The Effect of Educational Intervention Based on Health Belief Model on the Improvement of Periodontitis and Gingivitis in Adults

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Abstract

Introduction: Oral and dental diseases are very common in periodontal diseases and not only have physical, but also economic, social and psychosocial consequences. Periodontal diseases are the main cause of tooth loss and as a result of a public health problem Children, adolescents and adults are affected. Oral health education has been a major public health problem, which is the first step in the prevention of oral and dental illness. This study aimed to investigate the effect of educational intervention based on Health Belief Model on the improvement of periodontitis and gingivitis in adult population referred to a dental clinic in Tehran.

Materials and Methods: This study was executed as a randomized clinical trial. The random selection of subjects with periodontitis and gingivitis disease was divided into two groups of intervention and control, with 98 subjects in each group. Patients were examined for plaque and depth of pocket index. The questionnaire was presented to both groups based on the Health Belief Model. In both groups, scaling treatment and root planning were performed. Individual training was performed in the intervention group in three sessions (baseline, one month later and three months later) for 15 minutes. One and three -month retreat was conducted in both groups by providing a questionnaire. The data were analyzed using SPSS version 24 software, which was considered to be less than 5% in this study.

Results: The pre-test results did not show a significant difference in the demographic data of the participants, the Health Belief Model, plaque index and the depth of the dental pocket. After intervention, there was a significant difference between the two groups regarding the factors of Health Belief Model as well as knowledge, performance and index of plaque and depth of pocket (p <0.001). But there was no significant difference in the perceived benefits construct (p = 0.535).

Conclusion: Regarding the results of this study, it can be concluded that educational intervention based on Health Belief Model improves oral health behaviors and decreases plaque and depth of pocket in persons.

Keywords: Periodontists; Gingivitis; Health Belief Model

Introduction

Oral health refers to the health of our mouths and ultimately represents the health of our whole body [1]. Oral diseases such as dental caries and periodontal diseases are very common and not only have physical, but also economic, social and mental symptoms - They are also psychological. These diseases seriously disturb the quality of life in a large number of people and affect many aspects of their lives, such as oral functioning, facial appearance and social relationships [2]. Chronic periodontitis is an infectious disease that results in inflammation in the supporting tissues of the teeth, loss of progressive joints and bone resorption. Clinical findings of chronic untreated periodontitis include the formation of plaque above the gums and abdominal cavities that are often associated with mass formation, gingival inflammation, envelope formation, loss of connective tissue and bone alveolar analysis [3]. Gingivitis is an inflammatory disease of the gum that is associated with Symptoms such as increased volume; color changes, form and gum congestion, and bleeding during probe are indicated. The bacterial plaque accumulating due to non-compliance with health around the teeth is the main cause of the disease [4].

Gingivitis begins in childhood and is prevalent with increases age [5]. Increasing age and systemic diseases can affect the health and function of the mouth. The relationship between periodontitis and prognosis has been proven with an increased risk of mortality. Until now, only this association has been proven and the cause is unknown. By 2020, more than one billion people in the world are aged over 60, of which two thirds of the population lives in developing countries. In Iran, according to the latest statistics from the health ministry, 7.3% of the population is elderly [6]. Studies have also shown that periodontal disease is an important risk factor for the birth of low birth weight infants, and bone loss is a common feature of periodontal disease and osteoporosis [7]. It has been proven recently that people with Periodontitis 4 times more likely than normal people to have rheumatoid arthritis [8]. chronic periodontitis is a disease Dysphonia, which leads to inflammation in the tissues that support the teeth, loss of bone loss is progressive and connections. Clinical findings of chronic untreated periodontitis include the formation of a plain gum and perineum often associated with mass formation, gingival inflammation, enveloping, loss of connective tissue and bone alveolar analysis [3]. Gingivitis is an inflammatory disease of the gum that is associated with Symptoms such as increased volume; color changes, form and gum congestion, and bleeding during probe are indicated. The bacterial plaque accumulating due to the lack of hygiene around the teeth is the main cause of the disease [9]. The mechanical removal of plaque is a proven method for controlling plaque and gum disease. However brushing, and the use of dental floss is a difficult task that depends on individual skills. The primary treatment of periodontal diseases is non-surgical curing and root planning, which is recognized as a primary treatment of periodontitis [10]. Importantly, the fight against the two factors that lead to poor oral and dental health, dental caries and gum disease is the first to understand the loss of tooth [11]. due to the high prevalence of periodontal diseases in third world societies, and given that Periodontal disease does not only act as a topical agent on the teeth and the preservative as an independent risk factor for systemic diseases, prevention, identification and early treatment for preventing systemic diseases can help [6]. Today, a wide variation in oral health status by various factors such as grade Oral hygiene, dental programs, oral hygiene awareness in the general population and access to oral health care professionals [12]. An important step is initially to combat the two factors that lead to poor oral and disfunctional health, dental caries and gum disease. It is a perception of tooth loss [11]. Educational programs emphasize the importance of improving the health / prevention of oral diseases, and they are also required to raise awareness and not to worry about oral health [13]. The Health Belief Model is based on the idea that individuals' perceptions of a health threat change their behavior, and this model mainly focuses on the prevention of diseases and behaviors to avoid a chain of illnesses and diseases. This template is among the precise and important patterns used to determine the relationship between health beliefs and behavior. This pattern was introduced by Hutchban and Rosen Stoke between 1950 and 1970 and completed by Baker and Miemam [14]. This theory is capable of describing long-term and short-term health behaviors and it is based on the hypothesis that preventive behavior occurs when a person is considered to be prone to a condition (perceived susceptibility), seriously evaluates the disease (severity Perceived) and able to reduce the perceived threat and achieve the perceived benefits of doing the behavior by paying the necessary time, money and ... (perceived barriers). In this case, if a person feels himself capable of performing behavior (he / she has self-efficacy), the person is ready to act and change behavior [15]. This study aimed to investigate the effect of educational intervention based on Health Belief Model on the improvement of periodontitis and gingivitis in adult population referred to dental clinic in Tehran.

Methods

This is an experimental clinical trial and the population of all adults with periodontitis and gingivitis referred to a dental center in Tehran. Subjects were randomly assigned to two groups of intervention and control group. The number of people in each group is 98. The inclusion criteria for people with a pocket depth index (the gap between the gum and the tooth is in the normal state between 0 and 1 mm deep) [16]. If the depth of the gland is increased due to inflammation and gingivitis, periodontal pocket are created. (More than 4 mm) without systemic disease and no smoking [16,17]. Exclusion criteria are all those who do not have these characteristics and have at least two sessions of absente training sessions [18]. Patients were evaluated for plaque index and periodontal index. Index plaque: Initially, people who were given no signs of harm to people who were told to swallow the pill for 45 seconds and immerse all teeth in the tongue for plaque. Then the number of dental surfaces dyed over the total teeth was divided into four, and the final number was declared as percentage [16]. Periodontal index was measured by probing and measuring the depth of pocket. Depth of pocket: All mouths of patients were probed and the probing depth of each tooth was recorded at three points: mesial, middle and distal. All information was recorded in each specialist form. Patients were provided with a questionnaire before the intervention to complete the information. Questionnaire based on Health Belief Model has two parts. The first part contains demographic and background information [15]. The questions include age, sex, occupation, marital status, family history of gum disease, family income, education, frequency of referral to the dentist and history of chronic disease. The second part of the questions relates to the Health Belief Model and awareness and performance [15,19]. The constructs of the Health Belief Model questionnaire in 6 areas include:

1. Perceived sensitivity (8 questions)
2. Perceived severity (7 questions)
3. Perceived benefits (7 questions)
4. Perceived barriers (8 questions)
5. Self-efficacy (7 questions).

The five structures mentioned are based on a 5-point Likert scale. I totally agree that I totally disagree with the highest score of 4

and the lowest score is zero.

6. Cues to action (4 questions) with yes, no, and somewhat with a score of 2 and a low score of zero. Ten questions related to awareness with correct answers, false and do not know; with the highest score of 2 and the lowest score is zero.

Ten questions related to performance with yes, no, and somewhat with a score of 2 and lowest scores. The validity questionnaire of all constructs was assessed. Perceived susceptibility (96%), perceived severity (98%), perceived benefits (93%), perceived barriers (90%), self-efficacy 93%), cues to action (95%), as well as awareness with score (94%) and performance with score (92%) confirmed the validity. In order to understand the perception of the questionnaire and the vocabulary used in it with the cognitive levels of the learners, a questionnaire was submitted to 30 persons for completion and the necessary points were corrected. The results of this study showed that all of the studied structures had internal consistency (Cronbach's alpha coefficient), so that the Cronbach alpha coefficient for perceived susceptibility questions was 73%, perceived severity was 83% , Perceived benefits of 89%, perceived barriers of 70%, cues to action of 74%, self-efficacy of 92%, and awareness of 70% and 79% performance. First, the questionnaire was completed by both intervention and control groups. After analyzing the data from the initial test, educational content based on the results of these data, existing research texts and based on the health belief model were prepared and adjusted. In the intervention group, in addition to non-surgical treatment including root planning, oral and dental health education was performed, and only non-surgical non-health education was performed in the control group. Dental and oral practice (using replica), brushing the standard Bass and proper use of dental floss twice a day. Individual training was conducted in three sessions (referral day - one month later and three months later) for fifteen minutes and group once for 60 minutes. In the field of training based on model structures: 1. the benefits of proper oral and dental health and perceived severity are explained. 2. For expressing the perceived benefits and barriers, group discussion and lecture were used. With the simplicity of brushing and using dental floss, each of these behaviors was discussed. 3. In the field of self-efficacy, patients being confident that they can best observe their oral hygiene, especially in the follow-up and one-to-three-month follow-ups of verbal encouragement, and talked about successful experiences. Follow up of patients after one month of referral. A re-examination and the indexes of the disease were re-measured. Repetition of oral and dental health education in the intervention group for the second time, the questionnaire was completed for completion. Repetition was carried out 3 months after the second referral.

Statistical analysis

Statistical analysis was conducted using SPSS version 24. Categorical variables were described using frequencies and percentages and continuous variables were described using means and standard deviations. T- Test was used to compare between the components of the Health Belief Model, plaque index and pocket depth .ANCOVA test was used to comparison of components and index between the two groups in the first and third month. Differences between means at baseline and post-treatment were evaluated using the paired t-test. The significance level in this study was less than 5%.

Ethics approval and consent to participate

This study was approved by the Medical Ethics Committee the School of Public Health of Tehran University of Medical Sciences with the number IR.TUMS.SPH.REC.1396.4000.

Also registered at the Clinical Trials Center of Iran.Trial Id: 20600

IRCT Id: IRCT20151006024381N2

Registration date: 2017-12-28.

Each participant completed a consent form and returned it to us. All patients in the study described that the information contained in the questionnaire is used confidentially and will only be used for this study, and also explained in the questionnaire's header.

Results

In this study, 196 people (67 men and 129 women) participated (Figure 1). Of these, 52 had periodontitis and 144 had gingivitis. The mean age of the participants was 40.62 ± 12.84 years, with a minimum and maximum (18-66 years). Also, the mean age of the participants in the intervention group (41.56) and in the control group (39.67) was determined by t-test (p = 0.305). There was no significant difference between the two groups. According to the table, the highest number of participants in both intervention and control groups is in the age group of 30-40 years.60 (31.6%) of the participants were free of charge and according to Chi-square test (p = 0.135) there was no significant difference between the two groups in this variable .Among the participants, 57 (29.1%) were single and 129 (65.8%) were married. According to Chi-square test (p = 0.637), there was no significant difference between the two groups. Also, the level of education among the participants was studied, among which 2 of the illiterate subjects who were randomly assigned to the control group and 97 (49.5%) had higher education than the diploma the distribution of this group was characterized by 52 (53.1%) people in the group and 45 (45.9%) in the intervention group. Using the Mann-Whitney test (p = 0.264), there was a significant difference in the level of education could not be seen .Family history of gum disease was also studied in 20 (10.2%) patients with family history and 176 (89.8%) patients without gingival disease history. Among 20 (8.2%) Were in the intervention group and 12 (12.2%) were in the control group, which according to the Chi-square test (p = 0.345) did

not show any significant difference. Of the other independent variables studied, the income was in this study. 33 (16.8%) of the people with a sufficient income, 142 (72.4%) of the middle-income people (approximately enough) and 21 (10.7%) of insufficient income in this study company. There was no significant difference between them according to the Mann-Whitney test (p = 0.756). The frequency of visits to the dentist was also assessed in two groups. 11 (5.6%) were twice a year, 9 (9.2%) were in the intervention group and 2 (2%) were in the control group. 5 (6.2%) of the participants participated more than twice a year; 4 (4.1%) of them were in the control group. 180 (91.8%) of the patients referred to the dentist in the event of a problem, 88 (89.8%) were in the intervention group and 92 (93.9%) were in the control group. Used for The mentioned variable was Mann Whitney, which showed no meaningful difference between the two groups (p = 0.258). According to the results of statistical analysis of pre-test data, there is no statistically significant difference between the two intervention and control groups in terms of demographic variables. The variables listed in the table below are for confirmation of the explanation (Table 1).
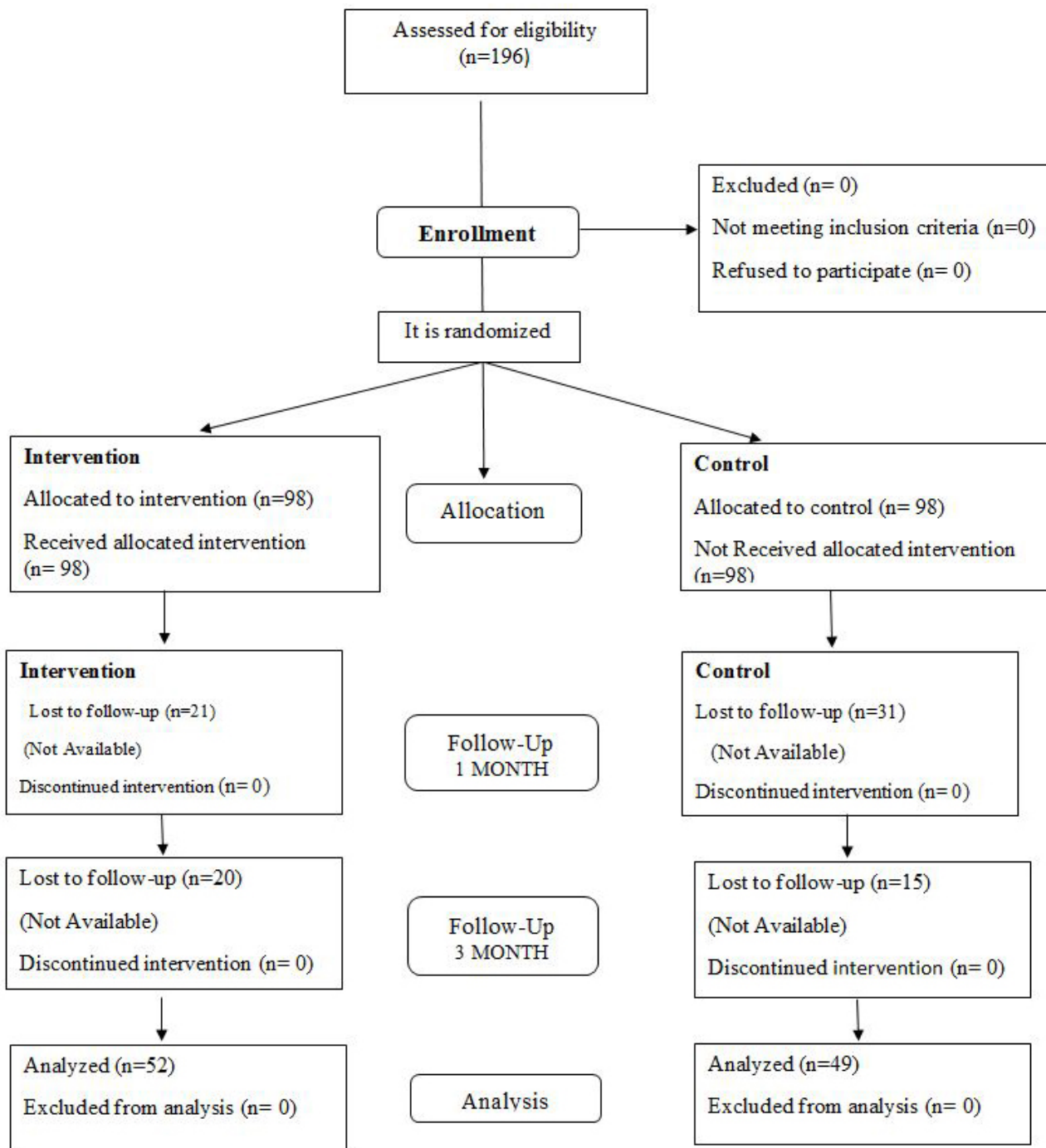

Figure 1: Randomize people to the group in the chart

Regarding the normal distribution of data, independent t-test was used for comparison of meanings in two groups that was presented in the classroom [20].

Variable	Category	Total	Group		p-value
			intervention	control	
Age	Mean (SD)	40.62(12.13)	41.56(13.50)	39.67(12.13)	0.305
	median	39	40	38	
	30≥	46(23.5%)	26(26.5%)	20(20.4%)	
	30-40	61(31.1%)	26(26.5%)	35(35.7%)	
	41-50	42(21.4%)	18(18.4%)	24(24.5%)	
	51-60	29(14.8%)	17(17.3%)	12(12.2%)	
	60+	18(9.2%)	11(11.2%)	7(7.1%)	
Sex	male	67(34.2%)	33(33.7%)	34(34.7%)	0.880
	female	129(65.8%)	65(66.3%)	64(65.3%)	
Job	jobless	55(28.1%)	31(31.6%)	24(24.5%)	0.135
	Retired	20(10.2%)	13(13.3%)	7(7.1%)	
	Employee	59(30.1%)	23(23.5%)	36(36.7%)	
	Non-employee	60(31.6%)	31(31.6%)	31(31.6%)	
Marital status	Single	57(29.1%)	30(30.9%)	27(27.6%)	0.637
	Married	139(70.9%)	68(69.4%)	71(72.4%)	
Education level	illiterate	2(1%)	0(0%)	2(2%)	0.264
	Subdomain	25(12.8%)	16(16.3%)	9(9.2%)	
	Diploma	72(36.7%)	37(37.8%)	35(35.7%)	
	Higher than diploma	97(49.5%)	45(45.9%)	52(53.1%)	
Family history of gum disease	yes	20(10.2%)	8(8.2%)	12(12.2%)	0.345
	no	176(89.8%)	90(91.8%)	86(87.7%)	
Family income	Quite enough	33(16.8%)	14(14.3%)	19(19.4%)	0.756
	Somewhat enough	142(72.4%)	75(76.5%)	67(68.4%)	
	Not enough at all	21(10.7%)	9(9.1%)	12(12.2%)	
Visit times	Twice a year	11(5.6%)	9(9.1%)	2(2%)	0.258
	More than twice	5(2.6%)	1(1%)	4(4.1%)	
	If there is a problem	180(91.8%)	88(89.8%)	92(93.3%)	
	I will not go	0(0%)	0(0%)	0(0%)	

Table 1: Comparison of the demographic variables of the subjects in the intervention and control groups

The perceived susceptibility construct before and after the intervention in both intervention and control groups were not statistically significant and there was no significant difference (p = 0. 275). But after intervention and referral after a month, the difference was significant in the two groups with (p <0.001). Also, using paired t-test, this difference was significant in two groups after one month (p <0.001). After 3 months of referral, perceived susceptibility was statistically significant (P <0.001). However, the changes in the intervals between one and three months did not show a statistically significant difference (p = 0.756). There was a significant difference between two groups in the perceived intensity of the structure before and after the intervention (p = 0.482), one (p = 0.348) and three months after the intervention (p = 0.297) did not have. Also, changes in the two groups at the intervals of one and three months after the intervention were not statistically significant (p = 0.407). Regarding the paired t-test, changes in the first month in two groups and changes in the third month only in the intervention group were statistically significant (p <0.001). There was no statistically significant difference for perceived benefits in time before intervention in two groups (p = 0.256). Also one and three months after intervention (p = 0.550), changes in two groups were not statistically significant. In the above table, the changes between the first and third months did not show any significant difference between the two groups (p = 0.505). According to the paired t-test, changes from the first month were significant in the control group (p = 0.024). If it was not significant in the intervention group in the first month and in the two groups in the third month. The results of the above table indicate that there is no significant difference in the score of perceived barriers in the two groups before intervention (p = 0.174). Also, there was no significant difference between the one month after the intervention (p = 0.702) and three months after the intervention (p = 0.383). However, based on the paired t-test, the difference between the changes in the first month and the third month was statistically

significant (p <0.001). However, there was no significant difference between two groups in the intervals between one and three months (p = 0.477), while the difference between the changes in these two intervals was significant in the intervention group (p = 0.015). According to the table, the self-efficacy score before intervention was similar in both intervention and observation groups (p = 0.385). Also, there was no significant difference in one month after intervention (p = 0.995). According to the paired t-test, the changes in the two groups in one month after the intervention showed a significant difference (p <0.001). The rate of self-efficacy after three months was different between the two groups and it was statistically significant (p = 0.076). In case of changes in the intervention group only (p <0.001), there is significant difference between the first and third months (p = 0.016). If the difference between the first and third months is significant only in the control group (p = 0.087). Regarding the results, there was no significant difference between the two points in the pre-intervention group before intervention, while after intervention, the difference between the two groups was statistically significant. The value of p-value in the two groups before intervention was 0.275 and one month after the intervention was <0.001. Also, there was a significant difference between the groups in the three months after the intervention (p <0.001). Before the start of the study, the level of awareness was similar in the two groups (p = 0.88). However, after the intervention, within one month, the level of awareness increased in both groups (p <0.001) and also statistically significant differences between the two groups (p <0.001). There was a significant difference in the level of awareness of people in the third month. Also, (p <0.001) in the changes between the first and third months showed a significant difference. The results of the table indicate that the level of performance in the two groups was similar before the intervention and was not statistically significant (p = 0.214). If one month after the intervention, this rate has changed and the p-value is less than <0.001. The change in the level of performance in the two groups is different for three months and it is statistically significant (p <0.001) (Table 2). Also, the level of p-value changes in the two groups from the first month, the third month and between the first and third months was <0001.

Variable	Time	Group Mean(SD)		paired t-test		95% confidence interval of the difference		p-value
		intervention	control	intervention	control	maximum	minimum	
Perceived sensitivity	baseline	60.36(14.38)	58.39(10.65)	0.001>	0.001>	1.5	-5.5	0.275
	1month	76.83(8.30)	65.98(9.57)	0.001>	0.001>	-7.8	-13.8	0.001>
	3month	79.41(8.85)	70.35(10.64)	0.003	0.001>	-5.1	-12.2	0.001>
Perceived severity	baseline	75.55(12.10)	76.75(11.80)	0.001>	0.001>	4.5	-1.5	0.482
	1month	81.27(10.51)	81.38(11.88)	0.001>	0.1	3.8	-3.6	0.348
	3month	83.33(16.38)	81.76(9.52)	0.157	0.832	4.2	-7.4	0.294
Perceived benefits	baseline	82.29(19.16)	79.66(12.32)	0.372	0.024	1.9	-7.1	0.256
	1month	82.19(11.10)	83.20(11.69)	0.444	0.663	4.8	-2.8	0.505
	3month	82.14(10.79)	80.79(8.76)	0.821	0.308	2.7	-5.4	0.505
Perceived barriers	baseline	60.52(9.75)	58.58(10.21)	0.001>	0.001>	0.86	-4.7	0.174
	1month	70.35(11.66)	70.85(19.79)	0.001>	0.001>	5.7	-4.7	0.702
	3month	76.64(17.56)	72.89(10.02)	0.015	0.875	2.5	-10.03	0.383
Self-efficacy	baseline	75.84(12.54)	74.20(13.82)	0.001>	0.001>	2.1	-5.3	0.385
	1month	79.97(9.88)	81.44(11.42)	0.001>	0.342	5	-2	0.959
	3month	80.90(10.60)	78.47(10.63)	0.176	0.087	1.9	-6.7	0.076
cues to action	baseline	46.56(28.99)	50.77(22.41)	0.001>	0.023	11.5	3.08	0.257
	1month	68.45(20.15)	56.15(19.45)	0.001>	0.005	-5.6	-18.9	0.001>
	3month	69.64(17.78)	58.45(15.61)	0.049	0.205	-4.2	-18.1	0.001>
Awareness	baseline	40(28.14)	46.12(27.94)	0.001>	0.001>	14.1	-1.7	0.128
	1month	96.10(12.55)	74.10(26.23)	0.001>	0.001>	-15.4	-28.5	0.001>
	3month	98.57(5.64)	76.49(20.44)	0.083	0.361	-16.6	-27.5	0.001>
Performance	baseline	55.97(21.29)	59.69(20.48)	0.001>	0.001>	9.6	-2.1	0.214
	1month	75.37(11.62)	68.36(15.54)	0.001>	0.001>	-2.5	-11.5	0.001>
	3month	81.27(9.20)	77.03(9.68)	0.001>	0.001>	-0.38	-8.1	0.003

Table 2: Comparison of Health Belief Model constructs in two groups of intervention and control

The results of the table showed that the level of microbial plaque in the two groups was similar before the intervention and was not statistically significant (p = 0.222) (Table 3). However, this level was different in two groups after one month after intervention and also three months later (p <0.001). However, these changes did not show a meaningful difference between months and three months (p = 0.762). In addition, based on the paired t-test, changes in three times were statistically significant (p <0.001).

Time	Group		Paired T-Test		95% Confidence Interval Of The Difference		P-Value
	intervention	control	intervention	control	maximum	minimum	
Baseline	41(16.44)	44(20.38)	0.001>	0.001>	8.2	-2.1	0.225
1Month	25.57(10.74)	35.48(17.05)	0.001>	0.001>	14.5	5.2	0.001>
3Month	23.57(9.18)	31.92(17.54)	0.079	0.009	13.5	3.01	0.001>

Table 3: Comparison of microbial plaque index in both intervention and control groups
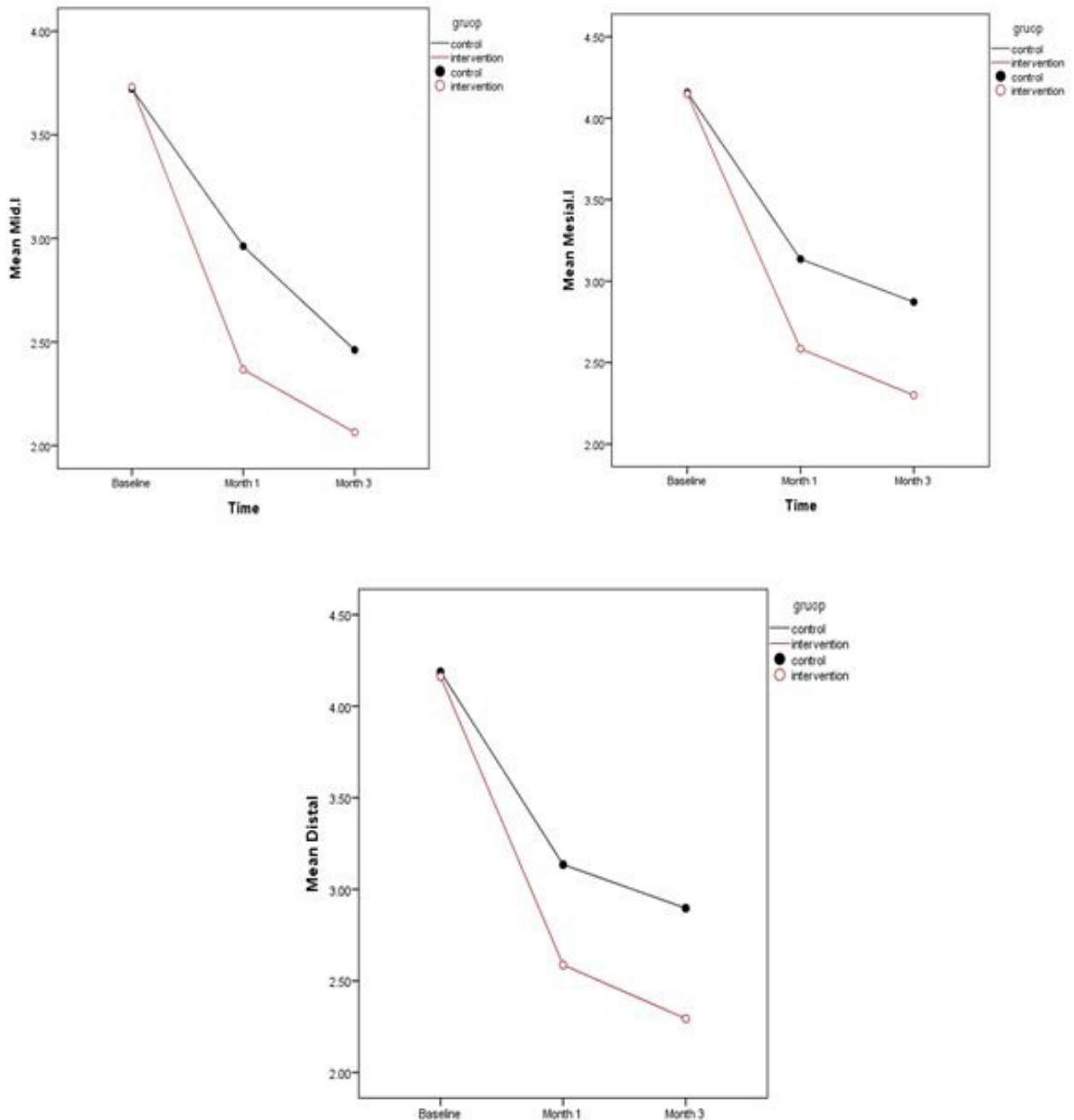

Figure 2: Pocket depth in the area of maxillary and mandibular labial in the intervention and control groups

The depth of pocket was measured in two groups of intervention and control in the form of a chart. As shown in the diagram, we found that the trend between two groups was different with p-value <0.001 by linear multivariate test (Figure 2 and 3).
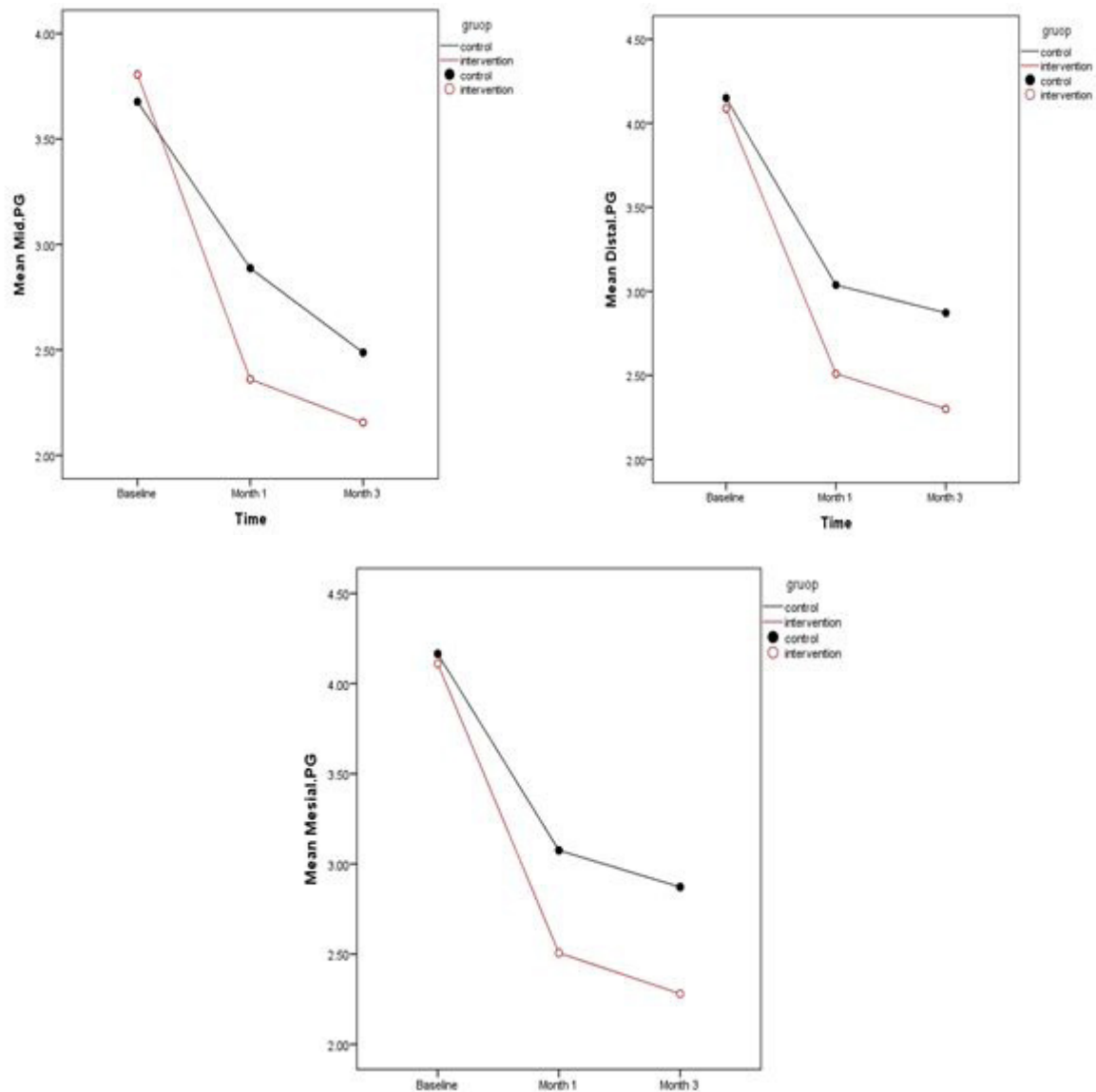
Figure 3: Pocket depth in the palatal and lingual area in the intervention and control groups

Discussion

The results of the study showed that there was no significant difference between the mean perceived susceptibility score between the two groups before the intervention, while after intervention; the reason for this can be attributed to the training sessions in the intervention group. With the training provided, the individuals in their intervention group found that they were more likely to be exposed to periodontitis and gingivitis than control subjects, which can be seen in the level of performance of the control group in oral hygiene, which was studied by Karami, *et al*., Badri, *et al*. have a significant relationship between the behavior of oral and dental health and the perceived sensitivity construct [21,22]. But in the study of Shahnazi, *et al*., there was the least correlation between perceived sensitivity and brushing that did not conform to this study [15].

Other outcomes of the study are perceived severity, perceived benefits and barriers. There was no significant difference between perceived severity of structure in one month after intervention in the two groups, but this comparison in the intervention group and observation of a month after training showed a significant change. This change was observed three months after the intervention for the group significant intervention was found. This indicates the effectiveness of the training program implemented to increase the perceived severity of the individuals after the intervention. In fact, understanding individuals and assessing them from danger is the focus of pattern application, which is consistent with Sohrabi vafa, *et al*. [19].

The results of this study on the effect of educational intervention on the perceived benefits construct show that there was no significant difference between the intervention groups after the training sessions. The curriculum did not have an impact on raising the perceived benefits score; as well as Badri, et al., perceived benefits are not a strong predictor factor [22]. One can point out the relative awareness of oral hygiene, including reduced costs, increased self-esteem and beauty. As mentioned above, there were no significant differences in perceived barriers by independent t-test between intervention and control groups; however, one and

three months after the intervention, the scores of these changes in groups significantly increased. However, these changes there were also fewer differences in the control group, which could be evidenced by the obvious barriers to proper oral hygiene at the community level. In other words, in patients with perceptual barriers such as high dental costs, the difficulty of using the proper method of toothbrushes and dental floss, the failure to observe the dentist's recommendations, the lack of time and the low level of information on oral health, Inhibition of the health behavior of brushing and flossing is in line with the study by Badri, et al and Buglar, et al [22,23].

The next finding is self-efficacy of individuals. The paired t-test showed that the mean of one month after the intervention was significantly increased in the intervention group. There was also an increase in mean scores in the control group compared to the intervention group. Although there was no difference between the two groups before intervention, but there was a significant difference between the two groups in the intervention group after intervention. Also, this difference was found to be significant in the three months after the intervention, which emphasized the efficacy of proper oral hygiene as a predictor of factors and also the relationship between perceived barriers and self-efficacy and behavior related to health behavior. In such a way that the person's perceptions of barriers to observance of The purpose of oral and dental health in preventing and progressing periodontal disease is higher self-efficacy and higher positive results in the performance of oral and dental health patients in this study, which measured the microbial plaque index and the depth of pocket. ; Which is consistent with studies by Buglar, Badri, Shahnazi and Karami [15,21-23]. The results of paired t-test in the intervention group showed that the mean score for the practice of one month after the intervention was significantly increased. This increased in the control group, with the difference that the increase in the intervention group was far more than the control group. Cues to action involves an accelerator that causes a person's need for action. In this study, a dentist and a team of health and pamphlets about periodontal diseases were used that showed a high effect on proper oral hygiene in the subjects in the intervention group. In addition to the impact of print media on increasing awareness and oral hygiene, the mass media (radio and television) also have an impact. In Gholami, *et al.* entitled "Periodontal Knowledge Assessment for Mass Media and Health Promotion Oral and dental "results indicate a significant statistical change in the periodontal knowledge of those who used the mass media, and indicates the significant impact of mass media on Iranian adult awareness of periodontal health and illness [24]. You can use pamphlets with different categories of oral hygiene, healthy posters as well as educational videos in health centers on oral health.

In the case of knowledge, the results of paired t-test showed that the mean scores of intervention in the intervention group were significantly different from the previous one. Also, the results of the analysis of covariance showed that there was a significant difference between the two groups after the intervention and three months after the intervention. In this study, the level of knowledge of people about oral hygiene in both control and intervention groups was low at the beginning of the study, which can be due to inadequate training required by Sohrabi Vafa [19]. Education is the only way to increase the knowledge and knowledge of individuals in different areas. According to Marino *et al.*, The web-based oral health program has been designed to significantly improve the attitude towards oral health, knowledge and self-efficacy as well as self-reporting practices (frequency of use Of dental floss) [25]. According to Ranga *et al.*, The teaching of interactive oral hygiene education on adolescents is effective in using the proper toothbrush and oral mucosal use [26]. After intervention, the mean of performance score in the intervention group was

Considering the relative knowledge of individuals about the perceived benefits of periodontitis and gingivitis and oral hygiene, the importance of the issue of prevention and health can be pointed out. Most people in the field of prevention and health in most areas, even oral and dental information There is a partial form, but why it is worth considering the importance of oral hygiene, which, in this study, and similar studies of sensitivity and perceived severity (perceived threat), should be more prominent. Of course, the perceived barriers should not be overlooked when it comes to preserving oral hygiene. There will be fewer obstacles to the importance of hygiene and prevention in older people. To increase the importance of oral and dental care in the dental and health care team will be very helpful. Cultivation in the community from an early age it will also be very effective through mass media and education.

The results of the microbial plaque index showed that there was no difference between the two groups before the intervention. But after the intervention, the plaque index in the intervention group was changed in two periods and there was a statistically significant difference between the two groups. This trend has also been less pronounced in the level of microbial plaque in the observation group, which can be attributed to non-surgical actions (scaling and root planning) that are effective in reducing the inflammatory process of the gums. The process of plaque formation can be divided into three main stages: 1. placing the plaque on the tooth surface. 2. Priming of the bacteria and adhesions. 3. Colonization and plaque maturation. The first stage of plaque formation is after thorough cleaning of the teeth in seconds. Within the first 24 hours, the surface of the tooth is covered with plaque. Within 3 days, plaque growth increases rapidly. After 4 days, an average of 30% of the total crown of the tooth is covered with plaque. This trend adds to the importance of proper oral hygiene in addition to non-surgical treatment [9]. The results of Hendi and Wang study on the effect of educational intervention on the reduction of microbial plaque were consistent [28,29]. Also, Nishi's study of the effects of scaling and leveling on the reduction of inflammatory process and gum health in patients with gum inflammation and invasive and chronic germs, which was consistent with the results of this study [30].

The last finding was the depth of the pocket, which did not differ from the two groups before the intervention. However, after the training one and three months later, the depth of pocket dental in the intervention group showed a significant decrease compared

to the control group (p <0.001). As explained in the plaque index, non-surgical treatment also affects reduction in pocket depth, but this trend is less than the intervention group and it shows the effectiveness of training in reducing the depth of the dental bone in the subjects in the intervention group. The results of the study by Jonsson's study on the effect of educational intervention on reducing the microbial plaque and the pocket depth of the tooth [31].

Limitations and The method of reducing it

- The lack of cooperation and the presence of a number of patients in the predetermined days to start treatment and education - telephone calls and coordination with people one day before the start of education and treatment.
- Flawed completion of the questionnaire by patients - To reduce the limitations before providing the questionnaire to patients, we will provide sufficient training to complete the questionnaire and its goal of completing it to all patients under study.

- Lack of access to a number of patients after starting treatment and monthly follow-up.
- The need to repeat the sessions for the target group because all individuals did not come on a day.
- Lack of readiness for attending meetings because they only came to visit.

Given the fact that this research was conducted at a dental center in Tehran, it is suggested that a more extensive research be carried out in other centers and with a larger population to generalize the results to the whole society.

Conclusion

Regarding the fact that education has a significant role in increasing the number of health behaviors, according to the results of this study, it can be concluded that educational intervention based on Health Belief Model improves oral and dental behaviors and decreases plaque and depth of envelope in People will be.

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