

Systematic Literature Review on the Effect of Play Way - A Game Based Oral Health Education on Oral Hygiene of School-Going Children

Gousalya V¹, Raj Mohan M², Dinesh Dhamodhar², Bharathwaj VV³, Sindhu R³,
Prabu D⁴, Elakiya S¹

¹Post graduate student, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India, ²Reader, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India, ³Senior Lecturer, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India, ⁴Professor and Head, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India.

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ABSTRACT

Objective: In this study, the literature was systematically reviewed to evaluate the effect of play way a game based oral health education on oral hygiene of school children.

Data Sources: Electronic databases were screened and hand searched. Searched electronic databases are PubMed, Cochrane library, Ovid Medline, Elsevier science direct, Wiley online library, Grey literature, Embase.

Materials and Methods: Systematic literature review of clinical trials evaluating the effect of play way a game based oral health education on oral hygiene of school children by following PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines. PICO model was used for population, intervention, comparison and outcome assessment. Cochrane risk assessment tool was used for bias analysis.

Results: A total of 5 articles fulfilled the inclusion criteria. The p-value is less than 0.05 showing that all the studies were statistically significant. Therefore, game-based oral health education is superior to conventional oral health education.

Conclusion: This systematic review concludes that game-based oral health education effectively improves the oral hygiene of school children than conventional oral health education.

Keywords: Oral hygiene, Health education, School children, Gaming method.

INTRODUCTION

Oral cavity problems are one of the most prevalent conditions globally, which can be largely preventable. School children are affected by 60-90% of dental caries. Dental caries is increasingly prevalent in developing

countries and highly prevalent in some Asian and Latin American countries. Prevalence of a periodontal disease is present globally, with 5-15% of severe periodontitis in most of the populations. In some countries, edentulism is high among older patients with age 65 and

Corresponding author: Prabu D, Professor and Head, SRM Dental College and Hospital, Department of Public Health Dentistry, Ramapuram, Chennai, India.

Email: researchphdsrm@gmail.com, Contact number: +91 8072019608

above. Universally, oral cancer is in 8th place among cancers. Oral diseases limit activities at work, in school, and at home, causing millions of work and school hours to be lost every year worldwide. In addition, quality of life is shrunken by the psychosocial impact of these oral diseases.^[1]

In 2003, WHO indicated that the focus of Oral Health Education actions should be on conditions and behaviours that promote oral health or reduce the risk of oral diseases. Health promotion at school should encourage toothbrushing daily, supervised toothbrushing, fluoride use and promotion of good nutrition, among other strategies.^[2] OHE aims to improve the overall knowledge of the people, which may lead to the adoption and maintenance of favourable oral health behaviours that, in return, lower oral health morbidity.^[3] Oral health education can be delivered to groups of people in an extensive scope through dental practices, at schools, workplaces, day-care and residential settings for older adults.^[4,5]

Oral health education is an important tool in the prevention of oral diseases by educating the school children. Health education seeks to protect or improve health through voluntary changes in behaviour due to learning opportunities. It includes personal education and development, mass media information and education. Personal education and development provides improved knowledge about health, offers health risk advice, promotes self-esteem and self-empowerment. Mass media information and education turns to be non-personal and raises public awareness, creates a climate of opinion and offers health risk information and advice. It includes public relations, marketing, advertising, news information and distance learning projects through radio, television, newspapers and other publications.^[6] Playing games benefits the children by developing visual alertness, increasing attention span, and assisting with memory strategy and reasoning, thus making learning an enjoyable one.^[7] Game-based teaching has a dual effect of facilitating and reinforcing a child's

learning in a thought-provoking and self-motivating format.^[8] Conventional health education, if conducted by professionals or disseminated through pamphlets, posters and media campaigns, may not be enough to reach favourable behaviours and positive attitudes.^[9] Game-based teaching with its dynamic effect and benefiting features to the children. This systematic review of the literature evaluates the effect of oral health education through the gaming method on the oral hygiene of school children.

MATERIALS AND METHOD

STUDY DESIGN

Systematic literature review of clinical trials evaluating the effect of play way a game based oral health education on oral hygiene of school-going children following Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.

Population: School children.

Intervention: Game-based oral health education.

Comparison: Conventional teaching method.

Outcome: Oral hygiene

SEARCH STRATEGY

Electronic databases used to find the effect of play way a game based oral health education on oral hygiene of school children are PubMed, Cochrane library, Ovid Medline, Elsevier science direct, Wiley online library, Grey literature, Embase. MeSH terms were used in the databases to identify the articles. The MeSH terms used were "game based oral health education" AND "game based oral health education on oral hygiene" AND "game based oral health education on school children".

INCLUSION CRITERIA

- Articles on the effect of play way a game based oral health education on oral hygiene of school children.
- Articles with full text were included.
- *In vitro* studies were included.

EXCLUSION CRITERIA

- Review articles were excluded.
- Articles other than the English language.

RESULTS

Flow chart 1: Flow chart diagram showing the number of studies identified, screened, assessed for eligibility, excluded, and included in the systematic review.

TABLE 1: represents the population, duration of the study, methods used for oral health education and intervening groups for all the five studies included in this systematic review.

DISCUSSION

In general, traditional oral health education effectively reduced plaque accumulation over a short period of small magnitude.^[2] OHE is also effective in improving the knowledge attitude and practice regarding oral health.^[1]

Nyandindi et al., in their study on the impact of oral health education on primary school children before and after teacher's training in Tanzania, concluded that the group with conventional oral health education had somewhat better oral health knowledge. Still, their practices were no better than the referents.^[16]

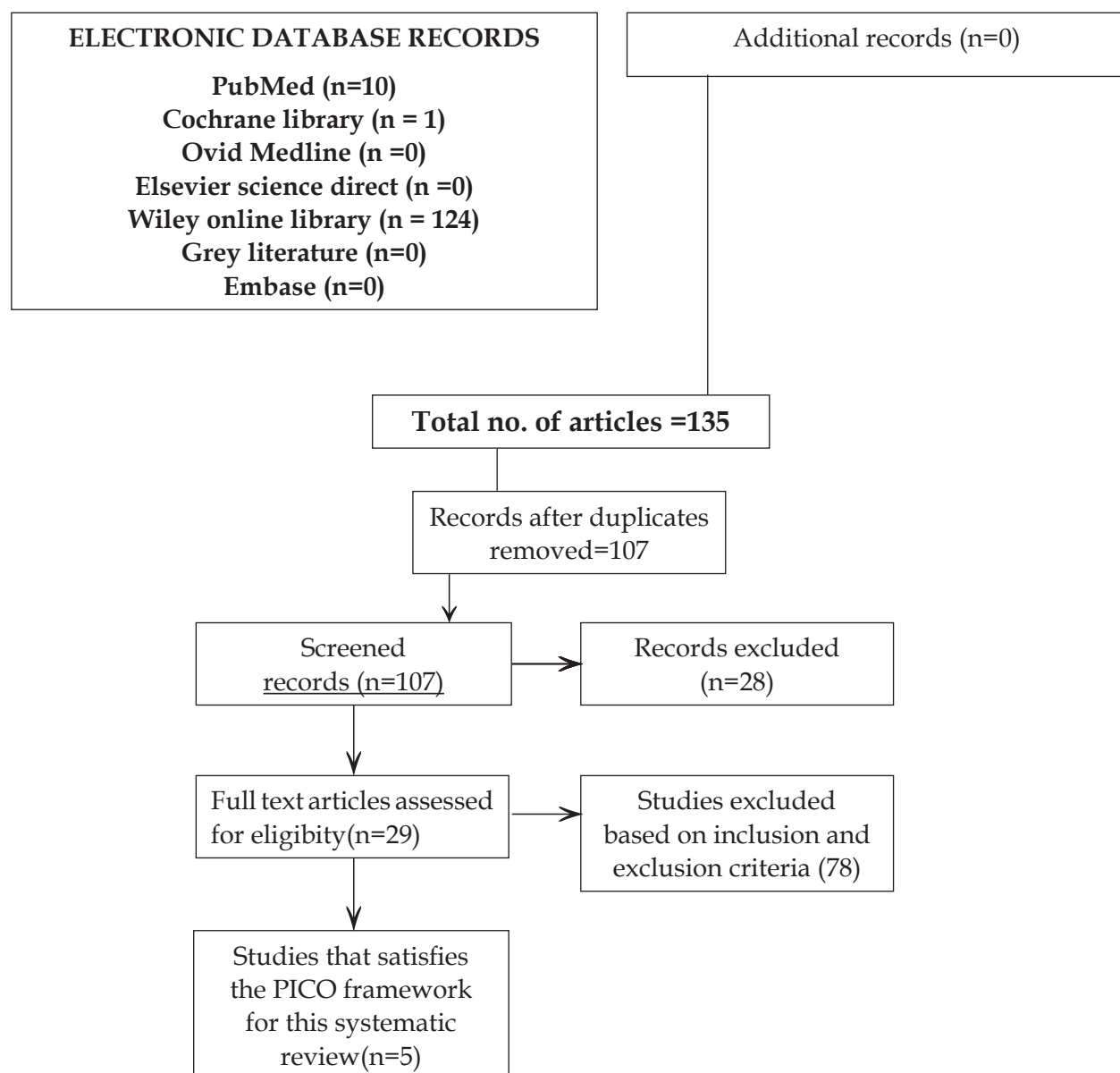


Table 1: Characteristics of Interventions Included in tise Study

<i>S.no</i>	<i>Author name</i>	<i>Year</i>	<i>Patient selection</i>	<i>Duration</i>	<i>Methods used for oral health education</i>	<i>Interoventions</i>
1	Maheswari UN et al. ¹⁰	2014	120 children aged between 5 to 10 years old	Three months	Conventional teaching method Game-based teaching method	Group A: 60 children received oral health instructions through flashcards once a day for seven days. Group B: 60 children received oral health instructions through snakes and ladders combined with the flashcard method.
2	Kumar Y et al. 1. ¹¹	2015	Sixty children aged between 7 to 10 years old	Three months	Conventional teaching method Game-based teaching method	Group A: 30 children educated with the flashcard method. Group B: 30 children educated with both flashcards and connect the dots game method.
3	Malik A et al. ¹²	2017	150 children aged between 8 to 12 years	Three months	Conventional teaching method Game-based teaching method	Group I: 75 children received health education through PowerPoint presentation once daily for seven days. Group II: 75 children received health education through crosswords and quizzes along with PowerPoint presentations.
4	Geetha Priya PR et al. ¹³	2020	360 children aged between 8 to 9 years old	Three months	Conventional teaching method Game-based teaching method	Group I: drama method. Group II: play way method using the snake and ladder game. Group III: flashcard method.
5	Nomair AM et al. ¹⁴	2020	174 children aged between 4 to 6 years old	Six months	Conventional teaching method Game-based teaching method	Group I: Motivational interviewing Group II: Motivational interviewing + Gaming method Group III: Conventional dental health education

Kumar Y et al.^[11] in 2015 compared the effect of conventional and game-based teaching on knowledge and practice regarding oral hygiene among 7 to 10 years school children. A sample of 60 children

aged between 8 to 10 years were randomly divided into two groups: group A (oral health education through flashcards once daily for seven days) and group B (play-way method, i.e. connect the dots game combined with

flashcards). The intervention was started after the pretest evaluation of their knowledge regarding oral health and estimation of Debris Indexsimplified (DI-S). Oral hygiene and DI-S were recorded on the 8th day after

intervention. A follow-up score was also recorded after 1 and 3 months. There was a significant increase in oral hygiene scores and a decrease in debris scores when compared to baseline in both groups at one week and one

Table 2: Outcome of the Studies included in the Systematic Review.

<i>S. No</i>	<i>Author name</i>	<i>Methods used in game-based health education</i>	<i>Methods used for assessing oral hygiene</i>	<i>P-value</i>	<i>Outcome</i>
1	Maheswari UN et al. ¹⁰	<p>Group A: Oral hygiene instructions through flash.</p> <p>Group B: snakes and ladders combined with a flashcard. Snakes and ladders game consisted of a checkered board with numbers 1 to 100. The coin moves with the corresponding dice numbers. If the player lands on the space at the bottom of the ladder (do's of the oral hygiene). If the children land on the head of the snake (don't's of the oral hygiene)</p>	Debris Index-Simplified (DI-S) was used for assessing oral hygiene (post-intervention)	< 0.05	In the game-based oral health education group, there is a significant increase in good oral hygiene scores and a significant decrease in fair and poor debris scores post-intervention day one and at three months follow up.
2	Kumar Y et al. ¹¹	<p>Group A: Children were shown the flashcards with a picture in front and oral hygiene instructions behind.</p> <p>Group B: (Anagram and connect the dots game). The anagram used was 'Bright Smile', where each alphabet represented a specific oral hygiene instruction. Connect the dots game was developed in tooth structure with 11 alphabets as in the anagram and oral hygiene instruction.</p>	Debris Index-Simplified (DI-S) was used for assessing oral hygiene (post-intervention)	p<0.05	There was a significant increase in the Debris index score from 0 to 15 children with good oral hygiene in group B (game-based method) when compared to group A(conventional method).

<i>S. No</i>	<i>Author name</i>	<i>Methods used in game-based health education</i>	<i>Methods used for assessing oral hygiene</i>	<i>P-value</i>	<i>Outcome</i>
3	Malik A et al. ¹²	Group I: PowerPoint presentation. Group II: crosswords and quizzes along with PowerPoint presentation.	Plaque index	p <0.05	In both the groups, there was a significant increase in good oral hygiene scores and a significant decrease in plaque scores on postintervention 1 and 3 months follow-up, but much better scores were seen in group II compared to group I at both the follow-ups
4	Geetha Priya PR et al. ¹³	Group I: drama method (dialogues and the scenes in the drama were framed to educate children about oral health) Group II: Play-way method using the snake and ladder game. (The square with the snake's head provided information about oral diseases and poor oral health practices, and the square with the snake's tail showed the consequences or the risk of practising harmful oral hygiene habits)	dft/DMFT indices, oral hygiene (OHI-S) and oral health-related quality of life (OHRQoL)	p=0.03	The game mode group had the highest impact, followed by drama and flashcard modes.
5	Nomar AM et al. ¹⁴	Group II: Gaming method (Android tablet games "Happy teeth, Healthy kids") + Motivational interviewing	Oral Hygiene Index-Simplified (OHI-S)	p<0.001	MI with game-based learning method was effective in promoting preschool children's oral hygiene.

month. At three months interval, both groups showed a decrease in oral hygiene scores from baseline, with group B showing highly significant reduction and concluded that the connect the dots game, including good dental hygiene and dietary habits, can be an effective

intervention aid for teaching the basic oral health concepts among school-going children.

Malik A et al.¹² in 2017 conducted a study to find the effectiveness of game-based oral health education over conventional on the oral health-related knowledge and oral hygiene status among 8- to 12-year-old schoolchildren.

Table:3: Bias Analysis For The Included Studies

S. No	Author	Random Sequence Generation	Allocation Concealment	Selective Reporting	Incomplete Outcome Data	Blinding of Outcome Assessment	Blinding Participants And Personals
1	Maheswari UN et al. ¹⁰	-	-	-	-	+	+
2	Kumar Y et al. ¹¹	-	-	-	+	-	-
3	Malik A et al. ¹²	-	-	+	+	-	-
4	Geetha Priya PR et al. ¹³	-	-	-	-	-	-
5	Nomar AM et al. ¹⁴	-	-	-	-	-	-

The bias is assigned as low risk (-), high risk (+), and unclear (?)

A sample of 150 children aged between 8 to 12 years were divided into two groups, group I (oral health education through PowerPoint presentation once daily for seven days) and group II (play method, i.e., crosswords and quiz with a PowerPoint presentation). A pretest evaluation of their knowledge regarding oral health and the estimation of plaque index was carried out. The evaluations regarding oral health-related knowledge and plaque scores were recorded on postintervention 1 and 3 months. The result obtained in both the groups had a significant increase in good oral hygiene scores and a significant decrease in plaque scores on postintervention 1- and 3-months follow-up. Still, much better scores were seen in group II when compared to group I at both the follow-ups.

Geetha Priya PR et al.¹³ in 2020 compared the effect of 3 modes of school dental health education and the two frequencies of reinforcements on the oral health status of children. Three hundred sixty school children aged between 8 to 9 years participated in this study. For dental caries (DFT/DMFT) indices, oral hygiene (OHI-S) and oral health-related quality of life (OHRQoL) scores were recorded. Post-intervention data were collected after two years. The result shows that there was a significant reduction in the dft scores [drama mode ($p = 0.006$), game mode ($p = 0.001$) and flashcards ($p = 0.002$)] and OHI-S scores [drama and game mode ($p < 0.001$) and flashcards method ($p = 0.01$)] and significant improvement in the total OHRQoL scores

[drama mode ($p = 0.001$), game mode ($p = 0.016$) and flashcards method ($p = 0.023$)] in all the three modes. Every three months, children who received game mode school dental health education had a significantly higher number of filled primary teeth. When compared to children who received the reinforcement every six months, she concluded that all three modes effectively improved the oral health status of school children. The game mode had the highest impact when compared to the other two modes. Health educators should focus on child-friendly modes to make the health information more retentive

Nomar AM et al.¹⁴ evaluated the effect of motivational interviewing (MI) and games in changing oral health behaviours among preschool children in Egypt. The participating children were recruited from the 12 governmental preschools available within the Edko administration of Beheira governorate, Egypt. Experimental group I (MI), experimental group II (MI+ gaming) or the control group (conventional dental health education (CE)). The outcomes of oral hygiene index simplified (OHI-S) for children and knowledge, attitude and practice of children's mothers were measured at baseline and after six months follow-up. The result after six months follow-up, compared with the control group (1.41 ± 0.77), preschool children in experimental group I and II had significantly lower mean \pm SD of OHI-S (0.69 ± 0.61 and 0.70 ± 0.72), $P < 0.05$. He concluded that using MI (motivational interviewing) as an oral

health education tool was significantly more effective in promoting preschool children's oral hygiene and improving mothers' knowledge, attitude and oral health-related practices than CE (conventional health education) alone.

LIMITATION OF THE STUDY

This systematic literature review concluded based on the game-based health education on oral hygiene of school-going children only. Further research is needed for game-based education on oral hygiene of diseased dental patients for medically compromised children and visual impairment children. Therefore, generalizability with this study cannot be finalized.

CONCLUSION

This systematic review concludes that game-based oral health education effectively improves the oral hygiene of school children than conventional oral health education.

CONFLICT OF INTEREST: NIL

SOURCE OF FUNDING: NIL

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