



The Effect of Health Education Videos on Knowledge of Food Additives

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ABSTRAK

Latar Belakang: Pangan jajanan anak sekolah masih menjadi permasalahan kesehatan masyarakat karena sebagian produk belum memenuhi standar keamanan pangan dan berpotensi mengandung bahan tambahan pangan yang tidak aman. Rendahnya pengetahuan siswa mengenai pengawet, pewarna, pemanis, dan perisa meningkatkan risiko konsumsi jajanan yang tidak sehat. **Tujuan:** Penelitian ini bertujuan untuk menganalisis efektivitas video animasi edukasi kesehatan dalam meningkatkan pengetahuan siswa sekolah dasar tentang bahan tambahan pangan. **Metode:** Penelitian menggunakan desain pra-eksperimental dengan pendekatan one-group pre-test dan post-test pada 23 siswa kelas V yang dipilih melalui purposive sampling di SDN Karangrejo 6 pada tahun 2025. Instrumen penelitian berupa kuesioner pengetahuan yang diberikan sebelum dan sesudah intervensi video animasi. Data dianalisis menggunakan uji Wilcoxon dengan tingkat signifikansi 0,05. **Hasil:** Terjadi peningkatan proporsi kategori pengetahuan baik dari 43% menjadi 61% serta penurunan kategori kurang dari 35% menjadi 13%. Hasil uji Wilcoxon menunjukkan perbedaan yang signifikan antara skor pre-test dan post-test ($p = 0,004$). **Kesimpulan:** Video animasi efektif meningkatkan pengetahuan siswa mengenai bahan tambahan pangan dan direkomendasikan sebagai media edukasi kesehatan yang inovatif serta terintegrasi dalam program promosi kesehatan sekolah untuk memperkuat literasi keamanan pangan sejak dini.

ABSTRACT

Background: School snacks remain a public health concern because some products do not meet food safety standards and may contain unsafe food additives. Limited student knowledge regarding preservatives, colorants, sweeteners, and flavor enhancers increases the risk of unhealthy snack consumption. **Purpose:** This study aimed to analyze the effectiveness of animated health education videos in improving elementary school students' knowledge of food additives. **Methods:** A pre-experimental design with a one-group pre-test and post-test approach was conducted among 23 fifth-grade students selected through purposive sampling at SDN Karangrejo 6 in 2025. A structured knowledge questionnaire was administered before and after the animated video intervention. Data were analyzed using the Wilcoxon signed-rank test with

a significance level of 0.05. **Results:** The proportion of students with good knowledge increased from 43% to 61%, while the poor knowledge category decreased from 35% to 13%. Statistical analysis showed a significant difference between pre-test and post-test scores ($p = 0.004$). **Conclusion:** Animated video media is effective in improving students' knowledge of food additives and is recommended as an innovative school-based health education strategy to strengthen food safety literacy from an early age.

BACKGROUND

Advances in science and technology have facilitated various aspects of human life, including the fields of education and health. One important issue that needs to be introduced early is understanding food additives, such as preservatives, colorants, sweeteners, and flavorings. Food additives are widely used in modern food products to enhance taste, color, texture, and shelf life. Although their use is permitted within certain limits, inappropriate use or excessive consumption may have negative impacts on children's health, such as digestive disorders, hyperactivity, obesity, and an increased risk of chronic diseases later in life (Contento, 2011). This issue becomes increasingly relevant among school-age children, who tend to frequently consume snack foods in the school environment. School snacks represent a significant source of daily dietary intake because they are easily accessible, affordable, and appealing in terms of color, taste, and form, which align with children's preferences. However, despite this convenience, the safety and nutritional quality of school snacks remain a public health concern in many countries, including Indonesia.

In Indonesia, the consumption of school snacks among children remains a serious concern. Previous monitoring conducted by the Indonesian Food and Drug Authority (BPOM) indicated that approximately 40–45% of school snack products did not meet food safety standards due to the presence of hazardous chemicals or food additives exceeding the permitted limits. Although various interventions have been implemented through national programs to improve the safety of school snacks, food safety problems are still found to persist. Recent data on school snack monitoring also indicate that around 15.67% of samples still fail to meet microbiological safety requirements. (Badan Pengawas Obat dan Makanan, 2023). Other studies have also reported that some snacks sold around schools still contain hazardous substances such as borax, Rhodamine B, formalin, and methanil yellow (Fahcrudin, 2025). The Indonesian Health Survey 2023 reported that more than 47.5% of children aged over three years habitually consume sugar-sweetened beverages more than once per day. Other studies have also indicated that 48.39% of elementary school students exhibit negative behaviors related to snack consumption, such as frequently consuming foods containing flavor enhancers, colorants, and preservatives (Awalatul Firdausi, 2015).

Snack consumption behavior among school children is strongly influenced by their level of knowledge regarding food safety and food additives. However, various studies have shown that children's knowledge of healthy snacks remains relatively low. Most students are still unable to recognize the characteristics of safe snacks or identify hazardous substances such as borax, formalin, and textile dyes in food products. In addition, many students have limited knowledge about the functions, safe usage limits, and potential health impacts of food additives. As a result, children tend to choose snacks based primarily on taste, color, and price without considering food safety aspects (Sari, Nugraheni, & Kartini, 2020).

Based on a preliminary study conducted at SDN Karangrejo 6, it was found that many students still frequently purchase snacks in the school environment without considering food safety aspects or the presence of food additives in these products. Most students tend to select snacks based on attractive colors, strong flavors, and affordable prices. Initial observations also indicated that some students have not yet understood the types of food additives commonly used in foods and are unable to distinguish between safe and unsafe snacks for consumption. This condition suggests that the level of food safety literacy among elementary school students still needs to

be improved through health education activities that are appropriate to children's learning characteristics.

To date, health education related to school snacks and food additives has generally been delivered through conventional methods, such as lectures, verbal explanations, and the use of passive printed materials. These approaches often fail to effectively capture the attention of elementary school students, who typically have visual, active, and stimulus-oriented learning characteristics. As a result, the health messages delivered through these methods are often less effective in improving students' understanding and promoting behavioral change. Therefore, there is a need for innovative health education media that are more interactive, engaging, and aligned with technological developments as well as children's learning characteristics.

One potential educational medium is health animation videos, as they can integrate visual elements, audio, and interactive storytelling, thereby enhancing students' attention, comprehension, and retention of the information delivered. The use of animation media is also consistent with modern health education approaches that emphasize experiential learning and the active engagement of learners. Based on these considerations, this study was conducted to analyze the effectiveness of an animated health education video on food additives in improving the knowledge of elementary school students. The effectiveness was assessed using a pre-test and post-test design to examine the role of this animation-based media in supporting health education among school-aged children.

RESEARCH METHODS

This study employed a pre-experimental design with a one-group pre-test and post-test approach. The population consisted of all fifth-grade students, totaling 23 students. The sampling technique used was purposive sampling. The inclusion criteria were fifth-grade students who were present during the study implementation and willing to participate in all research activities. Based on these criteria, all eligible students, totaling 23 respondents, were included as the study sample.

The research instrument was a knowledge questionnaire on food additives consisting of 15 multiple-choice questions. The questionnaire covered topics including the definition of food additives, types of food additives (preservatives, colorants, sweeteners, and flavorings), their functions, and potential health impacts resulting from improper use. The same questionnaire was used for both the pre-test and post-test to measure changes in respondents' knowledge levels. Prior to its use in the study, the questionnaire underwent validity and reliability testing to ensure the adequacy of the research instrument.

The intervention consisted of health education delivered through an animated video specifically designed to explain food additive concepts in a simple, engaging manner appropriate to the comprehension level of elementary school students. The research procedure began with the administration of a pre-test to assess students' baseline knowledge. Subsequently, students received the intervention through the presentation of the animated health education video. After the intervention, students completed a post-test to measure any increase in knowledge. The data were analyzed using the Wilcoxon test with a significance level of 0.05 to determine differences in knowledge scores before and after the intervention. Ethical approval for this study was obtained from the Research Ethics Committee with certificate number 1260/PL17.4/PG/2025.

RESULTS

This study aimed to analyze the effectiveness of an animated health education video in improving elementary school students' knowledge about food additives. The intervention provided in this study consisted of an animated health education video specifically designed to explain the concept of food additives in a simple and engaging manner, appropriate to the learning characteristics of elementary school students. The animated video used in this study had a duration of eight minutes and covered several main topics, including the definition of food additives, types of food additives such as preservatives, colorants, sweeteners, and flavorings, as well as examples of commonly used food additives. In addition, the video explained the characteristics of snacks that are safe for consumption and emphasized the importance of choosing healthy foods. A short quiz was also included at the end of the video. The delivery of the material in the video combined visual animation, voice narration, and brief on-screen text to facilitate students' understanding of the information presented.



Figure 1. Display of the Animated Health Education Video on Food Additives

The results of the descriptive analysis indicated a change in the distribution of knowledge levels before and after the intervention. In the pre-test results, some students were still categorized as having low knowledge. Of the 23 respondents, 10 students (43%) were classified as having good knowledge, 5 students (22%) had moderate knowledge, and 8 students (35%) had low knowledge. This distribution indicates that before the intervention was administered, students' understanding of preservatives, colorants, sweeteners, and flavorings was not evenly distributed, with a considerable proportion still having a low level of knowledge. After receiving education through the animated video, a change in the distribution of knowledge categories was observed. The number of students categorized as having good knowledge increased to 14 students (61%), those with moderate knowledge increased to 6 students (26%), while the number of students with low knowledge decreased to 3 students (13%). The distribution of pre-test and post-test results is presented in Table 1.

Table 1. Distribution of Pre-test and Post-test Knowledge Levels

Knowledge Level	Pre Test		Post Test	
	n	%	n	%
Good	10	43%	14	61%
Moderate	5	22%	6	26%
Low	8	35%	3	13%
Total	23	100%	23	100%

Table 1 shows an 18% increase in the proportion of students in the good knowledge category and a 22% decrease in the low knowledge category. This shift indicates an improvement in students' level of understanding after the intervention was administered.

The difference test was conducted using the Wilcoxon Signed-Rank Test. The analysis results showed that out of 23 students, 16 students experienced an increase in scores (positive ranks), 3 students experienced a decrease in scores (negative ranks), and 4 students had unchanged scores (ties). The test statistics showed a value of $Z = -2.889$ with $p = 0.004$ ($p < 0.05$), indicating a statistically significant difference between the pre-test and post-test scores. The complete results of the Wilcoxon test are presented in Table 2.

Table 2. Result of Wilcoxon Signed Ranks Test

Component	n	Mean Rank	Sum of Rank
Negative Ranks	3	6,17	18,50
Positive Ranks	16	10,66	170,50
Ties	4	-	-
Test Statistics			
Z	-2,889		
Asymp. Sig (2 Tailed)	0,004		

The results of this study indicate that animated health education videos are effective in improving elementary school students' knowledge about food additives. The improvement was observed both descriptively and inferentially. Descriptively, there was a shift in the distribution of knowledge levels toward higher categories. Statistically, the Wilcoxon test showed a significant difference between the scores before and after the intervention ($p = 0.004$). The increase experienced by 16 out of 23 students indicates that the intervention had a broad impact within the study group. Although 3 students experienced a decrease in scores and 4 students showed no change, the predominance of improvement suggests that the animated video generally enhanced the understanding of most students. Furthermore, the reduction in the proportion of students with low knowledge from 35% to 13% indicates that this intervention was effective in reaching students with the lowest level of understanding, thereby helping to reduce the knowledge gap within the classroom.

DISCUSSIONS

This study demonstrates that health education delivered through animated video media is effective in improving elementary school students' knowledge about food additives. These findings strengthen empirical evidence that audiovisual media have advantages in enhancing health understanding among school-aged children. Several

previous studies have reported that video-based interventions significantly improve students' knowledge and engagement compared with conventional lecture methods (Tuong, Larsen, & Armstrong, 2014). This suggests that interactive digital media have substantial potential for school-based health promotion.

The effectiveness of animated videos in this study can be theoretically explained through the Cognitive Theory of Multimedia Learning (Mayar, 2009). This theory states that individuals process information through two primary channels, namely visual and auditory channels, which have limited capacity but can complement each other. When information is presented through a combination of moving images, voice narration, and brief text, deeper cognitive integration occurs compared to information delivered through a single channel. In the context of food additives, concepts such as the functions of preservatives, safe usage limits, and potential long-term health impacts are relatively abstract for elementary school students. Visualization through animation helps transform these concepts into more concrete learning experiences that are easier for students to understand.

In addition to the cognitive approach, these findings are also relevant to health behavior change theories, particularly the Health Belief Model (Glanz, Rimer, & Viswanath, 2015). This model emphasizes that increased knowledge plays an important role in shaping individuals' perceived susceptibility and perceived severity regarding a health risk. When students understand the potential dangers of unsafe food additives, their awareness of the associated risks increases, which may serve as a foundation for the development of more selective behavior in choosing snacks. Therefore, the improvement in knowledge observed in this study represents an important initial step in the process of health behavior change. The findings of this study are also consistent with previous research showing that multimedia-based learning in child health education leads to significantly greater information retention compared to traditional teaching methods (Pitoy, 2021). Animated media provide engaging visual stimuli that enhance students' attention and learning motivation. For elementary school children, who tend to have visual and kinesthetic learning preferences, this approach is more adaptive than printed materials or one-way lecture-based methods.

Contextually, the urgency of this intervention becomes increasingly relevant considering that school-aged children are a group vulnerable to exposure to snacks that do not fully meet food safety standards. Children tend to choose foods based on visual appeal, bright colors, and taste rather than considerations of safety or nutritional content. Therefore, educational strategies tailored to children's visual characteristics and learning preferences are essential. The use of animated videos that combine moving images, colors, and narration has been shown to be effective in improving health knowledge in various contexts of child and adolescent health education (Apriani, 2023) (Santoso, Indriatie, Miadi, & Christiany, 2024). This approach aligns with the principle of audience-centered interventions, in which educational media and messages are adapted to the needs and developmental stages of the target population.

The effectiveness of animation-based media in improving understanding is also supported by recent studies reporting significant increases in knowledge following animation-based educational interventions. The use of animated videos in nutrition education has been shown to significantly improve respondents' knowledge compared with pre-intervention levels (Ningrum, Setiadi, Sejati, & Fauziyah, 2024). Similarly, animation-based media have been found to significantly increase adolescents' health knowledge scores after the intervention (Nabiilah, Cahyati, Bahtiar, & Kusmiyati.,

2025). The consistency of these findings reinforces the idea that animation is not only visually engaging but also effective in transforming complex health information into content that is easier to understand.

Although the majority of students in this study experienced an improvement in knowledge, variations in individual responses indicate that not all participants achieved the same level of improvement. These variations may be influenced by factors such as concentration, learning motivation, and differences in information processing abilities. Previous research has found that although knowledge levels increased after animation-based video education, a small proportion of respondents showed minimal changes, which were associated with factors such as attention and engagement during the intervention (Karim, Isa, Seman, Ab Latif, & Othman, 2025). This finding suggests that the effectiveness of educational media is still influenced by individual characteristics and the context in which the intervention is implemented.

From the perspective of intervention sustainability, reinforcing the material through repeated exposure or integration into routine learning activities is recommended to improve long-term retention. The combination of animated video media with face-to-face learning methods has been shown to produce more optimal learning outcomes compared with the use of a single method (Assidik, Rabbany, & Syabariyah, 2025). Therefore, animated videos can be positioned as a strategic supporting medium integrated into school-based health education programs. Overall, the findings of this study are consistent with various recent studies that highlight animated videos as an effective health education medium for improving knowledge among children and adolescent populations. The contribution of this study lies in the application of animation-based media in the context of food additive safety literacy, which has received relatively limited attention compared to other health topics such as reproductive health or nutrition. Therefore, this study expands the empirical evidence regarding the effectiveness of digital media in school-based health promotion, particularly in preventive efforts related to food safety.

CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that health education delivered through animated video media is effective in improving elementary school students' knowledge about food additives. The improvement in knowledge was observed both descriptively and through statistical testing, which indicated a significant difference between scores before and after the intervention. These findings confirm that animation-based media, which integrates visual and audio elements, can simplify abstract concepts of food safety into more concrete and easily understandable information for school-aged children. Therefore, animated videos can be recommended as an innovative health promotion medium that is adaptive to the learning characteristics of the digital generation. It is suggested that animation-based educational interventions be continuously integrated into the School Health Program and school-based food safety education activities to strengthen food safety literacy from an early age. Future studies should employ experimental designs with control groups and conduct long-term evaluations to assess whether improvements in knowledge lead to changes in students' attitudes and snack consumption behaviors.

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