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Literature Review

Indonesian School Students' Knowledge After Online Dental Health Education: A Scoping Review

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KEYWORDS

Biofilm; *Caesalpinia sappan* L.; Dental Caries; *Streptococcus sanguinis*

ABSTRACT

Introduction: One way to prevent dental health problems is through Dental Health Education (DHE). Elementary, junior, and senior high school students are ideal participants for DHE, and it is expected that their knowledge will increase after receiving DHE. During the COVID-19 pandemic, DHE has adapted its traditional offline to online method using various educational media. **Objective:** This review aimed to identify the theoretical overview presented in the literature regarding Indonesian school students' knowledge after online DHE. **Methods:** Article searches by Google Scholar database and focusing on students' knowledge after online DHE. Selected articles were screened and structurally read by two persons. **Results:** In this research, 853 articles identified. Subsequently, articles filtered and presented in a data extraction table with three categories: elementary, junior, and senior high school. There were 30 included articles: elementary school (n=18), junior high school (n=9), and senior high school students (n=3). In each inclusion article, the students' knowledge increased after online DHE, as evidenced by the rise in mean scores from pretest to posttest with significant test ($p<0.05$), if present. Dental health education media varied by level: elementary school = educational video, junior high school = Zoom Meetings, and senior high school = Instagram. **Conclusion:** In conclusion, the students' knowledge after online dental health education has increased through various media.

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INTRODUCTION

Dental health concerns persist as a significant health challenge in Indonesia. According to data from the 2018 Basic Health Research (Riskesdas), 57.6% of the Indonesian populace experience dental health issues.[1] This predicament is prevalent among the school-age demographic, exhibiting 67.3%, 55.6%, and 51.9% in the 5-9, 10-14, and 15-24 age groups, respectively.[1] The predominant dental health concern is dental caries, with a prevalence of 92.2% in the 5-9 age group.1 Issues about dental health in students may emanate from a deficiency in knowledge, adversely affecting learning efficiency, psychological aspects such as self-assurance, and the overall progression of growth and development.[2,3]

Prevention of dental health problems is crucial, especially during school years.[4] One of the successful approaches to educating students on oral hygiene is implementing Dental Health Education (DHE).[3] Participating in DHE can change behavior, including a positive shift in students' knowledge, attitudes, and habits toward a healthy lifestyle.[5] Instilling correct dental habits in students is crucial for long-term health.[6]

The COVID-19 pandemic, which has swept through Indonesia, has led nearly every sector, including the education sector, to adapt by transitioning from offline to online.[7] According to Herwiana S, online activities offer advantages such as enhancing participants' proficiency in using technology, allowing for the replay of materials, reducing barriers related to the fear of speaking to others, and reaching a broad audience across various locations in a short period.[8] The provision of online DHE represents one form of adaptation within the school environment, utilizing the internet through various media.[5,9] According to the 2018 Global Education Census conducted by Cambridge International, it was found that Indonesian students are already accustomed to using internet-based technology as a learning facilitator.[10]

Based on Fitri et al. research of the DHE for junior high school students in Sambas, Padang, and Bengkulu, both offline and online groups showed significant improvements in knowledge scores, with the offline group increasing from 62.56 to 82.8 and the online group increasing from 58.8 to 80.88 ($p<0.05$).[11] Similarly, Veeraiyan DN et al. found no significant difference between online and offline dental education for undergraduate students in India ($p>0.05$).[12] These results suggest that online DHE can be a viable method for healthcare professionals to use continuously.[11] Despite advancements in technology, dental health professionals continue to explore optimal strategies for delivering DHE with growing attention toward the utilization of online platforms. This review article aims to provide the information presented in the literature regarding Indonesian school students' knowledge (elementary school, junior high school, and senior high school/equivalent students) after online DHE.

MATERIALS AND METHODS

This study constitutes descriptive observational research through a scoping review held from September to December 2023. The literature search method consists of a Population, Concept, and Context (PCC) framework. (P=Population) school students in Indonesia undergoing online DHE, (C=Concept) school students' knowledge in Indonesia after participating in online DHE, (C=Context) online DHE. The systematic journal screening process adhered to the Preferred Reporting Items Guidelines for Methods of Systematic Review and Meta-Analysis (PRISMA) (Figure 1), modified to meet specified inclusion and exclusion criteria. The inclusion criteria for this study include research articles and community health reports that discuss the knowledge of school students in Indonesia after online DHE. These journals must be published between 2021 and 2023 and accessible through the Google Scholar database in either English or Indonesian. On the other hand, the exclusion criteria pertain to journals that are not fully accessible and those in the form of theses, dissertations, or research papers.

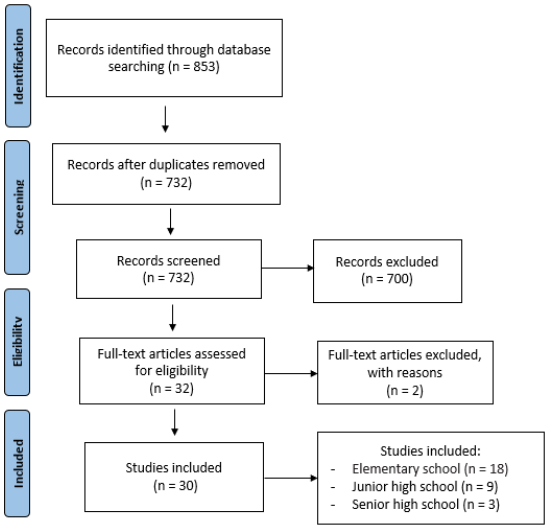

Figure 1. PRISMA flow diagram showing the stages of study searching, screening, inclusion, and exclusion.

The investigation into journals began with customized boolean search specific for elementary school students : *(Peningkatan OR Pengaruh OR Perbedaan OR Dampak) DAN Tingkat DAN Pengetahuan DAN Upaya DAN (Pendidikan kesehatan gigi dan mulut OR (Penyuluhan kesehatan gigi dan mulut OR edukasi kesehatan gigi dan mulut) AND (online OR daring OR "dalam jaringan") DAN Tingkat DAN Pengetahuan DAN Upaya DAN (Pendidikan kesehatan gigi dan mulut OR (Penyuluhan kesehatan gigi dan mulut OR edukasi kesehatan gigi dan mulut) AND (online OR daring OR "dalam jaringan") AND ("siswa SD" OR "siswa sekolah dasar")*. For junior high school students : *(Peningkatan OR Pengaruh OR Perbedaan OR Dampak) DAN Tingkat DAN Pengetahuan DAN Upaya DAN (Pendidikan kesehatan gigi dan mulut OR (Penyuluhan kesehatan gigi dan mulut OR edukasi kesehatan gigi dan mulut) AND (online OR daring OR "dalam jaringan") DAN Tingkat DAN Pengetahuan DAN Upaya DAN (Pendidikan kesehatan gigi dan mulut OR (Penyuluhan kesehatan gigi dan mulut OR edukasi kesehatan gigi dan mulut) AND (online OR daring OR "dalam jaringan") AND ("siswa SMP" OR "siswa sekolah menengah pertama")*. For senior high school students : *(Peningkatan OR Pengaruh OR Perbedaan OR Dampak) DAN Tingkat DAN Pengetahuan DAN Upaya DAN (Pendidikan kesehatan gigi dan mulut OR (Penyuluhan kesehatan gigi dan mulut OR edukasi kesehatan gigi dan mulut) AND (online OR daring OR "dalam jaringan") DAN Tingkat DAN Pengetahuan DAN Upaya DAN (Pendidikan kesehatan gigi dan mulut OR (Penyuluhan kesehatan gigi dan mulut OR edukasi kesehatan gigi dan mulut) AND (online OR daring OR "dalam jaringan") AND ("siswa SMA" OR "siswa sekolah menengah atas")*.

The identified journals underwent a screening process to eliminate duplications, and the selection proceeded with an examination of titles and abstracts based on inclusion criteria. Following this, the journals that successfully passed the initial selection were thoroughly reviewed, and the final decision on the inclusion in this study was made after a comprehensive reading.

RESULTS

In this research, article reading and review by two persons. From the search results presented in the PRISMA diagram, 853 articles were identified. After removing duplicate articles, 732 articles remained. These articles were then filtered based on titles and abstracts according to inclusion criteria, selecting 32 fully accessible articles. Upon further review, two articles were excluded as they were research papers. Therefore, the total number of articles included in this study is 30, consisting 18 articles in the elementary school student, nine in the junior high school student, and three in the high school student. The data extraction results can be seen in Tables 1, 2, and 3.

Table 1. Data extraction on elementary school students' knowledge after online DHE

No	Author, Year	Title	Research Area	Sample	Media	Results
1	Kurniawan I et al., (2021)	Journal of Community Health	Kuantan Singingi, Riau	n = 54	Google Form, crossword puzzle, YouTube	The mean scores pretest to posttest Google Form = 21.1 to 38.89; crossword puzzle = 24.7 to 76.94; control = 18.61 to 17.78, p value = 0.000. A significant increase in knowledge was observed across all groups with Google Forms and crossword puzzles after online DHE using YouTube.
2	Henry SA et al., dkk (2022)	Medali Journal	Semarang, West Java	n = 86	Zoom Meetings	The mean scores pretest = 46.51% (moderate), posttest = 77.91% (good), p value = 0.000. A significant increase in knowledge was observed after online DHE using Zoom Meetings.
3	Gumilar MS et al., dkk (2022)	Jurnal Kesehatan Gigi	Jambi	n = 88	Virtual Reality (VR)	The mean scores pretest to posttest VR = 6.63 to 14.31; video = 5.38 to 7.75; control = 6.63 to 7.19, p value (VR = 0.0005; video = 0.021; control = 0.072). A significant increase in knowledge was observed after online DHE using VR and video.
4	Syaputri IO et al., (2023)	Journal CoE: Health Assistive Technology	Depok, West Java	n = 32	Animated Video	The mean scores pretest = 8.9, posttest = 11, p value = 0.001. A significant increase in knowledge was observed after online DHE using animated video.
5	Pay MN et al., (2023)	JDHT Journal of Dental Hygiene and Therapy	Kupang, East Nusa Tenggara (NTT)	n = 60	Zoom Meeting, puzzle, poster	The mean scores pretest to posttest puzzle = 63.3% (high) to 100% (high); pretest to posttest poster = 60% (high) to 83.3% (high), p value = 0.001. A significant increase in knowledge was observed across all groups with puzzle and poster after online DHE using Zoom Meetings.
6	Fione VR et al., (2021)	JIGIM (Jurnal Ilmiah Gigi dan Mulut)	Manado, North Sulawesi	n= 51	Animated Video	The mean scores pretest = 9.97, posttest = 12, p value = 0.000. A significant increase in knowledge after online DHE using animated video.

Table 1. Data extraction on elementary school students' knowledge after online DHE (continued)

No	Author, Year	Title	Research Area	Sample	Media	Results
7	Elsa SA et al., (2023)	BIMIKI Journal	Pekanbaru, Riau	n = 124	Educational Video	The mean scores for the pretest to posttest intervention = 12 to 14; control = 12 to 11. *p* value = 0.001. A significant increase in knowledge was observed across intervention and control group after online DHE using educational video.
8	Sumerti NN et al., (2022)	Jurnal Kesehatan Gigi	Bali	n = 60	Poster and Educational Video	The mean scores pretest to posttest poster = 53 to 89.17; video = 59.17 to 93.83, *p* value = 0.000. A significant increase in knowledge was observed after online DHE using poster and educational video.
9	Imamah N et al., (2023)	JPKM (Jurnal Profesi Kesehatan Masyarakat)	Demak, Central Java	n= 49	Animated Video	The mean scores pretest = 8.67, posttest = 13.14, *p* value = 0.000. A significant increase in knowledge was observed after online DHE using animated video.
10	Mayasari Y et al., (2021)	Moestopo International Review on Societies, Humanities, and Sciences (MIRSHuS)	South Jakarta, DKI Jakarta	n = 66	Video Game	The mean scores for the pretest = 39.52, posttest = 40.68, *p* value = 0.000. A significant increase in knowledge was observed after online DHE using video game.
11	Kusumadani N et al., (2022)	Indonesian Journal of Health and Medical	Bojonegoro, East Java	n = 30	Animated Video	The mean scores pretest to posttest intervention = 83.3% (poor) to 96.9% (good); control = 86% (poor) to 60% (moderate), *p* value = 0.000. A significant increase in knowledge was observed after online DHE using animated video.
12	Widodorini W et al., (2023)	Malaysian Journal of Medicine and Health Sciences	Bekasi, West Java	n = 30	Game Application	The mean scores pretest = 63.3, posttest = 94.6, *p* value = 0.000. A significant increase in knowledge was observed after online DHE using game application.
13	Dewi YK et al., (2021)	Jurnal Penelitian Kesehatan Suara Forikes	Sidoarjo, Jawa Timur	n = 70	Video and PowerPoint	The mean scores pretest to posttest video = 6.74 to 7.63; PowerPoint = 7.63 to 9.83, *p* value = 0.000. A significant increase in knowledge was observed after online DHE using video and PowerPoint.
14	Anggraini LD et al., (2021)	Prosiding Seminar Nasional Program Pengabdian Masyarakat	Yogyakarta	n = 1350	Google Meet and Powerpoint	Dental health is important to be known (100%), Brushing teeth should be done with vertical, horizontal, and rolling movements (84.10%), Brushing teeth for 1-2 minutes (65.9%) and 2-3 minutes (31.8%), DHE is important (97.6%), dan wish for additional DHE (97.6%).
15	Balbeid M et al., (2022)	Jurnal Inovasi Pengabdian Masyarakat-Sains	Malang, East Java	n = 95	Zoom Meeting and Powerpoint	The mean scores pretest = 80.3, posttest = 86.8, *p* value = 0.000. An increase in knowledge was observed after online DHE using Zoom Meetings and PowerPoint.
16	Wulandari P et al., (2022)	Indonesian Journal of Nutritional Epidemiology and Reproductive	Blitar, East Java	n = 36	Educational Video	The mean scores for the pretest = 97.2% (moderate), posttest = 77.8% (good), *p* value = 0.000. A significant increase in knowledge was observed after online DHE using educational video.
17	Anggraini NV et al., (2023)	Journal of Community Empowerment	Bekasi, West Java	n = 31	PowerPoint, Educational Video, Leaflet, Zoom Meetings	The mean scores for the pretest = 51.6% (good), posttest = 67.7% (good). An increase in knowledge was observed after online DHE using *Powerpoint,* educational video, leaflet and Zoom Meetings.
18	Indah FP et al., (2021)	Holistik Jurnal Kesehatan	South Tangerang, Banten	n = 30	Educational Video and Picture Guessing	The mean scores for the pretest = 18.86, posttest = 27.52, *p* value (video = 0.015; picture guessing = 0.01). An increase in knowledge was observed after online DHE using educational video and picture guessing.

Table 2. Data extraction on junior high school students' knowledge after online DHE

No	Author, Year	Title	Research Area	Sample	Media	Results
1	Utami W et al., (2022)	An-Nadaa: Jurnal Kesehatan Masyarakat	Banjarmasin, South Kalimantan	n = 80	Phantom	The mean scores pretest = 20.3, posttest = 27.43, p value = 0.000. A significant increase in knowledge was observed after online DHE using phantom.
2	Fitri H et al., (2022)	Jurnal Kesehatan Gigi	Sambas, Padang, Bengkulu	n = 150	Video teleconference	The mean scores pretest to posttest online = 58.8 to 80.88; offline = 62.56 to 100, p value = 0.000. A significant increase in knowledge was observed after online and offline DHE.
3	Sukini S et al., (2021)	Jurnal Kesehatan Gigi	Bali	n = 60	PowerPoint and Zoom Meeting	The mean scores pretest = 42% (moderate), posttest = 87% (good), p value = 0.000. A significant increase in knowledge was observed after online DHE using PowerPoint and Zoom Meeting.
4	Ngatemi N et al., (2021)	International Journal of Multidisciplinary Research and Analysis	South Jakarta, DKI Jakarta	n = 78	Zoom Meeting	The mean scores pretest = 61.68% (good), posttest = 67.6% (good), p value = 0.000. A significant increase in knowledge was observed after online DHE using Zoom Meeting.
5	Jennah EN et al., (2022)	Dentin Jurnal Kedokteran Gigi	Banjarmasin, South Kalimantan	n= 88	Animated Video and Podcast Video	The mean scores pretest to posttest animated video = 75% (poor) to 61.36% (good); podcast video = 72.2% (poor) to 65.9% (good), p value (animated video = 0.612; podcast video = 0.000). There is no significant increase in knowledge after online DHE using animated videos, but there is a significant increase in knowledge after online DHE using podcast video.
6	Salsabila D et al., (2023)	Dentin Jurnal Kedokteran Gigi	Banjarbaru, South Kalimantan	n = 92	Instagram	The mean scores for the pretest to posttest intervention = 45% (moderate) to 71.7% (high); control = 50% (moderate) to 58,7% (moderate), p value = 0.000. A significant increase in knowledge was observed after online DHE using Instagram.
7	Anggreni E et al., (2022)	International Journal of Multidisciplinary Research and Analysis	South Jakarta, DKI Jakarta	n = 48	Video and Flipchart	The mean scores pretest to posttest video = 75% (good) to 100% (good); flipchart = 75% (good) to 91.7% (good); p value = 0.69. There is no difference in knowledge before and after online DHE using video and flipchart.
8	Binartha CT et al., (2022)	Jurnal Abdimas Kesehatan Terpadu	Bekasi, West Java	n = 67	PowerPoint, Zoom Meetings and Educational Video.	The mean scores of knowledge (A=80%, B=70%, C=80%) An increase in knowledge was observed after online DHE using PowerPoint, Zoom Meetings and educational video.
9	Sandra F et al., (2023)	Poltekita: Jurnal Pengabdian Masyarakat	South Jakarta, DKI Jakarta	n= 61	PowerPoint, Zoom Meetings and Educational Video.	The mean scores pretest = 57.58%, posttest = 72.23%. An increase in knowledge was observed after online DHE using PowerPoint, Zoom Meetings and educational video.

Table 3. Data extraction on high school students' knowledge after online DHE

No	Author, Year	Title	Research Area	Sample	Media	Results
1	Dyah RS, dkk (2021)	Jurnal Evaluasi dan Pembelajaran	Lampung	n = 78	Instagram	The mean scores pretest = 67.94% (moderate), posttest = 91,02% (good), p value = 0.000. A significant increase in knowledge was observed after online DHE using Instagram.
2	Septiana R, dkk (2023)	Journal Center of Excellent : Health Assistive Technology	Serang, Banten	n = 30	Google Sites	The mean scores pretest = 11.8, posttest = 13.5. An increase in knowledge was observed after online DHE using Google Sites.
3	Fitri H, dkk (2023)	Buletin Ilmiah Nagari Membangun	Padang, Sumatra Barat	n = 57	Zoom Meetings	The mean scores pretest = 6.13, posttest = 8.32. An increase in knowledge was observed after online DHE using Zoom Meeting.

DISCUSSION

Through a scoping review, it was discovered that online DHE is mostly in elementary schools. There are more inclusion articles available for this age group compared to junior high school and high school students. The primary goal of DHE is to improve dental health knowledge among students from an early age and promote correct attitudes and actions for maintaining dental health.[13,14] According to Pulimeno M, schools are considered an ideal place for promoting health education as students spend most of their time there.13 With the advancement of information technology, online delivery of DHE has become more prevalent, especially during the COVID-19 pandemic, as a substitute for traditional face-to-face DHE implementation.[15] Fitri H noted that healthcare professionals can use online methods to provide DHE to students who are geographically distant and unable to engage in physical interactions.[11,16]

An included article in this research by Gumilar MS found that providing online DHE through educational videos and VR can significantly increase students' knowledge ($p<0.05$).[17] Educational videos are the most widely used medium among elementary school students. A literature review conducted by Utami FR supports the use of educational videos, suggesting that they can expand students' knowledge on health topics such as obesity.18 Videos that have moving images and various elements can keep students engaged in receiving PKG, thus increasing their knowledge.[18]

There are studies that show how game applications can be an alternative educational medium. According to an included article by Widodorini, there is an increase in student's knowledge after being provided with DHE using a modified educational game application ($p<0.05$).[19] Another inclusion article by Mayasari T found that a significant improvement in knowledge also occurs among students in South Jakarta elementary schools after receiving online DHE through a video game ($p<0.05$).[14] The use of digital game-based learning applications can be useful as a learning tool, a source of entertainment, and an alternative to significantly enhance and expand students' knowledge, according to Hung CM.[20]

Electronic tools and information technology can enhance the output of online DHE. Indonesian students are familiar with technology for social media interactions and learning purposes.[10] Based on several inclusion aerticles by Ngatemi and Sukini, Zoom Meetings have become an online DHE medium that significantly improves students' knowledge ($p<0.05$).[15,21] Junior high school students can independently apply Zoom Meetings because of their practical usage and the ability to provide direct learning feedback.[15,21] This is align with a research by Setiawati R shows significant increase in students' knowledge of reproductive health after receiving education through Zoom Meetings ($p<0.05$).[22] However, learning through Zoom Meetings has limitations, such as internet network instability and the inability of health professionals or students to use it.[7,15]

According to inclusion studies, there is an increase in senior high school students' knowledge of online DHE using social media platforms such as Instagram, Google Sites, and Zoom Meetings.[23–25] Research by Oktavianti R on high school students in West Jakarta shows that Instagram is the most owned and accessed social media platform, followed by Facebook and other social media such as Snapchat, Twitter, and Path.[26] This statement aligns with Maharani's research that there is an increase in the knowledge of Instagram users after education about physical activity through Instagram ($p<0.05$).[27] Meanwhile, according to Purmadi, Google Sites is an interactive web-based learning medium that can increase high school students' interest in learning activities and enhance their ability to absorb the taught material.[28]

Online DHE has several limitations, including poor internet connectivity and difficulties controlling online DHE conditions.[29,30] Respondent participation and pretest-posttest administration can introduce bias.[31] According to research by Henry SA, this can serve as a basis for further development by innovating the media used, replacing it with other types of media to enhance variety and make online DHE implementation more interesting, with continuous supervision during the delivery of DHE content.[31] This scoping review also has limitations, particularly in the manual article screening process conducted by two readers, which may lead to inaccuracies in determining inclusive articles due to readers' imprecision. Additionally, the boolean search needed to be more specific, resulting in a limited number of obtained articles. Furthermore, most inclusion articles are related to community service-oriented DHE activities, making the findings primarily an evaluation of these activities.

CONCLUSION

This scoping review concludes that the majority of Indonesian school students' knowledge has increased after online DHE using various media. The researchers suggest further research on innovative online DHE media to identify the most efficient media to support the implementation of online DHE. Additionally, the effectiveness of online DHE implementation across various community groups should be investigated. It is recommended to conduct article searches using less specific Boolean search terms.

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