three months after intervention the scores significantly improved in both groups but yet the intervention group had significantly higher mean score in all constructs of HBM compared to the control group.

Table 3 shows the scores of dental plaque index and caring performance before and 3 months after the study in the two group. Before initiating the intervention, the two groups were similar in terms of both indicator and there was no statistically significant difference between the two groups in terms of dental plaque index and caring performance. After three months of intervention, dental plaque index were dramatically decreased in the intervention group from 36.34 (SD = 15.19) to 21.3 (SD = 10.63). In contrast, dental plaque scores significantly increased from 37.4 (SD = 17) before the study to 44.7 (SD = 17) three months after the study. The scores of Caring performance were significantly improved in both groups.

Figure 1 shows the adjusted mean scores of both indicators after three months of intervention. The mean scores were adjusted for the values of covariates prior the study using the analysis of covariance. The results showed that the adjusted scores of dental plaque index in the intervention group were significantly lower than the control group (P-value < 0.001). In contrast, the intervention group had significantly higher scores of caring performance than the control group.
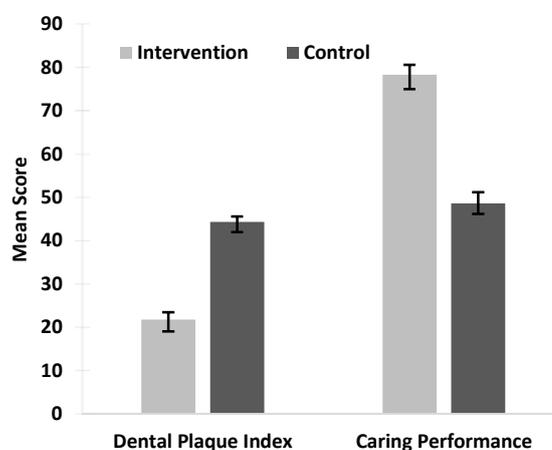

Figure 1. Adjusted Mean Score of Dental Plaque Index and Caring Performance in the two Groups. Error Bars, 95% Confidence Intervals.

Table 2. Comparison of HBM Constructs in Adopting Oral and Dental Health Behaviors by Pregnant Mothers Before and 3 Months After the Intervention in the Two Groups

Constructs	Intervention Group Mean (SD)	Control Group Mean (SD)	Between group P-value
Knowledge			
Before intervention	44.4 (14.39)	49.4 (13.7)	0.07
3 months after	87.6 (11.6)	63.7 (13.1)	0.001
Within group P-value	0.001	0.001	
Perceived susceptibility			
Before intervention	72 (9.5)	75.8 (11.9)	0.07
3 months after	90 (5.6)	83.7 (10.5)	0.001
Within group P-value	0.001	0.001	
Perceived severity			
Before intervention	80.5 (6.4)	80.2 (9)	0.84
3 months after	94.3 (5.12)	86.1 (7.2)	0.001
Within group P-value	0.001	0.001	
Perceived benefits			
Before intervention	84.2 (6.7)	84.6 (8.4)	0.75
3 months after	96.3 (4.5)	87.9 (7.7)	0.001
Within group P-value	0.001	0.001	
Perceived barriers			
Before intervention	48 (9.2)	49.9 (10.3)	0.32
3 months after	30.1 (7.5)	44 (9.7)	0.001
Within group P-value	0.001	0.001	
Behavior			
Before intervention	35.4 (12.5)	39.6 (18.6)	0.17
3 months after	77.3 (9.3)	49.6 (1.37)	0.001
Within group P-value	0.001	0.001	

The findings of this study showed that, based on Pearson correlation coefficient, there was a negative correlation between mean score of dental plaque and performance (r = -0.588: P-value = 0.001).

Discussion

The results of current study showed that educational program based on HBM significantly improved the score of dental plaque index and caring performance in the pregnant women. According to the HBM, health-related action will take place if a person has some beliefs about the health condition and action toward avoiding the condition. The person must feel that negative health condition can be avoided and have a positive expectation that the prevention can be accessed through taking recommended action. Previous studies showed that pregnant women may not adequately have these believes.

The studies have shown that most pregnant women do not aware that their pregnancy outcomes is connected with their oral hygiene in pregnancy and therefore, they do not sufficiently adhere to oral hygiene (14-16). On the other hand, dental practices considered to be harmful during pregnancy (17, 18). Therefore, tailoring an educational program that improve the pregnant women precieved benefits and sensitivity can influence on their oral hygiene as well. The HBM that is spelled in four constructs of perceived susceptibility, perceived severity, perceived benefits, and perceived barriers can be a useful program to achieve these goals. In this study all constructs of HBM model improved in pregnant women after three months of intervention. The ultimate effect of education on dental health and caring performance has also showed improvement in both indicators. This finding is in agree with previous reports by Shahnazi et al (19).

Table 3. Comparison of Dental Plaque Index and Caring Performance Scores After 3 months of Intervention in the Two Groups

Variables	Intervention Group Mean (SD)	Control Group Mean (SD)	Between group P-value
Plaque index			
Before intervention	36.3 (15.2)	37.4 (17.5)	0.74
3 months after	21.3 (12.1)	44.7 (16.8)	0.001
Within group P-value	0.001	0.001	
Caring performance			
Before intervention	35.4 (12.5)	39.6 (18.6)	0.17
3 months after	77.3 (9.3)	49.6 (14.4)	0.001
Within group P-value	0.001	0.001	

In this study, dental plaque index significantly decreased in the educational intervention group and increased in the control group. This finding is in accordance with previous studies. In a study by Sohrabi Vafa et al, the index of dental plaque increased in the control group and decreased significantly in the intervention group after training (20). In fact, normal pregnancy is associated with increasing calculus and debris that may predispose women to periodontal diseases (21, 22). Shamsi et al, found a decrease in dental plaque index of mothers before and three months after the educational intervention from 68 to 35 (23). In Another study by Haji Miri et al, the dental plaque index in the intervention group significantly decreased after training(24). In a study by Haerian et al, the index of dental plaque in all participants significantly decreased in both groups after health education (25).

Finally, the results of current study showed that the level of the performance significantly increased in the experimental group after the invention based on the Health Belief Model; this result applies to the control group as well. The reasons for the increased performance in the control group could be due to studying the questionnaire, increased curiosity and raised awareness; the increase in experimental group was significantly more than the control group indicating the effect of oral health education based on the model.

Sohrabi vafa et al showed in a study that the caring performance of the intervention group significantly increased after the education (20). In a study by Haerian et al the level of performance significantly increased in all participants in both groups after providing them with health education (25). In a study by Bahri et al on pregnant women in Mashhad, there was no significant difference in the scores of performance between the two groups before the intervention. Scores of the short-term performance immediately after the intervention were higher in the experimental group (26).

Similar to other educational intervention studies, this study was limited for lack of blinding of study participants. Therefore, the control group might be contaminated by receiving educational material from the participants in the intervention group and this might be the probable reason of increasing the performance score among control group.

Conclusion

The results of current study showed the efficacy of education program based on HBM on improving both the dental health indicators and health belief constructs. Due to the importance of oral hygiene during pregnancy on both maternal and neonatal outcomes, implementing a routinely structured health education to pregnant mothers for maintain oral health is suggested.

Ethical consideration
The study protocol has been approved by ethical committee of Guilan University of Medical Sciences. The research protocol has been registered at Iranian Clinical Trial Registry (code: IRCT2051072423294N1).

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