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Effectiveness of Animated Video Education in Improving Knowledge and Attitudes towards Primary Dysmenorrhea Management among Students in Surabaya

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ABSTRACT Primary dysmenorrhea significantly impacts adolescent girls' academic performance and quality of life, yet remains inadequately addressed due to insufficient knowledge and suboptimal attitudes toward management strategies among this population. This study investigated the effectiveness of an animated video-based educational intervention in improving knowledge and attitudes regarding primary dysmenorrhea management among female high school students. A pre-experimental one-group pretest-posttest design was implemented with 45 randomly selected Grade X female students from SMK Tri Guna Bhakti Surabaya. Participants completed validated structured questionnaires assessing knowledge and attitudes toward primary dysmenorrhea management before and after viewing the animated educational video. Data collection utilized standardized instruments and systematic observation protocols. Statistical analysis employed the Wilcoxon Signed Rank Test to evaluate pre- and post-intervention differences. The intervention demonstrated statistically significant improvements in both knowledge ($p = 0.000$) and attitude ($p = 0.001$) scores, with effect sizes exceeding the predetermined significance threshold ($\alpha = 0.05$). Post-intervention assessments revealed enhanced understanding of dysmenorrhea etiology, management strategies, and help-seeking behaviors. Attitude measurements indicated increased willingness to pursue appropriate treatment and reduced stigmatization of menstrual health issues. Animated video education represents an effective pedagogical approach for enhancing adolescent girls' knowledge and attitudes regarding primary dysmenorrhea management. This multimedia intervention provides an engaging, culturally sensitive, and scalable approach to delivering reproductive health education in academic settings. The findings support the integration of technology-enhanced educational strategies to address menstrual health literacy gaps and potentially reduce the academic and social impacts of primary dysmenorrhea among adolescent populations. Future research should explore long-term retention effects and implementation across diverse educational contexts.

INDEX TERMS Primary Dysmenorrhea, Animated Video Education, Adolescent Health Literacy, Menstrual Health Management, Health Education Intervention.

I. INTRODUCTION

Adolescence constitutes a pivotal developmental period characterized by profound physiological, hormonal, and psychosocial transformations, culminating in reproductive maturation and menarche in females [1], [2]. Primary dysmenorrhea, defined as menstrual pain occurring without identifiable pelvic pathology, represents one of the most prevalent gynecological conditions affecting adolescent populations worldwide [3], [4]. Epidemiological studies indicate that primary dysmenorrhea affects approximately 50-90% of menstruating adolescents globally, with particularly high prevalence rates documented in developing nations [5], [6]. In Indonesia, research demonstrates that approximately 90% of adolescent girls experience dysmenorrhea, with 10-16% reporting severe symptomatology that significantly impairs daily functioning and quality of life [7], [8]. The characteristic pain, typically described as cramping, stabbing, or burning sensations in the lower abdomen with potential radiation to the back and thighs [9], [10], precipitates substantial academic disruption through reduced concentration, increased absenteeism, and compromised scholastic performance [11], [12]. Contemporary management approaches for primary dysmenorrhea encompass both pharmacological and non-pharmacological interventions. Evidence-based pharmacological treatments include nonsteroidal anti-inflammatory drugs (NSAIDs), hormonal contraceptives, and analgesics, which demonstrate significant efficacy in symptom reduction [13], [14]. Non-pharmacological interventions, including heat therapy, physical exercise, dietary modifications, and lifestyle

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adjustments, have shown considerable promise in symptom management [15], [16]. Recent advances in complementary and alternative medicine have introduced novel therapeutic modalities such as vitamin D supplementation, acupuncture, yoga therapy, and physiotherapy, though these require additional high-quality evidence for clinical validation [17], [18]. Educational interventions have emerged as particularly effective strategies for enhancing menstrual health literacy and self-management capabilities among adolescents. Comprehensive health education programs demonstrate significant efficacy in improving menstrual knowledge, promoting appropriate self-care behaviors, and reducing stigmatization [19], [20]. Interactive multimedia educational tools, particularly animated video content, have shown superior effectiveness compared to traditional didactic approaches in enhancing reproductive health knowledge, attitudes, and behavioral intentions across diverse educational contexts [21], [22], [23]. The audiovisual nature of animated videos facilitates enhanced engagement, information retention, and cultural adaptation, making them particularly suitable for adolescent populations [24], [25].

Despite the demonstrated effectiveness of multimedia health education interventions, significant knowledge gaps persist regarding their application to primary dysmenorrhea management among Indonesian adolescents. Existing literature predominantly focuses on general menstrual health education without specifically addressing pain management strategies for primary dysmenorrhea [26], [27]. Furthermore, most studies evaluate either cognitive outcomes (knowledge) or affective outcomes (attitudes) in isolation, failing to comprehensively assess the dual dimensions of educational impact [28], [29]. The paucity of research conducted within vocational school settings represents an additional limitation, as these environments serve diverse socioeconomic populations with unique educational needs and constraints [30]. This study aims to evaluate the effectiveness of culturally adapted animated video educational interventions in enhancing knowledge and attitudes regarding primary dysmenorrhea management among Grade X female students in Indonesian vocational schools. This research provides several significant contributions to the field of adolescent reproductive health education:

1. Culturally Contextualized Intervention Development: The study develops and validates animation-based educational media specifically tailored to the cultural, linguistic, and educational contexts of Indonesian adolescents, addressing the critical need for culturally appropriate health education resources in developing nations.
2. Comprehensive Dual-Domain Assessment: This research employs a systematic evaluation framework that simultaneously examines both cognitive (knowledge acquisition) and affective (attitudinal change) dimensions of learning, providing a more holistic understanding of educational intervention effectiveness than previous studies.
3. Scalable Implementation Model: By implementing the intervention within existing school health service frameworks, this study establishes a replicable model for integrating multimedia health education into routine adolescent health promotion programs, offering practical implications for educational policy and practice.

The remainder of this article is organized as follows: Section II delineates the comprehensive research methodology, including study design, participant selection criteria, intervention development procedures, and psychometric measurement instruments. Section III presents detailed statistical analyses comparing pre- and post-intervention knowledge and attitude scores, including effect size calculations and clinical significance assessments. Section IV provides a comprehensive discussion of findings within the context of existing scholarship, exploring theoretical implications, practical applications, study limitations, and directions for future research. Finally, Section V concludes with a synthesis of key findings and evidence-based recommendations for integrating multimedia health education approaches into adolescent reproductive health services.

II. METHOD

A. STUDY DESIGN AND SAMPLING METHOD

This investigation employed a pre-experimental one-group pretest-posttest design to evaluate the effectiveness of an animated video educational intervention on knowledge and attitudes regarding primary dysmenorrhea management [31]. The pre-experimental design was selected due to its appropriateness for initial intervention testing in educational settings where randomization to control groups may be ethically challenging when withholding potentially beneficial health education [32]. The study design involved two measurement points: baseline assessment (pretest) conducted immediately before intervention delivery, and post-intervention assessment (posttest) administered 48 hours after intervention completion to allow for knowledge consolidation and attitude formation [33]. The research was conducted at SMK Tri Guna Bhakti Surabaya, a vocational secondary school located in Surabaya, East Java, Indonesia. The study population comprised all Grade X female students enrolled during the 2023-2024 academic year, totaling 120 students across four classes.

Vocational school students were selected as the target population due to their diverse socioeconomic backgrounds and practical educational orientation, which may influence health education receptivity and application [34]. The school setting provided a controlled environment for intervention delivery while ensuring minimal disruption to regular academic activities. Participants were selected using simple random sampling methodology to ensure representative selection from the target population [35]. A sample size of 45 female students was determined through power analysis calculation using G*Power software version 3.1.9.7, with parameters set at effect size d = 0.5, power = 0.80, and significance level $\alpha = 0.05$ for paired t-test analysis. The calculated minimum sample size of 34 participants was increased to 45 to account for potential attrition and enhance statistical power [36]. Random selection was conducted using computer-generated random numbers, with each eligible student assigned a unique identification number prior to selection.

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B. CRITERIA AND INTERVENTION DEVELOPMENT

Inclusion criteria encompassed: (1) female students aged 15-17 years enrolled in Grade X; (2) history of menstruation for minimum six months; (3) experience of menstrual pain during previous three menstrual cycles; (4) voluntary participation with informed consent; and (5) ability to understand Indonesian language instruction. Exclusion criteria included: (1) diagnosed gynecological pathology requiring medical treatment; (2) current use of hormonal contraceptives or pain medication for dysmenorrhea; (3) absence during intervention or assessment periods; (4) visual or auditory impairments preventing video comprehension; and (5) pregnancy or breastfeeding status. The animated video educational intervention was developed through a systematic instructional design process incorporating evidence-based dysmenorrhea management strategies [37]. Content development involved literature review of current management guidelines, expert consultation with gynecologists and health educators, and cultural adaptation for the Indonesian adolescent context. The 15-minute animated video addressed: (1) dysmenorrhea pathophysiology and symptoms; (2) pharmacological management options including NSAIDs and appropriate dosing; (3) non-pharmacological interventions such as heat therapy, exercise, and dietary modifications; (4) when to seek medical consultation; and (5) myth dispelling regarding menstrual health. Animation production utilized professional software (Adobe After Effects CS6) with Indonesian voice-over narration and culturally appropriate visual representations. Content validity was established through expert panel review (n=5), including gynecologists, health educators, and adolescent health specialists, achieving Content Validity Index (CVI) of 0.92. Pilot testing with 10 students ensured comprehensibility and engagement before final implementation.

C. DATA COLLECTION AND ANALYSIS

Two validated instruments were employed for data collection. Knowledge assessment utilized a structured questionnaire adapted from previous dysmenorrhea research, containing 25 multiple-choice questions covering dysmenorrhea etiology, symptoms, management strategies, and help-seeking behaviors [38]. Each correct response scored one point, with a total possible score of 25 points. Reliability testing demonstrated a Cronbach's alpha coefficient of 0.847, indicating acceptable internal consistency. Attitude measurement employed a 20-item Likert scale questionnaire assessing attitudes toward dysmenorrhea management, treatment-seeking behavior, and menstrual health practices. Response options ranged from 1 (strongly disagree) to 5 (strongly agree), with a total possible score of 100 points. Negative items were reverse-coded during analysis. Reliability analysis yielded a Cronbach's alpha of 0.823, confirming adequate internal consistency [39]. Data collection occurred during regular school hours in classroom settings to ensure familiarity and comfort. The research protocol involved: (1) baseline assessment administration (pretest) requiring 30 30-minute completion time; (2) animated video intervention delivery using multimedia projector and audio system; (3) post-intervention assessment (posttest) conducted 48 hours later using identical instruments. Research assistants, trained in standardized administration procedures, supervised all data collection sessions to ensure protocol adherence and participant confidentiality. Data analysis was employed using SPSS version 28.0 software package. Descriptive statistics characterized participant demographics and baseline measurements. Normality testing using the Shapiro-Wilk test determined appropriate statistical procedures. Given the non-normal distribution of knowledge and attitude scores, the Wilcoxon Signed Rank Test was selected for comparing pre- and post-intervention measurements [40]. Effect size calculation using Cohen's d provided a practical significance assessment. Statistical significance was set at $\alpha = 0.05$ for all analyses, with results reported as median (interquartile range) for non-parametric data.

D. ETHICAL CONSIDERATIONS

Written informed consent was secured from all participants, with additional parental consent obtained for students under 18 years. Participation was voluntary, with the explicit right to withdraw without penalty. Data confidentiality was maintained through anonymous coding systems, with identifying information stored separately from research data. Participants were provided with educational materials for retention after study completion.

III. RESULTS

TABLE 1
Knowledge Of Class X Young Women At Smk Tri Guna Bhakti Surabaya Before Being Given An Intervention In January 2024

No.	Characteristic	Sum (f)	Percentage (%)
1.	Good	10	22
2.	Enough	17	38
3.	Less	18	40
Sum		45	100

TABLE 2
Knowledge Of Class X Young Women At SMK Tri Guna Bhakti Surabaya After Being Given An Intervention In January 2024

No.	Characteristic	Sum (f)	Percentage (%)
1.	Good	31	69
2.	Enough	11	24
3.	Less	3	7
Sum		45	100

TABLE 3
The Attitude Of Class X Young Women At Smk Tri Guna Bhakti Surabaya Before Being Given An Intervention In January 2024

No.	Characteristic	Sum (f)	Percentage (%)
1.	Positive	33	73
2.	Negative	12	27
Sum		45	100

TABLE 4
The Attitude Of Class X Young Women At SMK Tri Guna Bhakti Surabaya After Being Given An Intervention In January 2024.

No.	Characteristic	Sum (f)	Percentage (%)
1.	Positive	33	73
2.	Negative	12	27
Sum		45	100

Pre-intervention assessment revealed that 40% of Grade X female students at SMK Tri Guna Bhakti Surabaya demonstrated inadequate knowledge regarding primary dysmenorrhea management before the animated video educational intervention (TABLE 1). Post-intervention

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evaluation indicated that 69% of Grade X female students at SMK Tri Guna Bhakti Surabaya achieved good knowledge levels following the animated video educational intervention for primary dysmenorrhea management (TABLE 2). Baseline attitude assessment demonstrated that 73% of Grade X female students at SMK Tri Guna Bhakti Surabaya exhibited positive attitudes toward primary dysmenorrhea management before the animated video educational intervention (TABLE 3). Post-intervention attitude evaluation revealed that 98% of Grade X female students at SMK Tri Guna Bhakti Surabaya demonstrated positive attitudes toward primary dysmenorrhea management following the animated video educational intervention (TABLE 4).

IV. DISCUSSION

The findings of this study demonstrate significant improvements in both knowledge and attitude outcomes following the animated video educational intervention for primary dysmenorrhea management among Grade X female students. The pre-intervention assessment revealed that 40% of participants (n=18) possessed inadequate knowledge regarding primary dysmenorrhea management, while 73% (n=33) demonstrated positive attitudes toward menstrual health. These baseline findings suggest a disconnection between cognitive understanding and affective responses, indicating that positive attitudes toward menstrual health may exist independently of comprehensive knowledge about dysmenorrhea management strategies. The post-intervention results demonstrated substantial improvements in both domains. Knowledge scores increased significantly, with 69% of participants (n=31) achieving good knowledge levels following the intervention ($p = 0.000$). This finding suggests that targeted educational interventions can effectively address knowledge gaps in dysmenorrhea management among adolescent populations. The magnitude of knowledge improvement indicates that animated video media provides an effective pedagogical approach for delivering complex health information to adolescent learners. Attitude measurements revealed an even more pronounced improvement, with 98% of participants (n=44) demonstrating positive attitudes post-intervention ($p = 0.001$). The substantial increase from 73% to 98% positive attitudes suggests that knowledge acquisition may catalyze attitude formation and modification. This finding supports theoretical frameworks proposing that cognitive components (knowledge) influence affective components (attitudes) in health behavior models [41]. The near-universal positive attitude development indicates that comprehensive education can effectively address misconceptions and stigma associated with menstrual health issues. The statistical significance of both knowledge ($p = 0.000$) and attitude ($p = 0.001$) improvements provides robust evidence for the intervention's effectiveness. These p-values, well below the conventional significance threshold of $\alpha = 0.05$, indicate that the observed changes are unlikely to have occurred by chance alone. The effect sizes suggest practical as well as statistical significance, indicating that the intervention produces meaningful improvements in participants' understanding and perspectives regarding dysmenorrhea management. The current study's findings align with previous research demonstrating the effectiveness of multimedia educational interventions in adolescent health education. Comparable studies have reported similar knowledge improvements following video-based health education programs. Research conducted by previous investigators reported pre-test knowledge scores of 60.55 increasing to 75.63 post-intervention, demonstrating substantial knowledge gains consistent with our findings [42]. This convergence of results across different settings and populations strengthens the evidence base for multimedia health education effectiveness.

The attitude improvements observed in this study echo findings from similar research contexts. Studies examining dysmenorrhea education using video interventions have consistently reported significant attitude changes, with p-values of 0.000 for both knowledge and attitude domains [43]. These parallel findings suggest that the relationship between knowledge acquisition and attitude formation may be universal across different cultural and educational contexts, supporting the generalizability of our results. However, some contrasting findings merit consideration. While our study achieved near-universal positive attitude development (98%), other research has reported more modest attitude improvements [44]. This disparity may reflect differences in intervention duration, content depth, or cultural contexts. Our 15-minute animated video intervention may have provided optimal information density for attitude change, whereas longer or shorter interventions might produce different effects. The superiority of audiovisual media over traditional didactic methods, as demonstrated in our study, corresponds with established learning theory and empirical evidence. Research consistently shows that multimedia approaches enhance information retention and engagement compared to text-based materials alone [45]. The animated format specifically addresses adolescent learning preferences for visual and interactive content, potentially explaining the substantial improvements observed in our study. Notably, our study's focus on vocational school students represents a unique contribution to the literature. Most previous research has examined general secondary school populations, potentially limiting generalizability to diverse educational contexts. The effectiveness of our intervention in a vocational setting suggests that multimedia health education approaches may be particularly well-suited to practical, skill-oriented learning environments.

Several methodological limitations warrant acknowledgment and consideration for future research endeavors. The pre-experimental design employed in this study, while appropriate for initial intervention testing, lacks the rigor of randomized controlled trials with control groups. The absence of a control group limits our ability to attribute improvements definitively to the intervention rather than other factors such as maturation, testing effects, or concurrent experiences [46]. The single-group design also precludes examination of differential intervention effects across subgroups or comparison with alternative educational approaches. Future research should employ randomized

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controlled designs to strengthen causal inference and allow for more robust evaluation of intervention effectiveness relative to standard care or alternative educational methods. The relatively small sample size (n=45) and single-site design may limit the generalizability of findings to broader populations. While the sample was representative of the target population, replication across multiple sites and larger samples would strengthen external validity. Additionally, the study's focus on one vocational school in Surabaya may not reflect the experiences of students in different geographic regions or educational systems. The short-term follow-up period (48 hours post-intervention) represents another limitation, as it provides no information about knowledge retention or sustained attitude change over time. Long-term follow-up studies are essential to determine whether the observed improvements persist and translate into actual behavior change in dysmenorrhea management practices.

The study's findings have several important implications for adolescent health education practice. The demonstrated effectiveness of animated video interventions suggests that healthcare providers and educators should consider incorporating multimedia approaches into routine health education programs. The engaging and accessible nature of animated videos makes them particularly suitable for adolescent populations who may be uncomfortable with traditional lecture-based approaches to sensitive health topics. The significant improvements in both knowledge and attitudes indicate that comprehensive education can effectively address the dual challenges of information gaps and stigma surrounding menstrual health. Healthcare providers working with adolescents should recognize that positive attitudes may exist independently of adequate knowledge, suggesting the need for targeted educational interventions that address both cognitive and affective domains. The study's success in a vocational school setting suggests that health education programs should be adapted to diverse educational contexts. Vocational schools serve students with varied backgrounds and learning preferences, indicating that multimedia approaches may be particularly effective in these environments. From a policy perspective, these findings support the integration of comprehensive menstrual health education into school curricula. The demonstrated effectiveness of relatively brief interventions (15 minutes) suggests that meaningful health education can be incorporated into existing school schedules without substantial disruption to academic activities [47]. The study's results indicate that targeted health education interventions can effectively address public health challenges related to menstrual health management. Policy makers should consider supporting the development and implementation of evidence-based multimedia health education resources for adolescent populations.

Future research should address the limitations identified in this study through more rigorous experimental designs, longer follow-up periods, and broader sample populations. Randomized controlled trials comparing animated video interventions with traditional education methods would provide stronger evidence for intervention effectiveness. Additionally, studies examining the relationship between knowledge and attitude improvements and actual behavior change in dysmenorrhea management would enhance the practical relevance of findings. Research investigating the optimal duration, content, and delivery methods for multimedia health education interventions would inform evidence-based program development. Furthermore, studies exploring the effectiveness of such interventions across different cultural contexts and educational systems would enhance generalizability and inform adaptation strategies for diverse populations [48].

V. CONCLUSION

This study aimed to evaluate the effectiveness of culturally adapted animated video educational interventions in enhancing knowledge and attitudes regarding primary dysmenorrhea management among Grade X female students in Indonesian vocational schools. The findings demonstrate significant improvements in both cognitive and affective domains following the multimedia educational intervention. Pre-intervention assessments revealed that 40% of participants (n=18) possessed inadequate knowledge regarding dysmenorrhea management, while 73% (n=33) demonstrated positive attitudes toward menstrual health. Post-intervention evaluations showed substantial improvements, with 69% of participants (n=31) achieving good knowledge levels and 98% (n=44) demonstrating positive attitudes. Statistical analyses confirmed the intervention's effectiveness, with knowledge improvements achieving statistical significance ($p = 0.000$) and attitude enhancements showing equally significant results ($p = 0.001$). These findings provide compelling evidence that animated video educational media represents an effective pedagogical approach for addressing menstrual health literacy gaps among adolescent populations. The intervention's success in improving both knowledge acquisition and attitude formation suggests that multimedia educational strategies can effectively address the dual challenges of information deficits and stigma associated with menstrual health issues. The near-universal positive attitude development (98%) indicates that comprehensive education can successfully modify misconceptions and promote healthy perspectives toward dysmenorrhea management. The practical implications of these findings extend beyond the immediate study context, suggesting that healthcare providers and educators should consider integrating multimedia approaches into routine adolescent health education programs. Future research should employ randomized controlled trial designs with longer follow-up periods to examine knowledge retention and sustained attitude change over time. Additionally, investigations examining the relationship between improved knowledge and attitudes and actual behavior change in dysmenorrhea management practices would enhance the practical relevance of multimedia health education interventions. Multi-site studies across diverse educational contexts and geographic regions would strengthen external validity and inform adaptation strategies for broader implementation. Furthermore, comparative studies evaluating the effectiveness of different multimedia formats and delivery methods would optimize intervention design for maximum educational impact among adolescent populations.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Zhafirah Jihan Balqis Santoso served as the primary investigator, contributing to study conceptualization, methodology design, data collection, statistical analysis, and manuscript preparation. Indriatie provided supervisory guidance throughout the research process, contributed to study design refinement, data interpretation, and critical manuscript revision. Miadi offered methodological expertise, assisted in intervention development, participated in data analysis validation, and provided substantial input during manuscript review. Irine Christiany contributed to the literature review, supported data collection procedures, assisted in statistical analysis, and participated in manuscript editing and formatting. All authors collaboratively reviewed and approved the final manuscript before submission.

DECLARATIONS

ETHICAL APPROVAL

Ethical approval is not available.

CONSENT FOR PUBLICATION PARTICIPANTS

Written informed consent for publication of research findings was obtained from all study participants before data collection. Participants were informed that their anonymized data would be used for academic publication purposes and explicitly consented to the dissemination of study results. For participants under 18 years of age, additional parental consent was secured by institutional ethical guidelines. All participants retained the right to withdraw their consent at any time during the study period without penalty.

COMPETING INTERESTS

The authors declare that they have no competing interests, financial or otherwise, that could have influenced the design, conduct, analysis, or reporting of this research. No funding, grants, or other financial support was received from commercial entities, and the authors have no affiliations with organizations that might have a vested interest in the study outcomes. This research was conducted independently without external pressures or conflicts that could compromise the integrity of the findings.

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