

Review Article

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The effectiveness of game-based education on dental and oral health behavior: Systematic review

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Abstract

Preliminary: The skill of brushing teeth has a significant role in preventing dental caries. To improve teeth brushing skills. Health education is needed for children from an early age. Educational media determine the effectiveness of children's learning. So there needs to be treated using android-based educational game media to attract students' attention to learning.

Objective: To determine the effectiveness of Game-Based Education on Dental and Oral Health Behavior in Literature Review

Results: Of the 11 works of literature reviewed, 7 of them discussed changes in dental and oral health, with 6 showing positive results and one literature showing negative results, but the literature still shows an improvement in oral health, but not significantly. These results can be obtained due to the lack of samples and short observation times. However, 6 of the literature reviewed showed favorable oral health conditions.

Conclusion: This paper presents a review of several pieces of literature that highlight the effectiveness of game-based education on oral health behavior. The literature obtained generally shows positive results in increasing knowledge and behavior of oral health.

Keywords: education game; health promotion; behavior; change education.

Introduction

Dental health education is an effort or activity to convey messages about dental health to group/individual school children with the hope that they can gain experience about better dental health, and in the end, it is hoped that this knowledge can influence behavior change [1,2]. Dental and oral health education is an effort or activity to influence a person to behave well in maintaining dental and oral health, as well as increasing public awareness in providing an understanding of ways to maintain dental and oral health [3,4].

Dental and oral health education is part of health education

for disease prevention and improving oral health and children's welfare [5]. Dental health education is a process of making a person aware in terms of increasing knowledge and an effort to change one's behavior to pay attention to dental and oral health Interventions [2]. The education used has a variety of ways, from providing simple information to more sophisticated programs that involve changing psychological strategies and behavior. The intervention goals are also comprehensive so that knowledge, attitudes, intentions, beliefs, behavior, use of dental services, and oral health status have all been targeted for change. These efforts are an illustration of the progress of dental health that has been going on for a long time and may re-

quire effort, concern for prevention through changes in knowledge, attitudes, and behavior, as well as changes to a healthier lifestyle [2,4].

One of the health promotion strategies is health education, where it is desired to achieve optimal dental health improvement focusing on lifestyle, namely knowledge, attitudes, and behavior [4]. Despite many studies conducted, it is still unclear which type of intervention is most effective for oral health promotion. Efforts to modify human behavior must be based on understanding the principles of social interaction, communication, and developmental processes. However, most of the research conducted to determine behavioral changes related to dental and oral health only uses different methods with the same educational approach to provide simple information about the causes of oral diseases and instructions for brushing teeth [4,6].

Creative use of media can facilitate and improve learning efficiency so that learning objectives can be achieved. Learning media is one of the essential aspects of the educational process; according to Schramm in Sudrajat (2008), learning media is a messenger technology that can be used for learning purposes. In addition, the media has various benefits, including helping teachers in delivering their teaching materials. The media is also seen as a communication tool that bridges abstract ideas and the real world. The use of interactive multimedia can streamline learning time, make students more active, qualified, and improved. The effectiveness of student learning can make the teaching and learning process positively impact student learning attitudes [7,8].

Since the first game has been a recreational activity to have fun, filling spare time, or doing light exercise. Games function as a medium for promoting dental and oral health [10]. Games can also be alternative learning media or educational games, hoping that they will be effective. The game method is considered more effective in increasing children's dental and oral health knowledge than conventional methods. Game technology can make software a learning medium that is more motivating and interesting so that the learning process is fun [11]. Health behavior theory suggests more effective methods for behavior change and patient compliance and a basis for implementation, monitoring, and evaluation of interventions. Therefore, various ways of promoting oral health have emerged to increase knowledge and an overview of that knowledge—itsself in the form of educational games.

Methods

Data collection was carried out by searching for articles obtained from PubMed and Google Scholar data sources published from 2016 to 2021. The data search was carried out systematically using the keywords "Oral health education game, health promotion based games and oral health behavior change education."

Data collection used in this study is data derived from articles that have been obtained from PubMed and Google Scholar data sources and meet the inclusion and exclusion criteria set by the researcher. The inclusion criteria are articles that examine oral health education, dental and oral health education games, and

articles published from 2016-2021. Exclusion criteria are paid articles, literature reviews, systematic reviews, and editorials.

Based on keywords in two databases, searches yielded 440 articles, consisting of Pubmed 260 articles and Google Scholar 180 articles, eliminating articles that have duplicates and leaving 327 articles. The articles were then filtered, as many as 327 articles were excluded for the following reasons; screening of titles and abstracts (N=175), reviews (n=35), and articles that are not on the topic (n=117). After that, 113 articles were found that met the eligibility. Then the screening was carried out again and resulted in 11 articles according to the criteria.

Results

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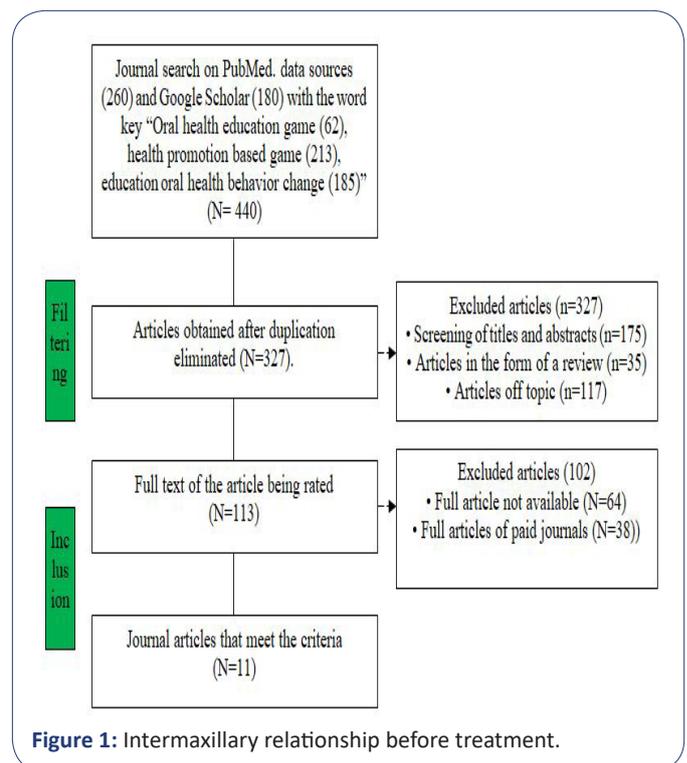


Figure 1: Intermaxillary relationship before treatment.

Discussion

Health education is an integral part of general health, which is very important to inspire one's mind to increase knowledge and develop skills, interests, attitudes, and values. Therefore, one way to achieve this condition is to make the learning process fun. Game-based education is an educational strategy that facilitates and improves children's education in stimulating children's minds, and this can be an alternative to influence children's attitudes and knowledge in improving oral health [11,12].

Table 1: General characteristics of included studies.

Category		n	%
Country	Indonesia	4	36.4
	China	1	9.1
	Iran	2	18.2
	United Kingdom	1	9.1
	India	1	9.1
	Denmark	1	9.1
	Switzerland	1	9.1
Year	2017	3	27.3
	2018	1	9.1
	2020	2	18.2
	2021	5	45.6

Table 2: Details of the articles along with the main findings of each.

Category	Number of Articles	Articles showing positive effects	Articles showing no effect
Knowledge level	6	6	0
Behavior	3	3	0
Satisfaction	2	2	0
OHIS	7	6	1
BOP	1	0	1

Eleven literature that has been reviewed presents game-based education consisting of 7 works of literature by applying online game-based games and four works of literature based on offline games. These two types of games were able to show an increase in knowledge of the subjects studied, as in the study conducted by Malik et al. [11] using offline games in the form of quizzes and crosswords showed an increase in knowledge within 1 and 3 months of follow-up. Similar results were obtained by Zolfaghri et al. [16] by using a gamified intelligent phone application which showed a change in the level of knowledge in the subjects studied. This condition can show that games-based education can attract children's interest by delivering more fun information [11,24]. A strong evidence shows that games that are used as educational media can improve several cognitive aspects such as reaction time, memory, attention, and multi-tasking, besides that the statement also supports the effectiveness of game-based learning that playing games have benefits in 4 aspects, namely motor, social, motivational and emotional [23,25].

The literature reviewed found satisfaction and positive behavioral changes related to the use of games in education. The use of games as education creates a fun atmosphere and certainly attracts children's interest to be more accepting and satisfied with the health education methods provided. The use of online games by utilizing mobile phones can function as a reminder, educate, and entertain children; of course, it can motivate them to maintain oral health, leading to behavior change. In addition, behavioral changes in a positive direction can also occur due to an increase in knowledge after conducting game-based education [18,21].

In the 11 works of literature reviewed, 7 of them discussed changes in oral health, with 6 showing positive results and one literature showing negative results. However, the literature still shows an improvement in oral health, but not significantly. These results may be obtained due to the lack of samples and short observation time. However, 6 of the literature reviewed showed favorable oral health conditions. Providing health education in improving oral health with the help of games to motivate children's knowledge improvement and motivate behavior change. In a study conducted by Alfajari et al. (2017), providing education using computer games was able to increase children's knowledge and positive dietary changes to reduce the risk of caries and improve children's oral health conditions [17].

Conclusion

This paper reviews some literature that highlights the effectiveness of game-based education on oral health behavior. The literature obtained generally shows positive results in increasing knowledge and behavior of oral health.

Suggestion: In some of the literature reviewed, the author has not received any related differences in the effectiveness of online and offline games, so it needs to be studied further.

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