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DIFFERENCES BETWEEN BANNER AND LEAFLET EDUCATION IN STUDENTS' ORAL HEALTH KNOWLEDGE: CROSS-SECTIONAL STUDY

PERBEDAAN PENYULUHAN DENGAN BANNER DAN LEAFLET TERHADAP PENGETAHUAN KESEHATAN GIGI SISWA: PENELITIAN CROSS-SECTIONAL

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A B S T R A C T

Background: *The prevalence of dental caries in children in Banyumas Regency is increasing. Karanglewas Public Health Centre is the only Health Center in Banyumas Regency that regularly performs periodic examinations in nearby primary schools. However, some schools still report a high prevalence of dental caries, reaching approximately 91.3% at SDN 1 and 2 Tamansari. Improving knowledge through oral health counseling is essential, banners and leaflets provide engaging educational overviews, which are suitable for children aged 7 to 8 years old.* ***Purpose:*** *To compare the effectiveness of banner-based and leaflet-based counseling in improving oral health knowledge among second-grade students at SDN 1 and 2 Tamansari.* ***Method:*** *This cross-sectional study used a pre-experimental, pre-post test design. This research used total sampling. 71 students participated classified into 32 in the banner counseling group and 39 in the leaflet counseling group. The Wilcoxon test analyzed knowledge score changes in the leaflet group and the Paired-T test in the banner group. An Independent-T test compared both media.* ***Result:*** *Knowledge improved significantly from pre-to post-counseling in both groups (p-value < 0.05). The increase in knowledge scores also differed significantly between the two media (p-value < 0.05), with the leaflet group showing a greater increase (37.54 ± 17.35) than the banner group (12.13 ± 6.22).* ***Conclusion:*** *Both media improved students' oral health knowledge, but leaflets were more effective than banners.*

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A B S T R A K

Latar belakang: Prevalensi karies anak-anak di Kabupaten Banyumas, Jawa Tengah, mengalami peningkatan. Puskesmas Karanglewas merupakan satu-satunya puskesmas di Kabupaten Banyumas yang secara rutin melakukan pemeriksaan berkala pada siswa SD di sekitarnya, namun masih ada beberapa diantaranya yang memiliki prevalensi karies tinggi mencapai 91,3% (SDN 1 dan 2 Tamansari). Penyuluhan mengenai karies gigi perlu dilakukan, media *banner* dan *leaflet* memberikan pemahaman menarik bagi anak usia 7 hingga 8 tahun. **Tujuan:** Untuk mengevaluasi dan membandingkan efektivitas intervensi edukasi berbasis *banner* dan *leaflet* dalam meningkatkan pengetahuan kesehatan mulut siswa kelas dua di SD Negeri 1 dan SD Negeri 2 Tamansari. **Metode:** Desain penelitian menggunakan *cross-sectional* dengan pre-eksperimental *pre-post test*. Metode sampling dengan total sampling melibatkan seluruh siswa kelas 2 sebanyak 71 siswa (32 kelompok penyuluhan dengan *banner* dan 39 siswa dengan *leaflet*). Uji Wilcoxon digunakan untuk menganalisis skor pengetahuan penyuluhan menggunakan *leaflet*, sementara Uji T berpasangan digunakan untuk menganalisis skor pengetahuan dengan media *banner*. Uji T independen digunakan untuk membandingkan pengaruh kedua media tersebut terhadap pengetahuan siswa. **Hasil:** Terdapat perbedaan signifikan pengetahuan siswa sebelum maupun setelah penyuluhan baik menggunakan media *banner* maupun *leaflet* (*p-value* < 0.05). Terdapat perbedaan yang signifikan peningkatan skor pengetahuan antara penyuluhan dengan media *leaflet* maupun *banner* (*p-value* < 0.05), dimana skor peningkatan pengetahun penyuluhan dengan *leaflet* lebih tinggi (37.54 ± 17.35) dibandingkan *banner* (12.13 ± 6.22).**Kesimpulan:** Penyuluhan menggunakan media *banner* dan *leaflet* meningkatkan skor pengetahuan tentang kesehatan gigi mulut, namun penyuluhan dengan media *leaflet* lebih efektif dibandingkan *banner*.

Kata kunci:
Banner, *Leaflet*, Pengetahuan kesehatan gigi dan mulut

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INTRODUCTION

Dental caries is a chronic condition that can lead to irreversible damage, significantly affecting children's overall health and quality of life. Untreated caries may progress to tooth loss, which will subsequently have an impact on one's ability to chew, speak, and perform daily activities. Food consumption, oral hygiene practices, and tooth health all contribute to the development of dental caries (Norfai and Rahman, 2017). Good dietary behaviour is associated with lower caries experience (Virkkala *et al*., 2022). Toothbrushing habits and dental caries have been found to be significantly correlated (Utami *et al*., 2023).

Dental caries is the most prevalent dental health issue among children. According to the Agency for Health Research and Development (2018), 73.4% of elementary school-aged children in Central Java province had dental caries, and 57% of the population there experienced dental and oral health issues. In Banyumas Regency, the caries prevalence among children aged 5 - 9 years was 53.51%, and only 2.49% of affected teeth had been treated with fillings (Ministry of Health, 2019). According to Outpatient Pain Data at the Karanglewas Public Health Center, Banyumas Regency, Central Java Province in 2017, 274 children experienced caries, comprising 143 girls and 131 boys. In 2018, the number increased to 288 children, consisting of 170 girls and 118 boys.

One of the main health facilities that actively conducts periodic examinations and counseling every three months in Banyumas Regency is the Karanglewas Public Health Center. A dental and oral health issue, specifically the high incidence rate of caries among elementary school students, has been identified at the Karanglewas Public Health Center based on information from secondary data and interviews with dentists, midwives, and mothers in these areas. Through a fish-bone analysis examining the environment, processes, facilities and infrastructure, and human resources, researchers identified that the root cause of this issue was a lack of dental and oral health education. At the Karanglewas Public Health Center service area, Tamansari State Elementary School (SDN) 1 and 2 reported a particularly high caries prevalence of 91.3% in 2022, despite routine dental examinations.

The cognitive (knowledge) domain is fundamental to the development of behaviour and everyday functioning (Lossu *et al*., 2015). The essential developmental period for knowledge and thinking occurs between the ages of 7 to 8. At this age, children are significantly developing both cognitively and emotionally (Daud *et al*., 2021). Often retain a fantasy-based worldview, making visual counseling media particularly appropriate for use. Early intervention can shape children's thinking and autonomy fostering, positive habits for the future (Almujadi and Taadi, 2017). Children's dental and oral health education is crucial at this age, in which permanent teeth have erupted, and the jawbone is still developing. The prevention of dental and oral issues that may affect general health requires a correct understanding of proper dental care, healthy eating habits, and the importance of maintaining oral hygiene (Noviasari, 2022). It is recommended that dental health providers and educators collaborate to promote students' knowledge of the importance of dental and oral hygiene, with an emphasis on proper tooth brushing techniques (Fatim and Suwanti, 2017; Utami *et al*., 2023).

This research used school-based promotional materials, like banners and leaflets, which represent an alternative strategy for teaching dental and oral health to second-grade elementary school students. Banners with simple graphics and text can capture children's attention and help them retain dental health-related information (Noviasari, 2022). Banners are perfect for reiterating important messages since they serve as large-scale visual reminders in public areas. The banner's visual elements help kids remember and retain the information that is being given (Hasanica *et al*., 2020).

A leaflet is a folded sheet that contains text, images, or both to convey information. When used as educational media or visual aids, leaflets can enhance learning outcomes compared to studying without any media because they are portable and can be reviewed at home, leaflets serve as valuable information sources for both children and parents (Mona and Azalea, 2018). Research also indicates that leaflets serve as an effective educational tool for enhancing both oral health knowledge and clinical oral hygiene indicators among children, making them suitable for school-based oral health education programs (Al Bardaweel and Dashash, 2018).

Other educational media, such as interactive whiteboards, mobile apps, and films should be taken into consideration. However, they may be less practical or cost-effective than leaflets and banners. Furthermore, many schools might not have access to the costly equipment, reliable electrical supply, or technological infrastructure that these alternative media frequently demand. By contrast, tangible items, such as banners and brochures, are easily updated or changed as necessary and are not affected by technical issues. Although numerous studies have shown how successful different forms of instructional media are at promoting health, comparative studies that particularly look at the relative efficacy of banners versus leaflets in oral health education are noticeably lacking. Clarifying their relative effectiveness is essential for optimizing resource allocation in school-based health promotion program. (Abdulrahaman *et al*., 2020; Hasanica *et al*., 2020).

This cross-sectional study evaluates and compares the effectiveness of banner-based and leaflet-based educational interventions in improving oral health

knowledge among second-grade students at State Elementary Schools 1 and 2 Tamansari. This research seeks to identify the more effective tool for oral health education in elementary school settings by assessing students' knowledge levels after exposure to these different educational media. The findings will contribute to evidence-based decisions in selecting appropriate educational media for school-based oral health promotion programs.

MATERIAL AND METHOD

This cross-sectional, quantitative pre-experimental pretest-posttest study was conducted at SDN 1 and 2 Tamansari, Tamansari Village, Karanglewas District, Banyumas Regency, after obtaining permission from the school and the Karanglewas Subdistrict Education Coordinator (Korwileam Dindik). The selection of SDN 1 and 2 Tamansari was based on the description in the introduction, as the student respondents shared similar characteristics, such as geographic location, social environment, educational level, and place of residence. A total of 71 students aged 7 to 8 years from grades 2 at SDN 1 and 2 Tamansari were selected using the total sampling approach to determine which school would receive the banner intervention and the leaflet intervention, a random allocation was conducted using a simple lottery method. Of these, 32 students from Tamansari 2 State Elementary School get counseling with leaflet media, and 39 students from Tamansari 1 State Elementary School get counseling through banner media.

Informed consent forms were sent home for completion by parents or guardians before the study began. Students who attended a counseling session and remained until its completion met the inclusion criteria for the study, while those who did not attend or refused to participate were excluded. Primary data for this study were collected through the researchers' own research and observational methods. Secondary data were obtained from related institutions, specifically dentists and dental nurses at the Karanglewas Health Primary Center and Tamansari 1 and 2 State Elementary Schools.

Prioritization of the issues underlying the high prevalence of caries in the two elementary schools was conducted, and the top issues were then scored using the Delbeque method with assistance from dental professionals at the Public Health Centre. These issues would serve as the foundation for questionnaires, counseling materials and media (Ningsih *et al*., 2018). The analysis findings yielded five priority problem points with the highest scores, including knowledge of healthy teeth and cavities, proper brushing technique and timing, foods and beverages that can harm teeth, foods and beverages that are good for teeth, and knowledge of good eating habits. There are numerous approaches to addressing this issue, one of which is intervention through counseling.

A pre-test was first administered, to measure the respondents' level of dental and oral health knowledge. The treatment groups were then given counseling using a leaflet or banner, and a post-test was subsequently administered. The study employed an identical 25-item questionnaire for both pre-test and post-test measurements, each of which had undergone validity and reliability testing to ensure consistency in data collection. Using the same questionnaire for both measurements allowed for direct comparison of changes in responses and minimized potential instrument-related variations in the results. Each correct response was worth 4 points, while an incorrect response was worth 0 for comparing the impact on students' knowledge before and after counseling. The banner media counseling group was analyzed using the Paired-T test because the data were normally distributed, while the leaflet media counseling group used the Wilcoxon test since the data were not normally distributed. The effects of the two media on student knowledge were examined by comparing the differences between the pre-test and post-test findings using the Independent-T test, a parametric test for normally distributed data (Dahlan, 2020).

RESULT

Based on the data (Figure 1), a total of 71 students from State Elementary Schools 1 and 2 Tamansari participated in the study. Of these students, 54.93% were male and 45.07% were female. These percentages indicate an almost equal ratio between male and female students.

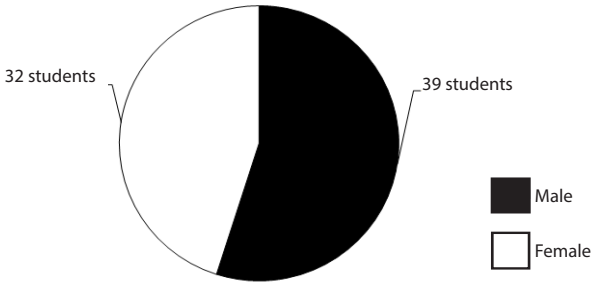

Figure 1. The gender distribution among Grade 2 students at State Elementary School (SDN) 1 and 2 Tamansari

Three categories were used to classify the overall knowledge scores: (1) Good (more than 75%), (2) Sufficient (between 51 and 75%), and (3) Low (less than 50%) (Baig *et al*., 2020). The majority of students had low knowledge levels prior to receiving counseling through banner or leaflet media, and students with good knowledge levels were the least numerous, as shown in Table 1. The students' knowledge level increased following counseling with banners and leaflets. The data shows that most students achieved a good level of understanding following counseling. A few students demonstrated sufficient knowledge, and none of the students remained at a low knowledge level after counseling.

Table 2 demonstrates that there was a significant improvement in oral health knowledge among second-grade students at SDN Tamansari 1 and 2. All students who received counseling through banner and leaflet media achieved a good level of knowledge.

According to Table 2, students' average knowledge before counseling with banner media was rated as sufficient. The findings of the oral health knowledge questionnaires demonstrate a substantial difference before and after counseling using banner media. The knowledge value increased by 16.67% to reach the good category, with a significant value of <0.01 (p-value < 0.05). In the counseling group using leaflet distribution, analyzed through the Wilcoxon test, the median values in the table indicate that knowledge levels were lower before the intervention, but increased to a good category after the intervention. The results of the oral health knowledge questionnaires before and after counseling through leaflet media showed significant changes, with a significance value of <0.01 (p-value < 0.05).

Based on Table 3, which compares the mean score differences between pre-test and post-test of students' knowledge in both counseling groups (using banners and leaflet media), the Independent-T test revealed a p-value of < 0.01 (p-value < 0.05). This result indicates a significant difference in oral health knowledge between the two groups of second-grade students at SDN Tamansari 1 and 2. The group receiving counseling through leaflet media showed a greater improvement in knowledge, as demonstrated by the larger difference between their pre-test and post-test scores compared to the banner media group.

Table 1. Degree of oral health knowledge among Grade 2 students at Tamansari State Elementary School (SDN) 1 and 2 based on scores taken before and after counseling utilizing banner and leaflet

Degree of knowledge	Number of students	
	Pre-test	Post-test
Low	26	0
Sufficient	25	13
Good	20	58

Table 2. Difference of mean ± standard deviation and median value (minimum-maximum) of oral health knowledge before and after counseling using banner media (Paired-T test) and leaflet (Wilcoxon test) among second-grade students of Tamansari State Elementary School (SDN) 1 and 2

	n	Pre-test (Mean ± SD) / (Median (Min-Max))	Post-test (Mean ± SD)/ (Median (Min-Max))	Increased Knowledge (%)	p-value
Banner	32	72.75 ± 10.43	84.88 ± 11.07	16.67	< 0.01
Leaflet	39	44 (28 - 84)	92 (56 - 100)	109	< 0.01

n = number of respondents, P = significance value, SD = Standard of Deviation, Min - Max = Minimum - Maximum value

Table 3. Difference in mean ± standard deviation of knowledge of oral health knowledge enhancement between counseling using banner media and leaflet (Independent-T test) among second-grade students of Tamansari State Elementary School (SDN) 1 and 2

	n	Mean ± SD	p-value
Banner	32	12.13 ± 6.22	<0.01
Leaflet	39	37.54 ± 17.35	

n = number of respondents, P = significance value, SD = Standard of Deviation, Min - Max = Minimum - Maximum value

DISCUSSION

Our study demonstrates significant improvements in oral health knowledge among elementary school students following educational interventions using banners and leaflet media. The study population comprised 71 second-grade students with a relatively balanced gender distribution (54.93% male and 45.07% female). Darsini *et al*. (2019) suggest that male and female brains process information differently, with females demonstrating superior abilities in information absorption and connecting memories to social contexts, while males excel in motor skills and hand-eye coordination. Methodological limitations prevented gender-specific controls in our study. The balanced gender distribution in our sample ensures adequate representation of both groups. This demographic balance strengthens the generalizability of our findings across gender groups despite the potential differences in information processing between male and female students.

The pre-test results revealed a notable baseline difference: the banner group showed notably higher baseline knowledge (72.75 ± 10.43) compared to the leaflet group (median 44, range 28 - 84). Initial knowledge categorization showed that most students had low knowledge levels, followed by sufficient levels, with the least number having good knowledge. These baseline differences may result from several factors: variations in random assignment, possible prior exposure to dental health information, and demographic heterogeneity between groups (Mohan *et al*., 2024; Opoku *et al*., 2024). In our analysis, this initial disparity potentially influenced the intervention's effectiveness measurement, as higher baseline scores might limit the potential for improvement in the banner group.

A notable finding emerged regarding intervention effectiveness: despite higher pre-test scores in the banner group, the leaflet intervention produced substantially greater knowledge improvement (109%) than the banner intervention (16.67%). Post-intervention results showed a significant shift in knowledge categories, with most students achieving good knowledge levels and none remaining in the low category. This dramatic improvement in the leaflet group suggests that the learning medium's accessibility and flexibility may be more crucial than initial knowledge levels. Little *et al.* (1998) reported similar findings, emphasizing the effectiveness of portable print media in facilitating self-directed learning. Sukartini *et al.* (2019) research found that health education with leaflet media has an impact on their behavior regarding disease prevention.

The banner intervention showed modest but statistically significant improvement (16.67%, p-value < 0.01), shifting students from sufficient (72.75 ± 10.43) to good (84.88 ± 11.07) knowledge levels. However, this revealed specific implementation challenges in our study. Vichi *et al*. (2023) reported similar findings regarding static visual media effectiveness, validating our observations. Aligning with Noviasari's (2022) findings that banners can influence behavior, we noted three constraints that likely dampened impact: limited accessibility due to fixed placement, restricted exposure time during counseling sessions, and difficulties maintaining participant attention in group settings.

Integrating lecture-based instruction with leaflet distribution demonstrated optimal effectiveness. The lecture method is a counseling technique that involves verbally transferring knowledge and information to a large group of people. The lecture method enables the audience to pay close attention to all the information, and the counselor can also manage time effectively (Mona and Azalea, 2018). Rusli *et al*. (2020) state that leaflet media influences students' understanding and actions regarding specific topics. The use of leaflet media makes respondents more engaged and attentive. Providing health information to the public through leaflets is more efficient for brief, inexpensive messages because readers can study the information at their own pace, independently, and in greater detail than through verbal communication (Rusli *et al*., 2020). Through systematic observation, we documented enhanced student engagement when participants possessed tangible reference materials. Alini and Indrawati (2018) emphasis on design quality and content presentation in leaflet-based education, aligning with our observation that physical possession of materials significantly contributes to knowledge retention. We observed that students frequently referenced their leaflets during discussions, indicating active engagement with the material.

Several limitations in this study require acknowledgment and careful interpretation. First, although our sample showed balanced gender distribution, the brief follow-up period limited the assessment of long-term intervention effects. The significant baseline knowledge difference between groups (72.75 vs median 44) suggests potential sampling bias despite randomization. Additionally, the analysis of confounding factors that might have impacted participants' comprehension was limited, and the ceiling effect in the banner group (pre-test 72.75) might have reduced the potential for measurable improvement.

Future research includes conducting longitudinal research to determine whether children's dental health behaviors are affected by the enhanced knowledge gained from leaflets over an extended period of time. An evaluation of other media can be conducted to assess the efficacy of leaflets in relation to other instructional materials such as interactive games, films, or applications. Research could focus on optimizing leaflet design by analyzing the elements of the layout, colors, and graphics that work best to increase children's comprehension. Additionally, researchers could conduct cross-age research by extending the study across several age groups to determine whether the efficacy of leaflets remains constant across these ranges. Based on Luxiarti (2018), who states that a person's memory is affected by the technology and media used in health education. Information received through multiple senses can improve memory by up to 50% and even increase respondents' knowledge. Further development could explore integration with technology by analyzing the ways in which leaflets can be made more effective through digital technology integration. Finally, studies could focus on examining the difficulties and most effective methods for implementing leaflet-based education programs in a variety of contexts (schools, clinics, and communities).

CONCLUSION

This study reveals that both banner and leaflet-based educational interventions effectively improved oral health knowledge among second-grade elementary school students, with the leaflet intervention showing significantly higher effectiveness. The superior performance of leaflets, attributed to their portability and opportunity for self-paced learning, suggests their value as a primary tool in school-based oral health education programs, though further longitudinal research is needed to assess long-term behavioral impacts and potential integration with digital technologies.

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AUTHOR CONTRIBUTION

R. A. H. conceived and design this study. R. A. H., F. D. O., E. A. M, A. P. collected and generated the data. R. A. H. performed the data analysis and interpretation. R. A. H, F. D.O., K. R. M. L. M., H. B. W. prepared and wrote the manuscript. R. A. H., E.A. M., A. P., provided funding for the study. All authors discussed the results and approved the final version of the manuscript.

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Not applicable.

DATA AVAILABILITY

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

CONFLICT OF INTEREST

The authors state there is no conflict of interest with the parties involved in this study.

ETHICAL APPROVAL

This research has been approved by the ethics committee with number 060/KEPK/PE/V/2023 issued on 23rd May 2023 by the Health Research Ethics Commission of the Medical Faculty, Jenderal Soedirman University.

INFORMED CONSENT

Not applicable.

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