

## Effect of Comprehensive Short-Term Oral Health Instruction on Level of Knowledge and Behavior of Patients

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### Abstract

**Background and Aim:** Prevention of dental caries and periodontal disease is an important health priority. Oral health instruction can help to achieve this goal. This study sought to assess the effect of a short-term, targeted, well-structured comprehensive oral health instruction on the level of the knowledge and behavior of patients.

**Materials and Methods:** This study was conducted on 120 patients who were randomly divided into two groups of case and control (n=60). The control group received routine oral health instructions, while the case group received a two-session comprehensive, well-structured oral health instruction provided by trained dental hygienists. The level of the knowledge in the two groups was assessed before and after the intervention using a questionnaire. To assess the effect of the instructions on the oral health behavior of the patients, bleeding on probing (BOP) and periodontal pocket depth (PPD) were measured before and after the instructions. Data were analyzed using generalized estimating equations (GEE).

**Results:** The level of knowledge, PPD, and BOP were not significantly different between the two groups at the baseline ( $P>0.05$ ). There were significant differences in the level of knowledge ( $P=0.02$ ), PPD ( $P=0.03$ ), and BOP ( $P=0.03$ ) between the two groups after the intervention such that the patients in the case group experienced a reduction in PPD by 2 mm, while BOP decreased by 45%, and knowledge was enhanced by 16% in the case group, compared to the control group, two months after the intervention.

**Conclusion:** Well-structured, targeted, comprehensive short-term oral health instructions can greatly enhance the knowledge and change the behavior of patients.

**Key Words:** Knowledge, Behavior, Oral Health, Gingival Bleeding on Probing, Periodontal Pocket, Periodontal Indices

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### Introduction

Dental caries and periodontal diseases are common oral diseases worldwide [1]. Poor knowledge about oral health and dental hygiene further adds to the

prevalence of oral and dental conditions. By enhancing the public knowledge in this regard, many oral and dental conditions can be prevented

or treated earlier and easier and with lower costs [1].

Dental caries is prevalent in 60%-90% of schoolchildren and adults in the developed countries; it follows an ascending trend in developing countries and is highly prevalent in Asian and Latin American countries [2]. Periodontal diseases have a global prevalence, with severe periodontitis in 5%-15% of most populations [2].

Since the 1970s, health promotion and disease prevention programs have gained an increasing popularity as strategies to improve public health [3]. The aim of oral health educations is to improve the knowledge of the audience and to develop positive oral hygiene behaviors [4]. Many oral and dental conditions such as dental caries and periodontal diseases can be prevented through changing the lifestyle and behavior of individuals. Preventive strategies with regard to the oral health mainly emphasize on changing the nutritional habits (decreasing carbohydrate intake) and on mechanical microbial plaque control (tooth brushing and dental flossing) [4]. Oral health instruction can help to change the nutritional habits and promote preventive behaviors; these are the main goals of oral health promotion programs in a community [3]. Clinical and public research has shown that cost of dental care is not affordable for most people, especially those living in developing countries; therefore, it is crucial to find a way to prevent oral diseases [5]. There are many options for preventing oral diseases; patient education is an easy and economical method [6]. Lawrence Green defined patient education as activities or educational programs designed to help patients change their behavior to promote their health status [1]. The World Health Organization (WHO) introduced a basic oral health care program for less industrialized countries, which includes oral health education and emphasizes on the union of health education with other oral health activities such as the provision of preventive, restorative, and emergency dental care [6].

Oral health instructions provide opportunities to learn healthy behaviors [3]. The teaching of the skills required for disease prevention is the simplest and most basic method to enhance the knowledge of a target population. Microbial plaque

control is essential for the prevention of oral and dental conditions [1]. Patients must be thoroughly instructed on microbial plaque control at each dental visit and should be encouraged to follow a daily plaque control program. A study conducted in the United States showed that only 44% of the subjects knew that microbial plaque accumulation was responsible for the occurrence of gingivitis [7]. Considering the significant role of education in enhancing the level of the knowledge and changing the behavior of patients, finding the most efficient method of instruction is a priority. For instance, Albandar et al [8] reported a significant improvement in the gingival health and the oral hygiene status of patients who received comprehensive oral and dental health instructions during several sessions provided by trained professionals regarding the etiology of oral and dental conditions and preventive measures compared to those who received a routine traditional instruction. This study aimed to assess the effect of a short-term, comprehensive and targeted oral health instruction on the level of the knowledge and behavior of patients in terms of the oral health.

### Materials and Methods

This study was conducted on 120 patients presenting to Imam Khomeini Dental Clinic, Tehran, Iran, for the first time. According to a systematic review conducted by Nakre and Harikiran [4] on 40 studies in 2013, the average number of the patients participating in these studies were 113 people. After filling personal information charts and signing an informed consent form approved by the Imam Khomeini ethics committee (IR.BMSU.REC.1396.568), the patients were randomly divided into two groups of case and control (n=60) by the reception manager without any priority and considering their sex, age, occupation, and insurance status. To assess the level of the knowledge of the participants, a questionnaire with 20 questions was used. We designed a questionnaire with 25 questions and applied it as a pilot research in a model consisting of 20 patients. We used confirmatory factor analysis (CFA) and the Varimax rotation method to determine the validity of the questionnaire. In order to determine the content validity of the

questionnaire, all questions were evaluated by five public health dentists. Also, we used the experts' comments to define the face validity of the questionnaire. The results showed that the content validity and the face validity of the questionnaire were appropriate. Next, questions with absolute values lower than 0.6 were determined, and five questions were excluded from the primary questionnaire. We used the Cronbach's alpha method to determine the reliability of the remaining questions. Patients in the two groups filled out the questionnaire, and thereby, the baseline level of the knowledge of the patients was determined. Also, periodontal pocket depth (PPD) and bleeding on probing (BOP) were measured at the site of the maxillary right first molar, maxillary right first premolar, maxillary left central incisor, mandibular left first molar, mandibular left first premolar, and mandibular right central incisor using a WHO probe (Stoma®; Storz am Mark GmbH, Emmingen-Liptingen, Germany) [9]. In the measurement of BOP, the patients were divided into two groups of with and without BOP.

Patients in the case group received oral health instructions by trained dental hygienists during two educational sessions (one hour each) within one week. Four oral hygienists were trained in 20 sessions (two hours each) and were calibrated for uniform oral hygiene instructions. We designed our instructions based on three essential rules of behavior change, including education, encouragement, and recall. We implemented five educational methods including face-to-face sessions with a trained hygienist, educational CDs, catalogs, short educational movies, and an extensive website ([www.101020.ir](http://www.101020.ir)). The educational content included the etiology and pathogenesis of oral and dental diseases as well as methods to eliminate microbial plaque. In order to motivate and encourage the patients in the case group to follow our oral health recommendations, we provided some incentives such as toothbrush, toothpaste, and dental floss. We used checklists for minimizing instructor interference and ensuring structured and targeted instructions in the process of education.

The control patients received a routine instruction provided by dental hygienists, which was not structured and was given to the patients based on

personal preferences and the experience of the hygienists. The patients were then referred to respective departments according to their dental treatment needs.

After two months, patients in both groups were recalled. During the two-month period before the recall session, we called the patients of the case group twice and sent several text messages to their cell phones to remind them of oral health instructions. BOP and PPD were measured again, the patients were asked to fill out the questionnaire again, and the level of the knowledge of the patients was reassessed. Age, sex, the level of education (as a dichotomous variable: with or without a university degree), and the insurance status (with or without insurance) were also recorded for each patient as independent variables, and their association with dependent variables (level of knowledge, PPD, and BOP) was evaluated.

#### *Statistical analysis:*

Generalized estimating equations (GEE) were used to assess the correlation of the level of knowledge, PPD, and BOP with the type of instruction, age, gender, level of education, and insurance status in different models for each response. In these models, the baseline and post-intervention knowledge levels were considered as a count response variable (the number of correct answers in the questionnaire) and were analyzed using the Poisson Distribution and the logarithm link function; BOP was considered as a binary response variable (presence/absence) and was analyzed using the binomial distribution and the logit link function, and PPD was considered as a scale response variable with normal distribution and was analyzed using the identity link function. The unstructured correlation matrix was used to assess the correlation between the responses of each individual at the baseline and after the intervention. Also, the control group, sex, education, and the insurance status were considered as reference groups. We used T-test, Chi-Square test, and E-test, respectively, to analyze the data related to PPD, BOP, and the level of knowledge. Data were analyzed using SPSS version 20 software (IBM Co., Chicago, IL, USA) at the significance level of 0.05.

## Results

Table 1 shows descriptive statistics for the age, sex, insurance status, and level of education of the patients in the case and control groups.

According to Table 2 and Figures 1, 2, and 3, there was no significant difference between the case and control groups at the baseline with regard to PPD, BOP, and the level of knowledge ( $P>0.05$ ).

The assessment of the effect of the type of instruction on PPD, BOP and the level of knowledge using the GEE showed a significant reduction in PPD ( $P=0.03$ ) and BOP ( $P=0.03$ ) as well as a significant increase in the level of knowledge ( $P=0.02$ ) in the case group compared to

the control group after the intervention (assuming 5% level of significance). In other words, two months after the intervention, PPD decreased by 2 mm in the case group compared to the control group, while the level of the knowledge of the patients in the case group increased by 16% after the intervention compared to the control group. Also, in the case group, BOP decreased by 45% compared to the control group. No significant difference was noted between males and females or between the subjects with and without a university degree or insurance in PPD, BOP, or the level of knowledge (Tables 3, 4, and 5).

**Table 1.** Descriptive statistics in the case and control groups

| Groups         | Age (year;<br>mean±SD) | Level of education        |                              | Insurance status  |                      | Gender         |                |
|----------------|------------------------|---------------------------|------------------------------|-------------------|----------------------|----------------|----------------|
|                |                        | With<br>university degree | Without<br>university degree | With<br>insurance | Without<br>insurance | Male           | Female         |
| <b>Control</b> | 32.33±10.34            | 24<br>(20%)               | 36<br>(30%)                  | 14<br>(11.67%)    | 46<br>(38.33%)       | 25<br>(20.84%) | 35<br>(29.16%) |
| <b>Case</b>    | 32.28±9.9              | 25<br>(20.84%)            | 35<br>(29.16%)               | 14<br>(11.67%)    | 46<br>(38.33%)       | 25<br>(20.84%) | 35<br>(29.16%) |

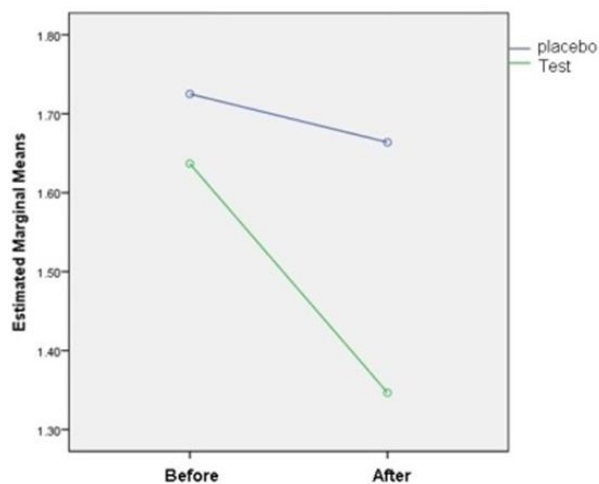
SD=Standard Deviation

According to Table 2 and Figures 1, 2, and 3, there was no significant difference between the case and control groups at the baseline with regard to PPD, BOP, and the level of knowledge ( $P>0.05$ ).

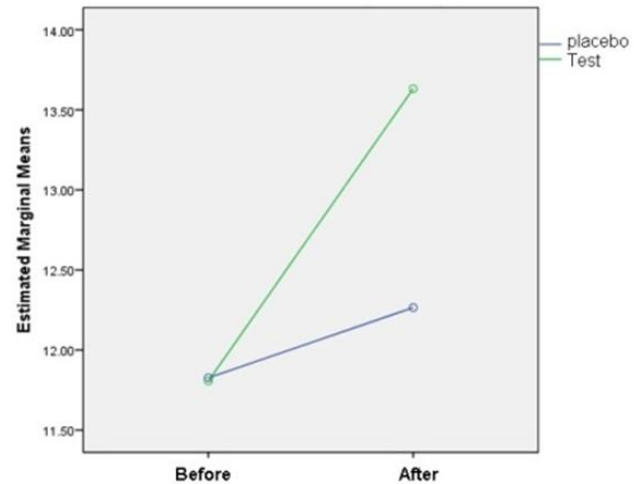
**Table 2.** Difference between the case and control groups at the baseline

|                           | Case group | Control group | P-value | Test                     |
|---------------------------|------------|---------------|---------|--------------------------|
| <b>PPD</b>                | 1.69       | 1.75          | 0.54    | T-test                   |
| <b>BOP</b>                | 0.71       | 0.75          | 0.67    | Chi-Square, proportional |
| <b>Level of knowledge</b> | 11.46      | 11.63         | 0.78    | E-test                   |

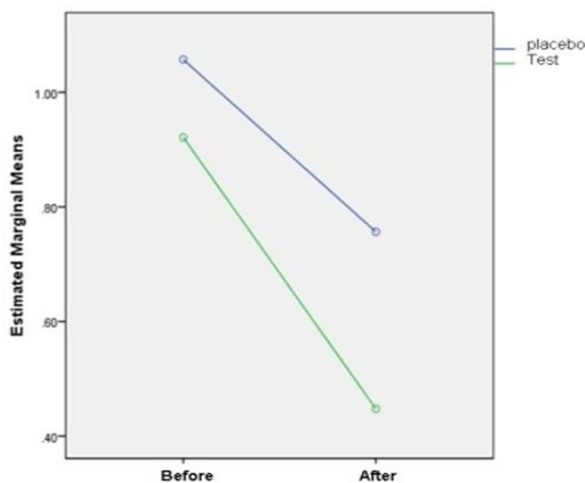
PPD=Periodontal pocket depth, BOP=Bleeding on probing; \*Significant at 5%.



**Figure 1.** Effect of oral health instruction on the periodontal pocket depth (PPD) in the case and control groups



**Figure 3.** Effect of oral health instruction on the level of knowledge in the case and control groups



**Figure 2.** Effect of oral health instruction on the bleeding on probing (BOP) in the case and control groups

## Discussion

This study aimed to assess the effect of organized, well-structured and comprehensive oral health instructions on the level of the knowledge and behavior of patients. The results showed that a comprehensive targeted instruction enhanced the level of the knowledge of the patients and

improved their oral hygiene practice, indicated by a reduction in PPD and BOP two months after the intervention. The instructions resulted in an improvement in the oral and dental health status of the patients. These results were in agreement with those found by Albandar et al [8]. They compared the efficacy of two educational programs for plaque control and prevention of gingivitis in adolescents for three years and reported an improvement in the oral hygiene of both groups [8]; however, the improvement after the comprehensive education was significantly greater than that after traditional instructions, which was in line with the current findings. Albandar et al [8] only evaluated the effect of oral health instructions on behavior change in patients, while we assessed this effect on the level of knowledge as well and showed that comprehensive instructions enhanced the level of the knowledge and improved the oral health behavior of the patients. In the current study, PPD and BOP were measured to assess the change in the oral health behavior of the patients. PPD and BOP significantly decreased in the case group after the intervention, which can be attributed to the enhanced level of the knowledge of the case group and better adherence to oral hygiene measures. However, further long-term studies are still required in this respect. In our study, BOP reduced by 45% in the case group

**Table 3.** Effect of the variables on the periodontal pocket depth (PPD) in the case and control groups after oral health instructions

| Parameter           | PPD             |                |            |         |
|---------------------|-----------------|----------------|------------|---------|
|                     | Estimated value | Standard error | Odds ratio | P-value |
| Type of instruction | -0.2            | 0.09           | 0.818      | 0.03*   |
| Gender              | -0.06           | 0.1            | 0.946      | 0.56    |
| Insurance status    | -0.13           | 0.12           | 0.881      | 0.31    |
| Education           | -0.03           | 0.1            | 0.971      | 0.76    |
| Age                 | -0.01           | 0.00           | 0.994      | 0.23    |

\*Significant at 5%

**Table 4.** Effect of the variables on the bleeding on probing (BOP) in the case and control groups after oral health instructions

| Parameter           | BOP             |                |            |         |
|---------------------|-----------------|----------------|------------|---------|
|                     | Estimated value | Standard error | Odds ratio | P-value |
| Type of instruction | -0.61           | 0.33           | 0.543      | 0.03*   |
| Gender              | 0.33            | 0.34           | 1.394      | 0.33    |
| Insurance status    | -0.69           | 0.38           | 0.503      | 0.11    |
| Education           | 0.24            | 0.34           | 1.273      | 0.54    |
| Age                 | -0.03           | 0.02           | 0.984      | 0.31    |

\*Significant at 5%

**Table 5.** Effect of the variables on the level of knowledge in the case and control groups after oral health instructions

| Parameter           | Level of knowledge |                |            |         |
|---------------------|--------------------|----------------|------------|---------|
|                     | Estimated value    | Standard error | Odds ratio | P-value |
| Type of instruction | 0.05               | 0.05           | 0.81       | 0.02*   |
| Gender              | -0.01              | 0.05           | 0.991      | 0.86    |
| Insurance status    | 0.08               | 0.07           | 1.082      | 0.22    |
| Education           | 0.01               | 0.05           | 1.014      | 0.78    |
| Age                 | 0.00               | 0.00           | 1.001      | 0.84    |

\*Significant at 5%

compared to the control group after the intervention, while Zimmerman et al [10] found a 50% reduction in BOP. Nakre and Harikiran [4] reviewed 40 articles published between 1990 and

2012 on oral hygiene instructions, of which, 13 articles showed that oral hygiene instructions enhanced the knowledge of the participants [11-23]. Fifteen articles reported that oral hygiene

training caused behavioral changes in the subjects and improved their oral hygiene practice [11,13-19,21-28]. Two articles reported that the instruction had no significant effect on the behavior or the knowledge of the participants, and 10 articles indicated that oral hygiene educations simultaneously enhanced the knowledge and improved the oral hygiene practice by the patients [13,14,18,20,23,24,26,29]. In the present study, we used five practical educational methods compared to previous studies that only used one or two educational methods. Moreover, our study focuses on additional psychological factors as well, including motivation and recall to enhance the efficacy of education in the behavioral change in the participants, while similar studies have only focused on the education.

According to the study by Nakre and Harikiran [4], oral hygiene instructions significantly enhance the knowledge and modify the behavior of the patients in terms of the oral hygiene practice. Based on their findings, the level of the knowledge of the patients increased between 7% and 40%, while in our research, it was improved by 16% after the intervention. However, the organization of such instructions in terms of the content and mode of delivery plays an important role in the efficacy of the intervention. Thus, in the current study, dental hygienists were first calibrated for uniform oral hygiene instructions, and a structured education was provided.

Wang et al [30] evaluated the effect of oral health instructions on orthodontic patients. The patients in the case group received oral health instructions immediately after bracket bonding, and their plaque index and gingival index were measured. These parameters were measured again after three weeks, and the results revealed that both parameters significantly decreased in the case group, which was in line with our results, with the exception that we measured BOP and PPD to assess behavioral changes. Use of BOP was a strength of the current study since it has high sensitivity and is more accurate than the indices based on visual changes in the gingiva [31]. Designing a checklist for a structured instruction and holding 20 informative sessions to calibrate dental hygienists for oral hygiene instructions to patients were among other strengths of this study.

The small sample size, due to strict inclusion criteria, was a limitation of this study. Further research is required to assess the effect of instruction on long-term behavioral changes. Also, the efficacy of other educational tools in oral hygiene instruction must be evaluated in future studies.

### Conclusion

Oral health instruction enhances the knowledge and changes the behavior of patients with regard to the oral hygiene practice. The type of instruction is particularly important in this respect. The current results showed that a targeted comprehensive instruction was more efficient than traditional instructions for knowledge enhancement and behavioral change in patients.

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