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Impact of Storytelling on Oral Hygiene Practices Among Preschool Children in Banyuwangi

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ABSTRACT Oral hygiene problems among children in Indonesia remain alarmingly high, with approximately 57.6% experiencing oral cavity damage. Poor dental hygiene during early childhood can negatively impact tooth development and overall health. Traditional health education methods often fail to engage preschoolers effectively, necessitating the use of more interactive and child-centered approaches. Storytelling, particularly through audio-visual media, has emerged as a promising method to enhance children's understanding and behavior related to oral hygiene. This study aimed to examine the effect of storytelling on oral hygiene practices among preschool children in Banyuwangi. A quantitative approach with a quasi-experimental one-group pretest-posttest design was employed. Fifty preschool children were selected using total sampling. Data were collected using a structured observation checklist focused on tooth-brushing techniques. The intervention consisted of a storytelling session using an original, researcher-developed audio-visual media titled "*Doni and Giginya*." Statistical analysis using the Wilcoxon Signed Rank Test showed a significant improvement in oral hygiene behavior post-intervention, with a p-value of 0.000 (<0.05). Prior to storytelling, 64% of children exhibited poor oral hygiene behavior; this figure dropped dramatically to 4% after the intervention. Conversely, the proportion of children demonstrating good oral hygiene behavior rose from 4% to 60%. These results confirm that storytelling significantly improves oral hygiene behavior in preschoolers. The findings suggest that storytelling can be an effective educational tool to promote healthy behaviors among young children. Health educators, parents, and early childhood teachers are encouraged to integrate storytelling, particularly in audio-visual formats, into oral health education programs to foster long-lasting hygiene habits from an early age.

INDEX TERMS storytelling, oral hygiene, preschool children, audio-visual media, health education

I. INTRODUCTION

Oral hygiene plays a vital role in children's overall health and development. Poor oral hygiene during early childhood can lead to dental caries, periodontal disease, and systemic infections, potentially affecting speech development, nutritional status, and quality of life [1]–[4]. Globally, dental caries is one of the most prevalent health problems, with the World Health Organization (WHO) reporting that nearly 46% of children aged 1–9 years in the Western Pacific region experience untreated dental issues [7]. In Indonesia, the situation is also concerning; around 28.8% of five-year-old children suffer from untreated dental caries [7], while local data from Banyuwangi shows that 57.6% of children face oral cavity problems, often due to improper hygiene practices [6]. Despite the availability of oral health programs, behavioral change in preschool children remains a challenge. At this critical stage of cognitive and emotional development, conventional health education methods may fail to effectively capture children's attention and foster meaningful behavioral change [5], [8]. Factors such as lack of knowledge, irregular brushing habits, excessive

consumption of sugary foods, and low parental involvement contribute significantly to poor dental hygiene among children [10], [11].

In response to these challenges, storytelling has emerged as a state-of-the-art method in pediatric health education. Storytelling, especially when delivered through audio-visual media, engages children cognitively, emotionally, and behaviorally [6], [9], [20]. It transforms abstract health messages into relatable narratives that stimulate imagination and promote retention [9], [19], [22]. Prior studies have demonstrated that storytelling improves knowledge retention and influences behavior among children across various health domains, including hygiene, nutrition, and social development [14], [21], [23].

However, while storytelling has been recognized as a promising educational tool, empirical evidence on its effectiveness in improving oral hygiene behavior particularly among preschoolers in low-resource settings is still limited. Most existing studies have focused on school-aged children, neglecting early childhood groups who are at

greater risk due to their dependency on caregivers for oral hygiene [4], [18]. Furthermore, few studies have evaluated the storytelling approach using quantitative designs with validated tools and statistical analysis, creating a gap in rigorously documented outcomes [12], [13], [15]. This study aims to address that gap by evaluating the effectiveness of storytelling using audio-visual media in enhancing oral hygiene practices among preschool children in Banyuwangi. The specific objective is to assess the impact of a custom-developed storytelling video, "*Doni and Giginya*", on children's tooth-brushing behavior before and after the intervention. The main contributions of this study are:

1. It provides empirical evidence on the effectiveness of storytelling as a behavioral intervention in oral health promotion among preschool-aged children.
2. It introduces and tests a localized, culturally relevant storytelling media designed for early childhood audiences.
3. It demonstrates the feasibility of implementing storytelling in community-based health education programs using a validated quasi-experimental design.

II. METHODS

This study employed a quantitative quasi-experimental design using a one-group pretest-posttest approach, which is commonly utilized in educational and behavioral health research when randomization or control groups are not feasible [31]. This design allows researchers to observe and measure behavioral changes before and after an intervention within the same group, making it ideal for evaluating short-term educational outcomes in preschool populations [32], [33].

A. STUDY SETTING AND POPULATION

The research was conducted at TK Muslimat Khadijah 124, located in Banyuwangi, East Java, Indonesia. The study population included all preschool children enrolled at the institution during the academic year 2024. A total sampling technique was applied, resulting in a sample size of 50 children. The inclusion criteria were children aged 4 to 6 years, who were present during the intervention, and whose parents provided informed consent. Children with cognitive or developmental disabilities that might interfere with understanding or participating in storytelling activities were excluded.

B. ETHICAL CONSIDERATIONS

Prior to data collection, the study received ethical approval from the Research Ethics Committee of STIKes Banyuwangi (No: 271/03/KEPK-STIKESWI/VII/2024). Written informed consent was obtained from the parents or guardians of all participants, and the study followed ethical standards for working with minors, including confidentiality and voluntary participation [34].

C. INTERVENTION DESCRIPTION

The intervention consisted of a storytelling session using audio-visual media titled "*Doni and Giginya*", a short-animated video developed by the researchers. The content was designed to convey messages about the importance of

proper tooth-brushing habits, the consequences of neglecting oral hygiene, and the correct technique of brushing. The video was approximately 7 minutes in duration and used colorful visuals and engaging narration to retain the attention of preschool-aged children. The media was officially copyrighted (Ministry of Law and Human Rights, No. 000782514). The storytelling session was conducted once in the classroom setting, using a projector and speaker system. Children were seated together to watch the video, followed by an informal discussion session led by the teacher, who reinforced key messages and allowed children to ask questions. The intervention was standardized for all participants and delivered on the same day to ensure consistency.

D. INSTRUMENTATION AND DATA COLLECTION

Data on children's oral hygiene behavior were collected using a structured observation checklist developed by the research team. The checklist evaluated three domains: frequency of tooth brushing, technique used (e.g., brushing duration, circular motion), and compliance with recommended times (after meals and before sleep). Observations were conducted twice: once before and once after the storytelling session. Two trained observers independently monitored the children's brushing routines during a practical demonstration and filled in the checklist accordingly. Inter-rater reliability was ensured through joint training and discussion prior to data collection [35].

E. DATA ANALYSIS

Data were analyzed using SPSS version 26.0. Descriptive statistics (frequency and percentage) were used to summarize pre- and post-intervention oral hygiene behavior. For inferential analysis, the Wilcoxon Signed Rank Test was employed to assess the statistical significance of differences between pretest and posttest results. This non-parametric test is appropriate for small sample sizes and ordinal data, and it does not assume normal distribution [36], [37]. A p-value of <0.05 was considered statistically significant.

F. VALIDITY AND RELIABILITY

To enhance validity, the research instrument was reviewed by three dental health education experts and piloted on a group of 10 children with similar characteristics. Content validity was confirmed, and minor modifications were made to improve clarity. Observer consistency was maintained throughout the study through standardized protocols [38].

G. LIMITATIONS

While the one-group pretest-posttest design is appropriate for measuring short-term educational effects, it does not control for external factors such as maturation or environmental influences. Additionally, the study lacked a control group, which limits generalizability. However, the within-subject comparison strengthens the internal validity of the findings.

III. RESULTS

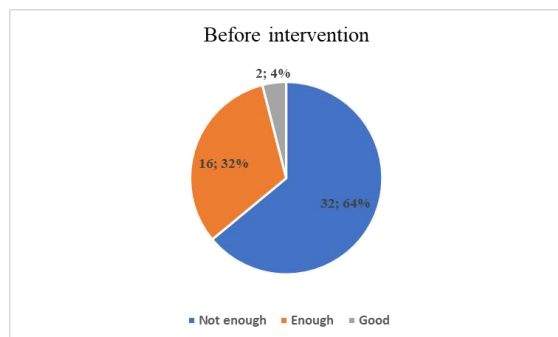
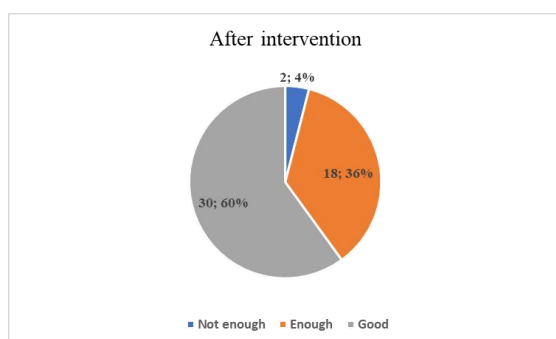
A. ORAL HYGIENE BEHAVIOR BEFORE STORYTELLING**FIGURE 1** Oral Hygiene Behavior Before Storytelling

FIGURE 1 shows the oral hygiene behavior of preschool children before storytelling, most of the children, 32 (64%), showed poor oral hygiene behavior. This illustrates that the majority of the sample has limited understanding or inconsistent practice of proper oral hygiene techniques. Such behavior has the potential to cause long-term dental health problems, as indicated by the high prevalence of dental caries among children in this age group, as in the introduction. Based on these data, there is a critical need for effective interventions in oral hygiene behavior.

B. ORAL HYGIENE BEHAVIOR AFTER STORYTELLING

FIGURE 2 presents the oral hygiene behavior of preschool children after storytelling through audio-visual media. After the intervention, there was a very significant increase in behavior, namely 30 children (60%) showed good oral hygiene practices from the initial 4%. And the percentage of children with poor hygiene behavior decreased drastically from 64% to only 4%. These results indicate that the storytelling intervention effectively improved children's knowledge and behavior regarding oral hygiene and showed the potential of using interesting and educational stories to promote healthier habits in early childhood.

**FIGURE 2** Oral Hygiene Behavior After Storytelling**C. THE EFFECT OF STORYTELLING ON ORAL HYGIENE BEHAVIOR**

The Wilcoxon test results obtained a value of $p=0.000 < 0.05$, there was an influence of the storytelling on oral hygiene behavior; this was because the information obtained through the story affected the level of children's behavior. The results showed a statistically significant improvement in behavior from pre-intervention to post-intervention, with a Z value of -6.030 and a p-value of 0.000 ($p < 0.05$). This indicates that

the storytelling intervention had a significant impact on children's oral hygiene practices. Before the intervention, the majority of children 64% exhibited poor oral hygiene behavior (Figure 1). However, after the intervention, this number dropped significantly, with 60% of children now exhibiting good oral hygiene behavior (FIGURE 2). This shift illustrates a marked improvement, which is directly attributable to the information conveyed through the stories. A comparative analysis of the pre- and post-intervention data (TABLE 1) underlines the effectiveness of the storytelling method. The significant decrease in poor behavior and increase in good behavior reflects that storytelling improved children's understanding and practice of proper oral hygiene techniques. These findings demonstrate the power of storytelling as an educational tool, effectively influencing behavior in children. Clear statistical significance ($p < 0.05$) strengthens the success of the intervention, highlighting its

TABLE 1
Cross Tabulation Results

| Before | After | | | Amount |
|------------|------------|--------|------|--------|
| | Not Enough | Enough | Good | |
| Not Enough | 2 | 16 | 14 | 32 |
| Enough | 0 | 2 | 14 | 16 |
| Good | 0 | 0 | 2 | 2 |
| Total | 2 | 18 | 30 | 50 |

TABLE 2
Wilcoxon test results

| | Post-Pre |
|-------------|----------|
| Z | -6.030b |
| Asymp. Sig. | .000 |

potential application in early childhood health education (TABLE 2).

IV. DISCUSSION**A. ORAL HYGIENE BEHAVIOR BEFORE STORYTELLING**

The baseline data from this study indicated that a majority of the preschool children, approximately 64% (32 out of 50), exhibited poor oral hygiene behavior prior to the storytelling intervention. This finding underscores a significant gap in oral health knowledge and practices among children in early childhood education settings. Such inadequate behavior may be attributed to a lack of exposure to effective oral health education both at home and in school environments. This supports the findings of Yao et al. [41], who observed that limited oral health awareness among children often results from insufficient guidance from parents and teachers. Children's oral health is heavily influenced by their surrounding environment, particularly parental modeling and school-based interventions. When neither source provides adequate information or support, children are less likely to engage in proper toothbrushing routines or understand the importance of maintaining oral hygiene. Previous studies have highlighted the critical role of structured oral health education programs in improving children's behavioral outcomes related to dental hygiene [42]. In this study, prior to the storytelling activity, children had not received any prior structured oral health counseling, reinforcing the importance of the educational gap. These findings align with previous research emphasizing the critical role of educational

interventions in shaping and modifying health-related behaviors. For instance, a study conducted by Abed et al. [43] highlighted that the lack of early health education often leads to the continuation of poor behavioral patterns into adolescence and adulthood, ultimately resulting in long-term adverse consequences for oral health. This reinforces the importance of introducing health education at an early age, particularly through methods that are both engaging and age-appropriate. The initial data from this study further validate the need for interactive and accessible educational tools that not only capture the attention of young learners but also involve their caregivers in promoting sustainable oral hygiene practices.

B. ORAL HYGIENE AFTER STORYTELLING

Following the implementation of the storytelling intervention via audio-visual media, there was a marked improvement in oral hygiene practices. The number of children demonstrating good oral hygiene behavior increased significantly from 4% to 60%. This result is consistent with prior research by Shruti et al. [44], who demonstrated that storytelling methods can effectively improve health-related knowledge and behavior among children aged 3 to 6 years. The success of the intervention can be attributed to the multisensory nature of the storytelling approach. Audio-visual storytelling stimulates both auditory and visual channels, enhancing comprehension and memory retention among young children. According to Ade and Hermanto [45], visual storytelling in particular helps translate abstract concepts into relatable and concrete ideas for children, thereby facilitating behavioral change. In this study, the use of the story "Doni dan Giginya" exemplified such a method, presenting moral and hygiene-related messages in a format that was both entertaining and instructional. Moreover, the storytelling approach was found to actively engage the children's curiosity, leading to a higher level of participation and internalization of the desired behaviors. This is supported by Hidayati [46], who emphasized that storytelling not only fosters cognitive development but also enhances emotional connections to the subject matter, thereby increasing motivation to act. It is worth noting that the content of the storytelling was contextually relevant, featuring scenarios familiar to the children's daily lives. This cultural relevance likely increased the resonance of the messages conveyed, as supported by Thomopoulou et al. [47], who argue that storytelling techniques are most effective when tailored to the sociocultural context of the learners. In this regard, the storytelling format used in this study represents an effective pedagogical tool for health education, particularly when other traditional approaches have limited appeal to young children.

C. IMPACT OF STORY TELLING ON ORAL HYGIENE PRACTICES AMONG PRESCHOOL CHILDREN

The statistical analysis, using the Wilcoxon signed-rank test, demonstrated a significant improvement in children's oral hygiene behavior following the storytelling intervention ($Z = -6.030$, $p < 0.001$). This reinforces the hypothesis that storytelling is an effective method for influencing knowledge and behavior in early childhood. The improvement is not only statistically significant but also

practically meaningful, given the potential long-term health benefits of improved oral hygiene practices established at a young age. These findings align with those of Choo et al. [48], who compared digital and oral storytelling methods and concluded that both can serve as impactful educational strategies when appropriately applied. The children in this study benefitted from the structured format of the story, which utilized both narrative and visual elements to reinforce key hygiene practices. Nonetheless, certain limitations must be acknowledged. First, the sample size of 50 children, while sufficient for initial analysis, limits the generalizability of the findings to a wider population. Future research should consider larger and more diverse populations to validate these outcomes across different socioeconomic and cultural settings. Secondly, the study utilized a short-term intervention without a long-term follow-up, making it difficult to assess the durability of behavioral change over time. As emphasized by van Houwelingen et al. [49], sustained behavioral change in health practices often requires periodic reinforcement, which may involve integrating storytelling into the regular curriculum. Despite these limitations, the implications of this study are substantial. The findings suggest that storytelling, especially when enhanced through audio-visual media, can be adopted as a cost-effective and scalable strategy in early childhood education settings. This aligns with contemporary pedagogical frameworks that prioritize child-centered learning and multisensory engagement [50]. In practice, this intervention method can be adopted not only in schools but also in community health initiatives, pediatric clinics, and home-based education programs. Educators and health practitioners can collaborate to develop age-appropriate story-based health modules that align with national health education goals. Moreover, involving parents in the storytelling process can create continuity between school and home environments, reinforcing the learning and encouraging consistent practice. Importantly, the storytelling method can be modified and expanded to cover a range of health behaviors beyond oral hygiene. Topics such as nutrition, physical activity, handwashing, and mental health can all benefit from narrative-based interventions. As pointed out by Bietti et al. [51], storytelling supports adaptive sensemaking in group settings, making it a suitable vehicle for health promotion among children and families alike. Finally, the storytelling method fosters not only cognitive development but also emotional and social learning. It creates an empathetic connection between the storyteller and the listener, encouraging reflective thinking and enhancing moral reasoning. In this way, it fulfills a dual function: promoting specific health behaviors and contributing to holistic child development. The integration of storytelling into educational and health interventions thus represents a promising direction for interdisciplinary research and practice.

V. CONCLUSION

This study aimed to assess the effectiveness of storytelling through audio-visual media in improving oral hygiene behavior among preschool children. The findings provide compelling evidence that storytelling can serve as a

powerful educational tool in health promotion. Prior to the intervention, 64% of the 50 respondents demonstrated poor oral hygiene behavior, while only 4% exhibited good behavior. After the storytelling intervention using the custom story "Doni dan Giginya," the percentage of children displaying good oral hygiene behavior increased dramatically to 60%, and those with poor behavior declined to just 4%. The Wilcoxon Signed Rank Test confirmed this change to be statistically significant with a p-value of 0.000 ($p < 0.05$), suggesting a strong relationship between the storytelling intervention and improved behavior. These findings emphasize the value of integrating storytelling into early childhood health education as a means of engaging young learners and facilitating behavior change. The use of audio-visual media appeals to multiple senses and enhances children's ability to comprehend and internalize health messages. However, this study has limitations, notably the small sample size and short intervention duration. These constraints limit generalizability and do not capture the long-term retention of improved behaviors. Future research should consider longitudinal designs with larger and more diverse samples to evaluate sustained behavioral impact. Furthermore, exploring the integration of storytelling across various health topics could broaden its educational utility. In conclusion, storytelling, when delivered through engaging and culturally relevant audio-visual media, proves to be an effective strategy for enhancing oral hygiene knowledge and behavior in preschool-aged children. Its potential for application in broader health education efforts warrants further exploration by educators, healthcare professionals, and policymakers.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Haswita Haswita conceptualized the study, conducted the data collection, and led the drafting of the manuscript. Mila Mar'atus Sholihah was responsible for designing the intervention material and supporting statistical analysis. Roshinta Sony Anggari contributed to literature review, data interpretation, and the critical revision of the manuscript. All

authors have read and approved the final version of the manuscript.

DECLARATIONS

ETHICAL APPROVAL

This research was approved by the STIKes Banyuwangi Ethics Committee (No: 271/03/KEPK-STIKESWI/VII/2024).

CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants

COMPETING INTERESTS

The authors declare no competing interests.

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