

## RESEARCH ARTICLE

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# Effectiveness of Puppetry in Enhancing Oral Health Knowledge Among Preschool Children in Melaka

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**ABSTRACT** Dental caries affects 60-90% of children globally. 70% of children suffer from dental caries in Malaysia. Early childhood oral education is crucial to lifelong oral hygiene habits. Traditional educational methods may not capture the attention and interest of preschool children. Thus, puppetry can be an engaging and creative learning tool to enhance comprehension and retention of oral health messages among preschool children. We aim to inculcate oral health knowledge among preschool children. A cross-sectional study was conducted at Ar Rayyan Integrated Smart Caliph Melaka, Malaysia, among 51 preschool children aged 4 to 6 years old using the purposive sampling method. A questionnaire was used to identify the oral health knowledge score in 4 intervals (before and after on day 1, day 7, and day 14). A live puppet show was performed on day 1 after the pre-test questionnaire was completed, followed by a video recording of the puppet show played daily for the preschool children after day 1 till day 14. Results showed significant improvement of mean oral health knowledge scores of 2.71 and 3.53 (pre- and post-test) on day 1 with a p-value of <0.0015. Subsequently, the mean knowledge score was 4.00 on day 7 and 4.27 on day 14. All five knowledge areas showed sustained improvement ( $p < 0.001$ ) over the spaced time. The study found that puppetry significantly improved and sustained oral health knowledge among preschool children over a 14-day period. The sustained increase in mean knowledge scores highlights its potential as an innovative tool in early childhood oral health education.

**INDEX TERMS** Puppetry education; early childhood health education; oral hygiene education; preschool health promotion

## I. INTRODUCTION

Oral health is essential to general health and well-being. Dental caries continues to be the most prevalent oral health condition globally, posing a substantial public health burden [1]. Global estimates showed over 530 million children are affected by dental caries in their primary teeth, and its prevalence is especially high in developing countries due to limited access to oral health education and services [2], [3], [4].

Early childhood represents a critical window for establishing lifelong health behaviour. Educating children about proper oral hygiene practices during this formative stage has the potential to significantly reduce the burden of dental disease. The Oral Health Division, Ministry of Health Malaysia began a Dental Health Puppetry project through puppetry workshops, forums, seminars, puppet shows, and

dental health puppetry modules for preschool children, to deliver messages on dental hygiene, dental care, and nutrition for dental health [5]. As a result, health education strategies must be age-appropriate, interactive, and capable of capturing children's attention and imagination [6], [7]. One effective approach to enhance children's knowledge and awareness of oral health is through educational media. In this regard, puppets have been chosen as a teaching tool [8]. Puppetry plays an edutainment role in playing and learning activities for nursery and kindergarten children [9]. Puppetry integrates storytelling, dramatization, and visual stimuli, has emerged as a promising pedagogical tool in early childhood education [10], [11]. Rooted in both ancient tradition and modern educational theory, puppetry engages children through interactive narratives, allowing them to internalize key messages while enjoying the learning process [12].

Research demonstrates that puppet-based interventions not only enhance children's cognitive development and imagination but also improve their attitudes, attention span, and knowledge retention [6], [13]. While previous studies have shown the efficacy of puppetry in other educational contexts, little research has focused on its impacts on oral health knowledge in preschool settings.

In the realm of oral health promotion, puppetry has shown notable success. Studies from various regions have revealed that puppet theater and puppet-based storytelling significantly improve oral health knowledge, attitudes, and practices among preschool and school-aged children [14], [15], [16]. A quasi-experimental study conducted in Peru proved substantial reductions in plaque index scores and improved oral health knowledge following puppet theater interventions among preschool children [2]. Similarly, a study in India found statistically significant gains in both knowledge and oral health status after a puppet show-based intervention [14].

Puppetry not only entertains but also stimulates emotional and social engagement, making it ideal for health messaging. The combination of visual appeal, anthropomorphism, and relatable narratives enables children to empathize with characters and internalize behavioural lessons [5], [17], [18], [19], [20]. Integrating puppets into oral health education aligns well with the Malaysian preschool curriculum emphasis on holistic, play-based learning [9].

Thus, this research aims to evaluate the impact of puppet theater on oral health knowledge in Ar Rayyan Integrated Smart Caliph Melaka. This school has not received any prior education on oral health knowledge, resulting in a low understanding among students about dental care. Through this intervention using dental puppets, we hope to enhance knowledge of oral health and develop good oral health habits of preschool children.

## II. MATERIALS AND METHODS

A cross-sectional study was conducted in a selected preschool, Ar Rayyan Integrated Smart Caliph Melaka which was chosen because this kindergarten had not been visited by any dental team from the Oral Health Division of the Ministry of Health, Malaysia. This means that these children have not had any exposure to any oral health promotion messages. Thus, we can truthfully assess the effectiveness of puppetry as an effective tool to enhance oral health knowledge among these children. We created five (5) puppet characters, ie Bird as narrator, three friends Dumbo the elephant, Snowball the rabbit, Boots the monkey and Dr Fairy the dentist. These characters were chosen to reflect the casual and friendly nature of children of the age group 4 to 6 years, eager to socialize. We constructed a simple story line to tell a story about the Boots who did not brush his teeth and ate a lot of sweets while his friends Dumbo and Snowball regularly brushed their teeth and did not take sweet unhealthy foods. Eventually, Boots had toothache, whereby Dumbo and Snowball suggested they meet Dr Fairy. At the clinic Dr Fairy did mouth examination and found that Boots had a lot of cavities. Dr Fairy gave advice regarding the importance of taking good care of the teeth and health diet.

During the puppet show, the appropriate brushing frequency and healthy foods was emphasized. The methodology used in the 14-day educational program aimed to improve the knowledge of oral health among children through innovative puppet use. This program was structured to incorporate attractive pedagogical techniques that facilitate retention and understanding of important health concepts. The objectives were not only to convey knowledge about oral hygiene practices but also actively involve children in the learning process through interactive methods. To evaluate the effectiveness of the program, a two-phase evaluation was carried out. A five-item questionnaire <sup>[2]</sup> was translated to Bahasa Malaysia and validated to ensure reliability and accuracy. The translated version was piloted among a sample of 4- to 6-year-old children attending our Paediatric Dental Clinic, Manipal University College Malaysia, to check for clarity and relevance. This translated and validated questionnaire was used in the study. This structured questionnaire was designed to measure the basal knowledge of children with respect to oral health. This evaluation was essential to identify the initial knowledge gaps. The questionnaire included multiple-choice questions focused on key concepts presented in the puppet show. The children sat in their little chairs in small groups of 5–6 in the common area of the preschool. Each child used a pencil to circle the correct answers of the five items. monitored by the authors. The authors read each question to the group and requested the children to circle the answer. This creative approach was aimed at stimulating the imagination of children and improving their commitment, thus improving the probability of knowledge retention. Interactive narration sessions allowed children to ask questions and participate actively in answering the scenarios raised by puppets. This participatory format took advantage of the natural curiosity of the children and encouraged an environment conducive to learning. For the subsequent evaluation, the same questionnaire was administered to measure any change in knowledge scores. The comparison of the results prior to the program constituted the primary quantitative measure of the impact of the program. The data collected were analyzed using basic statistical methods to determine the general improvement in knowledge scores. We used Wilcoxon signed-rank test, a non-parametric test, to analyze paired data of pre-test and post-test scores because the assumptions of normality were not met. Friedman's test was done to compare the results in all those four intervals, which are before, after, at day 7, and at day 14.

## III. RESULTS

The findings of this study provide an overview of how effective puppet shows are at delivering oral health knowledge, which can in turn improve the understanding of preschool children. This study was participated by 51 students at Ar Rayyan Integrated Smart Caliph Melaka. **TABLE 1** shows the distribution of respondents by age, gender, and ethnicity.

**TABLE 1**  
**Socio-demographic characteristics of study sample (n=51).**

Variables	n (%)
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Age	4	20 (39.2)
	5	16 (31.4)
	6	15 (29.4)
Gender	Male	26 (51.0)
	Female	25 (49.0)
Ethnicity	Malay	50 (98.0)
	Indian	1 (2.0)

**TABLE 2**  
Oral health knowledge pre- and post-test at Day 1 (n=34).

Question	Pre-test		Post-test	
	n (%)	Mean (SD)	n (%)	Mean (SD)
1. Berapa kali perlu brus gigi sehari?	22 (64.7)		27 (79.4)	
2. Berapa lama perlu brus gigi?	15 (44.1)		21 (61.8)	
3. Apakah makanan yang baik untuk gigi?	16 (47.1)	2.71 (1.62)	22 (64.7)	3.53 (1.05)
4. Berapa kali perlu jumpa doktor gigi?	17 (50.0)		22 (64.7)	
5. Adakah kuman baik untuk gigi?	22 (64.7)		28 (82.4)	

TABLE 2 shows the mean oral health knowledge score pre and post-test at Day 1.

**TABLE 3**  
Oral health knowledge at Day 7 (n=30).

Question	Day 7	
	n (%)	Mean (SD)
1. Berapa kali perlu brus gigi sehari?	24 (80.0)	
2. Berapa lama perlu brus gigi?	22 (73.3)	
3. Apakah makanan yang baik untuk gigi?	28 (93.3)	4.00 (1.20)
4. Berapa kali perlu jumpa doktor gigi?	24 (80.0)	
5. Adakah kuman baik untuk gigi?	22 (73.3)	

TABLE 3 shows the mean oral health knowledge score at Day 7.

**TABLE 4**  
Oral health knowledge at Day 14 (n=30).

Question	Day 14	
	n (%)	Mean (SD)
1. Berapa kali perlu brus gigi sehari?	24 (80.0)	4.27 (0.87)
2. Berapa lama perlu brus gigi?	24 (80.0)	
3. Apakah makanan yang baik untuk gigi?	29 (96.7)	
4. Berapa kali perlu jumpa doktor gigi?	25 (83.3)	
5. Adakah kuman baik untuk gigi?	27 (90.0)	

TABLE 4 shows the mean oral health knowledge score at Day 14.

**TABLE 5**

Comparison of oral health knowledge pre- and post-test at Day 1 (n=34).

Question	Pre-test		Post-test		P-value
	n (%)	Mean (SD)	n (%)	Mean (SD)	
1. Berapa kali perlu brus gigi sehari?	22 (64.7)		27 (79.4)		
2. Berapa lama perlu brus gigi?	15 (44.1)		21 (61.8)		
3. Apakah makanan yang baik untuk gigi?	16 (47.1)	2.71 (1.62)	22 (64.7)	3.53 (1.05)	0.015*
4. Berapa kali perlu jumpa doktor gigi?	17 (50.0)		22 (64.7)		
5. Adakah kuman baik untuk gigi?	22 (64.7)		28 (82.4)		

Wilcoxon Test, p,0.015\* significant

TABLE 5 shows the comparison of oral health knowledge scores at Day 1.

**TABLE 6**  
Comparison of oral health knowledge pre- and post-test at Day 1, Day 7, and Day 14 (n=14).

Time Interval	Mean (SD)	Minimum	Maximum	p-value
Pre-test	2.57 (1.65)	0	5	
Post-test	3.71 (0.05)	2	5	
Day 7	4.64 (0.63)	3	5	0.001*
Day 14	4.21 (0.89)	3	5	

Friedman Test, p,0.001\* significant

TABLE 6 shows the comparison of oral health knowledge scores at pre- and post-test of Day 1, Day 7, and Day 14.

#### IV. DISCUSSION

The results show a notable increase in oral health knowledge among the children after the puppet show. The mean oral health knowledge scores on Day 1 pre-test were 2.71 (1.62), and the post-test was 3.53 (1.05). This showed an increase in oral health knowledge among the children. Subsequently, on Day 7, the mean oral health knowledge score was found to be 4.00 (1.20), followed by 4.27 (0.87) on Day 14. Comparing the mean oral health knowledge scores on Day 1 (pre- and post-test) using the Wilcoxon test, we found the increase in oral health knowledge score was significant ( $p < 0.015$ ). This finding highlights the ability of live puppet shows to capture attention and reinforce knowledge immediately.

The detailed structure of this 14-day educational program underlines the pedagogical benefits of incorporating puppets in the teaching of oral health knowledge. By involving children through interactive narration, the program not only taught crucial knowledge but also made the learning process pleasant and memorable. The double-phase evaluation method effectively demonstrated the success of the program in improving children's oral

literacy, establishing bases for greater exploration on the use of creative educational techniques in health education. The implementation of puppet intervention has produced significant improvements in oral health knowledge among pre-school children. This section presents the main conclusions of the study, and the data show a sharp increase in comprehension and retention rates for a period of 14 days after the intervention. The quantitative analysis of understanding data highlights the varied retention levels observed among pre-school children. The knowledge retention assessment was performed using a follow-up test administered 14 days after the initial session. This behavioural change supports the notion that experimental learning, but also provided through puppets, not only improves knowledge acquisition, but also stimulates proactive health behaviour [14],[15], [16]. In a deeper assessment, statistical analysis was performed to evaluate the degree of improvement observed between pre- and post-intervention research using paired tests, which confirmed the significance of results. Our findings illustrate the powerful efficacy of the program to alter knowledge and behaviour in relation to oral health among preschool children.

The results of this study aligned with previous literature that suggests interactive and visually engaging educational tools can lead to better learning results [12] [16]. The combination of narrative and engaging character parts, as employed in the intervention of puppets, seems to captivate children's attention and facilitate the deeper cognitive processing of health-related information. Puppetry leverages this developmental characteristic, enabling children to learn by observing and internalizing the behaviour exhibited by puppet characters [21]. As preschool children are particularly skilled in learning through games or play, study findings advocate the broader implementation of creative educational strategies designed to deal with health concerns in paediatric populations. The reinforcement through daily viewing of puppet videos between day 1 to day 14 further supported knowledge retention. Continued exposure was crucial in solidifying understanding, as reflected in the improved mean scores. Repetition is a key principle in early education, and the puppet videos acted as an effective review tool that reinforced learning while maintaining entertainment value [22].

Our findings imply that including puppetry in national oral health promotion initiatives could be a cost-efficient strategy with substantial impact. Puppet shows can be duplicated across various environments, adapted into different languages, and shared through multimedia platforms, making them accessible even in areas with limited resources. Moreover, the use of puppets could help alleviate fear or resistance related to dental care. The character Dr. Fairy, a gentle figure who addressed Boots' dental issues, may help in normalizing dental visits and alleviating associated anxiety, which is a significant psychological result not explicitly measured in this study but merits further investigation in future research. Prior studies underline the efficacy of puppetry in health education. Previous authors also found that storytelling via puppets improved oral hygiene practices among preschool children [4], [23]. Puppet

narratives had a more significant educational impact than movies among elementary school children in Indonesia, reinforcing the notion that interactive and relatable media surpass passive learning tools. These findings also endorsed the expanded application of puppetry across various educational fields, such as language and science instruction [9], [10] [15]. This success across disciplines emphasizes the adaptability and significance of puppetry in early childhood development. Children also learn at various paces and puppetry is also effective in improving knowledge among different learner levels [24].

In general, these findings contribute valuable information about approaches that can be used to improve oral health literacy among young children, reflecting the critical role of early education in preventive health measures. The results not only highlight the effectiveness of puppetry as a pedagogical tool but also reinforce the need for additional research and implementation of similar creative interventions in various educational contexts. Puppetry as an innovative educational tool has unique implications to improve oral health education in young children. The commitment that the puppet favours can transform conventional educational approaches by incorporating an element of play which calls for innate curiosity and the imaginative capacities of children. Studies have shown that children are more likely to absorb information when presented in an interactive and entertaining manner [5] [17]. Characters and stories delivered via puppets, educators can introduce oral health concepts, which makes them more relatable and understandable for young audiences. The long-term advantages for children's health behaviours are also obvious with the integration of the puppet in an educational environment. Engaging children through relatable puppet characters discussing routines of oral health, such as brushing and healthy diet inculcates positive habits early in life. Research indicates that behaviours established during childhood often persist in adulthood, resulting in an improvement in health results. By establishing positive associations with oral hygiene practices, children are more likely to internalize these behaviours. In addition, as the puppet sessions conclude, children can be encouraged to share what they have learned with peers and family members, promoting knowledge transfer and strengthening healthy behavior. Beyond health education, the emotional and social aspects of learning through the puppet must also be recognized. Puppetry can help approach the development of social skills because children learn to communicate effectively in a safe environment where they can express themselves without fear of judgment. These skills are correlated with better decision-making capacities concerning health choices. In addition, the collaborative nature of puppets shows teamwork and the collective resolution of problems, skills that are useful in various areas of life.

## V. CONCLUSION

This study highlights the significant impact of puppetry as a creative educational tool in improving oral health knowledge among preschool children. The implications of the use of



puppets as a teaching tool for oral health education extend in broader educational contexts, the promotion not only of the retention of knowledge, but also of the development of essential life skills and positive health behaviours. The analyses revealed a significant increase in knowledge on day 1, showing that even a single, well-structured intervention using puppetry can effectively capture children's attention and improve their comprehension of important health information. The sustained improvement in knowledge observed on day 7 and day 14 suggests that reinforcement through repeated exposure such as daily video sessions play a vital role in retaining the information. The gradual increase in mean scores across the three time points not only reflects the effectiveness of the initial live performance puppet show but also supports the value of continued engagement through visual and narrative-based learning methods. This approach caters to the developmental needs of young children, who often learn best through play and storytelling. The effectiveness of the puppet as an educational tool to improve knowledge in oral health in preschool children has been supported by various studies [18] [19] [20]. It not only captures the attention of children but also facilitates the retention of crucial health information. Interactive learning methods, such as puppetry, considerably improve understanding and recall in early childhood education circles.

This is particularly important in the context of oral health, where fundamental knowledge can influence lifelong health behaviour. Puppets can simulate real scenarios, allowing children to link the information presented directly to their personal experiences, which makes the learning process both pleasant and impactful. The current research set suggests that puppet can be effective support for providing educational content in an accessible manner relating to preschool children. When children interact with puppets, they are more likely to internalize the messages transmitted. This method exploits theories of social learning, as children often learn from imitation and observation. In addition, the playful nature of the puppet promotes a safe environment where preschool children feel comfortable asking questions and expressing their thoughts, thus enriching the learning experience.

Future research should aim to assess the long-term impacts of interventions based on puppets on oral health behaviour and knowledge retention. It would be prudent to conduct longitudinal studies which evaluate not only immediate results, but also the sustainability of knowledge over time. In addition, surveys on various interactive learning tools beyond the puppet can give an overview of the alternative methods that can be used in early childhood education. The implementation of a wider range of interactive techniques could provide educators with a toolbox to improve children's learning experiences in various fields, strengthening the importance of adaptability and innovation in educational strategies. While educational executives are increasingly focusing on experiential and interactive learning, there is an urgent need for complete programs that incorporate methods such as puppet to meet educational standards and objectives. Programs

incorporating such innovative strategies could lay the basis of healthier life choosing as children develop, ultimately benefiting their well-being and development. In summary, although the preliminary results are promising, the need for continuous exploration in the use of the puppet and other interactive tools in preschool education is essential. These surveys will significantly contribute to the field, ensuring that early childhood educators are equipped with strategies based on evidence to improve learning results and promote a generation equipped with essential knowledge for health [25].

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