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EFFECT OF AUDIOVISUAL-BASED REPRODUCTIVE HEALTH EDUCATION ON ADOLESCENT GIRLS' KNOWLEDGE OF PREVENTING FLUOR ALBUS AT SMA NEGERI 20 MAKASSAR

PENGARUH PENDIDIKAN KESEHATAN REPRODUKSI BERBASIS AUDIOVISUAL TERHADAP PENGETAHUAN REMAJA PEREMPUAN TENTANG PENCEGAHAN FLUOR ALBUS DI SMA NEGERI 20 MAKASSAR

Noviyani Hartuti[1*], Suharti Buhari[2], Suriyanti[3], Niska Afriani[4]

[1*,3,4]Institut Ilmu Kesehatan Pelamonia, Email : viyanihartuti20@gmail.com
[2]TPMB Suriyanti

*email koresponden: viyanihartuti20@gmail.com

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Abstract

Adolescent girls require accurate and age-appropriate reproductive health information to distinguish physiological vaginal discharge from abnormal symptoms and to adopt appropriate genital-hygiene practices. Audiovisual education may improve learning by combining visual and auditory stimulation in a format that is familiar to adolescents. This study evaluated changes in knowledge regarding the prevention of fluor albus (vaginal discharge) after audiovisual-based reproductive health education among female students at SMA Negeri 20 Makassar. A pre-experimental one-group pretest-posttest design was conducted in August 2026. All 40 eligible eleventh-grade female students were recruited using total sampling. Knowledge was assessed using a 10-item dichotomous questionnaire scored from 0 to 100. Normality testing showed non-normal distributions at pretest and posttest, therefore the Wilcoxon signed-rank test was used. The mean knowledge score increased from 52.00±18.56 before the intervention to 93.50±10.27 after the intervention. The median score increased from 60.0 (IQR 37.5-70.0) to 95.0 (IQR 90.0-100.0). Thirty-nine participants improved and one participant had a lower posttest score, with no ties. The Wilcoxon test showed a statistically significant improvement ($W=6.0$; $Z=-5.44$; $p<0.001$) with a very large effect size ($r=0.86$). Audiovisual reproductive health education was associated with a substantial immediate increase in adolescent girls' knowledge regarding fluor albus prevention. School-based reproductive health programs may benefit from integrating short audiovisual modules with discussion and referral guidance for abnormal symptoms.

Keywords : Adolescent Girls, Audiovisual Media, Fluor Albus, Reproductive Health, Vaginal Discharge, Knowledge.

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Abstrak

Remaja putri memerlukan informasi kesehatan reproduksi yang akurat dan sesuai dengan usia mereka agar dapat membedakan keputihan fisiologis (normal) dari gejala yang tidak normal, serta menerapkan praktik kebersihan organ reproduksi yang tepat. Edukasi audiovisual dapat meningkatkan proses pembelajaran dengan menggabungkan stimulasi visual dan auditori dalam format yang familier bagi remaja. Studi ini mengevaluasi perubahan pengetahuan mengenai pencegahan fluor albus (keputihan) setelah pemberian edukasi kesehatan reproduksi berbasis audiovisual kepada siswi di SMA Negeri 20 Makassar. Penelitian ini menggunakan desain pre-experimental dengan pendekatan one-group pretest-posttest yang dilaksanakan pada Agustus 2026. Sebanyak 40 siswi kelas sebelas yang memenuhi kriteria dilibatkan melalui teknik total sampling. Pengetahuan diukur menggunakan kuesioner dikotomi yang terdiri dari 10 butir pertanyaan dengan rentang skor 0 hingga 100. Uji normalitas menunjukkan distribusi data tidak normal baik pada pretest maupun posttest, sehingga analisis dilakukan menggunakan uji Wilcoxon signed-rank. Rata-rata skor pengetahuan meningkat dari 52,00±18,56 sebelum intervensi menjadi 93,50±10,27 setelah intervensi. Skor median meningkat dari 60,0 (IQR 37,5–70,0) menjadi 95,0 (IQR 90,0–100,0). Sebanyak 39 peserta mengalami peningkatan skor, sementara satu peserta menunjukkan penurunan skor pada posttest, dengan tidak ada nilai yang sama (ties). Uji Wilcoxon menunjukkan peningkatan yang signifikan secara statistik ($W=6,0$; $Z=-5,44$; $p<0,001$) dengan ukuran efek yang sangat besar ($r=0,86$). Edukasi kesehatan reproduksi berbasis audiovisual terbukti berkontribusi terhadap peningkatan pengetahuan yang substansial dan langsung pada remaja putri mengenai pencegahan fluor albus. Program kesehatan reproduksi di sekolah dapat dioptimalkan dengan mengintegrasikan modul audiovisual singkat yang disertai diskusi serta panduan rujukan untuk menangani gejala yang tidak normal.

Kata Kunci : Remaja Putri, Media Audiovisual, Fluor Albus, Kesehatan Reproduksi, Keputihan, Pengetahuan.

1. INTRODUCTION

Adolescence is a developmental period in which rapid biological, psychological, and social changes occur simultaneously. For girls, puberty introduces menstruation, changes in vaginal secretions, and new responsibilities related to genital hygiene. Accurate reproductive health information is therefore important before misconceptions become established. The World Health Organization emphasizes that comprehensive, age-appropriate sexuality and reproductive health education should provide scientifically accurate information, correct misconceptions, support informed decision-making, and help young people seek appropriate care when needed (World Health Organization, 2026).

Vaginal discharge is a normal physiological phenomenon in many circumstances, but changes in color, odor, amount, consistency, or accompanying symptoms such as itching, burning, irritation, or pain can indicate pathological processes. The term fluor albus is commonly used in Indonesian reproductive health literature to describe vaginal discharge. Clinical guidance stresses that abnormal vaginal symptoms may have infectious or noninfectious causes and should not be diagnosed solely from symptoms or self-treatment; persistent or symptomatic discharge requires appropriate clinical assessment (Centers for Disease Control and Prevention, 2021). In adolescents, distinguishing normal discharge from warning signs is especially important because embarrassment, misinformation, and limited access to confidential services can delay help-seeking.

The thesis on which this manuscript is based identified an important local educational gap. Direct observation and discussion with the counseling teacher at SMA Negeri 20 Makassar indicated that the school had not previously conducted structured reproductive health education or research focused on preventing fluor albus. The study therefore addressed a practical school-health need: increasing students' understanding of the definition, types, causes, warning signs, personal hygiene,

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and prevention of vaginal discharge. The source thesis also emphasized correct genital hygiene, including keeping underwear clean and dry, choosing absorbent material, changing menstrual products regularly, avoiding excessive use of fragranced vaginal cleansing products, and cleaning from front to back.

Health education delivered through audiovisual media is particularly relevant to adolescents because it can combine narration, images, animation, text, and examples in a single learning sequence. This dual sensory input can make abstract or sensitive reproductive health concepts easier to understand. Recent evidence supports digital and audiovisual approaches. A 2025 systematic review and meta-analysis of web-based sexual and reproductive health education involving 7,876 adolescents found a moderate improvement in knowledge, although the certainty of evidence was limited by heterogeneity (Guo et al., 2025). Indonesian studies have also shown that video-based interventions can improve adolescents' reproductive health knowledge (Yuliasih et al., 2025; Wilandika et al., 2025).

Comparable findings have been reported for girls' hygiene and reproductive health. Fuadah et al. (2025) found that digital educational media, including animated video, significantly improved menstrual hygiene knowledge among adolescent girls in Bandung Regency. Fajariyah and Lidia (2026) similarly reported significant improvements in knowledge and personal-hygiene attitudes after video education. These studies suggest that audiovisual methods can support school-based reproductive health learning, especially when content is concise, visually engaging, and tailored to adolescents.

Evidence specific to vaginal discharge is also emerging. A randomized study using TikTok-based education reported significant improvements in adolescent girls' knowledge and attitudes regarding vaginal discharge (Barriyah, 2024). More recently, Sarah et al. (2026) found that both video and leaflet education significantly improved knowledge of vaginal discharge among junior high school girls, while audiovisual-focused community and school interventions have also reported increased awareness of physiological and pathological discharge (Merdikawati et al., 2026; Musmundiroh et al., 2024). These findings support the potential value of visually mediated education but also highlight the need for locally grounded evidence in different school populations.

The original study at SMA Negeri 20 Makassar used a one-group pretest-posttest approach among eleventh-grade female students. The central hypothesis was that knowledge about fluor albus prevention would be higher after audiovisual reproductive health education than before the intervention. Because the original thesis reported only mean scores and a p-value, the present manuscript re-analyzes the available master-table scores to provide distribution-sensitive statistics, Wilcoxon test details, and effect-size information. The study aimed to evaluate the change in adolescent girls' knowledge regarding fluor albus prevention following audiovisual-based reproductive health education.

2. RESEARCH METHOD

This study used a quantitative pre-experimental design with a one-group pretest-posttest approach. Although one section of the source thesis used the term quasi-experimental, the absence of a comparison or control group is methodologically more consistent with a pre-experimental one-group design. The study was conducted at SMA Negeri 20 Makassar, South Sulawesi, Indonesia, on 22 August 2025. The population consisted of eleventh-grade female students at SMA Negeri 20 Makassar. Total sampling was used, resulting in 40 respondents. The inclusion criteria in the source thesis were female students of SMA Negeri 20 Makassar, aged 15-18 years, and willing to participate. Students who were absent because of illness or permission, or who declined participation, were excluded. The final analytic sample included all 40 participants with paired pretest and posttest data.

The intervention consisted of reproductive health information delivered using audiovisual media focused on fluor albus. The educational content covered the meaning of vaginal discharge, physiological and pathological characteristics, possible causes, warning symptoms, personal hygiene, and preventive practices. The thesis described audiovisual media as an educational format combining

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sound and visual material to facilitate understanding of sensitive reproductive health topics. The intervention was delivered between the pretest and posttest assessments during the school-based study session.

Knowledge was measured using a 10-item true/false questionnaire on fluor albus. Items addressed the definition of vaginal discharge, differentiation between normal and abnormal discharge, moisture and tight clothing, genital hygiene, stress and fatigue, menstruation-related discharge, and signs that may suggest infection. Each correct response was scored as 10 points, producing a total score from 0 to 100. The questionnaire in the thesis was attributed to Dwi Ayu Nurul Faizah (2023). However, the thesis did not report study-specific item-validity coefficients or a reliability coefficient for this instrument; this limitation is acknowledged in the interpretation of the findings.

Data were summarized using frequencies, percentages, means, standard deviations, medians, interquartile ranges (IQR), minima, and maxima. The thesis reported Shapiro-Wilk p-values of 0.002 for pretest scores and <0.001 for posttest scores, indicating non-normal distributions. Accordingly, paired pretest and posttest scores were compared using the Wilcoxon signed-rank test with a two-sided significance level of 0.05. The master-table data were re-analyzed to calculate the Wilcoxon statistic, standardized Z value, direction of paired changes, and effect size r, calculated as |Z|/sqrt(N). Participation was voluntary. The source thesis documented informed consent, confidentiality of participant data, password-protected data storage, and the use of codes rather than names in research records. An institutional ethical-clearance number was not reported in the thesis and was therefore not invented or added to this manuscript.

3. RESULT AND DISCCUSSION

Participant Characteristics

The study included 40 eleventh-grade female students. Ages ranged from 15 to 17 years, with most participants aged 16 years. All respondents were female by design because the study focused on reproductive health education for adolescent girls.

Table 1. Characteristics of Study Participants

Characteristic	n	%
Age 15 years	2	5.0
Age 16 years	36	90.0
Age 17 years	2	5.0
Female	40	100.0

Source: Primary data, 2026.

The concentration of participants at age 16 reflects the composition of the eleventh-grade cohort rather than an intentional age stratification. This relatively homogeneous age profile reduces age-related variability in cognitive maturity but also limits generalizability to younger or older adolescents. The intervention therefore represents a school-specific cohort rather than the entire adolescent population of Makassar. Adolescence is an appropriate stage for reproductive health education because health beliefs and hygiene routines are still developing. WHO guidance emphasizes that age-appropriate, scientifically accurate education can improve knowledge and support responsible health decisions. In practical terms, education about vaginal discharge should normalize physiological changes while also teaching adolescents when symptoms warrant consultation, thereby reducing both unnecessary anxiety and harmful delay in seeking care.

Pretest and Posttest Knowledge Scores

Knowledge scores increased substantially after the audiovisual intervention. The pretest mean was 52.00 (SD 18.56; range 20-80), whereas the posttest mean was 93.50 (SD 10.27; range 40-100). Because the score distributions were non-normal, medians and IQRs provide a more appropriate summary for inferential interpretation. The median increased from 60.0 (IQR 37.5-70.0) to 95.0 (IQR 90.0-100.0).

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Table 2. Distribution of Knowledge Scores Before and After Audiovisual Education

Assessment	Mean	SD	Median	IQR	Min-Max	Shapiro-Wilk p
Pretest	52.00	18.56	60.0	37.5-70.0	20-80	0.002
Posttest	93.50	10.27	95.0	90.0-100.0	40-100	<0.001

Source: Primary data, 2026. Mean, SD, and normality results were reported in the thesis; median and IQR were calculated from the master-table scores.

The increase of more than 40 points in the mean score and 35 points in the median demonstrates a large immediate educational gain. The posttest distribution also became more concentrated near the upper end of the scale, with an IQR of 90-100. This pattern suggests that the intervention not only increased average knowledge but also reduced variability among participants, bringing most students toward a high level of understanding. The size of the change is consistent with the mechanism proposed for audiovisual learning. Reproductive health topics such as the appearance of normal versus abnormal discharge, correct genital-cleaning direction, and clothing-related moisture are easier to communicate when verbal explanation is paired with visual examples. Audiovisual material can provide a concrete representation of concepts that students may otherwise find embarrassing or difficult to discuss. It can also standardize the message so that every participant receives the same core content.

Recent Indonesian evidence supports this pattern. Yuliasih et al. (2025) found that reproductive health education using video and e-leaflet media improved students' knowledge, attitudes, and practices. Wilandika et al. (2025) reported that an animated video intervention markedly increased adolescent awareness of sexual health risks and HIV prevention. Although these interventions addressed broader reproductive health topics rather than fluor albus alone, they reinforce the usefulness of short, structured audiovisual content for adolescent learning. Similarly, Fuadah et al. (2025) demonstrated significant improvements in menstrual hygiene knowledge using digital educational media among adolescent girls. The intervention effect was stronger than traditional education in their controlled study. Fajariyah and Lidia (2026) also reported significant improvements in knowledge and attitudes toward personal hygiene after video education. Together, these findings suggest that audiovisual education is especially suitable for topics involving bodily care, hygiene, and reproductive health, where visual demonstration can reinforce verbal messages.

The high posttest scores should nevertheless be interpreted as immediate knowledge acquisition rather than evidence of long-term retention or behavior change. A one-session posttest can capture short-term recall, but it cannot determine whether students continue to remember the material weeks or months later, adopt safer hygiene practices, or seek professional care appropriately when abnormal symptoms occur. Follow-up measurement is therefore essential in future studies.

Wilcoxon Signed-Rank Analysis and Magnitude of Change

Paired score analysis showed that 39 of 40 students had higher posttest scores, one student had a lower posttest score, and no students had identical pretest and posttest scores. The Wilcoxon signed-rank test yielded W=6.0 and Z=-5.44, with p<0.001. The effect size was r=0.86, indicating a very large within-participant effect. The median individual improvement was 40 points (IQR 30-60).

Table 3. Wilcoxon Signed-Rank Test for Paired Knowledge Scores

Positive ranks	Negative ranks	Ties	W	Z	p-value / Effect size
39	1	0	6.0	-5.44	p<0.001; r=0.86

Source: Re-analysis of the thesis master table. Effect size r=\|Z\|/sqrt(N).

The Wilcoxon result confirms that the change was not driven by a small number of high responders. Almost the entire cohort showed improvement. The very large effect size strengthens the interpretation that the observed immediate knowledge gain was educationally meaningful, not merely statistically significant. Reporting effect size is particularly important in small pre-post studies because p-values alone do not indicate the magnitude of change. Findings from studies specifically addressing

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vaginal discharge are consistent with this result. Sarah et al. (2026) compared video and leaflet education among adolescent girls and found significant knowledge gains in both groups, with all participants reaching good knowledge after the intervention. Barriyah (2024) reported significant improvements in knowledge and attitudes following social-media education about vaginal discharge. Merdikawati et al. (2026) also documented increased knowledge and attitudes after audiovisual education on reproductive health care and the risks of abnormal discharge.

The source thesis included studies linking poor knowledge and inadequate personal hygiene with vaginal discharge among adolescent girls. Hanifah et al. (2023) reported associations between personal hygiene, physical activity, stress, and discharge in female students, while Hanipah and Nirmalasari (2021) described gaps in knowledge and attitudes regarding vulval hygiene. These studies support the practical rationale for education: knowledge is not the same as behavior, but it is a prerequisite for recognizing appropriate hygiene practices and warning symptoms.

Clinically, education should avoid presenting all vaginal discharge as disease. Physiological discharge can occur normally around hormonal changes, whereas persistent discharge accompanied by odor, itching, burning, pain, or marked color changes warrants assessment. Current clinical guidance stresses that history alone may be insufficient to identify the etiology of vaginitis and that symptomatic individuals should be evaluated appropriately rather than self-medicating indiscriminately (Centers for Disease Control and Prevention, 2021). This distinction is important for adolescent education because fear-based messages may pathologize normal puberty-related changes.

The educational message should therefore have two balanced components. First, adolescents should receive practical prevention and hygiene guidance: keeping the genital area clean and dry, using breathable underwear, changing damp clothing and menstrual products, cleaning from front to back, and avoiding unnecessary fragranced or irritating products. Second, they should understand when self-care is insufficient and professional evaluation is needed. This combination promotes both self-efficacy and safe help-seeking. The study setting also matters. Schools can reach large numbers of adolescents before they routinely access reproductive health services. Audiovisual modules can be integrated into school health programs, counseling activities, or collaboration with primary health centers. WHO guidance supports school-based reproductive health education as a means of improving knowledge and enabling adolescents to make informed health decisions. The findings from SMA Negeri 20 Makassar suggest that even a single structured session can produce a substantial immediate knowledge gain in a school that had not previously implemented a similar program.

However, the absence of a control group prevents a strong causal conclusion. Improvements could theoretically be influenced by repeated testing, short-term memory, attention from the research team, or other uncontrolled factors. The large within-person effect and the direction of change in 39 of 40 participants are compelling, but they do not substitute for a controlled design. Future research should compare audiovisual education with standard teaching, printed materials, or interactive digital approaches and should include delayed follow-up assessments. Another limitation is the measurement instrument. The questionnaire contained only 10 dichotomous items, creating a coarse score scale in 10-point increments and a possible ceiling effect at posttest. Many students reached 90 or 100, which may limit the ability to differentiate higher levels of understanding. The thesis did not report study-specific validity or reliability coefficients. Future studies should use or develop a psychometrically tested instrument with broader item coverage, including recognition of physiological versus pathological discharge, hygiene practices, misconceptions, and appropriate care-seeking.

The sample was also relatively small, drawn from a single school, and overwhelmingly concentrated at age 16. These characteristics limit external validity. In addition, the posttest was conducted immediately after education, so long-term retention and behavioral outcomes were not assessed. Because the participants were minors, future protocols should also explicitly document the applicable institutional ethics approval and consent/assent procedures required by the reviewing ethics committee. Despite these limitations, the study has practical strengths. It used complete paired data from all 40 eligible students, provided item-level master-table scores that permit transparent re-

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analysis, and addressed a locally identified educational gap. The consistency between the present results and recent controlled or quasi-experimental digital-health studies suggests that audiovisual media are a reasonable component of adolescent reproductive health promotion. The next step is to test whether improved knowledge translates into sustained hygiene behavior, reduced inappropriate self-treatment, and earlier consultation for abnormal symptoms.

Content-Level Pattern of Knowledge Change

The availability of item-level master-table data permits a more detailed interpretation of what students learned. Correct-response percentages increased on nine of the ten questionnaire items. The largest gains occurred on items related to the effect of tight or non-absorbent underwear and genital hygiene (item 6; +75.0 percentage points), the role of damp underwear (item 5; +67.5 points), features of abnormal discharge (item 4; +52.5 points), personal hygiene as prevention (item 8; +50.0 points), and recognition of discharge that may indicate infection (item 10; +50.0 points). These patterns indicate that the audiovisual session was particularly effective for practical hygiene and warning-sign concepts that can be illustrated visually.

Table 4. Item-Level Correct Responses Before and After the Intervention

Item	Knowledge content	Pretest correct (%)	Posttest correct (%)	Change (pp)
1	Definition of vaginal discharge	77.5	100.0	+22.5
2	Normal and abnormal types	60.0	100.0	+40.0
3	Characteristics of normal discharge	52.5	97.5	+45.0
4	Characteristics of abnormal discharge	45.0	97.5	+52.5
5	Damp underwear as a risk-related hygiene issue	30.0	97.5	+67.5
6	Tight/non-absorbent underwear and poor genital hygiene	17.5	92.5	+75.0
7	Stress and fatigue in relation to discharge	75.0	97.5	+22.5
8	Personal hygiene as prevention	45.0	95.0	+50.0
9	Discharge around menstruation	87.5	77.5	-10.0
10	Yellow-green thick discharge as a possible infection sign	30.0	80.0	+50.0

Source: Re-analysis of item-level master-table scores from the thesis. pp=percentage points.

The item-level pattern is useful because an overall score can conceal specific learning gaps. At baseline, the weakest content areas were item 6 (17.5% correct), items 5 and 10 (30.0% correct each), and items 4 and 8 (45.0% correct each). These items are closely related to day-to-day prevention, personal hygiene, and recognition of abnormal symptoms. After the audiovisual session, correct responses on these items ranged from 80.0% to 97.5%, indicating that the intervention addressed precisely the practical concepts in which baseline knowledge was lowest.

The strong gain on the underwear and genital-hygiene items is educationally plausible. Adolescents may have heard general advice to “maintain cleanliness” without understanding specific mechanisms such as moisture retention, inadequate ventilation, irritation, or the importance of dry, breathable underwear. Visual demonstrations can transform vague advice into observable behaviors: when to change underwear, what types of material are preferable, how moisture accumulates, and how

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to clean the genital area. Such content can be reinforced using simple animations or images without requiring explicit or stigmatizing presentation.

The gain in recognizing abnormal discharge is also clinically relevant. Adolescents need to understand that vaginal discharge is not automatically pathological. Physiological secretions may occur around hormonal changes, while discharge accompanied by strong odor, itching, burning, pain, or unusual color may warrant clinical evaluation. The posttest improvement on items differentiating normal and abnormal discharge suggests that the educational material helped students organize these distinctions. This is important because both over-pathologizing normal discharge and dismissing abnormal symptoms can produce harm.

The only item that did not improve was item 9, which concerned whether vaginal discharge can occur during or after menstruation. The correct-response percentage decreased from 87.5% to 77.5%. This isolated decline deserves attention rather than being hidden by the large overall score increase. It may indicate residual conceptual confusion, an ambiguous item, a mismatch between the wording used in the questionnaire and the wording used in the video, or a scoring-key issue. Because the thesis did not report item-validity results or an answer-key validation process, the reason cannot be determined from the available evidence.

This finding has a direct implication for instrument refinement. Before a larger study, questionnaire items should undergo expert content validation and cognitive interviewing with adolescents to determine whether wording is understood as intended. A pilot study should then assess item difficulty, item-total correlations, and reliability. Items that are too easy, too difficult, ambiguous, or conceptually overlapping should be revised. The present item-level pattern suggests that the instrument is sensitive to large changes but may also contain ceiling effects and at least one potentially problematic item. Content-level analysis also shows why future research should not rely exclusively on total knowledge scores. A participant may achieve a high overall score while retaining a misconception about a clinically important point. Reporting domain-level or item-level outcomes can help teachers and health workers identify which messages require reinforcement. For example, future audiovisual modules could devote additional time to the normal physiology of vaginal secretions around puberty and menstruation, while maintaining clear warning signs that should prompt consultation.

Why Audiovisual Education May Produce Large Immediate Knowledge Gains

The observed improvement can be interpreted using the cognitive theory of multimedia learning. Mayer (2021) proposes that people process verbal-auditory and visual-pictorial information through partially distinct channels, each with limited capacity, and that meaningful learning requires active selection, organization, and integration of information. Well-designed audiovisual education can therefore support learning when spoken explanation and relevant images complement rather than compete with one another. In the context of reproductive health, narration can explain concepts while diagrams, icons, and demonstrations show practical behaviors and symptom characteristics.

This theoretical explanation does not mean that adding more images or animation automatically improves learning. Multimedia can become distracting when information is excessive, redundant, poorly sequenced, or unrelated to the learning objective. For sensitive topics, design quality is especially important. Students should not be overloaded with medical terminology, alarming images, or overly detailed pathology. The most effective audiovisual material is likely to be segmented into short sections, use clear language, highlight key distinctions, and allow brief pauses for reflection or questions.

The posttest ceiling observed in the present study may partly reflect the close temporal proximity between the video and the assessment. Immediately after exposure, students can often retrieve recently presented information efficiently. Long-term learning, however, requires consolidation and repeated retrieval. From a learning-science perspective, future interventions could incorporate spaced reinforcement, short follow-up quizzes, interactive discussion, or retrieval practice

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several days after the initial session. These strategies would test whether the large immediate effect can be converted into durable knowledge.

Audiovisual education may also reduce the interpersonal barriers associated with reproductive health topics. Adolescents can feel embarrassed when asking direct questions about vaginal discharge, genital hygiene, menstruation, or sexually transmitted infections. A structured video provides a standardized first exposure to the topic and can normalize discussion before a facilitator invites questions. This sequence may be less threatening than beginning with a lecture that depends entirely on verbal interaction. However, the video should be followed by an opportunity for confidential clarification, because passive viewing cannot address every misconception.

The intervention in this study can also be understood as a health-literacy intervention. Knowledge about fluor albus includes the ability to recognize relevant information, distinguish normal from abnormal signs, understand preventive actions, and decide when professional help may be needed. These are not merely facts; they are elements of functional health literacy. School-based audiovisual education can strengthen this foundation, but higher-level health literacy also requires confidence to communicate with trusted adults or health professionals, evaluate information encountered on social media, and avoid unsafe self-treatment.

The rapid expansion of digital media among adolescents makes this especially important. Young people may obtain reproductive health information from short-form videos, social media, peers, and search engines before they consult health professionals. The quality of such information varies widely. School-based audiovisual education offers an opportunity to provide a credible reference point against which students can evaluate other messages. Recent systematic-review evidence indicates that web-based sexual and reproductive health education can improve knowledge, but heterogeneity in intervention quality and outcomes remains substantial (Guo et al., 2025). This reinforces the need for evidence-based content design rather than assuming that any digital format is effective.

Comparison With Recent Evidence and Interpretation of Effect Size

The effect size of r=0.86 in the present study is larger than would typically be expected for many educational interventions. Several factors may explain this magnitude. First, baseline knowledge was modest, leaving considerable room for improvement. Second, the intervention content closely matched the 10 questionnaire items, increasing the probability that students could immediately apply what they had just learned. Third, the posttest was administered soon after the education session, maximizing short-term recall. Fourth, the questionnaire used a limited set of dichotomous items, so a small number of newly learned concepts could produce a large change in the total score.

These design features do not invalidate the finding, but they help define what the effect size represents: a very large immediate within-group improvement on the specific knowledge test used. It should not be interpreted as proof that audiovisual education will produce an equally large effect on behavior, clinical outcomes, or knowledge retention in other populations. Controlled studies such as Fuadah et al. (2025) provide stronger evidence that digital media can outperform conventional approaches, while the present study provides locally relevant evidence that the method is feasible and highly responsive in one Makassar school.

The 2026 study by Sarah et al. is especially comparable because it evaluated education about vaginal discharge and used the Wilcoxon signed-rank test. Both video and leaflet groups improved significantly, suggesting that the educational content itself is important and that more than one medium may be effective. The present study cannot determine whether audiovisual delivery was superior to a leaflet, lecture, or facilitated discussion because no comparison group was included. A future trial at SMA Negeri 20 Makassar could directly compare these formats while holding the core content constant.

Barriyah (2024) used a randomized design to evaluate TikTok-based education on vaginal discharge and found improvements in knowledge and attitudes. This suggests that adolescents may benefit from reproductive health information delivered in formats that resemble the digital

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environments they already use. However, platform familiarity should not replace educational quality. Short-form content must still distinguish physiological from pathological discharge, avoid stigmatizing language, and provide clear instructions for when to seek professional care.

Video interventions in broader adolescent reproductive health have reached similar conclusions. Wilandika et al. (2025) found that an eight-minute animated video repeated across sessions substantially improved awareness of sexual health risks and HIV prevention. Yuliasih et al. (2025) also reported improvements in reproductive health knowledge, attitudes, and practices after education through videos and e-leaflets. These findings support the plausibility of the present results while also indicating that repeated exposure and multimodal reinforcement may be useful for sustaining learning beyond a single session.

From a public-health perspective, the consistency across studies is more important than any single p-value. Different interventions, populations, and reproductive health topics repeatedly show that structured digital or audiovisual education can improve adolescent knowledge. The remaining research question is no longer simply whether videos can increase immediate knowledge, but how they should be designed, how often they should be repeated, whether they change behavior, and how they can be integrated with confidential adolescent-friendly health services.

Implications for School-Based Reproductive Health Education

For school implementation, audiovisual material should be short, scientifically accurate, culturally appropriate, and linked to opportunities for questions. Sensitive reproductive health topics are unlikely to be fully addressed by passive video viewing alone. A brief facilitated discussion can clarify misconceptions, reinforce the distinction between normal and abnormal discharge, and give students a confidential route for asking questions. School counselors and health workers can also provide referral information for persistent or concerning symptoms. Periodic reinforcement is recommended because one-time education may not be retained. Schools could repeat the module each academic year, integrate it into puberty and menstrual-health sessions, and use QR-linked microlearning content for review. Peer educators may further improve acceptability, but peer-delivered content should remain supervised to maintain scientific accuracy. Evaluation should move beyond immediate knowledge scores to include retention, attitudes, personal-hygiene practices, self-efficacy, and appropriate health-service use.

Finally, audiovisual education should be framed within broader adolescent reproductive health literacy rather than as a single-disease message. Students benefit from understanding body changes, menstruation, genital hygiene, vaginal discharge, sexually transmitted infections, confidentiality, and when to seek help. Such a comprehensive approach is consistent with current WHO recommendations for adolescent sexuality and reproductive health education and can reduce both stigma and misinformation.

4. CONCLUSION

Audiovisual-based reproductive health education was associated with a substantial immediate improvement in adolescent girls' knowledge regarding the prevention of fluor albus at SMA Negeri 20 Makassar. The mean score increased from 52.00 to 93.50, while the median increased from 60.0 to 95.0. Thirty-nine of 40 students improved after the intervention, and the Wilcoxon signed-rank test confirmed a significant change ($W=6.0$; $Z=-5.44$; $p<0.001$) with a very large effect size ($r=0.86$). These findings support the use of audiovisual material as a practical school-based reproductive health education strategy. Nevertheless, because the study used a one-group pretest-posttest design, a small single-school sample, immediate posttesting, and a questionnaire without reported study-specific psychometric coefficients, the results should be interpreted as strong evidence of short-term knowledge gain rather than definitive proof of long-term behavioral effectiveness. Future studies should use controlled designs, validated instruments, follow-up assessments, and outcomes related to hygiene behavior and appropriate care-seeking.

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