e-ISSN: 3025-6224

Scientific Journal of Pediatrics (SJPed)

Journal website: https://phlox.or.id/index.php/sjped

Effectiveness of Storytelling Versus Lecture Methods on Oral Health Knowledge in Children Aged 7–8 Years: A Quasi-Experimental Study

Suci Rahmasari[1,2*], Yona Ladyventini[1], Rahmi Khairan[2,3]

[1]Department of Community Dental and Oral Health Sciences, Universitas Andalas, Padang, Indonesia

[2]Dental and Oral Hospital, Faculty of Dentistry, Universitas Andalas, Padang, Indonesia

[3]Department of Dental Materials, Faculty of Dentistry, Universitas Andalas, Padang, Indonesia

ARTICLE INFO

Keywords:
Pediatric dentistry
Oral health education
Quasi-experimental study
School-age children
Storytelling

***Corresponding author:**
Suci Rahmasari

E-mail address:
suci@dent.unand.ac.id

All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.59345/sjped.v3i2.251

A B S T R A C T

Introduction: Dental caries remains the most prevalent chronic disease in children worldwide, disproportionately affecting school-age populations in low- and middle-income countries. This quasi-experimental study evaluated the effectiveness of storytelling versus traditional lecture methods in improving oral health knowledge among children aged 7–8 years (mean age 7.4 ± 0.5 years) in Padang, Indonesia. **Methods:** A total of 110 children were enrolled and assigned to storytelling (n=55) and lecture (n=55) groups, with 108 children (54 per group) completing the study. Pre-test and post-test knowledge assessments were conducted using a validated 15-item questionnaire (Content Validity Index = 0.87, Cronbach's α = 0.73). **Results:** The storytelling group demonstrated a significant mean score increase of +1.28 points (95% CI: 0.97–1.59, $p < 0.001$, Cohen's d = 1.12), while the lecture group showed a non-significant gain of +0.35 points (95% CI: -0.13 to 0.83, $p = 0.152$, Cohen's d = 0.22). Post-intervention, 83.3% of the storytelling group achieved "good" knowledge levels compared to 51.9% in the lecture group (OR = 4.66, 95% CI: 1.88–11.54, $p < 0.001$; NNT = 3.2). Children with lower baseline knowledge benefited most from storytelling ($r = 0.51$, $p < 0.010$). Children perceived storytelling as more enjoyable (92.6% vs 51.9%), easier to understand (88.9% vs 59.3%), and more motivating for oral hygiene practice (81.5% vs 50.0%). **Conclusion:** Storytelling was significantly more effective than lectures in enhancing oral health knowledge, particularly among children with limited baseline understanding, supporting its implementation as a school-based oral health promotion strategy.

1. Introduction

Dental caries is the most prevalent chronic disease affecting children globally, with an estimated 530 million children suffering from caries of primary teeth according to the Global Burden of Disease Study 2019.[1] The World Health Organization has identified early childhood caries as a major public health concern, particularly in low- and middle-income countries where access to preventive dental care and oral health education remains severely limited.[2] In Southeast Asia, including Indonesia, the prevalence of dental caries among school-age children exceeds 70%, driven by inadequate oral hygiene practices, high consumption of sugary foods, and limited dental service utilization.[3] National health survey data from Indonesia confirm that oral health remains a significant pediatric public health challenge, with a substantial proportion of children experiencing untreated dental disease.[4]

The pathogenesis of dental caries in school-age children is multifactorial, involving the interaction of cariogenic microorganisms, fermentable carbohydrates, susceptible tooth surfaces, and time.[5] Children aged 7–8 years are in the mixed dentition phase, during which newly erupted permanent first molars are particularly vulnerable to caries due to immature enamel mineralization and morphological pit-and-fissure anatomy.[6] This developmental period, corresponding to Piaget's concrete operational stage, represents a critical window for oral health education because health-related behaviors established during early school years tend to persist into adolescence and adulthood.[7] Furthermore, the American Academy of Pediatric Dentistry recommends that anticipatory guidance for oral health be reinforced during this age, emphasizing the pediatric relevance of educational interventions targeting this population.[8]

Conventional lecture-based oral health education, while widely implemented in school settings, has demonstrated limited effectiveness in engaging young learners and sustaining behavioral change.[9] Children's shorter attention spans, preference for interactive experiences, and reliance on concrete rather than abstract reasoning necessitate educational strategies aligned with their developmental capacities.[10] Storytelling has emerged as a promising alternative, integrating visual media, fictional characters, and narratives contextualized to children's daily experiences. Paivio's dual coding theory posits that information encoded through both verbal and visual channels creates stronger and more accessible memory traces, particularly benefiting children in the concrete operational stage.[11] Complementarily, Bandura's social learning theory suggests that children adopt health behaviors more readily when modeled by relatable characters within engaging narratives.[12]

Recent evidence supports the effectiveness of storytelling in pediatric health education. Studies have demonstrated significant improvements in oral health knowledge and awareness among preschool and primary school children exposed to storytelling interventions.[13,14] Interactive storytelling approaches, including digital storytelling and storybook-based education, have shown superiority over conventional methods in knowledge retention and transferability.[15,16] However, limited research has directly compared storytelling with traditional lectures using rigorous quasi-experimental designs in school-age oral health education within Southeast Asian contexts, and fewer studies have examined whether storytelling differentially benefits children with varying baseline knowledge levels—an equity consideration critical for addressing oral health disparities.[17]

The aim of this study was to evaluate the effectiveness of storytelling compared to traditional lecture-based methods in improving oral health knowledge among children aged 7–8 years attending elementary schools in Padang, Indonesia. We hypothesized that children receiving storytelling-based education would demonstrate significantly greater knowledge improvement and a higher proportion achieving good knowledge levels compared to those receiving lecture-based instruction. Additionally, this study assessed children's perceptions of the educational methods and the relationship between baseline knowledge and intervention effectiveness.

2. Methods

Study design and setting

This quasi-experimental study employed a pre-test and post-test control group design comparing storytelling and traditional lecture-based oral health education. The quasi-experimental design was chosen because true individual-level randomization was impractical in the school setting, and ethical considerations favored assignment by classroom. The study was conducted at elementary schools in Padang, West Sumatra, Indonesia, between March and June 2024. The Department of Community Dental and Oral Health Sciences, Faculty of Dentistry, Universitas Andalas, supervised the educational intervention protocols.

Participants

The study enrolled 110 children aged 7–8 years (84–96 months; mean age 7.4 ± 0.5 years) from two elementary schools in Padang. Participants were

recruited through purposive school selection based on comparable sociodemographic profiles and assigned to groups by classroom. Inclusion criteria were: (1) age 7–8 years at enrollment, verified by school records; (2) ability to communicate and comprehend Bahasa Indonesia; (3) no prior exposure to structured oral health education programs, confirmed by parental questionnaire and school health records; and (4) written parental consent obtained. Exclusion criteria included children with significant cognitive or developmental disabilities impairing participation, and those absent during either assessment. Two children from each group were excluded due to incomplete post-test data, yielding 108 children (54 per group) for analysis. This represents a 3.6% attrition rate. Per-protocol analysis was conducted.

Sample size calculation

The minimum sample size was calculated using the formula for comparing two independent means: $n = (Z\alpha/2 + Z\beta)^2 \times 2\sigma^2 / \delta^2$, where $Z\alpha/2 = 1.96$ ($\alpha = 0.05$, two-tailed), $Z\beta = 0.84$ (power = 0.80), $\sigma = 1.3$ (estimated standard deviation from pilot data of 30 children), and $\delta = 0.8$ (minimum clinically meaningful difference representing approximately 5.3% of the 15-point scoring range, based on prior educational intervention studies in similar populations). This yielded a minimum of 42 participants per group. Accounting for a 20% anticipated dropout rate, 55 children were enrolled per group (110 total).

Intervention

The storytelling group received oral health education through a structured 30-minute session incorporating illustrated storybooks featuring age-appropriate characters, projected visual media, and interactive narrative discussion. The story followed a child character navigating daily oral health decisions including tooth brushing technique, sugary food choices, and dental visits. The lecture group received identical educational content through a conventional 30-minute didactic format with verbal explanation and static visual aids. Both interventions were conducted by trained facilitators (dental health professionals) in classroom settings at the Dental and Oral Hospital, Faculty of Dentistry, Universitas Andalas. Intervention fidelity was monitored using a standardized checklist completed by an independent observer at each session.

Instruments

Oral health knowledge was assessed using a validated 15-item multiple-choice questionnaire covering tooth brushing practices, dietary habits, and dental care importance. Content validity was established by two pediatric dentistry specialists and one public health expert (Content Validity Index = 0.87). Reliability testing in a pilot sample of 30 children (not included in the main study) yielded Cronbach's $\alpha = 0.73$, indicating acceptable internal consistency. Item-total correlations ranged from 0.42 to 0.68. The questionnaire was read aloud to all children to accommodate varying literacy levels. Children's perceptions were assessed through a five-item structured feedback survey using binary (yes/no) responses evaluating ease of understanding, enjoyment, contextual relevance, information retention, and motivation to practice oral hygiene.

Data collection

Both groups completed a pre-test immediately before the intervention and a post-test exactly one week post-intervention. Knowledge scores were calculated as total correct responses (range: 0–15). Knowledge levels were categorized as poor (0–5 correct), moderate (6–10 correct), and good (11–15 correct). The perception survey was administered immediately after the post-test.

Statistical analysis

Normality was assessed using the Shapiro-Wilk test (pre-test scores: $W = 0.967$, $p = 0.08$; post-test scores: $W = 0.954$, $p = 0.06$), supporting the use of parametric tests. Levene's test confirmed equality of variances ($F = 2.31$, $p = 0.132$). Paired t-tests assessed within-group changes; independent t-tests compared between-group differences (df = 106). Cohen's d was calculated using the pooled standard deviation. Chi-Square analysis tested the association between educational method and knowledge categories (x^2, df =

2), with Cramer's V quantifying effect strength. Odds ratios (OR) with 95% confidence intervals were calculated for achieving good knowledge. The number needed to treat (NNT) was derived from the absolute risk difference. Pearson correlations assessed relationships between pre-test scores, post-test scores, and score gains. The primary outcome was post-test knowledge score (between-group comparison); secondary outcomes were knowledge category distribution and perceptions. All analyses were performed using SPSS version 23.0 (IBM Corp., Armonk, NY, USA), with significance at $p < 0.05$ (two-tailed).

Ethical considerations

This study was approved by the Research Ethics Committee of Universitas Andalas (Approval No. 119/UN.16.2/KEP-FK/2024) and was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from parents or legal guardians of all participating children. Age-appropriate verbal assent was obtained from each child, who was informed that participation was voluntary and that they could stop at any time without consequences. After study completion, the lecture group also received the storytelling intervention to ensure ethical equipoise.

3. Results and Discussion

Of 110 children enrolled, 108 (98.2%) completed the study (54 per group). Two children per group were excluded due to absence during the post-test assessment. Table 1 presents the baseline characteristics of participants by group. No significant differences were observed between the storytelling and lecture groups for any demographic variable (all $p > 0.05$), confirming adequate baseline comparability. The sample comprised predominantly 7-year-old children (57.4%) with balanced gender distribution. Notably, 58.2% of children brushed fewer than twice daily, 53.6% consumed sugary snacks frequently, and 64.5% had never visited a dentist, reflecting poor oral health behaviors and limited access to dental care.

Table 1. Baseline characteristics of study participants by group.

Characteristic	Total (N=110)	Storytelling (n=55)	Lecture (n=55)	p-value*
Age (years), mean ± SD	7.4 ± 0.5	7.4 ± 0.5	7.4 ± 0.5	0.872
7 years, n (%)	63 (57.4)	32 (58.2)	31 (56.4)	
8 years, n (%)	47 (42.6)	23 (41.8)	24 (43.6)	
Male gender, n (%)	58 (52.7)	30 (54.5)	28 (50.9)	0.710
Parent education ≥ College, n (%)	29 (26.3)	15 (27.3)	14 (25.5)	0.838
Income ≥ 4,000,000 IDR, n (%)	23 (20.9)	12 (21.8)	11 (20.0)	0.818
Brushing ≥ 2x/day, n (%)	46 (41.8)	24 (43.6)	22 (40.0)	0.701
Sugary snacks ≥ 2x/day, n (%)	59 (53.6)	29 (52.7)	30 (54.5)	0.849
Never visited a dentist, n (%)	71 (64.5)	35 (63.6)	36 (65.5)	0.840
Has print media at home, n (%)	66 (60.0)	34 (61.8)	32 (58.2)	0.698

* Chi-square or independent t-test. IDR = Indonesian Rupiah. No significant between-group differences at baseline.

Table 2 summarizes the primary and secondary outcomes. The storytelling group demonstrated a significant within-group knowledge score increase of +1.28 points (95% CI: 0.97–1.59, $t = 4.240$, $df = 53$, $p < 0.001$), corresponding to a large within-group effect size (Cohen's $d = 1.12$). The lecture group showed a modest, non-significant improvement of +0.35 points (95% CI: -0.13 to 0.83, $t = 1.452$, $df = 53$, $p = 0.152$,

Cohen's d = 0.22). The between-group difference in post-test scores was 1.19 points (95% CI: 0.64 to 1.73, p < 0.001), with a large between-group effect size (Cohen's d = 0.82). Children in the storytelling group were 4.66 times more likely to achieve good knowledge (OR = 4.66, 95% CI: 1.88–11.54, p < 0.001), with a number needed to treat (NNT) of 3.2.

Table 2. Primary and secondary outcome measures by educational method.

Outcome measure	Storytelling (n=54)	Lecture (n=54)	Between-Group Diff (95% CI)	p-value	Effect size
Pre-test score, mean ± SD	7.11 ± 1.245	6.85 ± 1.332	0.26 (-0.23 to 0.75)	0.292	—
Post-test score, mean ± SD	8.39 ± 1.036	7.20 ± 1.774	1.19 (0.64 to 1.73)	< 0.001	d = 0.82†
Within-group change, mean (95% CI)	+1.28 (0.97 to 1.59)‡	+0.35 (-0.13 to 0.83)	—		d = 1.12 vs 0.22
Post-test 'Good' knowledge, n (%)	45 (83.3)	28 (51.9)	OR = 4.66 (1.88 to 11.54)	< 0.001	V = 0.36
Post-test 'Poor' knowledge, n (%)	0 (0.0)	6 (11.1)	—	0.001§	NNT = 3.2

† Between-group Cohen's d (pooled SD). ‡ Paired t-test (df = 53). § $x^2 = 14.131$, df = 2, Cramer's V = 0.36. OR = Odds Ratio. NNT = Number Needed to Treat.

Figure 1 illustrates the shift in knowledge categories. The storytelling group showed a dramatic transition from predominantly moderate baseline knowledge (66.7%) to predominantly good post-test knowledge (83.3%), with complete elimination of the poor category. The lecture group demonstrated more modest improvement, with 37.0% remaining moderate and 11.1% remaining poor post-intervention.

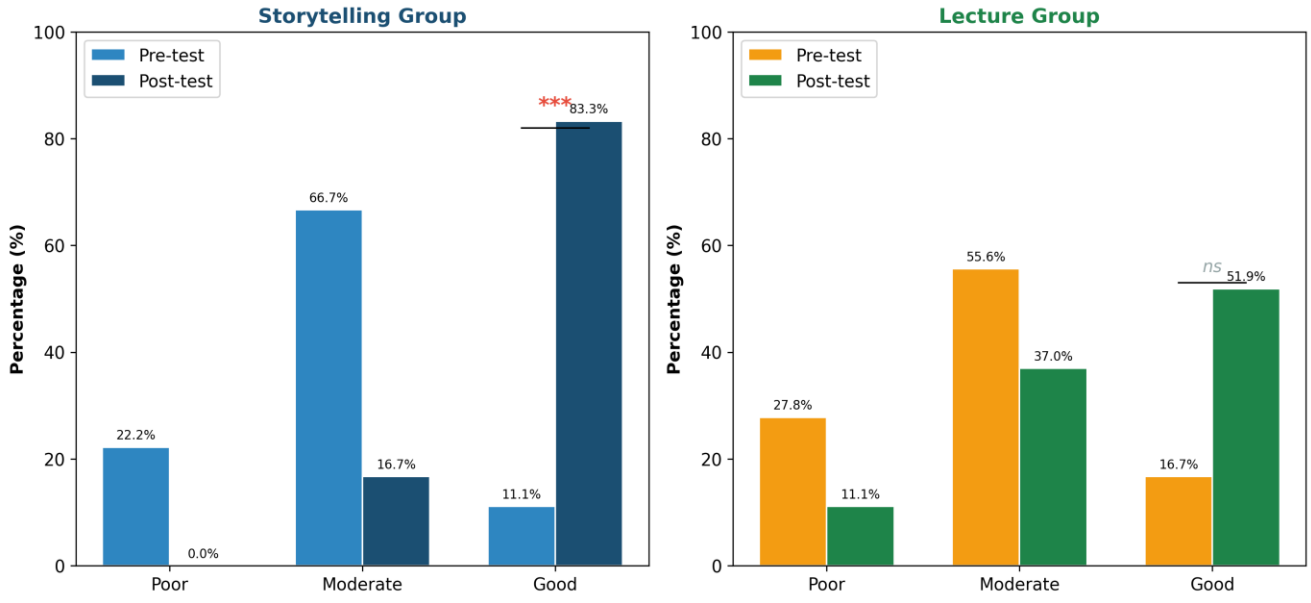

Figure 1. Distribution of oral health knowledge levels before and after educational intervention. *** indicates p < 0.001 (paired t-test); ns = not statistically significant (p = 0.152).

Table 3 presents the correlation matrix. A strong positive correlation between pre-test and post-test scores ($r = 0.78$, $p < 0.010$, $R^2 = 0.61$) indicated consistency in performance across the intervention. The moderate correlation between pre-test scores and score gains ($r = 0.51$, $p < 0.010$, $R^2 = 0.26$) suggests that children with lower baseline knowledge achieved greater improvements, particularly following storytelling. This finding should be interpreted cautiously, given the potential contribution of regression to the mean in pre-post designs. Figure 2 displays the forest plot summarizing effect estimates. The storytelling group showed consistently significant effects with a large within-group effect size and a significant between-group difference.

Table 3. Correlation matrix of knowledge scores and score gains (n = 108).

Variable	Pre-test	Post-test	Score gain	p-value
Pre-test score	1.00	0.78**	0.51**	< 0.01
Post-test score	0.78**	1.00	0.69**	< 0.01
Score gain	0.51**	0.69**	1.00	< 0.01

** Pearson correlation, $p < 0.01$ (two-tailed). R^2 for pre-test vs score gain = 0.26.

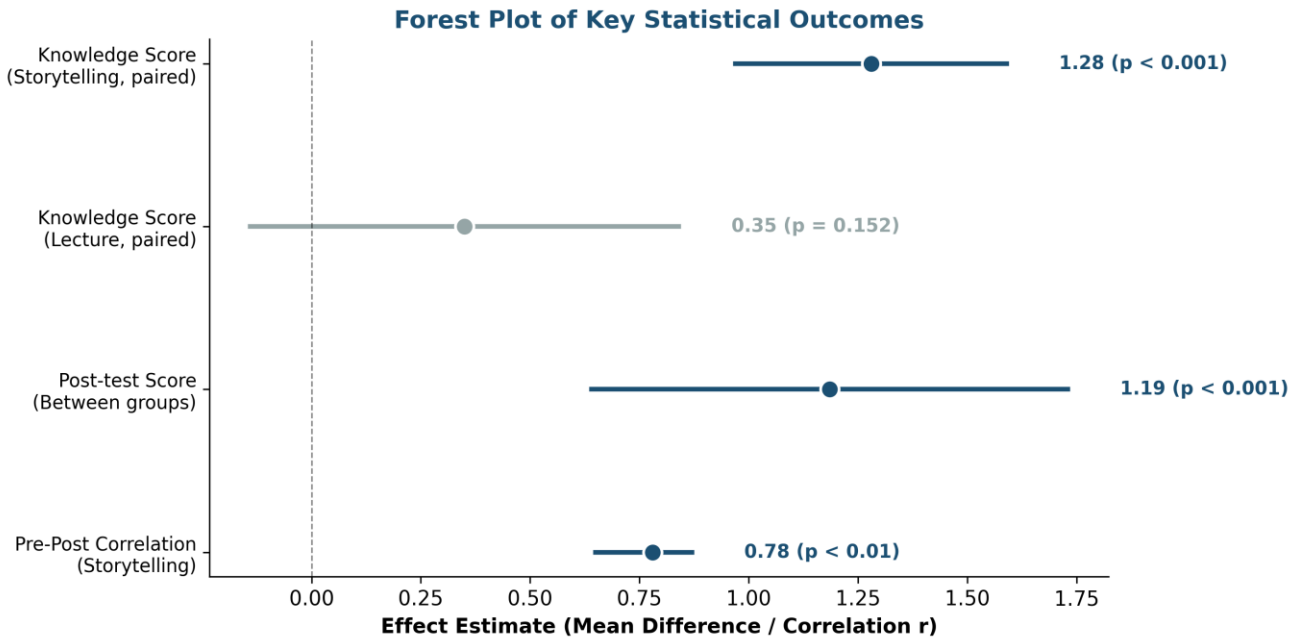

Figure 2. Forest plot of key statistical outcomes with 95% confidence intervals. Teal = statistically significant; gray = non-significant.

Figure 3 depicts children's perceptions. Storytelling was consistently rated higher: ease of understanding (88.9% vs 59.3%), enjoyability (92.6% vs 51.9%), contextual relevance (83.3% vs 55.6%), information retention (85.2% vs 53.7%), and motivation to practice oral hygiene (81.5% vs 50.0%).

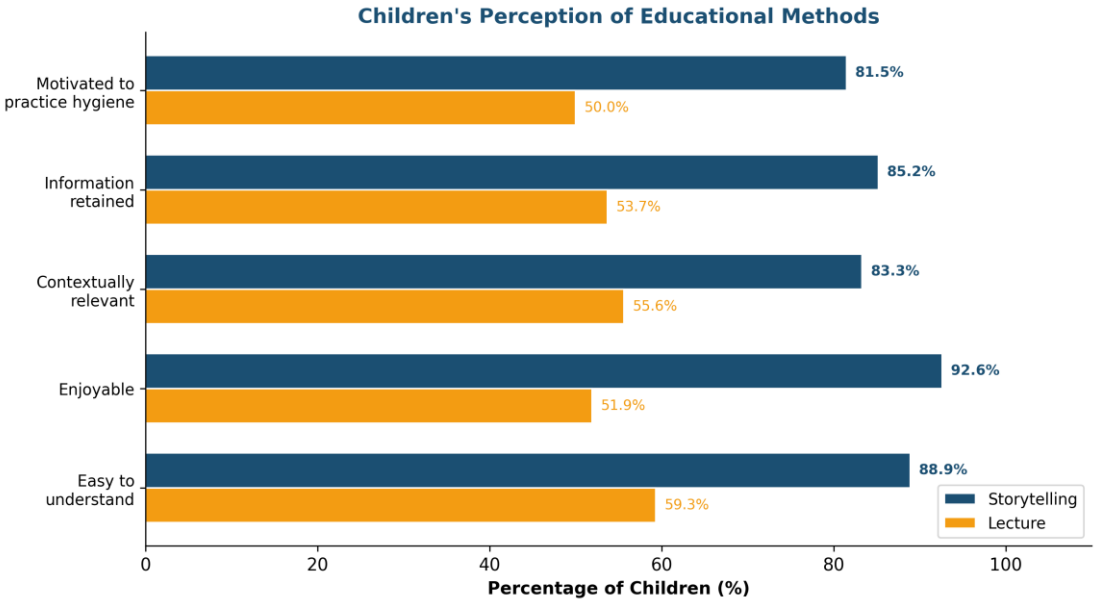

Figure 3. Children's perceptions of storytelling versus lecture methods across five learning effectiveness dimensions.

This study demonstrated that storytelling was significantly more effective than traditional lectures in improving oral health knowledge among children aged 7–8 years, with a large between-group effect size (Cohen's d = 0.82) and a number needed to treat of 3.2. Children in the storytelling group were 4.66 times more likely to achieve good knowledge levels, and the method completely eliminated the poor knowledge category post-intervention. These findings provide robust evidence supporting storytelling as a school-based oral health promotion strategy for pediatric populations.

The participant characteristics revealed concerning patterns of oral health behavior in this pediatric population. More than half of children (58.2%) brushed fewer than twice daily, 53.6% consumed sugary snacks frequently, and 64.5% had never visited a dentist. These findings are consistent with epidemiological data from low- and middle-income countries where dental care access remains limited and oral health literacy among children and caregivers is inadequate.[1,8] The diverse socioeconomic backgrounds of participants underscore the importance of developing educational interventions effective across varying baseline conditions.

The significant knowledge improvement in the storytelling group (+1.28 points, $p < 0.001$) compared to the non-significant gain in the lecture group (+0.35 points, $p = 0.152$) aligns with previous studies. Shruti and colleagues reported that storytelling significantly enhanced oral health awareness among preschool children aged 3–6 years.[13] Sharma and colleagues found storybook-based education more effective than conventional methods in improving oral hygiene status among schoolchildren.[14] The effect size observed in our study (d = 0.82 between groups) exceeds typically reported effects in educational interventions for children, suggesting that storytelling may be particularly effective for oral health topics that lend themselves to concrete, visual narratives aligned with the concrete operational stage of cognitive development.

The Chi-Square analysis confirmed a significant association between educational method and knowledge distribution ($x^2 = 14.131$, df = 2, $p = 0.001$, Cramer's V = 0.36), indicating a medium-to-large effect. The odds ratio of 4.66 (95% CI: 1.88–11.54) for achieving good knowledge and the NNT of 3.2 translate the statistical findings into clinically interpretable metrics. The correlation between pre-test scores and score gains ($r = 0.51$, $R^2 = 0.26$), while partly

attributable to regression to the mean, supports the interpretation that storytelling functions as an equity-promoting strategy by disproportionately benefiting children with the greatest knowledge deficits.[16,17]

The mechanisms underlying storytelling's effectiveness are supported by established cognitive theories. Paivio's dual coding theory explains that combining verbal narratives with visual imagery creates dual memory representations, enhancing encoding and retrieval.[11] Bandura's social learning theory further explains that children learn health behaviors through observation of relatable characters.[12] The concept of narrative transportation enhances emotional engagement and behavioral intention. These theoretical mechanisms are supported by our perception data showing that 92.6% of children found storytelling enjoyable, and 81.5% felt motivated to practice oral hygiene.[18,19]

The perception outcomes have important clinical implications. The substantially higher rates of enjoyment, comprehension, and motivation in the storytelling group suggest that storytelling engages the affective domain, which is a proximal determinant of sustained behavioral change.[15] For pediatricians, school health professionals, and public health practitioners, these findings support recommending storytelling-based oral health education as an evidence-based approach to addressing the pediatric oral health crisis in resource-limited settings.[17]

Comparison with regional data supports the generalizability within the Southeast Asian context. Warman and colleagues demonstrated the effectiveness of storytelling combined with roleplay among Indonesian elementary school students.[17] Sarilita and colleagues reported successful community-based oral health education in Indonesian schools.[18] Chen and colleagues documented effective educational interventions for early childhood caries in Chinese populations.[20]

This study has several strengths: (1) the quasi-experimental design with pre-test and post-test assessments provides stronger causal inference than cross-sectional studies; (2) comprehensive reporting of effect sizes, confidence intervals, odds ratios, and NNT enhances clinical interpretability; and (3) the combination of quantitative knowledge outcomes with perception data provides a holistic evaluation of educational effectiveness.[21-24]

Several limitations should be acknowledged. First, the two-school design introduces potential cluster-level confounding; future studies should employ cluster-randomized designs with multiple schools per arm. Second, the one-week follow-up may capture only immediate recall; longitudinal studies with 3–6 month follow-up are needed to assess knowledge retention and behavioral change. Third, knowledge was measured by questionnaire rather than clinical outcomes such as DMFT indices or plaque scores. Fourth, anthropometric data (weight, height, BMI-for-age z-scores) were not collected, precluding examination of the relationship between nutritional status and oral health knowledge. Fifth, the absence of a no-intervention control group limits differentiation between the specific effect of storytelling and the general effect of any educational exposure. Sixth, the binary perception survey may inflate positive response rates. Finally, the potential Hawthorne effect and absence of assessor blinding should be considered when interpreting results.[25-27]

4. Conclusion

This study demonstrated that storytelling was significantly more effective than traditional lectures in enhancing oral health knowledge among children aged 7–8 years, with a large between-group effect size (Cohen's d = 0.82), an odds ratio of 4.66 for achieving good knowledge, and a number needed to treat of 3.2. The storytelling method was particularly beneficial for children with lower baseline knowledge, supporting its role as an equity-promoting educational strategy. Children consistently perceived storytelling as more enjoyable, comprehensible, and motivating than lectures. These findings support the implementation of storytelling as a school-based oral health promotion strategy in pediatric populations, particularly in low- and middle-income settings. Future research should evaluate long-term knowledge retention, include clinical oral health outcomes, employ cluster-randomized designs, and assess cost-effectiveness across diverse pediatric populations.

5. References

1. Peres MA, Macpherson LMD, Weyant RJ, et al. Oral diseases: a global public health challenge. Lancet. 2019; 394(10194): 249-60.
2. Phantumvanit P, Makino Y, Ogawa H, et al. WHO global consultation on public health intervention against early childhood caries. Community Dent Oral Epidemiol. 2018; 46(3): 280-7.
3. Tinanoff N, Baez RJ, Diaz Guillory C, et al. Early childhood caries epidemiology, aetiology, risk assessment, societal burden, management, education, and policy: global perspective. Int J Paediatr Dent. 2019; 29(3): 238-48.
4. Akera P, Kennedy SE, Lingam R, et al. Effectiveness of primary school-based interventions in improving oral health of children in LMICs: a systematic review and meta-analysis. BMC Oral Health. 2022; 22(1): 264.
5. Sobiech P, Olczak-Kowalczyk D, Hosey MT, et al. Vitamin D supplementation, characteristics of mastication, and parent-supervised toothbrushing in prevention of caries in 12-36-month-old children. Nutrients. 2022; 14(20): 4358.
6. Han SY, Chang CL, Wang YL, et al. A narrative review on advancing pediatric oral health: comprehensive strategies for prevention and management. Children. 2025; 12(3): 286.
7. Albino J, Tiwari T. Preventing childhood caries: a review of recent behavioral research. J Dent Res. 2016; 95(1): 35-42.
8. Aldowah O, Assiry AA, Mujallid NF, et al. Assessment of oral health knowledge, literacy, and attitude among schoolteachers towards oral health: a cross-sectional study. BMC Oral Health. 2023; 23(1): 392.
9. Bartan M. The use of storytelling methods by teachers and their effects on children's understanding and attention span. Southeast Asia Early Childhood. 2020; 9(1): 75-84.
10. Mir KJ, Fatima SA, Fatima ST. Impact of dual coding strategy to enhance students' retention of scientific concepts. Ann Hum Soc Sci. 2023; 4(4): 655-66.
11. Kanellopoulou C, Kermanidis KL, Giannakoulopoulos A. The dual-coding and multimedia learning theories: film subtitles as a vocabulary teaching tool. Educ Sci. 2019; 9(3): 210.
12. O'Donnell NH, Erlichman S, Nickerson CG. Health motivation in the influencer era: analyzing entertainment, personal, and social media role models. Health Commun. 2025; 40(3): 405-16.
13. Shruti T, Govindraju HA, Sriranga J. Incorporation of storytelling as a method of oral health education among 3-6-year-old preschool children. Int J Clin Pediatr Dent. 2021; 14(3): 349-53.
14. Sharma S, Saxena S, Naik SN, et al. Comparison between conventional, game-based, and self-made storybook-based oral health education on children's oral hygiene status. Int J Clin Pediatr Dent. 2021; 14(2): 273-8.
15. Ginting D, Woods RM, Barella Y, et al. The effects of digital storytelling on the retention and transferability of student knowledge. Sage Open. 2024; 14(3): 21582440241271267.
16. Hwang GJ, Zou D, Wu YX. Learning by storytelling and critiquing: a peer assessment-enhanced digital storytelling approach. Educ Technol Res Dev. 2023; 71(3): 1079-103.
17. Warman A, Arnetty A, Ifitri I, et al. Effectiveness of storytelling and roleplay in improving oral hygiene knowledge among elementary school students. AcTion: Aceh Nutr J. 2025; 10(3): 774-82.
18. Sarilita E, Putri AK, Faza AG, et al. Oral health education for school children and capacity building in cleft care. Gateways: Int J Community Res Engag. 2023; 16(1).
19. Schwerin J, Lenhart J. The effects of literariness on social-cognitive skills: examining narrative engagement, transportation, and identification. Psychol Aesthet Creat Arts. 2022; 17(6): 700-15.

20. Chen KJ, Gao SS, Duangthip D, et al. Managing early childhood caries for young children in China. Healthcare. 2021; 9(4): 390.
21. Cianetti S, Lombardo G, Lupatelli E, et al. Dental fear/anxiety among children and adolescents: a systematic review. Eur J Paediatr Dent. 2021; 22(1): 3-8.
22. Aljafari A, Gallagher JE, Hosey MT. Can oral health education be delivered to high-caries-risk children using a computer game? Int J Paediatr Dent. 2021; 31(3): 364-72.
23. Marchetti G, Fraiz FC, Nascimento WM, et al. Improving adolescents' periodontal health: evaluation of a mobile oral health app. Int J Paediatr Dent. 2020; 30(1): 28-37.
24. Kteily-Hawa R, Hari S, Soor JK, et al. Paradigm shifts in sexual health: quantitative analysis of story and fact-based health education interventions. Can J Human Sex. 2020; 29(1): 45-56.
25. Ruff RR, Senthi S, Engel R, et al. School-based caries prevention and longitudinal trends in untreated decay. BMC Res Notes. 2022; 15(1): 276.
26. Mishra P, Devi K, Chaturvedi A, et al. Approaches for imparting oral health to special groups: a literature review. Saudi J Oral Dent Res. 2025; 10(1): 79-85.
27. Duijster D, de Jong-Lenters M, Verrips E, et al. Establishing oral health promoting behaviours in children. BMC Oral Health. 2021; 21(1): 123.