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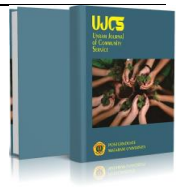

"JURUS SAKTI" Dental Caries Prevention Education Program: A One-Group Pre-Test Post-Test Study on Knowledge Improvement Among Vocational School Adolescents in Batang, Indonesia

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Abstract: Widespread daily toothbrushing, Indonesian adolescents continue to demonstrate poor preventive practice, reflecting a critical knowledge-practice gap. This study evaluated the effectiveness of the "JURUS SAKTI" structured caries prevention education program on knowledge among students of SMK Al-Sya'iriyah, Limpung, Batang. A one-group pre-test post-test quasi-experimental design was employed with 32 participants (10 males, 22 females). The JURUS SAKTI program comprised four interactive modules covering correct toothbrushing technique, sugar consumption awareness, fluoride use, and the importance of routine dental visits. Knowledge was assessed using a structured questionnaire administered before and immediately after the intervention. Data were analyzed using the Wilcoxon Signed Ranks Test. Results showed a statistically significant improvement in mean knowledge scores from 51.56 (±10.66) pre-intervention to 79.69 (±10.70) post-intervention ($Z = -4.946$, $p < .001$), with a large effect size ($r = 0.874$). Knowledge categorization revealed a complete transformation: participants classified as "Good" increased from 0% to 65.6%, while none remained in the "Poor" category post-intervention. The JURUS SAKTI program is an effective, practical, and replicable model for caries prevention education in community settings.

Keywords: Caries Prevention, Dental Health Education, Adolescents, Knowledge, Community Service.

Introduction

Dental caries is consistently ranked among the most prevalent non-communicable diseases globally. Untreated caries of permanent teeth affects approximately 2.3 billion people worldwide, while untreated caries of primary teeth affects an estimated 530 million children (Peres et al., 2019). Although dental caries is largely preventable through evidence-based behavioral and environmental strategies, it persists as a major public health burden, causing pain, reduced quality of life, and substantial economic costs, particularly in low- and middle-income countries (Peres et al., 2019; World Health Organization, 2022).

From an etiological standpoint, dental caries is a biofilm-mediated, sugar-driven, multifactorial disease in which fermentable carbohydrates fuel acid production by cariogenic bacteria, resulting in repeated cycles of enamel demineralization (Pitts et al., 2017). The condition is therefore highly responsive to preventive interventions targeting its principal risk factors: inadequate plaque removal, excessive sugar consumption frequency, insufficient fluoride exposure, and infrequent professional dental monitoring (Pitts et al., 2017).

In Indonesia, a striking paradox is documented in the 2018 National Basic Health Research (Riskesdas). While 94.7% of the population aged 10 years and above reported brushing their teeth daily, only 2.8% did so at the two clinically critical times: after breakfast and before bedtime (Kemenkes, 2018). This disparity illustrates that behavioral frequency alone is insufficient

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for effective caries prevention. The underlying problem is a knowledge-practice gap: individuals perform the ritual of toothbrushing without understanding its correct technique, optimal timing, or the broader pillars of prevention such as fluoride use, dietary sugar control, and professional dental care.

Adolescents represent a particularly vulnerable population. Typical teenage lifestyle patterns, including frequent consumption of sugary snacks and sweetened beverages, create favorable conditions for cariogenic bacteria (Dimopoulou et al., 2023; Pitts et al., 2017). Studies from Indonesia have consistently reported low levels of oral health knowledge and practice among adolescents (Mardianti et al., 2018; Misrohmasari et al., 2025), and students at vocational schools (Sekolah Menengah Kejuruan, SMK) in semi-urban settings face additional barriers related to limited access to preventive dental information.

Community service programs embedded in academic and healthcare institutions have demonstrated effectiveness as vehicles for oral health promotion. Firdausy et al., 2025 reported a significant improvement in knowledge following an oral health education program at the community level, with mean pre-test and post-test scores of 42.07 and 71.38, respectively ($p < .001$). Meta-analytic evidence further supports the effectiveness of dental health education in improving knowledge, attitudes, and behavior among adolescents (Gurav et al., 2022; Narulita & Aprilianto, 2022). However, published studies in Indonesia predominantly target elementary school children or elderly populations, leaving vocational school adolescents as an understudied subgroup.

To address this gap, the JURUS SAKTI (Jaga Rutinitas, Sikat Gigi Akurat, Kurangi Gula, Tuntaskan dengan Fluoride, dan Inspeksi) program was developed as a structured, evidence-informed, and mnemonically organized educational intervention. The present study aimed to evaluate the effectiveness of this program in improving dental caries prevention knowledge among students of SMK Al-Sya'iriyah, Limpung, Batang, and to examine the relationship between baseline knowledge and the magnitude of post-intervention knowledge gains.

Method

This study employed a one-group pre-test post-test quasi-experimental design, which is appropriate for evaluating the educational impact of a structured intervention in a community service context where a control group would be ethically difficult to justify. The program was conducted at SMK Al-Sya'iriyah, located in Limpung, Batang Regency, Central Java, Indonesia, in July 2025.

Participants

A total of 32 students participated using total sampling, comprising 10 males (31.2%) and 22 females (68.8%). Inclusion criteria were: (1) active enrollment as a student at SMK Al-Sya'iriyah, and (2) willingness to participate and complete both the pre-test and post-test. No participant withdrew from the study, yielding a complete dataset with no missing values (N = 32).

Intervention

The JURUS SAKTI program was delivered in a single structured session and comprised four sequential educational modules:

- Module 1 (SIKAT GIGI AKURAT): Demonstration of effective toothbrushing using an oversized dental model, emphasizing the Modified Bass method, a brushing duration of two minutes, and the two critical brushing times: after breakfast and before bedtime.
- Module 2 (KURANGI GULA): An interactive session on the cariogenic role of dietary sugar, including identification of hidden sugars in commonly consumed foods and beverages, and the principle that frequency of sugar exposure drives caries risk more than total quantity (Moynihan & Petersen, 2004).
- Module 3 (FLUORIDE & FLOSS): An evidence-based explanation of fluoride's mechanism in enamel remineralization and its role in caries prevention (Marinho et al., 2003), along with a practical demonstration of dental floss use for interproximal plaque removal.
- Module 4 (INSPEKSI RUTIN): Education aimed at repositioning the dental visit from a curative to a preventive experience, emphasizing early caries detection, professional scaling, and the application of preventive procedures such as fissure sealants.

Instrument and Data Collection

Knowledge was assessed using a structured questionnaire covering all four content areas of the JURUS SAKTI program. The questionnaire was administered as a pre-test prior to the intervention and as a post-test immediately following its completion. Scores were expressed on a scale of 0 to 100. Knowledge levels were categorized based on Notoadmojo, 2016 framework, which is widely used in Indonesian health research: Good ≥80; Moderate 60–79; Poor <60.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics version 25. Normality of pre-test and post-test score distributions was assessed using the Shapiro-Wilk test, which is recommended for samples smaller than 50. Because both distributions violated the

normality assumption, the Wilcoxon Signed Ranks Test was used to evaluate the statistical significance of pre-post score differences. Effect size was calculated as $r = |Z| / \sqrt{N}$, where $r \geq 0.10$ is considered small, $r \geq 0.30$ medium, and $r \geq 0.50$ large (Cohen, 2013). Spearman rank correlation (rs) was used to examine the relationship between baseline knowledge scores and the magnitude of individual improvement (delta score = post-test minus pre-test). The significance threshold was $p < .05$ for all tests.

Result and Discussion

Participant Characteristics

A total of 32 vocational school students participated in the study, with female students comprising the majority (68.8%, n = 22) compared to male students (31.2%, n = 10). This gender composition reflects the enrollment profile of the participating class. Research on oral health knowledge and practice among Indonesian adolescents has similarly reported higher female representation in school-based health education programs (Misrohmasari et al., 2025; Sinaredi et al., 2023).

Pre-Test and Post-Test Knowledge Scores

Descriptive statistics for pre-test and post-test knowledge scores are presented in Table 1. Prior to the JURUS SAKTI intervention, participants demonstrated notably limited caries prevention knowledge, with a mean pre-test score of 51.56 (SD = 10.66) and a median of 52.50. Individual scores ranged from 35 to 70, and no participant scored above 70. Following the program, the mean post-test score increased substantially to 79.69 (SD = 10.70), representing a mean absolute improvement of 28.12 points and a relative improvement of approximately 60.1% above baseline.

Figure 1. Educational presentation session

Table 1. Descriptive Statistics of Pre-Test and Post-Test Knowledge Scores (N = 32)

Parameter	Pre-Test	Post-Test
Mean	51.56	79.69
Standard Deviation	10.66	10.70
Median	52.50	80.00
Minimum	35	60
Maximum	70	95
95% CI Lower Bound	47.72	75.83
95% CI Upper Bound	55.41	83.54
Mean improvement	—	+28.12 pts (+60.1%)

Knowledge Categorization

Table 2 presents the distribution of participants across knowledge categories before and after the intervention. Prior to the program, 75.0% of participants (n = 24) fell in the Poor category (score <60), and 25.0% (n = 8) in the Moderate category (60–79). Notably, no participant reached the Good category (≥80) before the intervention. After the JURUS SAKTI program, the Poor category was entirely eliminated. Post-intervention, 34.4% (n = 11) were classified as Moderate and 65.6% (n = 21) as Good. In addition, the proportion of students achieving a passing score of ≥70 rose from 12.5% (n = 4) to 81.2% (n = 26).

Table 2. Knowledge Category Distribution Before and After the Intervention (N = 32)

Category (Score Range)	Pre-Test n (%)	Post-Test n (%)
Poor (<60)	24 (75.0%)	0 (0.0%)
Moderate (60–79)	8 (25.0%)	11 (34.4%)
Good (≥80)	0 (0.0%)	21 (65.6%)
Scored ≥70 (passing threshold)	4 (12.5%)	26 (81.2%)

Normality Testing

The Shapiro-Wilk test confirmed that neither pre-test ($W = 0.920$, $df = 32$, $p = .021$) nor post-test ($W = 0.887$, $df = 32$, $p = .003$) scores were normally distributed. These results justified the use of a non-parametric statistical test for comparative analysis.

Wilcoxon Signed Ranks Test and Effect Size

The Wilcoxon Signed Ranks Test revealed a statistically significant improvement in knowledge scores following the intervention ($Z = -4.946$, $p < .001$). All 32 participants (100%) demonstrated positive ranks, indicating that every participant scored higher on the post-test than on the pre-test, with no negative ranks and no tied scores. The effect size was $r = |-4.946| / \sqrt{32} = 0.874$, which falls in the large category according to Cohen, 2013. Results are summarized in Table 3.

Table 3. Wilcoxon Signed Ranks Test Results

	N	Mean Rank	Sum of Ranks
Positive ranks (post>pre)	32	16.50	528.00
Negative ranks (Post<Pre)	0	-	-
Ties	0	-	-
Z statistic	-4.946	-	-
p-value (2-tailed)	<.001	-	-
Effect size (r)	0.874 (large)	-	-

Correlation Between Baseline Knowledge and Improvement

Spearman rank correlation revealed a significant negative association between pre-test scores and delta scores ($r_s = -0.621$, $p < .001$), indicating that participants who entered the program with lower baseline knowledge experienced greater absolute knowledge gains. This pattern suggests that the JURUS SAKTI program was most impactful precisely for those with the highest knowledge deficits.

Figure 2. All participants received dental hygiene products as souvenirs

Discussion

The findings of this study provide robust evidence that the JURUS SAKTI program significantly improved dental caries prevention knowledge among vocational school adolescents. The statistically significant pre-to-post improvement ($p < .001$) and the large effect size ($r = 0.874$) collectively demonstrate that the program produced not only statistically meaningful but also practically significant gains. The latter point is particularly important: in health education research, effect size quantifies the proportion of variance in outcomes attributable to the intervention, and an r value of 0.874 indicates that the JURUS SAKTI program accounts for a substantial portion of the observed knowledge change. This result is especially notable given the program's single-session delivery format (Narulita & Aprilianto, 2022).

The categorical transformation observed, from 75.0% of participants in the Poor category pre-intervention to 65.6% in the Good category post-intervention, with complete elimination of the Poor category, represents a clinically and educationally meaningful outcome. The proportion of participants achieving a passing threshold of ≥70 rose from 12.5% to 81.2%, suggesting that the large majority of participants crossed a meaningful competency benchmark following the program. These findings are consistent with comparable community oral health education programs conducted in Indonesia. Firdausy et al., 2025 reported a similar trajectory, with pre-test and post-test means of 42.07 and 71.38 ($p < .001$), in an outreach education program on aesthetic dental filling materials, reinforcing the effectiveness of this structured educational approach across different oral health topics.

The four-module structure of JURUS SAKTI directly addresses each principal caries risk factor. The emphasis on brushing technique and timing directly targets the knowledge-practice gap described in Riskesdas 2018 (Kemenkes, 2018): while 94.7% of Indonesians brush daily, only 2.8% do so at clinically effective times. The sugar awareness module addresses the frequency-driven nature of caries risk (Dimopoulou et al., 2023). The fluoride module equips participants with an understanding of enamel remineralization, building on strong Cochrane evidence that fluoride toothpaste use substantially reduces caries incidence. The fourth module challenges the "dentist only when in pain" paradigm, which is a deeply entrenched barrier to preventive care-seeking in Indonesia and a documented contributor to high treatment burden (Peres et al., 2019; World Health Organization, 2022).

The significant negative correlation between pre-test scores and improvement ($r_s = -0.621$, $p < .001$) adds an equity dimension to the program's effectiveness. Students who began with the lowest knowledge levels gained the most from the intervention, suggesting that JURUS SAKTI functions not merely as a reinforcement tool for students who already have a knowledge foundation, but as a genuinely transformative program for the most educationally underserved participants. This aligns with the meta-analytic literature on dental health education effectiveness in adolescents, which consistently finds that structured, multimodal programs outperform passive information delivery (Gurav et al., 2022; Narulita & Aprilianto, 2022; Sinaredi et al., 2023).

Several limitations should be acknowledged. First, the one-group pre-test post-test design does not permit causal inference due to the absence of a concurrent control group. Test-retest effects, where participants perform better on the post-test due to familiarity with the questionnaire items rather than genuine knowledge gain, cannot be entirely excluded. Second, the post-test was administered immediately after the intervention, so the durability of knowledge gains over time remains unknown. Future studies should incorporate follow-up assessments at 1 to 3 months post-intervention. Third,

the small single-school sample (N = 32) limits the generalizability of findings to other adolescent populations in Indonesia. Fourth, the study measured knowledge only; whether improved knowledge translates into changed preventive behavior (toothbrushing technique, dietary practice, dental visit attendance) was not assessed and warrants investigation in longitudinal follow-up research.

Conclusion

The JURUS SAKTI community dental health education program was highly effective in improving caries prevention knowledge among students of SMK Al-Sya'iriyah, Limpung, Batang. A statistically significant pre-to-post improvement was demonstrated (pre-test mean 51.56; post-test mean 79.69; $Z = -4.946$, $p < .001$; effect size $r = 0.874$). Knowledge categorization showed a complete transformation, with the proportion of participants in the Good category increasing from 0% to 65.6%, and the Poor category entirely eliminated. The program demonstrated particular effectiveness for participants with the lowest baseline knowledge ($rs = -0.621$, $p < .001$). These findings support JURUS SAKTI as a practical, scalable, and evidence-based model for adolescent dental caries prevention education in community and school settings. Future research should assess the long-term retention of knowledge gains and examine behavioral outcomes to determine whether knowledge improvement translates into measurable changes in preventive oral health practice.

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References

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. routledge.

Dimopoulou, M., Antoniadou, M., Amargianitakis, M., Gortzi, O., Androutsos, O., & Varzakas, T. (2023). Nutritional Factors Associated with Dental Caries across the Lifespan: A Review. *Applied Sciences*, *13*(24), 13254.

Firdausy, M. D., Wardhana, E. S., & Hadianto, E. (2025). Program Edukasi tentang Pengenalan Bahan Tumpatan Estetik dalam Kedokteran Gigi kepada Masyarakat Kelurahan kaligawe. *PengabdianMu: Jurnal Ilmiah Pengabdian Kepada Masyarakat*, *10*(3), 796–800.

Gurav, K. M., Shetty, V., Vinay, V., Bhor, K., Jain, C., & Divekar, P. (2022). Effectiveness of Oral Health Educational Methods among School Children Aged 5–16 Years in Improving their Oral Health Status: A Meta-analysis. *International Journal of Clinical Pediatric Dentistry*, *15*(3), 338–349. https://doi.org/10.5005/jp-journals-10005-2395

Kemenkes, R. I. (2018). Hasil utama RISKESDAS 2018. *Online) Http://Www. Depkes. Go. Id/Resources/Download/Info-Terkini/Materi_rakorpop_2018/Hasil% 20Riskesdas*, *202018*.

Mardianti, F. T., Rahma, A., Ridho, F. M., Setyawan, A. P., Santoso, N. U., Salma, N., & Ramadhani, A. (2018). Level of oral and dental health knowledge in adolescents age 16-22 years old in East Java. *Prevalence*, *1*, 3.

Misrohmasari, E., Dwiatmoko, S., Tyas, A., Handayani, A., & Setyorini, D. (2025). Factors related to oral health knowledge, attitude, and practice among adolescent in Jember, Indonesia: a cross-sectional study. *Journal of Oral Research*, *14*(1), 14–26.

Narulita, D., & Aprilianto, D. (2022). Meta-Analysis Study: Is Dental Health Education Effective to Improve Knowledge, Attitude, and Behavior in Adolescents? *Journal of Health Promotion and Behavior*, *7*(3), 197–207. https://doi.org/10.26911/thejhpb.2022.07.03.03

Notoadmojo, S. (2016). *Promosi Kesehatan dan Ilmu Perilaku, Rineka Cipta*. Jakarta.

Peres, M. A., Macpherson, L. M. D., Weyant, R. J., Daly, B., Venturelli, R., Mathur, M. R., Listl, S., Celeste, R. K., Guarnizo-Herreño, C. C., Kearns, C., Benzian, H., Allison, P., & Watt, R. G. (2019). Oral diseases: a global public health challenge. *The Lancet*, *394*(10194), 249–260.

Pitts, N. B., Zero, D. T., Marsh, P. D., Ekstrand, K., Weintraub, J. A., Ramos-Gomez, F., Tagami, J., Twetman, S., Tsakos, G., & Ismail, A. (2017). Dental caries. *Nature Reviews Disease Primers*, *3*(1), 17030. https://doi.org/10.1038/nrdp.2017.30

Sinaredi, B. R., Bramantoro, T., Firmansyah, F. F., Cahyaningtyas, C. P., & Firdausi, N. L. (2023). Development of an Illustrated Module for Dental Health Education Enhancement in Islamic Boarding Schools. *Indonesian Journal of Dental Medicine*, *6*(1), 24–26. https://doi.org/10.20473/ijdm.v6i1.2023.24-26

World Health Organization. (2022). *Global oral health status report: towards universal health coverage for oral health by 2030*. https://www.who.int/publications/i/item/9789240061484