

Animated Video-Based Health Education on Primary School Students' Knowledge of Scoliosis: One Group Pretest-Posttest Study

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ABSTRACT

Introduction: Scoliosis is a musculoskeletal disorder that commonly develops during periods of growth and may lead to long-term complications if not detected early. Health education represents a key preventive approach to improving students' knowledge and awareness of spinal health. This study aimed to assess the effect of animated video-based education on primary school students' knowledge of scoliosis.

Method: A quantitative pre-experimental design with a one-group pretest–posttest approach was employed. The sample comprised 66 students in grades 4–6 at SDN 03 Tilongkabila, selected through purposive sampling. Data were collected using a 15-item questionnaire that was previously validated ($r > 0.444$) and demonstrated acceptable reliability (Cronbach's Alpha = 0.728). The intervention consisted of an 8-minute animated video on scoliosis and its prevention. Data was analyzed using a paired t-test.

Results: The findings revealed a statistically significant improvement in students' knowledge following the intervention (mean pretest = 6.80; mean posttest = 12.29; $p < 0.001$), with a mean difference of 5.485. These results indicate that animated video-based health education is effective in enhancing students' understanding of scoliosis, its risk factors, and preventive measures.

Conclusion: Integrating engaging health education into school settings may serve as an effective promotive and preventive strategy to reduce the risk of musculoskeletal disorders among school-aged children.

Keywords: Knowledge improvement, prevention, school-based health education, scoliosis



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Introduction

Scoliosis is a musculoskeletal disorder characterised by a lateral curvature of the spine accompanied by vertebral rotation, with a Cobb angle of $\geq 10^\circ$.^{1,2} The condition typically develops during periods of rapid growth in childhood and adolescence. In its early stages, scoliosis is often asymptomatic, leading to delayed detection until the curvature becomes more pronounced. If not appropriately managed, it may progress into a chronic condition associated with impaired respiratory function, reduced physical activity, persistent pain, and decreased quality of life.³⁻⁵ Musculoskeletal disorders are among the leading causes of disability worldwide, significantly affecting functional capacity, productivity, and overall well-being, while imposing a substantial burden on healthcare systems. Within this context, scoliosis represents an important public health concern, particularly among school-aged populations.^{6,7} Most cases in children and adolescents are classified as adolescent idiopathic scoliosis (AIS), a subtype for which the etiology remains unclear. The prevalence of AIS ranges from 2% to 5% in the general pediatric population and tends to increase during puberty.

Variations in prevalence across regions suggest the influence of genetic, environmental, and lifestyle factors.⁴ School-based screening programmes have been widely implemented to facilitate early detection, with large-scale studies indicating that approximately 3–4% of students are identified with scoliosis. Early identification enables timely conservative management, including corrective exercises, postural therapy, and bracing, which are effective in preventing curve progression.^{6,8} However, the effectiveness of these strategies depends not only on screening but also on awareness and understanding of spinal health. Health education plays a key role in improving knowledge of risk factors and preventive behaviors from an early age.⁹ Primary school children are particularly vulnerable to postural problems due to prolonged sitting during classroom activities. Poor posture, inappropriate furniture, excessive schoolbag loads, and increased use of digital devices often associated with non-ergonomic positions may further elevate the risk of musculoskeletal disorders.^{6,9}

In developing countries, including Indonesia, attention to scoliosis among children remains limited. Reported prevalence ranges from 2% to 3% among adolescents; however, these estimates may underestimate the true burden due to limited screening and low awareness of early detection. Inadequate knowledge among students, parents, and educators also contributes to delayed case identification.¹⁰ From a public health perspective, promotive and preventive strategies are essential to reduce the risk of musculoskeletal disorders. Health education has been shown to improve knowledge and encourage healthier postural behaviors.^{8,11,12} With advances in educational technology, digital media such as animated

videos, are increasingly used in health education. These media can effectively visualise abstract concepts, including spinal alignment and proper posture, thereby enhancing comprehension and information retention.^{11,12} Animated videos can facilitate the visualization of complex concepts, such as spinal curvature and proper postural principles, thereby enhancing conceptual understanding and information retention.¹²

Schools provide a strategic setting for implementing health promotion programmes due to the high level of student engagement. Integrating health education into the curriculum offers an effective approach to instilling healthy behaviors from an early age. However, empirical evidence on students' knowledge of scoliosis and the effectiveness of educational interventions remains limited, indicating a research gap. Therefore, this study aims to assess the effect of scoliosis-related health education on students' knowledge at SDN 03 Tilongkabila.

Methods

This study employed a quantitative approach using a pre-experimental one-group pretest–posttest design. The study was conducted in January 2026 at SDN 03 Tilongkabila, Bone Bolango Regency. The population comprised all students in grades 4–6 ($n = 124$), from which 66 participants were selected through purposive sampling. Inclusion criteria included students actively enrolled in grades 4–6, willing to participate, attending the full health education session, and consenting to scoliosis screening using the Adam's Forward Bend Test following the posttest. Exclusion criteria were students outside grades 4–6, those who did not complete the study, or those absent during the intervention.

Data were collected using a 15-item questionnaire that had been pilot-tested on 20 primary school students. All items were valid ($r > 0.444$), and the instrument demonstrated acceptable internal consistency (Cronbach's Alpha = 0.728). Data were analyzed using SPSS version 27.0 (IBM, USA). Differences in knowledge scores before and after the intervention were assessed using a paired t-test. The intervention consisted of an approximately 8-minute animated video providing information on scoliosis, including its risks and early prevention strategies. Ethical approval was obtained from the Ethics Committee of Gorontalo State University (No. 019A/UN47.B7/KE/2026).

Result

A total of 66 students participated in this study. The baseline characteristics of respondents were shown on Table 1. The majority were aged 11–12 years (37.8%) and were in grade 6 (37.8%). Female students accounted for 60.6% of the sample, while 39.4% were male. Based on scoliosis screening, 12.12% of participants were identified as having scoliosis.

Table 1. Characteristics of respondents (N=66)

Characteristics		Frequency (n)	Percentage (%)
Age	9 – 10	20	30.2%
	10 – 11	21	32.0%
	11 – 12	25	37.8%
Gender	Female	40	60.6%
	Male	26	39.4%
Scoliosis Status	Yes	8	12.12%
	No	58	87.88%
Grade	4	20	30.3%
	5	21	32.0%
	6	25	37,7%

As shown in Table 2, the results of the paired t-test showed a significant increase in students' knowledge scores following the intervention. The mean pretest score was 6.80, which increased to 12.29 in the posttest, with a mean difference of 5.485 (SD = 2.488). Statistical analysis indicated that this difference was significant ($p < 0.001$), demonstrating that the health education intervention had a positive effect on students' knowledge of scoliosis.

Table 2. Effect of health education on knowledge

Knowledge	Mean	Mean Difference	SD	<i>p</i> -value
Pretest	6.80	5.485	2.488	<0.001
Post test	12.29			

Discussion

This study demonstrates that health education plays a significant role in improving primary school students' knowledge of scoliosis and increasing awareness of the importance of maintaining proper posture from an early age. The significant increase in knowledge scores following the intervention indicates that educational strategies are effective in supporting promotive and preventive efforts to reduce the risk of musculoskeletal disorders in school-aged children.¹³ The findings also suggest that animated video-based education can effectively convey key information regarding scoliosis, including its risks, contributing factors, and preventive measures.¹² This is particularly important given that scoliosis is often asymptomatic in its early stages, leading to delayed detection and increased risk of complications such as

chronic pain, respiratory dysfunction, and reduced quality of life.^{5,14} These results are consistent with previous studies demonstrating that school-based health education improves musculoskeletal health literacy and promotes positive postural behaviors.^{8,11}

Schools represent a strategic setting for such interventions, as they enable systematic and continuous engagement with children during a critical period of habit formation. In addition to knowledge, behavioral factors play a crucial role in the development of postural disorders. Prolonged sitting, particularly in non-ergonomic positions, may negatively affect postural balance and increase the risk of spinal abnormalities, highlighting the importance of posture-related education.¹¹ The effectiveness of health education is influenced by the methods and media used. Interactive and engaging approaches, such as animated videos, can enhance student participation and facilitate understanding. In addition, game-based learning has been shown to increase motivation and engagement, which may further support knowledge acquisition and retention.^{15,16} From a public health perspective, these findings support the integration of health education into school settings as a sustainable strategy for early prevention of musculoskeletal disorders. Such interventions not only improve knowledge but also have the potential to promote long-term healthy behaviors.^{12,16}

However, this study has several limitations. The relatively small sample size and the use of a single study site limit the generalizability of the findings. Moreover, this study did not assess long-term behavioral changes or consider other contributing factors, such as genetic predisposition, physical activity levels, and environmental influences. Future research should involve larger and more diverse samples, as well as longitudinal designs to evaluate sustained behavioral outcomes. The development of more innovative and technology-based educational approaches is also recommended to enhance intervention effectiveness. Overall, the implementation of engaging, participatory, and sustainable health education programmes in schools represents a promising strategy for reducing the risk of musculoskeletal disorders among children.

Conclusion

Health education significantly improves primary school students' knowledge of scoliosis. The use of audiovisual media is effective in delivering information on risk factors and preventive measures. Therefore, integrating health education into school settings represents a valuable promotive and preventive strategy to reduce the risk of musculoskeletal disorders from an early age.

Conflicts of Interest

None.

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