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The application of the Dhiana Setyorini Score Card in early detection of the risk of preeclampsia

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ABSTRACT

Preeclampsia pregnancy complications can negatively impact the fetal in the womb, potentially leading to delayed or non-developmental growth. This study aimed to determine the effect of the application of the Dhiana Setyorini Score Card on the early detection of preeclampsia risk. The study employed a quasi-experimental design, with an intervention group receiving the Dhiana Setyorini Score Card and a control group receiving counselling on preeclampsia. The study utilized purposive sampling with 100 cadres divided into two groups, focusing on four health centers in Bima, Indonesia, and analyzed using the Mann-Whitney test. Knowledge in the intervention group increased significantly in both knowledge and ability categories. However, in the control group, knowledge and ability did not differ significantly. The application of the Dhiana Setyorini Score Card in the intervention group was better than counselling conducted by the health center for the early detection of preeclampsia. There was a significant difference between the levels of knowledge and ability in the intervention group ($p<0.005$). In conclusion, the application of the Dhiana Setyorini Score Card is more effective in increasing knowledge and the ability to detect preeclampsia early than the counselling method conducted by a health center.

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1. INTRODUCTION

The risks of pregnancy are dynamic because healthy pregnant women can suddenly experience complications such as preeclampsia [1]-[5]. Preeclampsia is a dangerous disorder that commonly manifests itself after 20 weeks of pregnancy [6]. It is characterized by high blood pressure and damage to other organs [6]. It is important for pregnant women to attend regular prenatal check-ups to monitor for signs of complications such as preeclampsia. Both the mother and the baby are at risk for developing major issues as a result of preeclampsia, which can include premature birth and low birth weight [7]. Early detection and management of preeclampsia are crucial to ensure safe pregnancy and delivery. In the presence of pregnancy-induced hypertension (blood pressure that is equal to or greater than 140/90 mmHg after 19 weeks of gestation) and substantial proteinuria (greater than 0.3 g/24 hours), preeclampsia is diagnosed [8]. The severity of preeclampsia can be further classified as either mild or severe, depending on the classification scheme that is utilized [9], [0]. In addition to severe hypertension (defined as a blood pressure reading of 170/110 mmHg or higher) and significant proteinuria, severe preeclampsia may also be accompanied by other maternal symptoms of end-organ failure [11].

About 800 women around the world lose their lives due to pregnancy and childbirth-related factors that may have been avoided. 99 percent of these fatalities took place in low- and middle-income countries, sometimes known as LMICs. When the millennium development goals were established at the beginning of the 21st century, they placed maternal health at the center of the fight against poverty and inequality. Hypertensive disorders during pregnancy are an important cause of severe morbidity and mortality among mothers and infants, and 10% of women experience them during pregnancy. Globally, preeclampsia is the second leading cause of maternal mortality, resulting in an estimated 76,000 deaths per year. In addition, 500,000 fetal and newborn lives are lost annually due to the perinatal consequences of preeclampsia.

Two to eight percent of all pregnancies are complicated by preeclampsia, and preeclampsia and eclampsia are related with ten to fifteen percent of all maternal deaths that occur directly. It is estimated that roughly 0.5–0.9% of all pregnancies are complicated by severe signs of preeclampsia, which include hemolysis, increased liver enzymes, and low platelets. Additionally, approximately 10–20% of cases of severe preeclampsia are involved in complications. When compared to the death rate at 37 weeks or later, preeclampsia at a gestational age of less than 32 weeks was related with a twentyfold increase in maternal mortality. Women who had preeclampsia had a higher overall mortality rate many years later [12], which was also greater than the general mortality rate among women. Additionally, preeclampsia is a significant contributor to the demise of both the fetus and the newborn. Preeclampsia is highly connected with fetal growth restriction, low birth weight, premature delivery, respiratory distress syndrome, and admission to neonatal intensive care [13]. Hypertension and/or proteinuria during pregnancy have also been linked to stillbirth. Furthermore, preeclampsia has been linked to stillbirth.

Indonesian Health Profile Data 2019, hypertension in pregnancy is the leading cause of maternal death after bleeding with a total of 1,066 cases [14]. As for data in the province of West Nusa Tenggara (NTB), the number of mothers who died due to preeclampsia starting in 2018 was 29 cases, increasing to 39 cases in 2019, then decreasing by 31 cases in 2020, and in 2021 decreasing again to 28 cases [15]. Although there is a reduction, the death rate due to preeclampsia still needs to be monitored and considered to improve the quality of maternal health services in NTB. Prevention efforts and appropriate treatment need to be continuously improved to reduce the death rate due to hypertension in pregnancy in the area.

With advances in technology, various methods have emerged to detect early preeclampsia, including the Dhiana Setyorini Score Card method, a simple tool used to detect the risk of preeclampsia in pregnant women. This method is so simple that everyone can use it, including family members, pregnant women, and community health workers. The Dhiana Setyorini Score Card is capable of early detection of PE with an accuracy of 90.9% of the gold standard, and a sensitivity of 96.8% and a specificity of 79.7% [16]. This method, through empowerment and collaboration with health cadres, has not yet been widely implemented in communities. Therefore, the Dhiana Setyorini Score Card method is used. It has not yet been optimally used by the wider community, even though the way to operate this method is quite simple and can be used by families and the wider community to detect the risk of preeclampsia early so that the incidence of preeclampsia in pregnant women can be reduced to a minimum. The main challenge for cadres is to ensure proper training and education on how to effectively use the Dhiana Setyorini Score Card method in order to improve its implementation and impact in communities. Additionally, establishing strong partnerships with healthcare providers and local authorities can help support the integration of this method into existing maternal health programs. This problem is not only for cadres in the research location but also for all health cadres in detecting preeclampsia, because proper training and education are essential for the implementation of effective health care methods. The novelty of this study lies in its focus on improving maternal health outcomes through the use of the Dhiana Setyorini Score Card method. By emphasizing the importance of training and education, healthcare providers can ensure that the Dhiana Setyorini Score Card method is implemented correctly and effectively. This research has the potential to not only improve maternal health outcomes in the research location, but also serve as a model for other communities looking to enhance their maternal health programmes.

The aim of this study was to determine the effect of the application of the Dhiana Setyorini Score Card on the early detection of preeclampsia risk. We hope that this research will provide useful information for the development of maternal and child health programmes in the community. It is hoped that the results of this research will increase public understanding of the importance of early detection of preeclampsia to prevent more serious complications. In addition, we hope that this research will provide recommendations to related parties to increase the role of health cadres in the early detection of preeclampsia.

2. METHOD

This study used a quasi-experimental design, with a two-group approach (intervention and control). The intervention group was given increased knowledge and ability to detect preeclampsia using the Dhiana Setyorini Score Card, which can be downloaded on the Playstore with the link https://play.google.com/store/

apps/detailsprovidedom.aplikasi.ksds. The delivery of the use of the Dhiana Setyorini Score Card was carried out by a certified senior midwife and assisted by researchers. The intervention group was given knowledge on how to use the Dhiana Setyorini Score Card and repeated 3 times to increase understanding. While control only given counseling about preeclampsia once through activities at the community health center. Specific components of the Dhiana Setyorini Score Card are statements regarding early detection of pregnancy poisoning risk/preeclampsia, consisting of the number of pregnancies, pregnancy poisoning heredity, age, history of high blood pressure, overweight, history of pregnancy poisoning, history of diabetes which are then scored and categorized into low and high risk. Practical application of the Dhiana Setyorini Score Card can be done by midwives at health centers for early detection of preeclampsia so as to avoid maternal death due to childbirth. The specific version of the Dhiana Setyorini Score Card that we use is the initial version published by Dhiana Setyorini in collaboration with the Ministry of Health. The Poltekkes Kemenkes Mataram awarded this study with the number LB.01.03/6/217/2024, which indicates that it was approved for ethical conduct.

Porposive sampling was used, with a total sample of 100 health cadres divided into 50 control and 50 treatment groups. The number of samples was determined using the Lemeshow equation. The randomized sample technique that we use is to determine the population first, then choose the sample size using a formula lemeshow which then gets the number 100. Then it is divided into two control and intervention groups, each of which is given a number where odd numbers become controls and even numbers become interventions using Excel. The research location includes four community health centers in each sub-district of Bima City: Jatibaru, Asakota, West Rasanae, and East Rasanae. Health cadres were selected on the basis of their availability and willingness to participate in the study. Data were collected through interviews and observations to assess the impact of a specific intervention. Further details are provided in the consort diagram as shown in Figure 1.

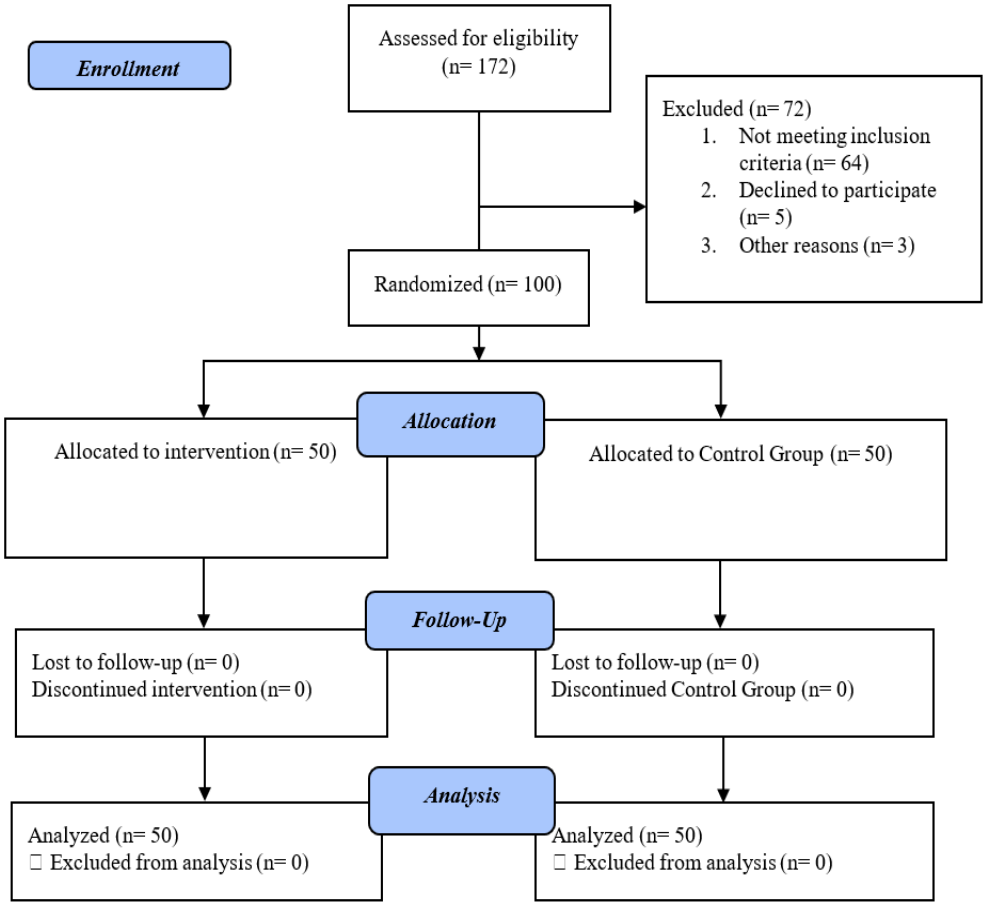

Figure 1. Consort diagram [17]

The collected data were expressed in the form of ratios. The tool used for data analysis is SPSS version 29. Before analyzing the data, a normality test was performed using the Shapiro-Wilk test. Most data were not normally distributed. Therefore, non-parametric data analysis was used, namely the Mann–Whitney test (between-group test) [18]. The Mann-Whitney U test is a non-parametric test used to compare two independent groups when the data are not normally distributed. This test is particularly useful in situations in which the assumptions of parametric tests cannot be met [19].

The Ministry of Health in Indonesia (Number: DP.04.03/XXXIV/1180/2024) has registered for this study, and the necessary parties at the research site have also given their approval. At the coordination stage, four health centers that served as research locations for cadre development and sample selection were selected. Coordination was then performed on the chosen samples. The health centers were chosen based on their capacity to support the study objectives and accessibility to the target population. This ensured that research could be conducted efficiently and effectively within the community.

The questionnaire disseminated by the Republic of Indonesia's Ministry of Health served as a model for the research. The questionnaire consists of respondent characteristics (age, education, gender, marital status, work status), knowledge, and ability level. For the purpose of determining whether or not the questionnaire was valid, the Pearson product-moment analysis test was considered. According to the results of the test, every single question that was submitted had a value that was greater than 0.5. If the results of the reliability test show that the variable has a Cronbach's alpha score that is greater than 0.958, then it is possible to assert that the variable is reliable or consistent in terms of measurement. In general, the study questionnaire that was constructed based on the model used by the Ministry of Health proved both validity and reliability. The credibility of the procedures used to collect data for the study is improved as a result of these findings.

3. RESULTS AND DISCUSSION

Table 1 shows that respondents in the intervention and control groups were homogeneous in all categories, with each p-value>0.05. This indicates that the respondents in the intervention and control groups were similar; therefore, the results of the treatment were not influenced by the characteristics of the respondents. Therefore, any differences observed in the outcomes can be attributed to the intervention itself rather than to pre-existing differences between the groups. This strengthens the validity of the study's findings and supports treatment effectiveness. Randomization was used to assign participants to the intervention and control groups, further ensuring that any differences observed were not due to bias. This strengthens the internal validity of the study and increases confidence in the results. More detail can be seen in Table 1.

Table 1. Homogeneity and characteristics of respondents

Characteristics		Intervention		Control		Homogeneity of intervention and control groups
		N	%	N	%	
Age (Years)	20-30	8	16	3	16	0.763
	31-40	29	58	24	58	
	41-50	13	26	23	26	
Education	Elementary school	-		1	2	0.698
	Junior high school	4	8	6	12	
	Senior high school	34	68	41	82	
	College	12	24	2	4	
Gender	Man	15	30	3	6	0.885
	Woman	35	70	47	94	
Marital status	Single	7	14	-	-	0.985
	Marry	41	82	48	96	
	Widower/widow	2	4	2	4	
Work	Government employees	5	10	-	-	0.547
	Private sector employee	15	30	3	6	
	Self-employed	28	56	27	54	
	Farmer	2	4	20	40	

Table 2 shows that knowledge in the intervention group increased significantly in both knowledge and ability categories. However, in the control group, knowledge and abilities did not differ significantly between pre- and post-tests. This showed that the implementation of the Dhiana Setyorini Score Card in the intervention group was better than that provided by the community health center for detecting early preeclampsia. These results suggest that the Dhiana Setyorini Score Card may be a more effective tool for improving knowledge and abilities related to early preeclampsia detection compared to the standard methods used by community health centers.

Table 3 shows that there was a significant difference between the level of knowledge and ability in the intervention group, with a p-value <0.005 for each. In the control group, there were no significant differences in knowledge quality (p>0.005). These results suggest that the intervention had a positive impact on participants' knowledge and ability levels compared to the control group. These findings highlight the effectiveness of the intervention in improving outcomes. Overall, the data indicated that the intervention group experienced a notable improvement in both knowledge and ability compared to the control group. This demonstrates the importance of implementing such interventions to enhance participant outcomes.

Table 2. Level of knowledge and abilities of pre-post respondents in the intervention and control groups

Domain	Type test	Category	Intervention		Control	
			N	%	N	%
Knowledge level	Pre-test	Good	-	-	-	-
		Moderate	12	24	10	20
		Poor	38	76	40	80
		Total	50	100	50	100
	Post-test	Good	37	74	-	-
		Moderate	13	26	11	22
		Poor	-	-	39	78
		Total	50	100	50	100
Ability level	Pre-test	Good	-	-	-	-
		Moderate	11	22	13	26
		Poor	39	78	37	74
		Total				
	Post-test	Good	34	68	35	70
		Moderate	16	32	15	30
		Poor	-	-	-	-
		Total	50	100	50	100

Table 3. Differences in the level of knowledge and abilities of respondents in the intervention and control groups

Variable (group)	Group	N	Mean	Z	P
Pre-post test knowledge	Intervention	50	1.24	6.179	0.000
	Control	50	1.20	243	0.808
Pre-post test ability	Intervention	50	1.22	6.164	0.000
	Control	50	1.26	1.414	0.157

Respondents in the intervention and control groups were homogeneous across all categories, with a p-value>0.05. This indicates that the respondents in the intervention and control groups were similar; therefore, the results of the treatment were not influenced by the characteristics of the respondents. Thus, it can be concluded that factors other than respondent characteristics influenced the treatment results. Therefore, the results of this study are valid and reliable. Sample homogeneity is important for providing reliable results and broader generalization to a wider population [20], [21]. Confidence in this study was further strengthened by the similarity in the respondent characteristics between the intervention and control groups.

Knowledge in the intervention group increased significantly in both knowledge and ability categories. However, in the control group, knowledge and abilities did not differ significantly between pre- and post-tests. This shows that the application of the Dhiana Setyorini Score Card in the intervention group was better than counseling conducted by the community health center for detecting early preeclampsia. This is in line with research conducted by Dhiana Setyorini which shows that the use of the Dhiana Setyorini Score Card is more effective in detecting early preeclampsia [16]. Thus, it can be concluded that the use of the Dhiana Setyorini Score Card can significantly increase knowledge and ability to detect preeclampsia. These results highlight the importance of implementing effective methods to prevent and treat health conditions such as preeclampsia. The Dhiana Setyorini Score Card can be a useful tool for health workers to improve the early detection of preeclampsia to provide appropriate and effective treatment. Thus, increasing knowledge and ability to detect preeclampsia can help reduce the risk of serious complications in pregnant women and their fetuses [22]-[28]. Preeclampsia is dangerous in pregnant women because it can cause high blood pressure, organ damage, and even death. Pregnant women should receive appropriate and regular medical care to prevent serious complications. This may involve close monitoring of blood pressure and protein levels in the urine as well as adjustments to diet and physical activity according to the doctor's recommendations. If preeclampsia is not treated properly, the risk of complications for the mother and fetus can increase significantly. Preeclampsia is very common in pregnant women, especially during the second

and third trimesters of pregnancy [29], [30]. The findings of previous studies demonstrated that preeclampsia can result in premature birth as well as a low birth weight in infants [31]. The symptoms of preeclampsia, which include severe headaches, changes in vision, and swelling, should be brought to the attention of pregnant women, and they should seek medical assistance if they encounter any of these warning signals [32].

Delays in detecting preeclampsia can affect the fetus and the baby in the womb, and can even cause premature birth or fetal death. Previous studies have demonstrated that the early detection and appropriate care of preeclampsia can considerably lower the risk of problems for both the mother and the infant [33]. Therefore, it is essential to have prenatal examinations on a regular basis and to pay close attention to the signs and symptoms of preeclampsia, which include signs and symptoms such as proteinuria and high blood pressure [34]. The process of preeclampsia itself is still not fully understood, but risk factors such as obesity, a previous history of preeclampsia, and multiple pregnancies can increase the likelihood of its occurrence [35]-[39]. It is crucial for health care providers to be vigilant in monitoring pregnant individuals for signs of preeclampsia and educating patients on the importance of seeking medical attention if they experience any concerning symptoms. Early detection and management of preeclampsia can significantly improve the outcomes for both the mother and the baby.

There was a significant difference between the level of knowledge and ability in the intervention group (p-value<0.005 for both). In the control group, there were no significant differences in knowledge quality (p>0.005). This indicates that the intervention had a positive impact on the knowledge and abilities of the group. These results can serve as the basis for the development of more effective intervention programs in the future. Therefore, it is important to develop appropriate intervention strategies to increase community knowledge and abilities [40]. By understanding the impact of interventions on knowledge and abilities, future programs can be tailored to address specific needs within communities effectively. It is crucial to continue evaluating and refining intervention strategies to ensure optimal outcomes for participants.

Urine protein increases the risk of preeclampsia during pregnancy. Therefore, it is important to monitor protein levels in urine regularly during pregnancy to detect preeclampsia early [8]. According to previous research conducted, early detection of preeclampsia can help in managing the condition effectively and reducing the risk of complications for both the mother and the baby. It is recommended to consult with a healthcare provider for proper monitoring and management of urine protein levels during pregnancy [41]. Diabetes also increases the risk of pre-eclampsia. Therefore, it is important to maintain a stable blood glucose level during pregnancy. Preeclampsia can cause serious complications in both the mother and fetus. Appropriate treatment is required to prevent this risk. Preeclampsia occurs not only because of the factors mentioned above but is also influenced by genetic and lifestyle factors. Although it is not fully understood why preeclampsia occurs, appropriate prevention and management efforts can help reduce the risk of complications during pregnancy [34].

The Dhiana Setyorini Score Card is useful for detecting preeclampsia during pregnancy. Using this score card, midwives can immediately take necessary actions to prevent serious complications in pregnant women and fetuses. A score card is an effective tool for monitoring the health of pregnant women on a regular basis, making it possible to intervene more quickly if necessary. Thus, the Dhiana Setyorini Score Card can help to increase the level of safety during pregnancy. The results also showed that cadres who were given an understanding of this score card were better able to recognize the symptoms of preeclampsia and eclampsia, so they could provide timely treatment compared to those who were only given regular counseling.

4. CONCLUSION

The application of the Dhiana Setyorini Score Card is more effective in increasing knowledge and the ability to detect preeclampsia early than the counseling method conducted by the health center. This can lead to improved outcomes for both mothers and babies, as the early detection of preeclampsia can prevent serious complications. Implementing the Dhiana Setyorini Score Card may be a cost-effective and efficient way of improving maternal health in resource-limited settings. Suggestions for health facilities seeking to improve maternal health outcomes include incorporating the Dhiana Setyorini Score Card into routine prenatal care practices. This could potentially lead to better health outcomes for pregnant women and their babies, ultimately reducing the burden of preeclampsia-related complications in the healthcare system.

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