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Effect of Smartphone Application Reminder on Improving Oral Hygiene

Ali Hadi Fahad

College of Dentistry, University of Kufa, Iraq

Abstract

Objective: To study the effect of smartphone application reminder on improving oral hygine among male students from University of Kufa.

Materials and Methods: In this prospective study, 120 students age ranging from 18 to 24 years were separated into two groups. All participants received a clinical examination and a questionnaire. After receiving typical oral hygiene instructions, participants in the study group were instructed to utilize the Brush DJ smartphone application and were compared to participants in the other group who got conventional oral hygiene instructions. Note that the two groups received same toothbrushes and toothpastes. The measurement of plaque and gingival index was done on three visits.

Results: Independent of the group, participants improved from the first to the third measurements for both plaque and gingival index.

Conclusion: Smartphone applications might significantly improve the oral hygiene compliance of students, by acting as reminders and motivators.

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Email: alih.fahad@uokufa.edu.iq

Introduction

Gingivitis linked to plaque accumulations, hormonal shifts, drugs, systemic ailments, and malnutrition has distinct traits. These include localized inflammation in the free and attached gingiva, reversible with biofilm disruption, and high bacterial plaque levels triggering or worsening the condition [1,2].

Maintaining optimal oral hygiene is imperative for overall health and well-being. Poor oral health not only leads to various dental ailments such as caries, periodontal diseases, and halitosis but also has systemic implications, including cardiovascular diseases, diabetes, and adverse pregnancy outcomes. Among university students, especially males, oral health tends to be overlooked due to hectic academic schedules, irregular lifestyles, and inadequate awareness regarding oral hygiene practice [3].

Oral cleanliness is crucial for oral health, removing microbial plaque and preventing its buildup on teeth and gums. Ideal plaque control through daily toothbrushing and inter-dental plaque removal every 24 hours is sufficient to prevent gingivitis and inter-dental caries [4,5]. Various inter-dental cleaning devices are available, posing challenges for both patients and dental professionals in selecting the right one. An ideal device should be easy to use, remove plaque effectively, and cause no harm to oral tissues [6].

Despite the widespread availability of dental health education, adherence to recommended oral hygiene behaviors remains a challenge for many individuals. This discrepancy underscores the necessity for innovative interventions that can effectively promote sustained oral care habits. In this context, smartphone applications present a promising avenue, leveraging ubiquitous technology to deliver personalized reminders and educational content tailored to individual oral health need [7].

In recent years, the proliferation of smartphone technology has fundamentally transformed various aspects of our daily lives, including healthcare management. Among the myriad of applications, those aimed at improving health behaviors have garnered substantial attention, particularly in the domain of oral hygiene. The oral cavity serves as a gateway to overall health, with inadequate oral care linked to a spectrum of systemic diseases, ranging from cardiovascular disorders to diabetes. Consequently,

optimizing oral hygiene practices emerges as a pivotal preventive strategy to mitigate these health risks [8].

With the advent of digital technology, smartphone applications have emerged as promising tools for promoting health behaviors, including oral hygiene practices. There are applications for educating and encouraging youngsters and adults to use additional oral hygiene products and proper teeth brushing techniques [9,10].

These applications offer personalized reminders, educational resources, and tracking features, which can potentially empower individuals to adopt and sustain healthy habits. However, despite the growing popularity of such applications, there remains a paucity of scientific literature evaluating their efficacy, particularly among specific demographics such as male university students [11].

Owing to half of the healthcare practitioners having smart phones use apps in their day-to-day practice, there are wide range of healthcare apps providing extensive information to support clinical decision-making and better patient care. Today, healthcare apps have better usage comparing any other source of information and benefitted healthcare professionals due to quicker access to information [12,13].

The University of Kufa, situated in Najaf, Iraq, represents a unique setting for studying oral hygiene practices among male students. With a diverse student population and varying socioeconomic backgrounds, the university provides an ideal environment to investigate the effectiveness of smartphone application reminders in improving oral health behaviors. Understanding the impact of these interventions is not only crucial for the well-being of the students but also has broader implications for public health initiatives in similar educational settings.

Material and Methods

Study Design and Setting

Blinded, parallel group, non-stratified randomization and equal allocation ratio (1:1) were used in this prospective study. The study was carried out in Faculty of Nursing and Faculty of Science, University of Kufa at Al-Najaf city. Ethical approval was obtained from the Local Ethical Committee, the College of Dentistry at University of Kufa (Reference number 745). Informed consent and assent were obtained from the students themselves. The study adhered to the principles of the Declaration of Helsinki.

Participants

A total of 120 subjects were randomly divided into two groups. In the first, a questionnaire containing 10 questions about oral health care was distributed to the two groups. Study group received toothbrush, toothpaste, and reminder application about oral hygiene. The other group received toothbrush, toothpaste, and oral hygiene instructions only without reminder application. Users could set reminders to brush twice a day, however, this App can be used as reminder to attend the next dentist/hygienist/therapist visit. The application also includes links to illustrated YouTube videos that show ways to use dental floss, an interdental brush and a traditional toothbrush.

Data Collection

Collection of data was performed by calibrated examiners. Clinical examinations were conducted in a standardized manner, using a dental mirror and a periodontal probe (WHO probe) under adequate lighting by dental chair light.

Oral Hygiene Assessment

Oral hygiene status evaluated by application plaque index (Pl) of Silness and Löe [14], and gingival inflammation assessed by using Gingival Index (GI) of Löe and Silness [15].

Statistical Analysis

Statistical analyses were done using SPSS 23 version 21 computer software (Statistical Package for Social Sciences) in association with Microsoft Excel 2013. Frequency distribution for selected variables was done first. The statistical significance, by using Description of Statistics, median, mean rank, chi-square for statistical differences. P value less than the 0.05 level of significance was considered statistically significant.

Results

Percentage of participants who brushed once daily was 42.5%, not everyday was 37,5% and twice or more was 20%.

For median of PI among study group, the higher median value was (1.33) found with the first exam, while the lower median value was (1.04) found with third exam.

For the comparison group, the higher median value was (1.54) found with third exam, while the lower median value was (1.048) found with second exam.

There were no statistically significant differences between the two groups.

Discussion

This App was selected in the present study to test the improvement of the oral health and creating a new positive habit for people. The efficiency of this App was studied by [16,17] who found that there was a positive correlation between App usage with the brushing duration and frequency, hence, its efficacy in improving oral health. Ben Underwod (2018) stated that "If you want to make people do something, you have to make it fun" [18,19]. A one year later, he was honored by the British Society of Pediatric Dentistry [4]s Outstanding Innovation for his innovation of this App transferring his concept to a reality.

In the present study, the median plaque index of study group highly significantly reduced from the baseline to 3 months after use the application. The reduction of PI agrees with other studies used smartphone App as |20,21]. For the control group, it showed slight increase in the median plaque index over time without significant differences. These results are like a recent study that found [21]. Significant differences in PI were noted between the two groups (study and control) after 3 months from the first examination show positive effect of application to improve oral health.

According to this research, the median gingival index of study group highly significantly reduced after use the application. This result was in line with other studies showed a relation between the effect of application and improve oral hygiene [22]. On the other hand, the median GI of control group, it shows slight increase in the median plaque index over time without significant differences.

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