

The Effect of Shaken Baby Syndrome Education through QR Code Access on Parents' Knowledge and Skills

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Abstract

Background: Shaken baby syndrome (SBS) is a collection of symptoms due to a baby being shaken, which is violence that befalls a baby after being shaken too hard. Health education media, such as animated videos, engage the senses of sight and hearing, making them more effective and easier to understand. **Aims:** To determine the average score of parents' knowledge and skills about shaken baby syndrome. **Methods:** This study used a quantitative method with a quasi-experimental pre-test and post-test with a control group. The sample for this study comprised 38 parents of babies <11 months, selected using probability sampling with cluster random sampling. The research instrument used a questionnaire that had been tested for validity and reliability. **Results:** The results of the study through dependent and independent t-tests obtained a significant difference in the average score of knowledge and skills before and after treatment in each group with a p-value of 0.001 and there was a significant difference in the average score of knowledge and skills after treatment between the intervention group and the control group with the results of the knowledge variable p-value 0.002 and the results of the skill variable p-value 0.001. **Conclusion:** Education on shaken baby syndrome via QR code access significantly increases respondents' knowledge and skills in the Parakannyasag Health Center work area.

Keywords: audiovisual, health education, knowledge, shaken baby syndrome, skills.



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Introduction

Infancy is a critical period of human development, spanning from birth to 11 months of age. During this stage, infants undergo rapid growth and development; however, their physiological systems are still immature, making them highly vulnerable to disease, injury, and environmental risks (Kemenkes, 2023). In addition to health vulnerabilities, infants are also at risk of experiencing violence, whether intentional or unintentional. One form of violence that poses serious risks to infants is Shaken Baby Syndrome (SBS), also

known as Abusive Head Trauma (AHT). SBS occurs when an infant is violently shaken, resulting in severe brain injury such as intracranial hemorrhage, retinal hemorrhage, and diffuse axonal injury, which may lead to death or long-term disability (AlOmran et al., 2022). AHT is widely recognized as one of the most severe forms of child abuse due to its high morbidity and mortality rates.

Globally, SBS remains a significant public health concern. Recent studies indicate that AHT continues to contribute substantially to infant morbidity and mortality, with serious neurological consequences among survivors (McInerney et al., 2020). Survivors often experience

developmental delays, cognitive impairment, and lifelong disabilities, emphasizing the importance of prevention strategies (Gutierrez et al., 2020). The primary trigger of SBS is excessive infant crying, which can lead to caregiver frustration, stress, and loss of emotional control. Factors such as sleep deprivation, lack of knowledge about normal infant behavior, and poor coping strategies significantly increase the risk (Aisah et al., 2021). Misinterpretation of infant crying and inability to soothe the baby often contribute to harmful caregiver responses.

Additional risk factors include low parental education, young maternal age, substance abuse, lack of social support, and infant-related conditions such as prematurity or chronic illness (AlOmran et al., 2022; McInerney et al., 2020). These factors can compound caregiver stress and increase the likelihood of abusive behaviors.

In Indonesia, specific data on SBS cases remain limited. However, infant population data indicate a substantial number of infants at potential risk. For example, in Tasikmalaya City, there are over 11,000 infants under one year of age, including those within the working area of the Paranyasag Health Center (Dinkes, 2023; Santika, 2023). Preliminary findings from local interviews suggest that many parents lack awareness of SBS, highlighting a significant gap in knowledge and prevention.

One of the main contributing factors to SBS is the lack of parental knowledge about the dangers of infant shaking and appropriate strategies for managing crying (Fajarianto et al., 2021). Therefore, effective educational interventions are essential for improving parental understanding and reducing the risk of infant injury. Health education plays a crucial role in influencing knowledge, attitudes, and behaviors. The use of engaging and interactive media, such as audiovisual tools, has been shown to improve comprehension and retention of health information (Aisah et al., 2021). Furthermore, digital technologies such as QR codes provide practical and efficient methods for disseminating information. QR codes enable quick access to educational content through mobile devices, making them highly suitable for modern parents (Fajarianto et al., 2021).

Given the limited data on SBS and the low level of parental awareness in the Paranyasag Health Center area, targeted educational interventions are needed. QR code-based education is considered an innovative and accessible approach to improving parental knowledge and skills. This study aims to evaluate the effect of QR code-based education on parents' knowledge and skills regarding Shaken Baby Syndrome (SBS), with the

expectation of reducing the risk of infant injury and improving child health outcomes

Methods

The method used was a quantitative quasi-posttest experiment with a control group. The sample for this study comprised 38 parents of babies <11 months old, selected through probability sampling using cluster random sampling and then screened against inclusion and exclusion criteria. Respondents consisted of 19 control groups and 19 intervention groups. Data collection was carried out over 5 days, beginning with a pre-test, followed by treatment for each group, and ending with a post-test. The research instrument uses questionnaires that have been tested for validity and reliability. Data were quantitatively analyzed using descriptive and inferential statistics. To evaluate the immediate effects of the educational intervention within each group, a dependent t-test (paired t-test) was performed to compare the mean scores of parents' knowledge and skills before (pre-test) and after (post-test) the intervention. Furthermore, an independent t-test was used to determine whether there were statistically significant differences in post-intervention mean scores for knowledge and skills between the intervention and control groups. All statistical analyses were conducted with a significance threshold set at $p < 0.05$. Study approval was obtained from Tasikmalaya Health Polytechnic (Approval number: DP.04.03/F.XXVI.20/234/2021, dated June 27, 2024).

Results

Table 1 shows that each group consisted of 19 respondents. Regarding age, the majority of mothers in the intervention group were between 26 and 35 years old (68.4%), while the control group was also predominantly composed of mothers aged 26–35 years (47.4%). In terms of educational attainment, most respondents in both groups had completed senior high school or vocational high school education, accounting for 68.4% of the intervention group and 73.7% of the control group. Regarding occupation, nearly all respondents were homemakers, representing 94.7% of participants in both groups. Based on monthly household income, the majority of respondents reported a family income ranging from IDR 500,000 to IDR 1,500,000 per month, comprising 52.6% of the intervention group and 63.2% of the control group.

Table 1. Characteristics of Respondents by Maternal Age, Educational Attainment, Occupation, and Household Income (n = 38)

Demographics	Classification	Intervention Groups (n=19)		Group Control (n=19)	
		n	%	n	%
Mother's Age	Ages 17-25	3	15.8	6	31.6
	Ages 26-35	13	68.4	9	47.4
	Ages 36-45	3	15.8	4	21.1
Education level	Elementary school	3	15.8	2	10.5
	Junior high school	2	10.5	3	15.8
	Senior high school/vocational school	13	68.4	14	73.7
Work	Bachelor	1	5.3	0	0
	Housewife	18	94.7	18	94.7
	State civil servants	1	5.3	0	0
Family Income	Other/employee/Employees	0	0	1	5.3
	<500,000	3	15.8	3	15.8
	500,000-1,500,000	10	52.6	12	63.2
	>2.000.000	6	31.6	4	21.1

Table 2 demonstrates that, in the intervention group, the mean pre-intervention knowledge score was 5.68 ± 0.582 , with scores ranging from 5 to 7. Following the intervention, the mean knowledge score increased to 10.74 ± 0.933 , with a score range of 9 to 12. These findings indicate a mean increase of 5.06 points in knowledge scores after the intervention. The mean pre-intervention skill score in the intervention group was 7.74 ± 0.452 , with scores ranging from 7 to 8. After the intervention, the mean skill score increased to $9.79 \pm$

0.419, with a score range of 9 to 10, representing a mean improvement of 2.05 points. In the control group, the mean baseline knowledge score was 5.26 ± 1.759 , with scores ranging from 2 to 9. Following the observation period, the mean knowledge score increased to 9.68 ± 1.003 , with a score range of 8 to 11, corresponding to a mean increase of 4.42 points. Similarly, the mean baseline skill score in the control group was 7.53 ± 0.513 , with scores ranging from 7 to 8. After the observation period, the mean skill score increased to 8.68 ± 0.478 , with a score range of 8 to 9, representing a mean improvement of 1.15 points.

Table 2 Average scores of parents' knowledge and skills before and after the intervention and control group care

Groups	Variable	Mean	Min	Max	SD	95% CI	
						Lower	Top
Intervention Groups	Previous Knowledge Score	5.68	5	7	0.582	-5,620	-4.485
	Knowledge Score After	10.74	9	12	0.933	-2.305	-1,800
	Previous Skill Score	7.74	7	8	0.452	-5.109	-3,733
	Skill Score After	9.79	9	10	0.419	-1,526	-0.789
Group Control	Previous Knowledge Score	5.26	2	9	1,759	-5.109	-3,733
	Knowledge Score After	9.68	8	11	1.003	-1,526	-0.789
	Previous Skill Score	7.53	7	8	0.513	-1,526	-0.789
	Skill Score After	8.68	8	9	0.478	-1,526	-0.789

Table 3 shows that the average score of knowledge after treatment in the intervention group was 10.74, with a minimum value of 9 and a maximum of 12, and a standard deviation of 0.933. While in the control group, the average score was 9.68 with a minimum value of 8 and a maximum value of 11, and a standard deviation of

1.003. The average difference was obtained as 1.06 and a p-value of 0.002 (p-value <0.05), which means there is a difference in the average score of knowledge after being given treatment between the intervention group and the control group.

Table 3. Difference in Average Score of Knowledge and Skills After Treatment Between the Intervention Group and Control Group

Groups	Variables	Average	Min	Max	SD	p-value
Intervention Group	Knowledge score	10.74	9	12	0.933	0.002
	Skill score	9.79	9	10	0.419	<0.001
Control Group	Knowledge score	9.68	9	12	0.933	0.002
	Skill score	8.68	8	9	0.478	<0.001

Discussion

The findings of this study demonstrate that QR code-based animated video education significantly improved parents' knowledge and skills regarding *Shaken Baby Syndrome* (SBS). This finding is consistent with previous studies showing that multimedia-based educational interventions effectively enhance the comprehension of complex health information. Smartphone-delivered video education has been shown to improve parental knowledge and decision-making in the care of preterm infants (Flynn et al., 2023), while virtual parenting education significantly enhances maternal parenting competence (Nouri et al., 2023). Likewise, QR code-assisted learning has produced higher knowledge and skill outcomes than conventional teaching methods in nursing education (Bagheri-Nesami et al., 2025). Collectively, these findings support the effectiveness of integrating animated digital media and QR technology into parental health education.

The superior effectiveness of audiovisual learning observed in this study is also supported by broader evidence on digital education. Video-based learning has been associated with significantly higher post-test scores and better knowledge retention than traditional lectures (Singh et al., 2025). Similarly, interactive multimedia enhances cognitive learning outcomes (Muslimah et al., 2025), whereas immersive technologies, including augmented reality and virtual reality, have demonstrated superior cognitive, affective, and engagement outcomes compared with conventional instructional approaches (Koç & Kanadli, 2025; Ka et al., 2025). These findings suggest that interactive digital media promote learning by increasing learner engagement, facilitating knowledge retention, and simplifying complex concepts.

Participant characteristics may also have contributed to the intervention's effectiveness. Most participants were 26–35 years old and had completed secondary education, representing an age group actively engaged in early parenting. Nevertheless, lower educational attainment has been associated with limited awareness of the emotional complexity of parenting (Augustine & Negraia, 2023). Furthermore, parental readiness is influenced by personal identity development, with stronger identity commitment associated with greater preparedness for parenthood, whereas ruminative identity exploration may hinder

successful transition into the parenting role (Verhelst et al., 2025). Better emotional well-being has also been linked to more positive parenting practices (LaMonica et al., 2025). Therefore, the effectiveness of the intervention likely reflects both the quality of the educational media and the participants' psychosocial characteristics.

Socioeconomic conditions should also be considered when interpreting these findings. Most participants had household incomes below the regional minimum wage, a condition associated with increased parenting stress. Low socioeconomic status has been consistently identified as a major risk factor for child maltreatment (Schneider et al., 2021), while income instability during early childhood has been linked to increased parenting stress and adverse developmental outcomes (Zhang et al., 2024). Conversely, higher minimum wages have been associated with reduced maternal stress and improved parenting practices (Rokicki et al., 2023). These findings suggest that educational interventions to prevent SBS should be complemented by broader social and economic policies that strengthen family well-being.

The use of QR codes also offers practical advantages for delivering health education. QR technology enables rapid, flexible, and real-time access to educational resources while reducing cognitive burden and improving usability (Macías, 2022). Its application across various daily activities has demonstrated improvements in efficiency (Eom et al., 2022), and its widespread adoption following the COVID-19 pandemic reflects growing public acceptance of QR-based technologies (Koay & Ang, 2024). Consequently, QR codes represent a feasible and scalable platform for delivering parenting education in contemporary healthcare settings.

From a practical perspective, integrating QR code-based animated video education into routine health promotion programs at primary healthcare centers could strengthen efforts to prevent SBS and other forms of child maltreatment. Digital health interventions have consistently improved health-related behaviors among children, adolescents, and families (Loganathan, 2022; Oh et al., 2022). Similar approaches have also demonstrated effectiveness in addressing gender-based violence and adolescent health (Huang et al., 2022), while the *Irie Homes Toolbox* program in Jamaica highlights the

successful integration of digital resources into violence prevention initiatives (Francis et al., 2025). Therefore, incorporating digital educational media into routine maternal and child health services may expand program reach, improve educational effectiveness, and support sustainable child protection efforts, particularly in low- and middle-income countries (Edwards et al., 2023).

This study has several limitations. The relatively small sample size (38 participants) and recruitment from a single primary healthcare center limit the generalizability of the findings. In addition, parenting skills were assessed using self-reported questionnaires rather than direct behavioral observations or long-term follow-up. Future multicenter studies with larger samples and longitudinal behavioral assessments are needed to evaluate the sustained effectiveness of QR code-based educational interventions in preventing SBS.

Conclusion

This research shows that using animated videos in education yields a greater increase in knowledge and skills than lecture-based methods. There is a clear difference between the two methods, with the QR Code-based audiovisual approach showing better results. This study recommends expanding the use of this method through supervised educational programs, the use of QR Code technology in health institutions, and conducting further research with a broader scope to validate its effectiveness.

Declaration of Conflicting Interest

No conflict of interest to declare.

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Author's Contribution

All Authors contributed to the study's conception and design, data acquisition, and data analysis, wrote the first draft of the manuscript, revised the final draft, and gave final approval of the version to be published.

Data Availability Statement

The dataset generated during and analyzed during the current study is available from the corresponding author upon reasonable request.

Declaration of Use of AI in Academic Writing

The author used ChatGPT/Gemini in the writing process to improve readability and remove grammatical errors. However, he took full responsibility for the content.

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