



INTERNASIONAL CONFERENCE ON

MULTIDISCIPLINARY APPROACHES IN HEALTH SCIENCE

VOLUME 3, No 1. Tahun 2025 , ISSN 3032-4408 (Online)

<https://ejournal.poltekkes-denpasar.ac.id/index.php/icmahs>

Strengthening Interactive Dental Health Education for Early Childhood in the Era of Globalization

Jusuf Kristianto^{1*}, Ita Yulita², Rikawarastuti³, Rini Widiyastuti⁴, Erni Mardiaty⁵, Erwin⁶, Roben Suhadi Pasaribu⁷, Dian Muliawati⁸

1,2,3,4,5,6,7,8 Department of Dental Health, Jakarta I Ministry of Health Polytechnic

Article history

Posted : 2025-10-30

Reviewed : 2025-11-04

Received : 2025-12-13

Abstract

Background: Dental health education is a crucial preventive measure in shaping healthy lifestyle behaviours from an early age. The success of education depends not only on the content of the material, but also on the effectiveness of the media and methods used to convey the message in an interactive and easily understandable way to children. This study aims to determine the changes in the index before and after education on how to brush teeth at Global Mandiri Kindergarten. **Methods:** This was a pre-experimental study with a one-group pretest–posttest design involving a total sample of 57 kindergarten B students. The intervention consisted of education on the purpose of brushing teeth, choosing the right toothbrush, brushing techniques (roll technique), brushing duration, and the use of fluoride toothpaste. The debris index was examined before and after the Interactive education with program Playstore GigiKuHartaKu. **Results:** Examination before the education showed a moderate to poor debris index category. After the intervention, there was a change in the debris index category to good and moderate. There was a significant decrease in the debris index from 2.11 to 0.711, with a p-value of 0.001 ($p < 0.05$). **Conclusion:** The intervention, in the form of interactive and structured dental education, significantly improved dental hygiene in young children. These findings reinforce the importance of promotional education in the school environment as the foundation for long-term healthy living behaviours.

Keywords: Debris Index, dental health education, young children, interactive methods.



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Introduction

Amidst the tide of globalization and changes in people's lifestyles, children's dental and oral health has become an important issue that requires serious attention. The latest report from the Indonesian Ministry of Health (Kemenkes RI) shows that dental and oral complaints now rank highest among various public health issues, even surpassing hypertension. Approximately 50% of Indonesians suffer from tooth decay, 37% have lost teeth, and 12.4% experience gum disease. (Kementerian Kesehatan RI, 2023)

According to the 2023 Indonesian Health Survey (SKI), 93.8% of Indonesians brush their teeth every day, but only 2.3% do so correctly. The same survey also noted that 56.9% of the population aged 3 years and above experience dental and oral problems, with 88% of them suffering from caries, and only 6.2% brush their teeth as recommended. These data show that dental hygiene behaviour is not yet fully accompanied by proper understanding. (Kementerian Kesehatan RI, 2023) This situation is further reinforced by a World Health Organisation report stating that three out of four school-aged children in Southeast Asia suffer from untreated dental caries. (World Health Organization, 2025)

The high incidence of caries is caused by various factors, ranging from diets high in sugar, habits of consuming cariogenic foods, to a lack of knowledge about proper tooth brushing techniques. Jusuf Kristianto et al. explain that dental hygiene behaviours and habits, including tooth brushing frequency and types of food consumed, have a significant impact on the occurrence of caries. (J. K. Kristianto et al., 2023)

In addition, Jusuf Kristianto et al. also emphasised the importance of establishing the habit of brushing teeth correctly as a primary preventive measure. Children in orphanages are considered to be a group

that is more vulnerable to dental problems due to limited access and supervision from adults, thus requiring an educational approach that is engaging, easy to understand, and utilises technology. (J. Kristianto et al., 2023) In addition, socio-economic factors also influence dental and oral health. Notohartoyo (2020) revealed that people with low economic status tend to have lower awareness and knowledge about the importance of maintaining dental health compared to those with higher economic status. (Notohartoyo, 2020)

Data from the Ministry of Health's BKPK (2023) even shows that of the 56.9% of people who experience dental problems, only 11.2% seek treatment from medical professionals, while 24.8% choose to treat themselves with over-the-counter painkillers. (Kementerian Kesehatan RI, 2023) This phenomenon shows that many people are still unaware of the importance of regular dental check-ups. Therefore, dental health education and outreach activities are very important, such as those carried out through Community Service (PkM) activities at the Yos Sudarso Cilandak Orphanage, which combines dental check-ups and health education for the children in the orphanage. This initiative aligns with the spirit of the Indonesia Free of Caries 2030 programme initiated by the Indonesian Ministry of Health. (J. Kristianto & Noviani, n.d.)

One form of innovation is the use of the Gigiku Hartaku application, an interactive digital educational medium that combines visual demonstrations, educational games, and guides on how to brush teeth properly. Innovations such as this prove that dental health education can be packaged in a fun way, especially for children. Several lecturers from the Jakarta I Ministry of Health Polytechnic also play an active role in community service activities aimed at increasing children's

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knowledge, awareness, and ability to maintain dental and oral hygiene. (J. Kristianto & Noviani, n.d.) The success of health education depends not only on how the educator speaks, but also on a deep understanding of the material and the ability to convey messages that can inspire behavioural change. (J. K. Kristianto et al., 2023)

The issue of tooth brushing behaviour among school-aged children remains a challenge. According to national data, only 2.3% of Indonesian children brush their teeth correctly, with the lowest rate among 10–14-year-olds at 1.7%. (Kementerian Kesehatan RI, 2023) Children in this age range are at a complex stage of cognitive and emotional development, where they begin to question the reasons behind every habit they are taught. Therefore, the educational approach should not only involve habit formation, but must also be accompanied by logical and emotional understanding that is appropriate for their stage of development. (Shirahmadi et al., 2024)

In an effort to improve the effectiveness of dental health education, various studies have shown that the selection of appropriate media and methods is very influential. Khafid et al. reported that the use of posters, both directly and through digital platforms such as WhatsApp, was proven to increase children's knowledge about dental health while lowering the Oral Hygiene Index – Simplified (OHI-S) score. (Khafid et al., n.d.)

Meanwhile, Grace Sianipar found that educational videos are one of the most effective tools for improving primary school children's understanding of the importance of brushing their teeth, especially if the videos are packaged with attractive visuals. (Sianipar, 2024) Similar findings were reported by Novita Sari et al.,

who showed that the use of dolls with teeth and interactive presentations were able to attract children's attention and significantly improve their knowledge retention. (Sari et al., 2025)

A similar learning model was also implemented by the Indonesian Paediatric Dentists Association (IDGAI) together with the Faculty of Dentistry, University of Indonesia (FKG UI) in the 'Healthy Smiles for Indonesian Children' activity in August 2025. More than 180 children from orphanages in East Jakarta participated in interactive educational sessions, group toothbrushing practice, and individual dental examinations. The programme emphasised the importance of preventive approaches over curative ones, and integrated dental education into school activities such as early childhood education (PAUD), kindergarten (TK), and primary school (SD). (Dinas Sosial DKI Jakarta, 2025)

One example of a similar activity is dental health education at Global Mandiri Regency Kindergarten, which is part of the School Dental Health Programme (UKGS). Based on initial observations, most students' dental hygiene is still less than optimal. Therefore, educational activities were carried out using lectures and demonstrations to improve children's knowledge and skills in brushing their teeth properly. (J. Kristianto & Noviani, n.d.) Dewanto et al. stated that a participatory approach is more effective in health promotion than passive methods. (Dewanto et al., 2020)

The effectiveness of this activity was then measured using the OHI-S (Oral Hygiene Index – Simplified) dental hygiene index, particularly the debris index (DI) component, to observe changes in dental hygiene before and after the education session. The use of OHI-S is considered valid and easy to apply in the field to

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objectively assess children's dental hygiene behaviour. Through this activity, children not only gained new knowledge but also experienced real changes in their oral hygiene behaviour. Thus, the interactive education session at Global Mandiri Regency Kindergarten serves as a concrete example of how targeted and enjoyable education can contribute to the efforts towards achieving a Caries-Free Indonesia by 2030. (J. K. Kristianto et al., 2023)

This study aims to determine the changes in the index before and after the toothbrushing education at Global Mandiri Kindergarten.

Method

The research design was pre-experimental with a one-group pretest-posttest design to measure changes in the debris index (DI) before and after the educational intervention. The research location was at Global Mandiri Regency Kindergarten, East Jakarta. The location was chosen because initial observations showed that children's dental hygiene was still low and the school was actively developing a UKGS programme. The research was conducted in three sessions: 13, 20, and 27 February 2025. The population in the study was all 57 kindergarten B students using the total sampling method.

Examination tools: Headlamp, mouth mirror, probe, tweezers, nierbecken, mask, sterile gloves, and writing instruments. Educational tools: Tooth model, toothbrush, uniform, laptop, LCD projector, and the GigiKuHartaKu Playstore programme. Supporting materials: Children's toothpaste, 70% alcohol, clean water, cotton wool, and tissues.

The study was conducted in four stages: preparation, pretest, educational intervention, and posttest. The preparation

stage began with coordination with the school, submission of permits, and obtaining informed consent from parents. The pretest stage involved an initial examination of children's dental hygiene using the Debris Index (DI) prior to intervention. The educational intervention stage was carried out by providing interactive counselling on how to brush teeth properly through lectures, demonstrations, tooth models, videos, and interaction with the GigiKuHartaKu Playstore programme. The final stage, which was a re-examination of the Debris Index, was carried out two weeks after the GigiKuHartaKu Playstore programme intervention.

The Debris Index data before and after the intervention in the form of counselling with the GigiKuHartaKu Playstore programme was then compared using descriptive and inferential statistical tests to see changes in the dental hygiene levels of children at Global Mandiri Regency Kindergarten.

Results

This study was conducted on 10, 20, and 28 February 2025 at Global Mandiri Regency Kindergarten, East Jakarta. The school has 73 students, led by a headmaster and supported by seven teachers, with seven classrooms and other supporting facilities. Of the total population, 57 students in Kindergarten B were selected as research subjects using total sampling to ensure maximum representation.

The distribution of respondents based on gender showed a balanced composition. Of the 57 students, there were 29 male students (51%) and 28 female students (49%), so that gender representation could be considered even (Table 1).

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The comparison between the conditions before and after the education programme shows very positive changes.
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Table 1. Distribution of respondent characteristics based on gender

Gender	n	%
Male	29	51
Female	28	49
Total	57	100

Prior to intervention, Debris Index (DI) examinations showed that most students had poor dental hygiene. No students were in the good category, 15 students (26%) were in the moderate category, and 42 students (74%) were in the poor category (Table 2).

Table 2. Debris Index examination results prior to dental health education

Category	n	%
Good	0	0
Average	15	26
Poor	42	74
Total	57	100

After conducting interactive education on proper tooth brushing techniques, there was a significant improvement in children's dental hygiene. Of the 57 students, 12 children (21%) achieved a good rating, 45 children (79%) achieved an average rating, and no students achieved a poor rating (Table 3).

Table 3. Results of debris index examination after dental health education

Category	n	%
Good	12	21
Average	45	79
Poor	0	0
Total	57	100

The good category increased from 0 to 12 students, the moderate category rose from 15 to 45 students, and the poor category was successfully reduced from 42 to 0 students. This proves that the education method applied—a combination of lectures, demonstrations, and the use of visual aids—is effective in improving understanding and practice of proper tooth brushing in early childhood (Table 4).

The average Debris Index score before the education programme was 2.11 ± 0.32 , while after the programme it decreased to 0.711 ± 0.15 . The results of the Wilcoxon Signed Rank Test showed a p-value of 0.0001 ($p < 0.05$), indicating a statistically significant difference between the conditions before and after the education (Table 5). Thus, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted.

Table 4. Debris Index results before and after the GigiKuHartaKu playstore programme intervention

Debris Index	Before		After	
	n	%	n	%
Good	0	0	12	21
Moderate	1	26	45	79
Poor	4	74	0	0
Total	5	100	57	100



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Table 5. Comparison of the average debris index before dental health education and the average debris index after dental health education with the GigiKuHartaKu Playstore programme

Index	n	Mean ± SD	P value
Before	57	2,11 ± 0,32	0,0001*
After	57	0,711 ± 0,15	

*Signifikan ($p < 0.05$)

Discussion

This study proves that dental health education using the GigiKuHartaKu Playstore Programme, conducted systematically and interactively, has a significant impact on the dental hygiene of young children. Using a pre-experimental One Group Pretest-Posttest approach, the researchers successfully demonstrated that changes in toothbrushing behaviour can be achieved through targeted education supported by methods appropriate to the characteristics of children.

The results of the study show that before the intervention, the average Debris Index score of students at Global Mandiri Regency Kindergarten was 2.11, which is considered poor. After the education session, this score dropped dramatically to 0.711, falling into the moderate category. Not only that, 12 students achieved the good category, and no students remained in the poor category. This change indicates that the educational intervention of the GigiKuHartaKu playstore programme was able to influence children's habits and skills in maintaining dental hygiene.

Statistical analysis using the Wilcoxon Signed Rank Test yielded a p-value of 0.0001, well below the significance threshold of $p < 0.05$. This indicates that the changes that occurred were not coincidental, but rather the actual

result of the intervention provided. Thus, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. The success of this intervention is inseparable from the educational approach of the GigiKuHartaKu Playstore Programme that was implemented.

Researchers not only convey information verbally through interactive education programmes such as GigiKuHartaKu, but also explain the purpose of brushing teeth, introduce the selection of appropriate toothbrushes, teach roll brushing techniques, emphasise brushing for two minutes twice a day, and encourage the use of fluoride toothpaste. This approach addresses both the cognitive and affective aspects of children, ensuring they not only know what actions to take but also understand the reasons behind them and are motivated to perform them regularly.

This study is supported by research conducted by Pudentiana et al. (2021), which shows that increasing knowledge about dental and oral health among primary school children can lower their OHI-S scores. Although specific scores are not mentioned, the results of this study are in line with the findings you mentioned. (Pudentiana Rr RE et al., 2021) Ilyas and Putri emphasised the effectiveness of the demonstration method in improving children's toothbrushing skills. Research conducted at Padang Loang Primary School showed a decrease in plaque index from 3.55 to 1.28. (Ilyas & Putri, 2012) Nurhidayat's research also proves that the use of PowerPoint is more effective than flipcharts. (Nurhidayat, 2012) Notoatmodjo recommends the lecture method for large groups. All of these findings support the notion that a combination of lectures, demonstrations, and educational media provides optimal results in children's dental health education. (Notoatmodjo, 2018)

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In addition, the use of educational media has been proven to strengthen students' understanding and awareness of dental and oral health. The success of this study can be analysed from various aspects, such as the active involvement of students in toothbrushing demonstrations, which encourages direct practice and reinforces knowledge retention. The lecture method with the interactive GigiKuHartaKu playstore programme and demonstrations was tailored to the characteristics of kindergarten children, making the material easier to understand, while the selection of attractive and age-appropriate educational media, including tooth models, videos, visual projections, and the GigiKuHartaKu playstore programme, increased children's attention and motivation.

In addition, consistent instruction and supervision by the outreach team ensures that toothbrushing techniques are performed correctly. Support from the school environment, including the headmaster and teachers who are responsive to the UKGS programme, also plays an important role in ensuring the smooth implementation of the outreach programme. The significant decrease in the Debris Index score indicates that children not only receive information but are also able to internalise and practise it in their daily lives.

Conclusion

The dental health education programme using interactive media, GigiKuHartaKu, conducted at Global Mandiri Regency Kindergarten proved to be highly effective in improving children's dental hygiene, both in terms of behavioural changes and clinically measurable results supported by statistical analysis. The results of this study indicate that early interactive educational interventions can establish proper toothbrushing habits and have a

tangible impact on children's dental and oral health. Therefore, dental health education from an early age is a crucial foundation in fostering a generation that is aware of the importance of maintaining good dental and oral health. To maintain and strengthen these results, sustained efforts are needed from dental health workers, in collaboration with schools through School Dental Health Activities (UKGS), so that students can apply good and proper oral hygiene habits.

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