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The Effect of Educational Program on Increasing Oral Health Behavior among Pregnant Women: Applying Health Belief Model

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Abstract

Aim: The oral health is one of the most of public health problems and women with pregnancy have high risk for dental caries and need more attention. The purpose of this study was to assess the effectiveness of a health education intervention based on the Health Belief Model (HBM) on oral health behavior in pregnant women.

Methods: This is a quasi-experimental study carried out on 130 pregnant women selected with random sampling method from health centers in Arak in 2011 (case and control groups each of 65 women). Data collection with questionnaire was based on construct HBM, as well as their knowledge and performance about oral health.

The women of the case group participated during the two month of intervention and again two month after، with 2 session meeting classes as the follow up after intervention. The data were collected 3 months after intervention and analyzed.

Findings: Our findings indicated that mean scores of HBM Model variables, i.e susceptibility, severity, benefit and barriers perceived, were significantly increased in the case group compared to the controls after intervention. Also, oral health care (before intervention 45 ±9.2, after three months 77±9.7) improved significantly among the case group, compared to the controls ($p<0/001$).

Conclusion: Applying the HBM Model is very effective for developing an educational program for oral health in pregnant women. Besides such programs, follow up education on controlling and monitoring is highly recommended.

Keywords: Health Belief Model, Oral Health, Pregnancy

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Introduction

The oral health is one of the most common public health problem that requires attention in the prevention chronic diseases and for the health promotion based on scope WHO (2010). Oral diseases cause serious long-term problems regarding both social (e.g. social confidence), and physical (e.g. heart disease) aspects [1]. However, despite considerable improvement in the field of oral health throughout the world, oral health problems still persist both in developed and developing countries [2]. While comprehensive prenatal health care should include an assessment of oral health, however, this is often avoided and misunderstood by the physicians, dentists, and midwives.

Only 22 to 34 percent of women in the United States consult a dentist during pregnancy. Even when an oral problem occurs, only one half of pregnant women attend to dentistry [3].

Pregnant women are at higher risk of tooth decay for several reasons, including increased acidity in the oral cavity, sugary dietary cravings, and limited attention to oral health. Moreover, children of mothers who have high caries levels are more likely to get caries [3, 4]. Research suggests that some prenatal oral conditions may have adverse consequences for the child. Periodontitis is associated with preterm birth and low birth weight, and high levels of cariogenic bacteria in mothers can lead to increased dental caries in the infant. Preterm birth is the leading cause of neonatal morbidity in the United States, costing approximately $26.2 billion per year [4].

A population-based cross-sectional study conducted in North Dakota (1996) revealed that young women, women in poverty, and women with Medicaid coverage were at increased risk of not having a dentist visit during their pregnancy [5]. In another study in Iran Haji Kazemy et al showed that majority (70%) of pregnant women had negative attitude regarding the performance of oral and dental care in during pregnancy [6]. A study on mother in south east Hungary showed that DMFTI was 4.8 [7]. This index was 4.3 in 35-44 years old adult in Lebanon and 8.7 in 35-44 years in Kerman in Iran [8, 9].

An estimated 1000 to 1500 women in the Arak city become pregnant each year [10]. Despite a general reduction in dental caries in all ages, studies show that it remains high during pregnancy since approximately 40 to 90 percent of women with pregnancy suffer from dental caries in developing countries. Indeed the Eastern Mediterranean region, which also includes Iran, has the high mean for Decayed, Missing and Filled teeth (DMFT) [11].

Moreover, clinicians and public health care providers who care for women during pregnancy need new practical information concerning factors that affect dental care use to

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allow development and implementation of oral health counseling, screening, and referral strategies. It is therefore crucial that the oral health knowledge, perception and status of dental caries in women with pregnancy in Iran be assessed as they are an important and high-risk group. Moreover, non-compliant oral health during pregnancy can affect the health of the fetus.

Based on the goal of "Health for all-HFA- until the year 2010 Project" achieving the goal of oral health is accessible by health education, floride therapy, nutrition recommendations, and primary health care. Health education is the important component of all these factors [12].

Health education and promotion scientists have prepared models by using different psychological and social patterns, that are very effective. One of these models is Health Belief Model (HBM), which was planned in 1950 and developed during the subsequent years [13].

In fact the Health Belief Model (HBM) is one of the most widely used in the public health and frameworks for trying to understand health behavior. The HBM framework was developed in the 1950s by Hochbaum (1958 & 1992), and Rosenstock (1974 & 1991) as a model for health educators [13].

The model asserts that to plan a successful educational intervention, the individual or group's perceived susceptibility; (that is the level, which a person knows his sensitiveness about a disease) should be considered [14].

Perceived severity is the perceptions of the person about severity of the disease) of the condition and its consequences; perceived benefits is the person's understanding about the advantages of doing the preventive behavior) in taking certain actions to reduce risk; and perceived barriers are some barriers and problems encountered by healthy behaviors and practices (e.g., costs of the advised action) [15].

Self-efficacy (empowerment for doing oral health) and cues to action (strategies for activating the "readiness" to undertake health actions) are required as cues to action act in two ways: some of them are internal like headache, that make the person to show a behavior for solving it. Some of the cues to actions are from outside such as mass media and communication between people, that help a person to adopt a specific behavior [14].

Knowledge of all of these dimensions in HBM is believed to be vital to the planning process for successful educational interventions (Figure 1) [14]. This model has been used successfully for many decades to promote health behaviors such as osteoporosis and self-medication [16, 17]. Other evidences showed that HBM model would increase likelihood of adopting healthy behaviors. Results of research about oral healthy behaviors in American white families showed that there was some relation between perceptions and the behaviors

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(r= 0.43) and this finding supports the application of HBM [18].

According to increasing DMFT index period of pregnancy and because of importance of oral health education through proper model for studying the behaviors [4, 5, 14], in this study health belief model was used in oral health in pregnant women. The aim of this study was to assess the effectiveness of a health education intervention based on the Health Belief Model (HBM) on oral health behavior in pregnant women.

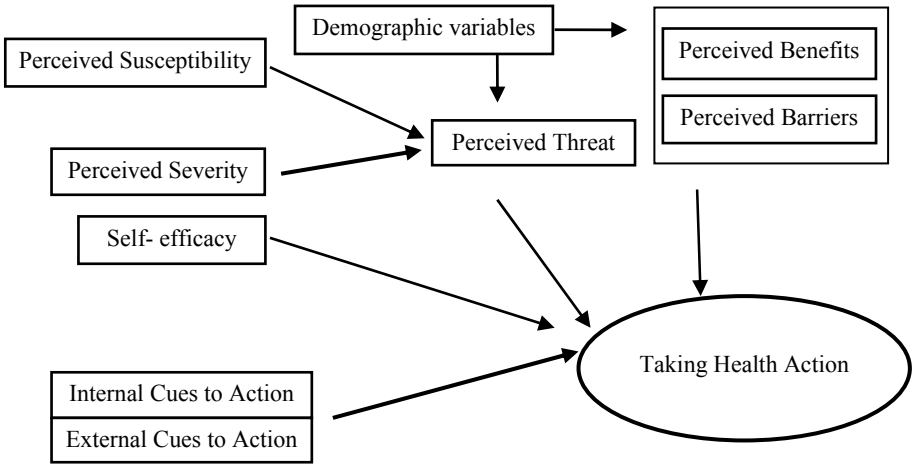


Figure 1 Theoretical model of relationship using the Health Belief Model and showing its construct

Materials and Methods

Participants and Procedure

This was a quasi-experimental study that was carried out on 130 pregnant women that were selected with random sampling method from health centers in Arak in 2011 (in case and control group each of 65 women).

The population studied was 21-35 years women with pregnancy from 10 health centers. Number of samples was calculated to be 65 for each group by using volume of sample formula based on the percent and mean of the variables. Ten percent was increased to this number in anticipation of dropout cases after education.

In this study inclusion criteria included consent of women with pregnancy for the study and without of oral diseases. Exclusion criteria were absence in more than 2 sessions of educational program, lack of interest or absence of visit to occupational dentistry. Moreover, mothers with oral of dental complication were excluded. The women agreed to participate and complete a questionnaire. All women gave their informed

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consent. Women participation was voluntary and anonymous using self-administered data collection procedures. The study was approved by both the Ethics Committee of the Tarbiat Modares University (Tehran-Iran) and the health center of Arak province in 2011.

Instruments

The data were obtained by using the finalized questionnaire completed during interviews, a checklist for quality of brushing and dental flossing and the health files of mothers.

The questionnaire included some demographic questions (ex. Age, time of pregnancy, status of job, level of education and so on), knowledge about oral health=15 item, HBM= consist of (perceived susceptibility=8, perceived severity=7, perceived benefits=10, perceived barriers=12, self -efficacy =8 and cues to action=2 questions).

The participant's behavior (taking health action) related to the oral health was assessed using brushing and use of dental floss. Cues to action were the measured with frequency. The perceived susceptibility and self-efficacy (range: 8-40), perceived severity (range: 7-35), the perceived benefits (range=10-50), barriers and behavior (range: 12-60) were measured by summing participant's responses to statements, with a high score reflecting higher threat for the prevention of their oral problems. The knowledge of their oral health care were measured; (range: 0-15) respectively. For analyzing data, the sum of scores for knowledge and all constructs of HBM was 100.

The content validity of the questionnaire was determined by a panel of reviewers consisting of college professors in health education and promotion, dentistry, midwife and an epidemiologist. Prior to conducting the main project, a pilot study was conducted to assess the content validity of the study questionnaires as well as its reliability. The pilot study was conducted to obtain feedback about the clarity, length, comprehensiveness, and the required time for the completion of the questionnaires as well as for data collection in order to estimate the internal consistency of the measures.

To determine the internal consistency of the instrument items a Chronbach's Alpha formula was applied to measure the reliability of the questionnaire. The results reveal the reliability rates, which are in an acceptable range.

Reliability in section of questionnaire was: knowledge (0.81), susceptibility (0.73), severity (0.7), benefit (0.75), barrier (0.71), self-efficacy (0.76) and total of reliability is 0.84.

Test- retest method was used for determining the reliability of checklist and the correlation coefficient of 0.88 was achieved. The women completed the questionnaires on two separate occasions (pre intervention, and three month after intervention) to evaluate the effectiveness

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of the educational interventional program.

Data was analyzed (pre-test) then an educational program was planned based on the results and Health Belief Model elements. During a two month period, pregnant women in case group received educational intervention sessions based on the HBM conceptual framework process (Figure 1). According to this model, the health education planning included goals and objectives based on individual perceptions (perceived susceptibility and severity), modifying factors (perceived threat and cues to action), and likelihood of action (perceived benefits, barriers and taking health action) that influenced preventive behavior among the pregnant women. The educational methods used included lectures, demonstrations, focus groups, discussions and role playing activities. Educational material such as full month model with large tooth brush, dental floss, film of oral health education, picture and slide show, pamphlet and booklet designed by the investigators, dentistry department and midwife. The teaching materials (a poster, a booklet, and a pamphlet) were based on the pre-test data analysis of the pregnant women.

In order to create a teachable moment and a "perceived threat", a pregnant women volunteer with dental decay who had experienced pain and dental problem as a result of the disease, participated in the group discussion. She described her unhealthy habits related to oral health that might have contributed to her condition. Moreover, a dentist and a midwife were also present in the some session. Women in the traditional education group received the traditional, mostly didactic health education curriculum on oral health routinely offered to pregnant women in this region. Researchers were present at these educational sessions to document the use of the routine pedagogical methods.

Three months after educational program administration, data were gathered and analyzed again. This interval time was enough to assess oral health behavior in women.

The study was conducted after human subject use approval was obtained. Participants were assured that their responses would be kept confidential and all questionnaire administrators and women were blinded to the conditions of this study. Control women received oral health education, dentist's recommendations and refer to a dental clinic at the end of research.

Statistics

The Statistical Package for the Social Sciences (SPSS 17) was used to analyze the data.

Data were analyzed using chi-square, t-test and paired t-test.

Findings

The results showed that mean age of women in

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case and control group was 27.1±3.5 and 29.8±4.3 years. Before intervention, findings showed that mean knowledge about oral health in case and control group was 41±8.20 and 45.2±9.1 respectively.

The mean scores of knowledge and HBM Model variables were significantly increased in the case group compared to the controls after intervention. The situation of case and control groups had been equal in their demographic characterization (ex. age, level of education, status of job and so on) (Table 1).

Table 1: Absolute and relative frequency distribution of the participants in case and control groups

Groups / Demographic characteristics		Case Group		Control Group	
		No	**Percent**	**No**	**Percent**
Age (years)	21-25	18	27	22	34
	26-30	36	55	33	51
	31-35	11	18	10	15
P		0.357			
Level of education	Elementary school	8	12	6	9
	Middle school	14	21	17	26
	High school	27	42	24	37
	College or university	16	24	18	27
P		0.147			
Monthly family income	0 (low)	14	21	17	26
	500-800$ (moderate)	30	46	26	40
	>800$ (high)	21	17	22	34
P		0.563			
Status of job	Yes	9	15	12	19
	No	56	85	88	81
P		0.658			

Table 2 compares the 2 groups' mean scores in knowledge and HBM domains before and three month after the intervention. The results showed no significant differences between the mean grades score of variables (knowledge, individual perception about element of health belief model, quality of brushing and quality of using dental floss) in the case and control groups before intervention, (Table 2); the t-test however, showed a significant difference between all variables mentioned, in the case and control groups after intervention ($p<0.001$); there was significant difference between mean grades score of all of variables in case group, before and after intervention. The mean scores of the case group women

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improved significantly on post-test across all six domains, compared with pretest scores. For the control group, no significant changes were found between testing times.

Table 2: Comparison of mean scorers of the pregnant women knowledge, element of HBM, practice of oral health before and 3 month after intervention

Variables	Groups	Before intervention		After intervention	
		Mean	SD	Mean	SD
Knowledge	Case	41	8.20	85	9.28
	Control	45.2	9.1	51	8.3
	P	0.194		0.001	
Perceived susceptibility	Case	32.6	8.14	74.36	10.11
	Control	36	9.8	39	9.5
	P	0.145		0.001	
Perceived severity	Case	61.7	10.12	81.5	10.7
	Control	64.4	10.15	52.5	9.98
	P	0.312		0.001	
Perceived threat	Case	47.15	10.12	81.5	10.7
	Control	50.2	10.3	52.5	9.98
	P	0.267		0.001	
Perceived benefits	Case	65.6	9.71	94	10.12
	Control	61	10.8	64	11.8
	P	0.212		0.001	
Perceived barriers	Case	68	8.9	37.3	8.25
	Control	71	8.3	67	9.6
	P	0.208		0.001	
Self-efficacy	Case	35.6	7.1	73.7	7.9
	Control	31.4	6.6	35.1	6.8
	P	0.135		0.001	
Practice	Case	45.1	9.2	77	9.8
	Control	42.6	8.7	46.5	9.1
	P	0.411		0.001	

Before intervention, the mean of perceptions about sensitivity and self- efficacy about oral health behaviors were weak or under moderate range in two groups.

Three month after intervention, a correlation was observed between the performance of

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brushing and sensitivity, severity, threat, self-efficacy and benefits perceptions in case group (P= 0.001).

In this study, between perceived susceptibility and performance (r=0.44, p=0.008), perceived severity and performance (r=0.51, p=0.002), self-efficacy and performance (r=0.61, p= 0.001) positive correlation was observed. While among the perceived barriers to oral health care and behavior, an inverse relationship was observed (r=-0.65, p= 0.001). Moreover self-efficacy and perceived barriers to most common predictor of oral health behavior in pregnancy women was based on health belief model.

The results in tables 3 and 4 show distribution of internal and external cues to action in case and control groups separately before and after intervention (Table 3 & 4).

The most cues to action in two groups (case & control) were respectively: dentist (53 & 55%), midwife (50 & 44%), family health practitioner (46 & 63%), partner (47 & 52%) and so on (Table 3).

Table 3: Distribution of external and internal cues to action about oral health before intervention in case and control groups

Case and control groups / External and internal cues to action		Case group		Control group		Chi-Square
		N	%	N	%	
External cues to action	Dentistry	33	50	36	55	0.521
	Midwife	35	53	29	44	
	Partner	31	47	34	52	
	Practitioner of health family	38	58	41	63	
	Mass media	30	46	37	56	
	Others family person	25	38	18	29	
	Others pregnant women	14	21	11	16	
	Educational books	12	18	7	10	
Internal cues to action	Fear of getting complications from tooth decay on child health	35	53	41	62	0.127
	Feeling of health and vitality	43	66	46	70	
	Personal unpleasant experience of dental caries in the past	32	49	37	56	

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Table 4: Distribution of external and internal cues to action about oral health after intervention in case and control groups

Case and control groups / External and internal cues to action		Case group		Control group		Chi-Square
		N	%	N	%	
External cues to action	Dentistry	55	84	34	52	0.032
	Midwife	49	75	34	47	
	Partner	47	72	35	53	
	Practitioner of health family	40	61	32	49	
	Mass media	31	47	25	38	
	Others family person	27	47	14	21	
	Others pregnant women	22	33	10	15	
	Educational books	18	27	9	13	
Internal cues to action	Fear of getting complications from tooth decay on child health	58	89	41	63	0.041
	Feeling of health and vitality	55	84	43	66	
	Personal unpleasant experience of dental caries in the past	34	52	31	47	

Discussion

Applying the HBM model is very effective for developing an educational program for oral health in pregnant women. Besides such programs, follow up education on controlling and monitoring is highly recommended**.**

The results of the study showed that prior to the intervention, most elements of HBM were below average in the two groups. After the intervention, women in case group showed significant improvement for behavior assessed, while women in control group showed no improvement. This supports our hypothesis that a health education program based on the HBM combined with non-traditional pedagogic methods for teaching can be effective in promoting the adoption of behaviors by pregnant women to prevent oral health problems.

All of these recommend increasing the participants' awareness of the need for prevention and control of their oral health through educational campaigns to improve their intentions to prevent and control their oral problems and their complications. The awareness of pregnant women significantly increased after intervention in the case group, consistent with the observations of Shamsi et al [17]. This study described the increase of self- medication in pregnant knowledge after intervention Moreover, our findings in this study are consistent with the observation of

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Cardenas et al. around effect of an oral health education program for pregnant women [19]. Finding of Cardenas, who found that oral health problem in pregnant women declined when their awareness increased [19]. These results support the finding of studies of Kloeblen [20], Smiech [21], Martin [22] and Solhi [23].

The mean for grade scores of perceived susceptibility as one of the constructs of HBM in both the case and control groups was under average. The results of our study are similar to the results of Mazlomi carried out among the students of Yazd (a city in Iran) [24] and study of Solhi et al in the students of Tehran, Iran [23].

Mazlomi described that the subjects did not prevent the complications of their oral problems, because their perceived susceptibility was low [24] Perceived susceptibility of participants increased in the case group, suggesting that education may have influenced pregnant women behavior, results consistent with the findings of Solhi [23] in Iran and the finding of a study from China [25]. These studies revealed that increasing the perceived susceptibility in subject helps to prevent and control their oral health problem. Results of a study in the Australia revealed that low perceived susceptibility is the reason for subjects not caring for their health [26].

Finally, knowledge and perceived susceptibility to disease are considered to be motivating factors for behavior change [27].

In this study there was no significant difference between the mean grade scores of perceived severity in the case and control groups before intervention, results which show that there is lack of perceived severity among pregnant women about complication of oral and dental health in all groups; results of the Mazlomi [24] and Solhi [23] in student population that support our results. They revealed that since the perceived severity of participants in their study was not appropriate, the subject ignored oral complications after intervention, while the perceived severity of case group increased 10 times more than in the control group. These results are consistent with the findings of Solhi [23] and Shamsi [17].

It has been shown that perceived threat, as another construct of HBM, can be used to take care of oral health.

The mean grade scores of participants in the case and control groups before intervention was low, similar to the results of Mazlomi [24] study that showed that the prevalence dental decay in participants was high. The perceived threat of subjects of the case group in both the Solhi [23] and in our study increased after intervention, decreasing plaque index by 73% in the Solhi study. Our data about perceived threat is similar to the results of Khorsandi

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[16] which showed that increase of perceived threat could prevent and control osteoporosis in pregnant women. The result of a research that was carried out by Solhi et al, showed that, DMFT rate in subject, with low perceived threat, was higher than others [23].

In practice, perceived barriers and benefits had an important role in the prevention of oral health problems in pregnant women. A study carried out in nurses with less than two years professional experience showed that those who followed the recommendation of not recapping the needle have less barriers and more benefits [28].

Our findings showed that perceived barriers were significantly decreased and perceived benefit increased after interventions in the case but not in control group.

The Mazlomi study revealed that perceived benefits among the subject was good with significant difference between the caring of the oral health and perceived benefits [24].

Our results about the perceived barriers and benefits are consistent with the results of many other studies [16-18, 23, 24].

In the case of having definite program of brushing, comparisons of the results of this research with other studies have shown that the situation of women under study was better than the others. In this study, 43% of case women and 45% of control women were brushing daily. This number in adult of Kerman (another city in Iran) in 2007 was 41% [9] however, in study of Chen, 51.9% of American white family did not have definite program for brushing [18].

In case of last visit to a dentist, women's situation was not desirable as 23% of adult (35-44 years old) in Denmark did not have any definite program for visit to the dentist [29] that was consistent with our study.

In this study results at the 3 months after education indicate the necessity of educational programming with support of appropriate models and activating the most important cues to action. Findings indicate application of health belief model in education of women with pregnancy in the health centers is appropriate. Modification of the perceptions in this model caused brushing behavior and use of dental floss. In addition, the corrected brushing behavior and use of dental floss correctly are affected by individual perceptions (sensitivity, severity, barriers, self-efficacy and benefits perception).

The powerful factor in this model for the above mentioned behaviors is perceived self-efficacy. This finding matches with Hollister and Anema's study entitled "health behaviors models and oral health". This study described health belief model as one of effective models for oral health [30].

Results of research about oral healthy behaviors in mothers and their children

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showed there is some relation between perceptions and the behaviors and the powerful factor were perceived barriers [31]. These findings support the application of HBM.

Moreover, a study conducted by Hajikazemi and colleagues in 2007 in Isfahan, Iran, targeting pregnant women showed that most of the women did not have suitable oral health behavior, consistent with our pretest findings [6].

Findings have shown that workers in the field of oral health should try for changing these five perceptions more because increasing such perceptions can be effective in behaviors, which prevent oral diseases. Also decreasing the DMFT index had been related to the increase of individual perceptions about self-efficacy and barriers although the effect of self-efficacy was more than the others. Decreasing the PI is also affected by increasing individual perception about self-efficacy, severity, susceptibility and benefits of oral health behaviors.

The results of this study identified several basic educational needs of participants which increase their knowledge and motivate change in their practices for the prevention of their oral problems.

In addition, internal cues to action that encourage the pregnant women to care for their oral health and the contribution of dentistry and midwife members to care as an external cue to action to increase the care of oral health are very important.

Conclusion

Overall the results of this study showed that the mean grade scores of knowledge and constructs of HBM of participants were average and practice of oral health care was low. Furthermore, the findings of this study showed that increase of the mean grades scores of knowledge and constructs of HBM of pregnant women, resulted in better oral health care by women themselves. Hence our results and results of many other studies carried out on HBM reveal that HBM constructs may initiate the changes and improve the behavior of subject. Our results and another study revealed that HBM has the potential for establishing educational programs for individuals and communities. It is therefore, recommended that the application of this model may be effectively used to prevent different diseases and complications including oral health problems.

In this study we were unable to actually see the behavior for oral health care, for the data collection of this parameter, we used self–reporting method and this was limitation of this study.

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