



## A Comparative Analysis of the Impact of Audiovisual and Leaflets through Whatsapp as Oral Health Promotion Media on Adolescents' Knowledge of Oral Health

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### KEYWORDS

Oral health promotion, audiovisual, online leaflets, whatsapp

### ABSTRACT:

**Introduction:** Health promotion involves empowering individuals to take charge of and enhance their own health. It encompasses a variety of strategies and communication channels aimed at delivering educational messages to the target audience. Audiovisual media refers to mediums that present both visual images and audio simultaneously. Visual media employs captivating visuals to engage and hold the attention of students while conveying information. WhatsApp is a social media platform that facilitates the exchange of various forms of messages and information, including videos and images. According to a survey by the Indonesian Ministry of Communication and Information Technology (Kominfo), 83% of the 171 million internet users in Indonesia utilize WhatsApp.

**Objectives:** The objective of this research was to determine the use of audiovisual and online leaflets through whatsapp on Adolescents' Knowledge of Oral Health.

**Methods:** The research method used in this study was of an experimental analytical nature, employing a two-group posttest-only design. These two groups comprised the audiovisual group, which was provided with video-based materials, and the online leaflets group, which was presented with content through posters. The research sample consisted of 100 respondents who were given materials on dental and oral health, along with a posttest questionnaire. The posttest scores were subsequently analyzed using the Mann-Whitney test..

**Results:** The research findings indicated that the significance value of the Mann-Whitney test was 0.009, signifying that it had a p-value of <0.05. This indicates that there was a significant difference between the posttest scores of the online

leaflets media and the posttest scores of the audiovisual media.

**Conclusions:** The research's conclusion was that audio-visual media proved to be more effective than online leaflets media as a means of health promotion.

## 1. Introduction

According to the World Health Organization (WHO), health promotion is the process of influencing an individual so that they can take control of and enhance their own health. Health promotion can be achieved by employing various methods and promotional media to deliver health education messages to the target audience. Promotional media can be categorized into print media and audiovisual media [1]–[3]. Audiovisual and social media are interconnected; educators and parents can access audiovisual media through social platforms limitlessly and provide education to students, thus enhancing their knowledge of oral health [4]–[6]. Based on a survey conducted by the Ministry of Communication and Information Technology in Indonesia, there were 171 million internet users, with 83% of them using WhatsApp [7], [8].

WhatsApp is a social media platform that offers benefits such as easy access to educational information, the flexibility to access it at any time, and the ability to use it from anywhere. It is widely used in schools as a literacy medium due to its ease of access and lower data consumption compared to other applications [9]–[11]. Visual media presents captivating images that can engage students' interest and attention in reading. Visual media like leaflets can enhance knowledge about oral health [12], [13].

Based on the Basic Health Research (RISKESDAS) in Central Java Province in 2018, it was found that 43.4% of the population had dental problems, such as cavities. Among adolescents aged 10-14 years in 2018, 37.38% had cavities. The same year, RISKESDAS recorded that only 2.1% of adolescents aged 10-14 years correctly chose the right time to brush their teeth, which is twice a day. Poor oral health

habits, such as irregular brushing (twice a day), can lead to the formation of dental plaque and result in cavities [14]. This is often influenced by a lack of oral health education for children. Dental caries is common among school-aged children because they still have detrimental habits that affect their oral health, highlighting the importance of oral health education in schools [15].

## 2. Objectives

Given these factors, the research aims to compare the effectiveness of oral health promotion media using audiovisual and online leaflets through WhatsApp on adolescents' oral health knowledge. This study also contributes valuable insights into effective educational media for oral health education.

## 3. Methods

This study was an experimental analytical research with a two-group posttest-only design. The study population consisted of adolescents attending junior high schools in Semarang City. The research sample was selected using non-probability sampling through consecutive sampling, where all subjects who met the inclusion criteria and were present on the day of the study were included until the required sample size was reached. The sample size was determined using the Slovin formula, resulting in 100 participants to be included in the study. The sample would later be divided into two groups: 50 subjects in the audiovisual group and 50 subjects in the visual group. Inclusion criteria for the study were adolescents aged 13-15 years who used the WhatsApp application for

communication.

The research subjects were provided with materials through audiovisual media and visual media (leaflets) via WhatsApp. Subjects were given 10 minutes to study the provided materials. Subsequently, research subjects were given a 20-question true or false questionnaire. Validity and reliability tests have been conducted on the questionnaire. Validity was assessed using the point biserial validity test technique, and reliability was assessed using the KR-20 reliability test [16]. The results of these tests confirm that the

questionnaire instrument used in this study is both valid and reliable. The questionnaire completion took approximately 10 minutes. Posttest scores were analyzed using the Komolgorov-Smirnov test for normality, followed by a homogeneity test using Levene's test and a non-parametric test using the Mann-Whitney test.

#### 4. Results

The frequency distribution of posttest answer scores between audio-visual media and visual media (Leaflets ) can be observed in the following table.

**Table 1** Results of measuring the correct scores for the question items

Question Item	Visual (Leaflet)	Audio- visual
	Post-test Score	Post- test Score
1. Tooth decay is caused by the accumulation of plaque	46	46
2. Infrequent tooth brushing can lead to the buildup of plaque.	48	48
3. Dental plaque can result in bad breath and bleeding gums.	45	46
4. Excessive consumption of chocolates and candies can lead to tooth decay	50	49
5. Brush your teeth at least twice a day after breakfast and before bedtime	47	50
6. Thumb-sucking habit can cause teeth to protrude.	43	46
7. A good toothbrush for brushing is one with rough bristles	46	49
8. Brushing teeth should be done gently	48	50
9. Proper tooth brushing involves brushing all parts of the teeth (front, back, and in between)	49	50
10. It's important to use fluoride toothpaste for brushing teeth	43	48
11. The recommended duration for brushing teeth is approximately 5 minutes	28	33
12. Consuming fiber-rich and nutritious foods can promote dental health	45	48
13. Enamel functions to protect the tooth's root	7	4
14. The layer of teeth that shields them from hot and cold temperatures is dentin	41	47
15. Tooth decay is not an indicator of healthy teeth	46	50
16. Chewing food on one side is a good habit that can promote dental health	44	49
17. Biting on ice cubes can result in tooth sensitivity	46	46
18. Regular dental check-ups should be done at least every 6	47	45

months

19. Tooth decay can be prevented by regularly brushing your teeth	48	49
20. Teeth are divided into two parts: the crown and the root	47	49
<b>Total score</b>	<b>846</b>	<b>902</b>
<b>Score difference</b>	<b>56</b>	

Table 1 illustrates the correct scores per question item, and from the table, it can be inferred that the knowledge level scores of the children who received materials through audiovisual media were higher. Out of the 20 question items, 14 of them in the audiovisual media group had high scores, 3 question items

had the same score as the leaflets media group, and 3 question items had lower scores than the leaflets media group.

In this study, the collected data underwent a normality test using the Kolmogorov-Smirnov test.

**Table 2 Normality Test**

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Posttest score						
Visual (Leaflets)	.179	50	.000	.838	50	.000
audiovisual	.256	50	.000	.840	50	.000

Table 2 showed that the significance value of the data's normality test was 0.00, which means the value was  $p < 0.05$ , indicating that

the data was not normally distributed. Next, a homogeneity test was conducted using the Levene's test.

**Table 3 Homogeneity Test**

Levene Statistic	
	Sig.
Posttest Score	.078

Table 3 presents the results of the data's homogeneity test, which yielded a significance value of 0.078, meaning it was  $> 0.05$ , indicating that the data was homogeneous. Since the data did not pass the normality test but did meet the homogeneity requirement, a non-parametric test

using the Mann-Whitney test was conducted to assess the comparison of posttest scores between those who received materials through visual media and audiovisual media. Below is the table presenting the results of the non-parametric test.

**Table 4 Average Posttest Scores**

Posttest Score	Rank	
	N	Mean Rank
Visual (Leaflets)	50	43.18
audiovisual	50	57.82

Table 4 presents the results of the Mann-Whitney test, indicating that the average posttest score for the audiovisual media was higher

compared to the visual media, specifically measuring at 57.82.

**Table 5 Mann-Whitney Test**

<b>Mann-Whitney</b>	
<b>Sig.</b>	.009

The Mann-Whitney test results indicate that if the significance value is  $p > 0.05$ , it means there is no significant difference, and if the significance value is  $p < 0.05$ , it signifies a significant difference. In Table 5, the

significance value was 0.009, indicating that it was  $p < 0.05$ , thus revealing a significant difference between the posttest scores for visual media and audiovisual media.

## 5. Discussion

The research findings indicate that audiovisual media as a health promotion tool is more effective in enhancing the knowledge of junior high school students compared to visual media (leaflets). Audiovisual media focuses on engaging learners' visual and auditory senses, providing them with the opportunity to observe sound, color, objects, and real-life events, which makes it easier for learners to comprehend the presented material [17], [18]. The theory proposed by Edgar Dale in 1946 explains that the understanding of material in the learning process varies depending on the senses used: reading 10%, hearing audio 20%, seeing 30%, hearing and seeing 50%, demonstrating 70%, and real-life experience 90%. This suggests that the more senses engaged during the learning process, the better the understanding of the material [3], [4].

results showed that adolescents' knowledge scores increased from 16.63 before the counseling to 20.73 after the counseling. Additionally, research conducted by Machado et al (2020) stated that the use of audiovisual media could enhance students' knowledge of COVID-19 [20]. The study found that the average knowledge score of students who received audiovisual materials was 8.50, whereas those who used visual media scored an average of 6.50. This difference was attributed to the fact that audiovisual media captures attention and provides engaging information. Furthermore, research by Janah et al (2020) on elementary school students regarding the effectiveness of audiovisual media and visual flipcharts on dental caries found that audiovisual media was more effective, with an average score of 17.75, compared to visual flipcharts with an average score of 15.25 [21].

The research findings indicate that the average posttest scores of students who were provided with materials through audiovisual media were higher, at 57.82, compared to those who received visual media, which had an average score of 43.18. This aligns with the research conducted by Martins et al. (2022), which suggested the influence of counseling using video media through WhatsApp on premarital sexual knowledge among adolescents [19]. The

Audiovisual media is a medium that can be easily and rapidly comprehended and is more captivating due to its inclusion of sound and moving images, which keeps students engaged in viewing the content until the end. This is supported by the findings of research conducted by Jannah regarding the use of audiovisual media in educating adolescents about SADARI (Self-Examination for Early Detection of Breast Cancer), which demonstrated an increase in

knowledge scores both before and after being presented with audiovisual media materials, with a significance level of  $p < 0.0007$  [20], [21]. Audiovisual media combines visuals and sound, making the content more appealing and drawing the audience's focus to the material being presented, thus enabling students to retain the information in their long-term memory and recall it effectively. This is further corroborated by the research results of Jumriani et al. conducted on fifth-grade students at SD Negeri 2 Kota Makasar regarding the effectiveness of using audiovisual media in enhancing knowledge about oral and dental health. The study found a significant improvement in the students' knowledge after being exposed to audiovisual media materials, with a significance level of  $p < 0.05$  [9], [22].

Social media platforms on the internet can serve as potent tools for health promotion, easily reaching target audiences across various age groups. Social media platforms are readily accessible to the general public, which can enhance the dissemination of health-related information [23], [24]. One such popular social media platform is WhatsApp, which is widely used by both adolescents and adults. Research conducted by Sary et al. suggests that there is an impact of using video media through the WhatsApp application for counseling on premarital sexual knowledge among

adolescents. The results indicated an increase in adolescents' knowledge scores from 16.63 before counseling to 20.73 after counseling [25], [26]. WhatsApp offers advantages, such as the ability to share diverse and appealing content, and the material provided can be saved and revisited by the intended audience [27].

## 6. Conclusions

The research results indicate that there is a significant difference in the effectiveness of audiovisual media and visual leaflets through WhatsApp in improving the knowledge of oral and dental health among adolescents. Audiovisual media proves to be more effective than visual leaflets in enhancing the knowledge of oral and dental health among adolescents.

### Funding

This research was conducted independently and supported by the Faculty of Dentistry, Sultan Agung Islamic University of Semarang, Indonesia.

*Conflicts of interest:* None declared.

### Author contributions

All the authors have contributed equally to the conception and design of the study, drafting the article or revising it, and approving the version to be submitted

## References

- [1] A. A. Ali and E. T. Miller, "Effectiveness of video-assisted debriefing in health education: an integrative review," *Journal of Nursing Education*, vol. 57, no. 1, pp. 14–20, 2018.
- [2] S. A. AlSadrah, "Social media use for public health promotion in the Gulf Cooperation Council: An overview," *Saudi Med J*, vol. 42, no. 1, p. 9, 2021.
- [3] S. E. Haque *et al.*, "Effect of a school-based oral health education in preventing untreated dental caries and increasing knowledge, attitude, and practices among adolescents in Bangladesh," *BMC Oral Health*, vol. 16, no. 1, pp. 1–10, 2016.
- [4] A. D. Pitoy, V. N. S. Wowor, and M. A. Leman, "Efektivitas Dental Health Education Menggunakan Media Audio Visual dalam Meningkatkan Pengetahuan Siswa Sekolah Dasar," *e-GiGi*, vol. 9, no. 2, pp. 243–249, 2021.
- [5] M. S. Al-Ak'hali, E. S. Halboub, Y. M. Asiri, A. Y. Asiri, A. A. Maqbul, and M. A. Khawaji, "WhatsApp-assisted oral

- health education and motivation: A preliminary randomized clinical trial,” *J Contemp Dent Pract*, vol. 21, no. 8, pp. 922–925, 2020.
- [6] N. Mohammadzadeh, M. Gholamzadeh, S. Zahednamazi, and S. M. Ayyoubzadeh, “Mobile health applications for children’s oral health improvement: A systematic review,” *Inform Med Unlocked*, p. 101189, 2023.
- [7] M. R. Nauvaldi, “Mobile Internet Analysis in Prevention of Negative Impacts of Information and Communication Technology in Indonesia,” *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 4, no. 2, pp. 137–145, 2023.
- [8] E. S. Wardhana, S. Suryono, A. Hernawan, and L. E. Nugroho, “EVALUATION OF FORMAT AND SECURITY OF DENTAL ELECTRONIC MEDICAL RECORD SYSTEMS IN GENERAL HOSPITAL BASED ON LEGISLATION,” *Odonto: Dental Journal*, vol. 9, pp. 80–89, 2022.
- [9] M. L. Hanye, J. S. Pramono, and L. Nulhakim, “The effectiveness of health education using media booklets and whatsapp on tuberculosis patients at the Linggang Bigung Health Center, West Kutai Regency,” *Formosa Journal of Science and Technology*, vol. 2, no. 4, pp. 1145–1156, 2023.
- [10] A. Alsharafi, “An empirical study into factors that influence e-learning adoption by medical students in UAE,” *South Eastern European Journal of Public Health (SEEJPH)*, 2022.
- [11] R. Sedgwick, S. Epstein, R. Dutta, and D. Ougrin, “Social media, internet use and suicide attempts in adolescents,” *Curr Opin Psychiatry*, vol. 32, no. 6, p. 534, 2019.
- [12] M. Zolfaghari, M. Shirmohammadi, H. Shahhosseini, M. Mokhtaran, and S. Z. Mohebbi, “Development and evaluation of a gamified smart phone mobile health application for oral health promotion in early childhood: a randomized controlled trial,” *BMC Oral Health*, vol. 21, no. 1, pp. 1–9, 2021.
- [13] S. Sharma, V. Mohanty, A. Y. Balappanavar, P. Chahar, K. Rijhwani, and A. Balappanavar, “Role of digital media in promoting oral health: a systematic review,” *Cureus*, vol. 14, no. 9, 2022.
- [14] N. Zulkifli, A. Rahardjo, R. R. Darwita, M. Adiatman, D. A. Maharani, and S. Susilawati, “Association Of Early Childhood Caries And Nutritional Status Among 5-Year-Old Children In Indonesia,” *Journal of Health and Dental Sciences*, vol. 2, no. 2, pp. 235–256, 2022.
- [15] I. Dewanto, S. Koontongkaew, and N. Widyanti, “Characteristics of dental services in rural, suburban, and urban areas upon the implementation of indonesia national health insurance,” *Front Public Health*, vol. 8, p. 138, 2020.
- [16] C. Fawns-Ritchie and I. J. Deary, “Reliability and validity of the UK Biobank cognitive tests,” *PLoS One*, vol. 15, no. 4, p. e0231627, 2020.
- [17] Y. D. Puspitarini and M. Hanif, “Using Learning Media to Increase Learning Motivation in Elementary School.,” *Anatolian Journal of Education*, vol. 4, no. 2, pp. 53–60, 2019.
- [18] M. Bonabi, S. Z. Mohebbi, E. A. Martinez-Mier, T. P. Thyvalikakath, and M. R. Khami, “Effectiveness of smart phone application use as continuing medical education method in pediatric oral health care: a randomized trial,” *BMC Med Educ*, vol. 19, no. 1, pp. 1–7, 2019.
- [19] J. C. S. Martins, J. B. de Lima, R. O. Cartaxo, and P. H. Sette-de-Souza, “Use of WhatsApp in dental education: a scoping review,” *Med Sci Educ*, vol. 32,

- no. 2, pp. 561–567, 2022.
- [20] R. A. Machado, N. L. de Souza, R. M. Oliveira, H. M. Júnior, and P. R. F. Bonan, “Social media and telemedicine for oral diagnosis and counselling in the COVID-19 era,” *Oral Oncol*, vol. 105, p. 104685, 2020.
- [21] N. M. Janah and E. Timiyatun, “Perbandingan Efektivitas Pendidikan Kesehatan dengan Media Leaflet dan Audio Visual dalam Meningkatkan Pengetahuan Remaja tentang Pemeriksaan Payudara Sendiri (SADARI),” *Jurnal Keperawatan Terpadu (Integrated Nursing Journal)*, vol. 2, no. 2, pp. 80–90, 2020.
- [22] J. Jumriani, A. Asriawal, A. F. Basrah, and P. Pariati, “Penggunaan Media Penyuluhan Audio Visual Dalam Meningkatkan Pengetahuan Tentang Kesehatan Gigi dan Mulut Pada Anak Sekolah Dasar Kelas V SD Negeri Maccini 2 Kota Makassar,” *Media Kesehatan Gigi: Politeknik Kesehatan Makassar*, vol. 21, no. 1, pp. 54–66, 2022.
- [23] E. Leonita and N. Jalinus, “Peran Media Sosial Dalam Upaya Promosi Kesehatan: Tinjauan Literatur. INVOTEK: Jurnal Inovasi Vokasional Dan Teknologi, 18 (2), 25–34.” 2018.
- [24] D. Farsi, “Social media and health care, part I: literature review of social media use by health care providers,” *J Med Internet Res*, vol. 23, no. 4, p. e23205, 2021.
- [25] E. Coleman and E. O’connor, “The role of WhatsApp® in medical education; a scoping review and instructional design model,” *BMC Med Educ*, vol. 19, pp. 1–13, 2019.
- [26] T. Berniyanti, T. Bramantoro, G. Rasuna, A. Zamzam, A. D. Kusumo, and A. Ramadhani, “WhatsApp platform as a dental and oral health online communication forum for dentist, nurse, and elementary teachers,” *Journal of International Oral Health*, vol. 11, no. 4, p. 213, 2019.
- [27] S. E. Mustafa, N. Z. Sarmiti, Z. Y. M. Yusof, N. A. M. Nor, and M. M. Nor, “WhatsApp and Health Communication: Its Impact on Promoting Children’s Oral Healthcare Among Parents,” *International Journal of E-Health and Medical Communications (IJEHMC)*, vol. 13, no. 1, pp. 1–13, 2022.