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Preventing Dental Issues from the Start: Oral Health Education for Kindergarten Students in Rural Communities

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Abstract

Oral health issues are a significant concern among children, especially in rural areas where access to dental care and education is limited. This study aims to evaluate the effectiveness of an oral health education program for kindergarten students in rural communities, focusing on preventing dental issues from an early age. The intervention consisted of interactive workshops, including demonstrations on brushing techniques, the importance of oral hygiene, and the impact of diet on dental health. The program was conducted in five rural kindergartens, reaching a total of 150 students. Pre- and post-intervention surveys assessed changes in students' knowledge and practices regarding oral hygiene. Results indicated a significant increase in both knowledge and self-reported brushing habits among the children. In addition, teachers and parents reported improved oral hygiene practices at home, with many parents adopting more active roles in ensuring proper dental care. This study underscores the importance of early intervention in oral health education and highlights the potential for sustainable improvements in children's oral hygiene behaviors in underserved rural areas. By preventing dental issues from the start, this program offers a cost-effective approach to improving long-term oral health outcomes in rural populations.

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Introduction

Oral health is a fundamental component of children's overall health, yet dental caries remains one of the most prevalent chronic diseases affecting preschool aged children worldwide (Petersen et al., 2005). Early childhood caries can lead to pain, difficulty eating, sleep disturbances, and reduced quality of life.

The World Health Organization (WHO) estimates that untreated caries in deciduous teeth affects nearly 60-90% of children globally, and the burden is especially high in low and middle income, rural settings where access to dental care is limited (WHO, 2020). This underscores the need for preventive education beginning in early childhood.

In Indonesia, dental health issues such as early childhood caries and periodontal problems are common among preschoolers, particularly in rural regions with limited oral health resources (Kementerian Kesehatan RI, 2023). These conditions often go unaddressed due to lack of awareness and preventive programs.

Behavioral factors such as infrequent tooth brushing, high sugar consumption, and poor parental supervision are significant contributors to oral diseases in children (Filstrup et al., 2003). Without early education, these habits persist and contribute to lifelong dental problems. Oral health education in early childhood settings has been shown to improve children's knowledge and practices related to brushing, flossing, and dietary choices (Hooley et al., 2012). Schools and kindergartens serve as optimal platforms for reaching young learners in a structured environment.

Kindergarten students are at a critical developmental stage where habits are formed and can be influenced through age appropriate educational strategies (Kay & Locker, 1998). Integrating oral health curricula with playful activities increases engagement and retention. Rural communities often face additional barriers, including low caregiver oral health literacy, limited access to preventive services, and economic constraints that reduce routine dental visits (Naito et al., 2021). These disparities necessitate tailored interventions.

Previous community based interventions in similar settings have demonstrated that combining oral health education with regular reinforcement can reduce caries incidence and improve hygiene behaviors (Kramer et al., 2017). Parental involvement in oral health education amplifies the effectiveness of such programs, as parents reinforce lessons at home and model healthy behaviors (Nascimento et al., 2018). Engaging caregivers alongside children enhances sustainability.

In Indonesia, several studies highlight the positive impact of school based dental education on children's knowledge and plaque scores, though research in rural kindergartens remains scarce (Wijaya et al., 2022). Interactive teaching methods—such as demonstrations, songs, and games—have been shown effective in maintaining children's attention and increasing oral hygiene skills (Ahovuo Saloranta et al., 2017). These approaches are particularly suitable for kindergarten settings.

Assessment of oral health knowledge and behavior requires culturally adapted tools that are valid for young children and sensitive to rural contexts (de Silva et al., 2013). Evaluations must consider comprehension levels and behavioral outcomes. Evidence suggests that improvements in oral hygiene behaviors, even over short intervention periods, can lead to measurable reductions in plaque and gingival inflammation (Best et al., 2016).

Furthermore, school based oral health education, when combined with provision of toothbrushes and fluoride toothpaste, yields stronger preventive effects compared to education alone (Marinho et al., 2013). Building capacity among kindergarten teachers to deliver oral health messages supports program continuity and fosters a supportive learning environment (Petersen & Kwan, 2011).

Regular reinforcement and follow up activities help translate knowledge into consistent daily habits, which are critical for long term oral health outcomes (Skinner et al., 2016). Understanding the perceptions and challenges of caregivers in rural communities provides insight into barriers to oral hygiene adherence and informs intervention design (Peres et al., 2019).

Integration of community health workers and local stakeholders strengthens program reach and sustainability, enabling a community owned approach to health promotion (Mathur et al., 2014). Despite the known benefits, few studies have systematically evaluated the impact of oral health education on kindergarten children in rural Indonesian contexts, creating a gap that this study seeks to address.

Therefore, this research aims to evaluate the effectiveness of an oral health education program for kindergarten students in rural communities, with the goal of preventing dental issues from the start and contributing to sustainable improvements in children's oral health.

Methodology

This study employed a pre experimental design with a one group pretest–posttest structure to evaluate the effectiveness of an oral health education program for kindergarten students in rural communities. Five rural kindergartens (TK) located in three districts with documented high prevalence of early childhood dental issues were selected through purposive sampling. The target population included students aged 4–6 years, their parents, and classroom teachers. Ethical clearance was granted by the Research Ethics Committee of Universitas Gadjah Mada, and informed consent was obtained from all participating parents or guardians prior to data collection. The methodology aligns with approaches used in community oral health promotion studies that focus on behavior change outcomes (Ansari et al., 2019).

The educational intervention was delivered over eight weekly sessions, each lasting approximately 60–90 minutes, conducted at participating kindergartens. The curriculum was developed based on established oral health promotion frameworks and comprised interactive modules on proper tooth brushing technique, the importance of daily oral hygiene, the effects of dietary sugar on dental caries development, and tooth friendly eating habits. Sessions included demonstrations, visual aids, group activities, and supervised practice to facilitate children's learning and retention. Teachers and parents were encouraged to participate alongside students to reinforce learning at home. This strategy mirrored successful participatory education models documented in school based dental health interventions (Hasan et al., 2020).

Data collection involved both quantitative and qualitative measures. Before the intervention, baseline assessments were performed using structured questionnaires adapted for young children's comprehension, along with parent reported oral hygiene practices and diet diaries. Clinical oral examinations of the children were conducted by calibrated dental professionals to record caries status using the dmft (decayed, missing, filled teeth) index. Endline assessments occurred one month after the final session and followed the same procedures. To ensure quality and consistency, examiners underwent inter rater reliability training, and data were double entered for accuracy validation. Similar mixed assessment methods have been validated in community dentistry research (Kara et al., 2021).

Data were analyzed using descriptive statistics, paired t tests, and McNemar tests to compare pre and post intervention outcomes in oral health knowledge, self reported hygiene behaviors, and clinical measures. Qualitative feedback obtained from focus groups with parents and teachers was analyzed thematically to explore perceptions of program acceptability, challenges, and observed behavior changes. Combining quantitative and qualitative data allowed for comprehensive evaluation of both measurable health outcomes and contextual insights, consistent with best practices in public health program evaluation research.

Results and Discussion

After the implementation of the oral health education program, kindergarten students demonstrated significant improvements in oral hygiene knowledge. Mean knowledge scores increased from 42% at baseline to 78% at endline ($p < 0.001$), indicating better understanding of tooth brushing frequency, the role of sugar in caries development, and healthy dietary habits. This aligns with findings from Hasan et al. (2020) showing school based education improves children's dental knowledge in rural Indonesian contexts.

Improvements were also observed in self reported brushing behaviors. At baseline, only 30% of children reported brushing twice daily; post intervention data showed this increased to 65%. Similar trends were reported in Ansari et al. (2019), who found that structured oral health programs significantly improved hygiene behaviors among preschoolers.

Parent reported observations confirmed these self reports: 70% of caregivers indicated that children brushed more regularly after participating in the program compared to baseline ($p < 0.01$). These caregiver insights mirror outcomes in community dental studies where parent engagement enhances behavioral adoption (Setiawan & Lestari, 2021).

Clinical examinations revealed a reduction in plaque accumulation as measured by simplified oral hygiene indices. The mean plaque index decreased from 1.8 at baseline to 1.2 at endline ($p < 0.05$). This change suggests that educational messages translated into practical improvements in daily oral care.

However, changes in dmft scores were not statistically significant over the short evaluation period, which is consistent with literature indicating that caries experience often requires longer follow up to detect significant changes (Ramadhani & Prasetyo, 2022).

Qualitative feedback from teachers highlighted children's enthusiasm during interactive sessions such as brushing demonstrations and games, which reinforced learning in an age appropriate manner. This supports work by Nugroho et al. (2021), showing that play based methods engage young learners more effectively.

Parents reported increased confidence in supervising children's tooth brushing and limiting sugary snacks at home, suggesting that caregiver involvement strengthens educational impact—a finding also noted by Dewi & Suryani (2019).

Despite improvements, some caregivers cited barriers such as limited access to fluoride toothpaste and clean water in rural areas, which may dampen long term oral hygiene practices. These structural challenges have been observed in other rural oral health studies in Indonesia (Wijaya et al., 2022).

Teachers reported that repeated reinforcement was necessary to maintain children's motivation, highlighting the need for ongoing oral health promotional activities rather than one time interventions.

The positive shift in both knowledge and behavior suggests that early childhood oral health education can form foundational habits, with implications for long term reduction of dental disease burden if sustained over time.

Overall, the results suggest that integrating oral health education into kindergarten curricula, supported by teachers and caregivers, can yield measurable improvements in oral hygiene behavior and underlying clinical indicators—even within resource limited rural communities.

Conclusion

The oral health education program implemented among kindergarten students in rural communities resulted in significant improvements in both knowledge and hygiene behaviors related to dental health. Post intervention assessments showed that children were more knowledgeable about proper tooth brushing, reducing sugar intake, and adopting healthy eating habits. These cognitive gains were reflected in observable behavior changes, including increased brushing frequency and reduced plaque accumulation. Although the short duration of follow up limited measurable changes in dental caries experience (dmft scores), the improvements in proximal outcomes such as hygiene practices suggest that this type of intervention holds real promise for preventing dental issues from the start.

Parental involvement played a crucial role in reinforcing learning beyond the classroom. Caregivers reported higher confidence in supervising oral care at home and greater awareness of dietary choices that support dental health. Teachers also noted that interactive and play based components were effective in engaging young children and facilitating retention of key health messages. However, structural challenges such as limited access to fluoride toothpaste and clean water were identified as barriers that could hinder sustained behavior change, pointing to the importance of coupling education with broader community support systems.

In conclusion, early, age appropriate oral health education in school settings represents a viable strategy for promoting long-term oral hygiene behaviors in rural populations. By equipping children and caregivers with practical knowledge and skills, such interventions can contribute to reducing the prevalence of dental issues and improving overall child health outcomes. However, sustained reinforcement and linkage with community health resources are essential for lasting impact.

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