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AI-Based Video Education as an Effort to Improve Parents' Knowledge in Maintaining Early Childhood Dental Health

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ABSTRACT

Oral health is an important component of overall health, particularly during early childhood. Young children are not yet fully capable of maintaining their own oral hygiene and therefore depend substantially on parental support and supervision. Parents' knowledge plays an important role in supporting appropriate oral health maintenance practices. The development of digital educational media, including artificial intelligence (AI)-based video, provides an alternative approach for delivering oral health information in an engaging and accessible manner. This study aimed to assess changes in parents' knowledge of oral health maintenance in early childhood following an AI-based video education intervention. A pre-experimental study with a one-group pre-test–post-test design was conducted among parents of students at BKB PAUD Nurilang, Mampang Prapatan, South Jakarta, Indonesia, in 2026. A total of 37 participants were selected using total sampling. Participants completed a knowledge assessment before and after receiving oral health education through an AI-based video. Knowledge scores were presented using descriptive statistics and categorized as good, sufficient, or poor. Before the intervention, the mean knowledge score was 60.8. Eighteen participants (48.6%) had sufficient knowledge, 8 (21.6%) had good knowledge, and 11 (29.7%) had poor knowledge. Following the AI-based video education, the mean knowledge score increased to 94.8, and all participants (100%) were categorized as having good knowledge. The mean increase in knowledge score was 34 points. Parental oral health knowledge increased following the AI-based video education intervention. These findings suggest that AI-based video may be a promising medium for oral health education among parents of young children. Further studies using larger samples, statistical hypothesis testing, and controlled experimental designs are needed to determine its effectiveness more rigorously.

INTRODUCTION

Oral health is an integral component of general health and well-being. It contributes to essential functions such as eating, speaking, and social interaction and can influence an individual's overall quality of life. Oral diseases remain a major public health concern worldwide, with untreated dental caries continuing to affect a substantial proportion of children (Organization, 2022).

Early childhood is a critical period for the establishment of healthy oral health behaviors. At this stage, children are not yet fully capable of independently maintaining appropriate oral hygiene and therefore depend on their parents or caregivers for assistance and supervision. Parents play an important role in establishing toothbrushing routines, controlling the consumption of sugary foods and beverages, and seeking appropriate dental care for their children. Previous studies have demonstrated that parental oral health knowledge is associated with children's oral health practices, including toothbrushing behavior (Pangestu et al., 2023). The importance of parental involvement in maintaining children's oral health has also been highlighted in studies involving parents of preschool-aged children (Hidayah et al., 2021).

Dental caries remains an important oral health problem among young children. A cross-sectional study conducted among children attending TK Tat Twam Asi in South Jakarta reported that 65.9% of participants experienced dental caries (Annisa et al., 2025). This finding illustrates the continuing need for preventive oral health efforts targeting not only children but also parents, who play a substantial role in daily oral health maintenance.

Health education is an important strategy for improving knowledge and supporting the adoption of appropriate health behaviors. The effectiveness of health education may be influenced by the media used

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to communicate information. Video-based education combines visual and auditory elements and may facilitate the delivery of complex health information in an engaging and understandable format. Previous studies have reported improvements in oral health knowledge following education delivered through video and audiovisual media (Ardhani & Haryati, 2022).

The theoretical basis for multimedia-based education can be explained by multimedia learning principles, in which the integration of verbal and visual information may support information processing and learning (Mayer, 2021). The increasing availability of digital technology has further expanded the possibilities for developing health education media. Artificial intelligence (AI) has recently been used in educational settings to support the development of digital learning materials and audiovisual content (Lidialiask, 2025).

Although previous studies have examined video-based oral health education, the use of AI-based video as an educational medium for parents of young children remains relatively underexplored. Therefore, this study aimed to assess changes in parental knowledge regarding oral health maintenance in early childhood before and after exposure to an AI-based educational video.

METHOD

This study employed a pre-experimental one-group pre-test–post-test design. Participants' oral health knowledge was assessed before and after the intervention. The intervention consisted of an AI-based video providing education on dental and oral health maintenance for young children. The study was conducted at BKB PAUD Nurilang, Mampang Prapatan, South Jakarta, Indonesia, in 2026. The study population consisted of parents of children attending the institution. A total sampling technique was used because the study population was relatively small. All eligible members of the population were included in the study, resulting in a total of 37 participants.

The intervention consisted of an educational video addressing oral and dental health maintenance in early childhood. The video was developed using AI-based technology and was used as the primary medium for delivering oral health information to the participants. The educational content focused on oral health maintenance among young children.



Figure 1. AI-based video education (https://l1nk.dev/edukasiai)

Before receiving the educational intervention, participants completed a pre-test to assess their baseline knowledge regarding oral health maintenance in early childhood. Participants were then shown the AI-based educational video. Following the intervention, participants completed a post-test using the knowledge assessment instrument. The primary outcome was parental knowledge regarding oral health maintenance in early childhood. Knowledge was assessed using a questionnaire administered before and after the intervention.

Data were analyzed descriptively. Frequencies and percentages were used to describe the distribution of participants according to knowledge categories before and after the intervention. Mean knowledge scores were calculated to describe changes in knowledge between the pre-test and post-test assessments.

RESULT

Table 1. Parental oral health knowledge before AI-based video education

Knowledge category	n	%
Good	8	21.6
Sufficient	18	48.6
Poor	11	29.7
Total	37	100

Before receiving the AI-based video education, the mean parental knowledge score was 60.8. As shown in Table 1, 18 participants (48.6%) had sufficient knowledge, 8 (21.6%) had good knowledge, and 11 (29.7%) had poor knowledge.

Table 2. Parental oral health knowledge after AI-based video education

Knowledge category	n	%
Good	37	100
Sufficient	0	0
Poor	0	0
Total	37	100

Following the AI-based video education, the mean knowledge score increased to 94.8. All 37 participants (100%) were categorized as having good knowledge, while no participants remained in the sufficient or poor categories.

Table 3. Comparison of mean parental knowledge scores before and after intervention

Assessment	Mean score
Pre-test	60.8
Post-test	94.8
Mean increase	34.0

The mean knowledge score increased from 60.8 before the intervention to 94.8 after the intervention, representing a mean increase of 34 points.

DISCUSSION

The present study demonstrated a substantial descriptive increase in parental knowledge regarding oral health maintenance in early childhood following exposure to an AI-based educational video. The mean knowledge score increased from 60.8 before the intervention to 94.8 after the intervention, representing an observed increase of 34 points. Furthermore, the proportion of participants categorized as having good knowledge increased from 21.6% before the intervention to 100% after the intervention. These findings indicate an improvement in parental understanding following the educational intervention.

The baseline findings demonstrate that parental knowledge was not uniformly high before the intervention. Nearly half of the participants were classified as having sufficient knowledge, while almost one-third were classified as having poor knowledge. This finding is important because parents play a central role in the establishment of oral health practices during early childhood. Young children require parental assistance and supervision in daily toothbrushing and other preventive practices. Previous research has demonstrated a relationship between parental oral health knowledge and children's toothbrushing habits (Pangestu et al., 2023). Similarly, studies among parents of preschool children have highlighted the importance of parental knowledge in maintaining children's oral health (Hidayah et al., 2021; Rofi'ah & Rofi'ah, 2024).

The need to strengthen parental knowledge is further supported by the continuing burden of dental caries among young children. The prevalence of dental caries reported among early childhood students in South Jakarta indicates that preventive oral health efforts remain necessary (Annisa et al., 2025). Parental education may therefore represent an important component of early childhood oral health promotion because parents are in a position to translate health information into everyday practices, including toothbrushing supervision, dietary control, and utilization of dental services.

The increase in knowledge observed in the present study is consistent with previous findings regarding video-based oral health education. Aisyah et al. (2024) reported an improvement in mothers' dental health knowledge following interactive video education. Similarly, Ardhani & Haryati (2022) found that video-based dental health education was associated with increased knowledge regarding toothbrushing. Hanif & Prasko (2018) also reported an increase in oral health knowledge following video-

based health education. These findings suggest that video can serve as a practical medium for communicating oral health information.

Evidence involving animated and audiovisual media also supports the present findings. Maramis & Fione (2022) reported improvements in oral and dental health knowledge following animated video education, while Liasari et al. (2024) reported increased understanding of dental health following audiovisual education. Research involving educational video among parents has likewise demonstrated positive changes in oral health knowledge (Putri, 2023). Taken together, these studies indicate that the use of audiovisual elements may facilitate the communication of preventive health information across different target populations.

One possible explanation for the observed improvement is the ability of video to combine visual and auditory information. Multimedia learning theory suggests that learners process information through different channels and that appropriately designed combinations of words and visual information can facilitate learning (Mayer, 2021). In oral health education, video can demonstrate recommended practices while simultaneously providing verbal explanations. This may help transform information that is otherwise abstract into concrete examples that are easier for parents to understand and recall.

The present study adds an additional dimension through the use of AI-based video. The development of AI-assisted educational media has become increasingly relevant in digital learning environments. Previous literature included in this manuscript has discussed perceptions of AI-generated videos and the development of educational videos using AI-based technology (Lidialiask, 2025; (Sabrina & Sakti, 2025). The use of AI may facilitate the development of audiovisual materials that incorporate animation, narration, and other visual elements. Such characteristics may provide opportunities to develop health education materials that are more visually engaging.

However, the contribution of AI itself needs to be interpreted carefully. The present study evaluated an AI-based video but did not compare it with a conventional video, leaflet, face-to-face education, or another control intervention. Therefore, the observed increase in knowledge cannot be attributed specifically to AI technology. The improvement may reflect the general educational effect of video-based learning, the content of the intervention, repeated exposure to the questionnaire, or a combination of these factors. Consequently, the present findings support the potential use of AI-based video as an educational medium, rather than establishing that AI-based video is superior to other educational approaches.

The magnitude of the observed change is notable because all 37 participants were classified as having good knowledge following the intervention. Nevertheless, this result should not be interpreted without considering the methodological characteristics of the study. The one-group pre-test–post-test design does not include a comparison group, making it difficult to distinguish the effect of the intervention from other possible explanations. The use of the same or similar knowledge assessment before and after the intervention may also introduce a testing effect, in which participants become more familiar with the assessment content.

Another important consideration is that the current study assessed knowledge, rather than actual oral health behavior or clinical outcomes. An increase in knowledge does not necessarily guarantee that parents will consistently implement appropriate practices or that children's oral health status will improve. Previous research has emphasized the relationship between parental knowledge and children's oral health practices (Pangestu et al., 2023), but knowledge and behavior should nevertheless be considered distinct outcomes. Future studies should therefore examine whether increased knowledge following AI-based education translates into changes in parental behavior, children's toothbrushing practices, dietary habits, dental attendance, or clinical oral health indicators.

The findings have potential implications for oral health promotion programs in early childhood educational settings. Schools and health professionals may consider digital video as an additional medium for communicating preventive oral health information to parents. Previous studies involving audiovisual and video-based education have demonstrated its potential in different health education contexts (Kurniasari et al., 2023; Safitri et al., 2021). The use of digital media may also provide greater flexibility in delivering educational messages compared with approaches that depend entirely on face-to-face sessions.

Nevertheless, the generalizability of the present findings is limited by the relatively small sample and the recruitment of participants from a single PAUD institution. The intervention was also evaluated using a short-term knowledge outcome, and the available manuscript does not provide information regarding longer-term knowledge retention. These limitations should be addressed in future research.

Future studies should involve larger samples and comparison groups, preferably using randomized controlled or quasi-experimental designs. Inferential statistical analysis should also be performed to determine whether observed changes are statistically significant and to quantify the magnitude of the intervention effect. Longer follow-up periods would be useful to assess knowledge retention, while

behavioral and clinical outcomes could determine whether educational improvements translate into meaningful oral health benefits.

Overall, the present findings indicate that AI-based video is a promising medium for delivering oral health education to parents of young children. However, the evidence from this study should be regarded as preliminary because of the pre-experimental design. Further rigorous research is required to establish whether AI-based educational video provides advantages over conventional oral health education media.

CONCLUSION

Based on the above research, it can be concluded that AI-based educational videos can improve parental knowledge in early childhood dental health maintenance at BKB PAUD Nurilang, Mampang Prapatan, South Jakarta.

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