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Effectiveness of Online and Offline Educational Media in Increasing Pregnant Women's Knowledge about the Warning Signs of Preeclampsia in Rural Aceh Besar Regency

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Abstract

This study explores the effectiveness of online and offline educational media in enhancing pregnant women's knowledge about the warning signs of preeclampsia in rural Aceh Besar District. Preeclampsia is a serious pregnancy complication that can lead to severe health risks for both mothers and infants, making education on its warning signs essential. A quasi-experimental design was utilized, involving three groups of pregnant women: one group received education through an animated video, the second group was provided with an online booklet, and the third group received an offline booklet. The study included pre-test and post-test assessments to evaluate knowledge improvement, followed by statistical analysis using the Wilcoxon signed-rank test and the Kruskal-Wallis test to determine the effectiveness of each intervention. The results revealed significant increases in average post-test scores across all groups, with a p-value of 0.000 indicating strong statistical significance. The video group demonstrated the highest improvement, with pre-test scores averaging 72.10 and post-test scores rising to 86.30, resulting in an increase of 14.20. The online booklet group showed a substantial increase as well, with pre-test scores of 68.70 rising to 81.00, reflecting an increase of 11.90. Similarly, the offline booklet group experienced an increase from 72.60 to 81.20, marking an increase of 8.60. These findings underscore the effectiveness of all intervention methods in improving knowledge about preeclampsia among pregnant women. Notably, the animated video emerged as the most effective educational tool, demonstrating its potential to engage and inform effectively.

Keywords: Preeclampsia, Pregnant women, Educational media, Online education, Offline education, Knowledge improvement, Rural health

Introduction

Preeclampsia is a hypertensive condition that occurs during pregnancy, typically after the 20th week, with a global prevalence ranging from 2-8% of all pregnancies. It can lead to serious complications for both mothers and babies, including maternal and neonatal mortality(Chang et al., 2023a; Djuanda et al., 2023). In Indonesia, the prevalence of preeclampsia is estimated to be around 10%, making it one of the leading causes of maternal death, significantly contributing to the maternal mortality rate in the country(Chang et al., 2023a; Djuanda et al., 2023). Efforts to raise awareness, ensure early diagnosis, and manage this condition through education for pregnant women are crucial in reducing the risks and complications associated with preeclampsia (Agarwal et al., 2022). In Aceh Province, preeclampsia accounted for 106 cases out of 471 maternal deaths (22.5%) over the last three years. Preeclampsia is one of the complications of pregnancy and is the second leading cause of maternal mortality, with an estimated 70,000 deaths due to preeclampsia occurring each year worldwide. It is one of the five leading causes of maternal death, responsible for 16% of maternal deaths.(Rana et al., 2019)

Preeclampsia can actually be prevented through prompt diagnosis, appropriate interventions, effective management, a well-functioning referral system, and efforts to enhance public knowledge and understanding of the condition(Tabassum et al., 2022). Research conducted by the Preeclampsia Foundation shows that 75% of pregnant women who receive counseling about the signs and symptoms of preeclampsia have sufficient knowledge to report the symptoms they experience and regularly monitor their blood pressure and pregnancy. A lack of awareness among patients regarding the importance of prenatal check-ups significantly affects outcomes for pregnant women. Several educational methods have been developed to improve pregnant women's knowledge about the risk factors for preeclampsia, including maternal and child health monitoring (PWS KIA), the Labor Planning and Complication Prevention Program (P4K), and the use of maternal and child health books (KIA). However, the results achieved are still far from expectations. The importance of health promotion media in the educational process cannot be overlooked.

Literature Review

Audio and visual media, particularly videos that combine animation and sound elements, have proven effective in delivering health messages persuasively to the public(Jane et al., 2018; Stellefson et al., 2020b). Additionally, booklets are often used to provide specific information that is easily accessible, making them a practical learning alternative. In the digital age, access to health information is vital for improving individual and community health(Bharti, 2023; Ghahramani et al., 2022). Unfortunately, rural communities often face limitations in accessing online information compared to urban populations, especially regarding high-speed internet availability. Infrastructure limitations in rural areas also pose significant barriers to obtaining health information. Therefore, this research aims to explore the effectiveness of various educational media, both online and offline, in enhancing pregnant women's knowledge about the warning signs of pregnancy, particularly preeclampsia.

Research Method

This study employs a quasi-experimental design, specifically a three-group pretest-posttest design, to assess the effectiveness of different educational interventions on pregnant women's knowledge of preeclampsia. The research will be conducted in three sub-districts: Kuta Baro, Darusalam, and Peukan Bada in Aceh Besar Regency, targeting a population of 240 pregnant women as of April 2023. Utilizing Slovin's formula with a 5% margin of error, the sample size is calculated to be 150, ensuring sufficient representation for the study. The intervention involves three groups: the first group will receive a 5-minute animated video focused on preeclampsia, the second group will benefit from health education delivered through an online booklet, while the control group will receive a printed booklet for their educational needs. The data collection process will begin with obtaining informed consent from participants, followed by the distribution of pre-test and post-test questionnaires designed to measure understanding of preeclampsia. Each respondent will be supported by enumerators who have undergone training to ensure consistent and accurate questionnaire completion.

The research instruments will include a comprehensive questionnaire that gathers both general data—such as the age of the respondents, their place of residence, gestational age, and number of children—and specific data focused on their knowledge regarding preeclampsia. Once data is collected, it will undergo editing to check for completeness, followed by coding to facilitate efficient tabulation based on the research variables.

Data analysis will be conducted using SPSS software, consisting of univariate analysis to describe the characteristics of each variable and bivariate analysis employing dependent and independent t-tests. The dependent t-test will compare means of paired data (before and after the intervention) at a 95% confidence level ($\alpha = 0.05$), while the independent t-test will compare means between unrelated groups. If the data does not meet normality assumptions, the Mann-Whitney test will be applied. Knowledge improvement will be categorized based on median values, with high knowledge indicated by scores equal to or above the median and low knowledge indicated by scores below the median. This structured approach aims to provide insights into the effectiveness of various educational media in enhancing knowledge about preeclampsia among pregnant women.

Result

Respondent Characteristics

The characteristics of respondents in this study encompass various aspects that are crucial for understanding the participant profile. The following characteristics will be collected:

Table 1. Distribution of Respondent Characteristics

No	Respondent Characteristics	Video Group		Online Booklet Group		Offline Booklet Group	
		f	%	f	%	f	%
1	Age						
	≤35 Years	42	84,0	37	74,0	45	90,0
	35 Years	8	16,0	13	26,0	5	10,0
2	Education Level						
	Primary	7	14,0	10	20,0	10	20,0
	Secondary	20	40,0	24	48,0	24	48,0
	Higher Education	23	46,0	16	32,0	16	32,0
3	Trimester of Pregnancy						
	First Trimester	7	14,0	8	16,0	10	20,0
	Second Trimester	26	52,0	17	34,0	17	34,0
	Third Trimester	17	34,0	25	50,0	23	46,0
4	Employment Status						
	Employed	8	16,0	11	22,0	2	4,0
	Unemployed	42	84,0	39	78,0	48	96,0
5	Source of Information						
	Health Workers	21	42,0	20	40,0	25	50,0
	Print Media	2	4,0	3	6,0	10	20,0
	Electronic Media	27	54,0	17	34,0	11	22,0
	Never Received Information	0	0,0	10	20,0	4	8,0
6	Frequency of Intervention Participation						
	Once a week	1	2,0	11	22,0	12	24,0
	Every 10 days	0	0,0	2	4,0	2	4,0
	2-3 times a week	15	30,0	19	38,0	8	16,0
	4-5 times a week	3	6,0	2	4,0	4	8,0
	Once a week	19	38,0	10	20,0	24	48,0
	Every day	12	24,0	6	12,0	0	0
	Total	50	100,0	50	100,0	50	100,0

Based on Table 1, the majority of respondents in each group were aged ≤35 years, with 42 individuals (84.0%) in the video group, 37 individuals (74.0%) in the online booklet group, and 45 individuals (90.0%) in the offline booklet group. In terms of education, the majority of respondents in the video group had a high education level, totaling 23 individuals (46.0%). Conversely, in the online booklet and offline booklet groups, the majority had a secondary education, with 24 individuals (48.0%) in each group. Regarding the trimester of pregnancy, most respondents in the video group were in their second trimester, totaling 26 individuals (56.0%). In the online booklet and offline booklet groups, the majority were in their third trimester, with 25 individuals (50.0%) and 23 individuals (46.0%), respectively.

Regarding employment status, the majority of respondents in each group were unemployed: 42 individuals (84.0%) in the video group, 39 individuals (78.0%) in the online booklet group, and 48 individuals (96.0%) in the offline booklet group. In the video group, most respondents had previously received information about the dangers of preeclampsia from electronic media, totaling 27 individuals (54.0%). In the online booklet group, 20 individuals (40.0%) reported receiving this information from health workers, while in the offline booklet

group, 25 individuals (50.0%) had also received information from health workers.

In the video group, 12 individuals (24.0%) participated in the intervention daily. In the online booklet group, 6 individuals (12.0%) engaged in the intervention daily. However, in the offline booklet group, no respondents participated in the intervention on a daily basis.

Table 2. Average Knowledge of Respondents About the Dangers of Preeclampsia in Each Group

No	Group		Mean	SD	Median	Min – Max
1	Video	Pre-test	72,10	8,02	70,00	60 – 90
		Post-test	86,30	7,20	85,00	70 – 100
		Difference	14,20	8,29	15,00	0,00 – 30
2	Booklet Online	Pre-test	68,70	13,39	70,00	30 – 100
		Post-test	81,00	9,42	80,00	60 – 100
		Difference	11,90	10,73	10,00	-10 – 45
3	Booklet Offline	Pre-test	72,60	13,41	72,50	45 – 100
		Post-test	81,20	10,07	80,00	50 – 100
		Difference	8,60	10,92	10,00	-20 – 35

Based on Table 2, in the group that received the video intervention, the average knowledge of respondents before the intervention was 72.10, with a minimum score of 60 and a maximum score of 90. After the intervention, the average knowledge increased to 86.30, with a minimum score of 70 and a maximum score of 100. The average difference in knowledge before and after the intervention was 14.20, with a minimum difference of 0 and a maximum difference of 30. In the group that received the online booklet, the average knowledge before the intervention was 68.70, with a minimum score of 60 and a maximum score of 100. Following the intervention, the average knowledge increased to 81.00, with a minimum score of 60 and a maximum score of 100. The average difference in knowledge before and after the intervention was 11.90, with a minimum difference of -10 and a maximum difference of 45. In the group that received the offline booklet, the average knowledge before the intervention was 72.60, with a minimum score of 45 and a maximum score of 100. After the intervention, the average knowledge increased to 81.20, with a minimum score of 50 and a maximum score of 100. The average difference in knowledge before and after the intervention was 8.60, with a minimum difference of -20 and a maximum difference of 35.

Table 3. Differences in Average Knowledge Before and After Intervention in Each Group (Wilcoxon Signed-Rank Test)

No	**Group**		***Mean Rank***		***p-value***
			Negative Rank	***Positive Rank***	
1	Video	Pre-test – Post-test	0,00	23,50	0,000
2	Booklet Online	Pre-test – Post-test	9,83	22,91	0,000
3	Booklet Offline	Pre-test – Post-test	17,10	20,99	0,000

Based on Table 3, the group that received the video intervention showed that the average post-test score was higher than the pre-test score, with a mean rank of 23.50. The results of the Wilcoxon signed-rank test yielded a p-value of 0.000, indicating a significant difference in average knowledge before and after the animated video intervention on preeclampsia. In the group that received the online booklet, the average post-test score was also higher than the pre-

test score, with a mean rank of 22.91. The Wilcoxon signed-rank test produced a p-value of 0.000, which means there was a significant difference in average knowledge before and after the online booklet intervention. For the group that received the offline booklet, the average post-test score was again higher than the pre-test score, with a mean rank of 20.99. The Wilcoxon signed-rank test resulted in a p-value of 0.000, indicating a significant difference in average knowledge before and after the offline booklet intervention.

Table 4. Differences in Average Pretest, Posttest, and Knowledge Difference in the Video, Online Booklet, and Offline Booklet Groups (Kruskal-Wallis Test)

No	Knowledge	Groups	Mean ± SD	Mean Rank	p-value
1	Pre-test	Video	72,10 ± 8,02	79,41	0,253
		Booklet Online	68,70 ± 13,39	67,27	
		Booklet Ofline	72,60 ± 13,41	67,27	
2	Post-test	Video	86,30 ± 7,20	90,70	0,009
		Booklet Online	81,00 ± 9,42	67,13	
		Booklet Ofline	81,20 ± 10,07	68,67	
3		Video	14,20 ± 8,29	87,24	0,022
	difference	Booklet Online	11,90 ± 10,73	75,70	
		Booklet Ofline	8,60 ± 10,92	63,56	

Based on Table 4, the analysis using the Kruskal-Wallis test indicates that there was no significant difference in average knowledge before the intervention among the three groups (p-value = 0.253). However, there was an increase in average knowledge after the intervention for each group. The Kruskal-Wallis test results showed a p-value of 0.009, indicating a significant difference in average knowledge after the intervention among the three groups. The highest average post-test knowledge was in the video group, with a score of 86.30, compared to the online booklet group (81.00) and the offline booklet group (81.20). In terms of the average difference in knowledge, the p-value was 0.022, indicating a significant difference in the average knowledge differences among the three groups, with the highest average difference found in the video group at 14.20. This suggests that respondents who received education through the video were more effectively able to increase their knowledge about the dangers of preeclampsia during pregnancy.

Table 5 presents the differences in average post-test knowledge between the video group, online booklet group, and offline booklet group, analyzed using the Mann-Whitney test.

No	group		Mean Rank	p-value
1	Post-test	Video	58,49	0,005
		Booklet Online	42,51	
2	Post-test	Video	57,71	0,012
		Booklet Offline	43,29	
3	Post-test	Booklet Online	50,12	0,894
		Booklet Offline	50,88	

Based on Table 5, there is a significant difference in average post-test knowledge scores between the group that received the video intervention and the group that received the online booklet (p-value = 0.005). Similarly, the difference in average post-test knowledge scores between the video group and the offline booklet group also showed a significant difference (p-

value = 0.012). However, the comparison of average post-test knowledge scores between the online booklet group and the offline booklet group did not demonstrate a statistically significant difference (p-value = 0.894). This indicates that the group that received the video intervention was more effective in enhancing pregnant women's knowledge about the dangers of preeclampsia compared to those who received the online and offline booklets.

Discussion

The results of the study indicate a significant increase in the average post-test scores compared to pre-test scores after the intervention in all three groups: those who received the animated video, the online booklet, and the offline booklet, with a p-value of 0.000. In the group that received the animated video, the average pre-test score was 72.10, while the post-test score increased to 86.30, demonstrating a knowledge increase of 14.20. This improvement suggests that video-based interventions are effective in enhancing participants' understanding of the dangers of preeclampsia. In the group that received the online booklet, the average pre-test score was 68.70, and the post-test score increased to 81.00, resulting in a knowledge increase of 11.90. Similarly, in the offline booklet group, the average pre-test score was 72.60, and the post-test score rose to 81.20, with a knowledge increase of 8.60. While all three interventions showed effectiveness, the use of animated video proved to be superior in enhancing pregnant women's knowledge, as it produced the highest average post-test score.

These findings align with recent research in maternal health education, emphasizing that digital media, particularly video, can present health information in a more engaging and easily understood manner(Darlington et al., 2018; Roy et al., 2023; Stellefson et al., 2020a). Various studies have shown that the use of audiovisual media, such as animated videos, can increase audience interest and attention, especially among pregnant women who may have numerous questions and concerns about their health and that of their babies. Animated videos can simplify complex medical concepts, making them more accessible to laypersons. For instance, in the context of preeclampsia, videos can clearly depict symptoms, causes, and associated risks, as well as the importance of early detection and appropriate care. Furthermore, the use of animated videos allows for interactive and engaging information delivery, which can enhance information retention among pregnant women(Chang et al., 2023b; Kókai et al., 2022). Those exposed to information via video are likely to find it easier to remember and apply what they have learned in their daily lives. Research indicates that visually presented information can improve understanding by up to 60% compared to traditional methods such as printed materials(Bellamy et al., 2007; Roy et al., 2023). The audio elements in animated videos add an additional dimension to the learning process. The accompanying narration can provide verbal explanations that sync with the visuals, accommodating various learning styles. This is particularly beneficial for those who understand information better through auditory means or a combination of audio-visual stimuli. Additionally, the use of background music or sound effects can enhance the emotional engagement of viewers, making the learning experience more memorable and impactful.

Conclusion

The conclusion of this study shows a significant increase in average post-test scores compared to pre-test scores after the intervention in all three groups: those who received the animated video, the online booklet, and the offline booklet, with a p-value of 0.000. In the group that received the animated video, the average pre-test score increased from 72.10 to 86.30, reflecting a knowledge increase of 14.20. This indicates that video-based interventions are highly effective in enhancing participants' understanding of the dangers of preeclampsia. The group that received the online booklet also demonstrated a significant increase, with the initial pre-test score of 68.70 rising to 81.00, resulting in a knowledge increase of 11.90. Meanwhile, the group using the offline booklet experienced an increase from 72.60 to 81.20, with a knowledge increase of 8.60. These findings underscore the effectiveness of all forms of intervention in improving understanding of preeclampsia, while also emphasizing that animated video is the most effective method. Therefore, it is essential to utilize engaging and informative educational media in maternal health programs, particularly to raise awareness of the dangers of preeclampsia among pregnant women.

Declaration of Conflicting Interest

The author declares that there is no conflict of interest in the implementation and results of this research.

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