

Prevention of Postpartum Complications with *M-Health* Application "Halo Manis" Based on Android

Tyas Febriana^{1,*}, Runjati² and Sudirman³

¹Department of Midwifery, Faculty of Health, University of Pringsewu, Pringsewu3, 35373, Indonesia

²Department of Midwifery, Poltekkes Kemenkes Semarang, Semarang, 50268, Indonesia

³Department of Nursing, Poltekkes Kemenkes Semarang, Semarang, 50268, Indonesia

Keywords: Application, M-health; Complications, Postpartum.

Abstract: One of the causes of maternal death in Indonesia is the incidence of complications during the puerperium or complications of the puerperium. Analysis of the implementation of preventing postpartum complications in the field is still low. The study aimed to determine the effectiveness of the Android-based "Halo Manis" m-health application in the prevention of postpartum complications. The type of research is true experiment research with a posttest-only control group design. The population in this study was all postpartum mothers >2 hours and the number of research samples was 60 postpartum mothers. This research uses a probability sampling method with cluster random sampling and simple random sampling. *Data analysis used the Friedman and Mann-Whitney test.* The results showed that the mean value of preventing complications was higher in the intervention group 99.11 than in the control group 93.83. The effectiveness of the "Halo Manis" Application on the prevention of puerperal complications (physiological) ≤ 0.0001 and the prevention of puerperal complications (psychological) ≤ 0.0001 . **The conclusion is that "Halo Manis" is effective in preventing the incidence of postpartum complications assessed from physiological and psychological aspects with access to utilization of 20-25 with each access duration of 10-15 minutes.**

1 INTRODUCTION

Complications during the postpartum period or difficulties during the postpartum period are one of the causes of maternal death in Indonesia (Ika Murtiyarini, Yuli Suryantu, 2020)(Yuanita Viva Avia Dewi, 2020). This is because, during the postpartum period, there are changes in physiological and psychological systems so care and assistance are needed to prevent continued pathological problems. In the postpartum period, there is a risk of experiencing problems or complications during the postpartum period, including postpartum infections, breast problems, swelling of the face and extremities (Preeclampsia), postpartum bleeding, sub-involution, thrombophlebitis, and psychological problems (Marmi, 2017). Therefore, providing appropriate postpartum care services can reduce the risk of maternal morbidity and death in postpartum due to postpartum complications (Ika Murtiyarini, Yuli Suryantu, 2020).

The success of postpartum care services can be seen from several factors, one of which is compliance

with postpartum visits and the incidence of postpartum complications (Nuryati & Yanti, 2017). Bleeding is one of the complications that occurs during the postpartum period. In 2019, the main cause of AKI in Indonesia was bleeding with a case percentage of 30.3% (Kementerian kesehatan Republik Indonesia, 2020). In the health profile of Central Java province in 2019, the cause of MMR was bleeding at 24.5% and infection at 6% (25 mothers) (Tengah, 2019). The number of MMR in Semarang district increased significantly compared to previous years in 2020 with the main cause being bleeding cases with a percentage of 32% (Dinas Kesehatan Kabupaten Semarang, 2020). Sub Other types of complications that occur during the postpartum period are sub-involution, postpartum infections, breastfeeding problems, and psychological problems of postpartum mothers. In Mardiana's research (2021), the incidence of uterine sub-involution in postpartum mothers was 23.33%. This is to the results of the type of identification of postpartum infections at the Cilacap District Hospital in 2016-2018, namely that the majority occurred due

to ILO post-SC (34.3%) (Susilawati & Kasron, 2019). The incidence of breast milk dams in postpartum mothers of 30 respondents, 43.3% of mothers experienced breast milk and problems (Ria Gustirini, 2021). The psychological problems of postpartum mothers during the current pandemic are also quite high, namely 48% of mothers experience the risk of postpartum depression and 42% of mothers experience postpartum depression (Rr. Arum Ariasih, 2020). The description of the results of postpartum problems/complications above shows that efforts to prevent postpartum complications are still less than optimal.

Analysis of the implementation of preventing postpartum complications in the field is still low. The results of Lidya's research (2018) showed that 60% of mothers had a negative level of preventing postpartum complications, 60% of postpartum mothers had low knowledge of postpartum, and 50% had negative behavior regarding preventing postpartum complications. This is in line with the description of the level of knowledge of postpartum mothers regarding the danger signs of perineal suture wound infection, which is mostly still low (58.1%) and 25.8% of postpartum mothers also have low knowledge regarding suture wound care (Tri Maharani, 2020). The factor of postpartum visits that are still not fulfilled also influences the incidence of postpartum complications, this is due to the lack of receipt of health education and early detection of complications during postpartum repeat visits (Khamidah Achyar, 2016).

Existing efforts to prevent postpartum complications, apart from conducting postpartum visits, include providing education using various media (Menteri Kesehatan republik Indonesia, 2021). The media used to convey information can use various methods adapted to the existing situation and conditions (Nuryati & Yanti, 2017). During the Covid-19 pandemic, the use of the MCH Book can be a medium that can be used in the process of increasing knowledge of postpartum care so that complications can be minimized. However, in Nur Indah's research, it was found that 40% of postpartum mothers did not use MCH books or did not read them (Noviyanti & Gusrian, 2021). Apart from using MCH books, the use of booklets, internet media such as social media, websites and applications can be an effort to increase the knowledge of postpartum mothers in preventing postpartum complications (Nuryati & Yanti, 2017).

The use of booklets as a medium for delivering health education has several shortcomings and is less effective in increasing knowledge from several

existing studies (Li et al., 2021). This is in line with Ghassani Milatina's research which shows that education using booklets has an effect on increasing mothers' knowledge regarding birth canal wound care but has a low level of influence, $r=0.378$ (Ghassani, Martini, Susanti, Nirmala, & Handayani, 2020). Providing education via social media has an effect on increasing knowledge of postpartum care but has no effect on compliance with postpartum visits ($p > 0.05$) (Nuryati & Yanti, 2017). Therefore, it is necessary to develop media that is appropriate to the current Covid-19 pandemic situation regarding visit compliance and preventing postpartum complications, namely by providing application media. The application media used can be M-health or modified health promotion with information technology (Gagnon, Ngangue, Payne-Gagnon, & Desmartis, 2016). The M-health application is an alternative health promotion opportunity during the Covid-19 pandemic that is effective and quickly adapted on a large scale and at low cost (Marcolino et al., 2018). This is supported by data on the population who use the internet to download applications in Indonesia at 64.8%, one of which is health applications (N. A. Putri, Hilmanto, & Zulvayanti, 2021).

Technological developments can help promote health by increasing knowledge and attitudes as well as increasing mothers' awareness of self-care. This is in accordance with the results of previous research regarding the "Mommy Postpartum" and "Healthy Postpartum" applications which have an effect on increasing the knowledge of postpartum mothers (Herlina, Fatmasari, Diyah, Sri & Pujiastuti, 2020; N. A. Putri et al., 2021). The use of the "BUFAS" reminder application in describing postpartum visit compliance is almost as complete as the second postpartum visit, but in the respondent interviews there were several weaknesses, including in understanding the content related to the language used and the appearance or menu (Ika Yuli Krisdiana, Rahajeng Siti NUr Rahmawati, 2019).

Applications as an effort to increase the knowledge of postpartum mothers have previously existed, such as the E-Postpartum application. The results of research regarding providing the E-Postpartum application to postpartum mothers are effective in increasing knowledge with a $p\text{-value} < 0.001$ (Khairunnisa, Sumarni, & Supriyana, 2021). This application has educational features regarding what parturition is and its stages, the psychological changes that occur, the correct way to breastfeed, consultation features and check-up schedule alarms that can be made independently by the mother.

Another application related to postpartum in the Play Store is Postpartum Care with almost the same educational features as the E-Postpartum application and WhatsApp chat link. The focus of problem solving in this research is regarding compliance with postpartum visits which is expected to reduce the incidence of postpartum complications. However, existing applications do not provide automatic reminders according to the length of postpartum days. The education provided also does not focus on preventing postpartum complications holistically. So, researchers are interested in developing an M-health application with a focus on education on postpartum visit compliance and holistic prevention of postpartum complications and automatic reminders according to the length of postpartum days or notifications. Providing education is expected to stimulate behavior change in preventing postpartum complications to be able to carry out independent self-care that focuses on compliance with postpartum visits and preventing the occurrence of postpartum complications in one application media package.

Self-care in the postpartum period is one of the actions needed to maintain the mother's level of well-being and health (Gessica Kyvia Soare de Lima et al, 2017). Postpartum mothers' self-care needs can be identified using Dorothea Elizabeth Orem's theoretical framework. This is in accordance with the results of Gessica's research regarding the identification of postpartum mothers' self-care knowledge needs based on the Orem model, namely regarding nutrition, prevention of postpartum infections related to urinary tract infections or suture wounds, breastfeeding problems, the need for rest, physical exercise related to uterine involution problems, myths and needs, counselling (Gessica Kyvia Soare de Lima et al, 2017).

Emotional well-being related to psychological changes in postpartum mothers in the early period also cannot be missed from the results of Orem's self-care model (Lambermon, Vandenbussche, Dedding, & Duijnhoven, 2020). The results of the needs of postpartum mothers based on Orem's theory can be adopted as the content of M-health education will be developed into an Android-based application with modifications to complication education, prevention of COVID-19 transmission, postpartum visit schedules and reminders, a chat room for midwives in optimizing counseling during the COVID-19 pandemic, as well as evaluation of complications and postpartum visit compliance in one application called Hallo Postpartum Mama "Hallo Manis". The research and applications in the Play store regarding the postpartum period also do not provide packaged

content and education regarding types of postpartum complications, postpartum visit reminders, and prevention of COVID-19 transmission with education and an attractive appearance. The results of the research are also still limited to the extent that the output (knowledge and attitudes) not yet see the outcomes of the resulting M-health model.

Based on the problem identification above, researchers are interested in researching the Android-based M-health Hallo Mama Postpartum "Hallo Manis" application based on the results of Orem's previous research model on postpartum mothers on the incidence of postpartum complications. This Android-based application was created as an education to prevent postpartum complications by providing a sequence of self-care schedules, education on preventing COVID-19 transmission, daily application notifications, education and reminders for postpartum visits, complications questionnaires and chat rooms for mothers and midwives as an effective effort. prevention of complications.

2 METHODS

The type of research that will be used in this research is true experiment research with a posttest-only control group design. The population in this study was all postpartum mothers >2 hours in the work area of the health center, namely the health centers in Ambarawa, Pringapus, and Bawen sub-districts, Semarang district on 1-30 March 2022. This research was conducted in March-May 2022. The number of samples in this study was based on calculations using the formula that 27 respondents were obtained, then 3 respondents were added to anticipate dropping out to 30 respondents. This research uses a probability sampling method with cluster random sampling and simple random sampling. The cluster random sampling technique was used to determine a very large number of samples, which consisted of 2 stages, namely the first and second stages. The first stage was used in selecting the research area which was determined based on the geographical criteria of having cellphone and internet access. Semarang Regency has 26 community health centers, after carrying out a cluster random sampling technique based on specified criteria, 6 community health centers were obtained. Next, a lottery was carried out from 6 community health centers to 3 selected places taking into consideration the adequacy of the research sample and research time. Preliminary test results show that the average number of mothers giving birth

per month in the 6 regions taken is 44 mothers. The selected areas are the Ambarawa Health Center, Pringapus and Bawen sub-districts. The research sampling criteria were mothers who had at least a junior high school education, had no history of complications or were currently experiencing complications, and had at least an Android 8 version of their mobile phone.

This study uses a postpartum complications questionnaire which has been tested for validity and reliability with valid results by the researcher ≥ 0.60 as well as the EPDS (Edinburgh Postnatal Depression Scale) questionnaire which has good consistency and accuracy with Cronbach's alpha value = 0.87 and spit-half = 0.88 (Hada et al., 2019). The research stages began when mothers were ≥ 2 hours postpartum who were provided with conventional services by utilizing and accessing applications that had been installed during the postpartum period for the intervention group at least 20-25 times within 10-15 minutes/use. The control group was given conventional services by using the independent MCH book during the postpartum period at least 6-10 times

within 5-10 minutes for each use. Evaluations were carried out on postpartum day 2, day 7, day 28, and day 42. This research uses data analysis, namely the Friedman and Mann-Whitney tests. Ethical clearance in this research was requested from the Health Research Ethics Commission (KEPK) with ethical number No. 592/EA/KEPK/2021 on December 24, 2021.

3 RESULT

3.1 Respondent Characteristics

The results of this study show that the characteristics of respondents including age, parity, education, employment, family support, and ownership of health insurance in both groups are equivalent, as shown by the $p\text{-value} > 0.05$, which means that the characteristics of respondents in the two groups have no significant differences. which is shown in the table 1.

Table 1: Distribution of Responden Characteristics

Characteristics	Group				Total		Mean ± SD		P
	Intervension		Control						
	n	%	n	%	N	%	Intervention	Control	
Age (year)									
20 – 35	26	86,7	24	80	50	83,3	27,1±5,66	28,3±6,16	0.421
<20 / > 35	4	13,3	6	20	10	16,7			
Parity									
Primipara	15	50	13	43,3	28	46,7	1,70±8,37	1,93±1,26	0.401
Multipara	15	50	16	53,3	31	51,7			
Grandemulti	0	0	1	3,3	1	1,6			
Education									
JHS	3	10	4	13,3	7	11,7	-	-	0.855
SHS	19	63,3	17	56,7	36	60,0			
College	8	26,7	9	30,0	17	28,3			
Work									
Work	15	50	10	33.3	25	41,7	-	-	0.190
Don't work	15	50	20	66.7	35	58,3			
Family support									
Support	20	66,7	17	56,7	37	61,7	6,96±1,35	6,80±1,32	0.624
Non supportive	10	33,3	13	43,3	23	38,3			
Health insurance tittle									
Yes	20	66,7	17	56,7	37	61,7	-	-	0.426
No	10	33,3	13	43,3	23	38,3			

Table 1. shows that the characteristics of respondents including age, parity, education, employment, family support, and ownership of health insurance in both groups are equivalent, as shown by the $p\text{-value} > 0.05$, which means that the characteristics of respondents in the two groups have

no significant differences. Thus, the characteristics of both groups can be controlled to ensure that the results of this research are not influenced by the characteristics of the respondents before being given treatment or the characteristics of homogeneous respondents.

3.2 Description of Postpartum Complications

The frequency distribution of postpartum complications assessed from physiological and psychological aspects is shown in the table 2.

Table 2: Description of Compliance with Postpartum Visits and Incidence of Postpartum Complications

Variabel	Group			
	Intervension		Control	
	n	%	n	%
Postpartum complication (Physiological aspects)				
6 hours – day 2				
Complication	5	16,7	9	30
Nothing	25	83,3	21	70
Day 3 – 7				
Complication	4	13,3	12	40
Nothing	26	86,7	18	60
Day 8 – 28				
Complication	1	3,3	9	30
Nothing	29	96,7	21	70
Day 29 – 42				
Complication	0	0	5	16,7
Nothing	30	100	25	83,3
Postpartum Complication (Psychological aspects)				
Day 3 – 7				
Normal	23	76,7	15	50
moderate	4	13,3	9	30
Heavy	3	10	6	20
Day 29 – 42				
Normal	29	96,7	23	76,7
Moderate	1	3,3	6	20,0
Heavy	0	0	1	3,3

Table 2 shows that postpartum complications were assessed from physiological aspects at 6 hours-2 days, showing that the majority of respondents who had no complications were in the intervention group with a total of 25 respondents or 83.35%. This also happened in the assessment of postpartum complications assessed from the physiological aspect with the number of respondents who had no complications mostly in the intervention group with the number of respondents namely when the assessor was 3-7 days postpartum total 26 respondents or 86.7%, at the time 8-28 postpartum days there were 29 respondents or 96.7% and at 29-42 days postpartum there were 30 respondents or 100%.

The postpartum complication variable seen from the psychological aspect during the assessment time 3-7 days after being given the "Halo Manis" application shows that the majority of respondents did not experience symptoms of postpartum blues or were normal in the intervention group, namely 23

respondents (76.7%). This is greater than the number of respondents who did not experience symptoms of postpartum blues in the control group, namely 15 respondents (50%). During the period 28 – 42 days postpartum, in the intervention group almost all respondents did not experience symptoms of psychological problems, namely 29 respondents (96.7%).

3.3 The Effectiveness of the M-Health Application "Halo Manis" in Preventing Postpartum Complications Was Assessed from the Physiological Aspect

The results of the analysis of the effectiveness of the "Halo Manis" application in preventing postpartum complications assessed from physiological aspects can be shown in the table 3.

Table 3: Effectiveness of the M-health Application "Halo Manis" in Preventing Postpartum Complications (Physiological Aspects)

Postpartum Complications (Physiological Aspects)	Group		P-Value
	Intervension Mean $\pm$ SD	Control Mean $\pm$ SD	
6 hours – day 2	96,38 $\pm$ 9,13	89,33 $\pm$ 1,95	0,148 ^a
Day 3 - 7	99,04 $\pm$ 2,47	94,26 $\pm$ 8,38	0,010 ^a
Day 8 - 28	99,67 $\pm$ 1,85	94,00 $\pm$ 1,07	0,005 ^a
Day 29 - 42	100,00 $\pm$ 0,00	96,00 $\pm$ 9,68	0,021 ^a
Total	99,11 $\pm$ 1,961	93,83 $\pm$ 6,83	0,0001 ^a
P-value	0,020 ^b	0,456 ^b	

^aUji Mann-Whitney*level of significance sig <0,05

^bUji Friedman*level of significance sig <0,05

Table 3 shows that the average total score for preventing postpartum complications in the intervention group was greater than the control group. The Friedman test aims to test differences in the significance of repeated data on postpartum complications variables. The results of this test showed a significant value in the intervention group with a p-value of 0.020 (<0.05) and not significant in the control group with a value of 0.456 (>0.05). It can be concluded that the "Halo Manis" application is effective in preventing complications.

Table 3. shows that in the period of 6 hours - 2 days, a p-value of 0.148 (p-value>0.05) was obtained, which means that there was no significant difference in the score of postpartum complications assessed from the physiological aspect or the application of the "Halo Manis" application. not effective in preventing postpartum complications in the 6 hour – day 2 period. In the assessment of

postpartum complications assessed in the period 3-7 days postpartum between the intervention and control groups, a p-value of 0.010 (p-value <0.05) was obtained, which can be interpreted as a difference in the mean value of the evaluation of prevention of postpartum complications. Evaluation of the prevention of postpartum complications during the period 8-28 days postpartum and 29-42 days postpartum and the total score between the intervention and control groups obtained a p-value <0.05 which can be interpreted as a difference in the mean value between days 8-28 postpartum, days 29-42 postpartum and the total incidence of postpartum complications. It can be stated that the "Halo Manis" application is more effective for postpartum mothers in preventing postpartum complications, assessed from the physiological aspect of postpartum mothers.

The change in the mean value of prevention of postpartum complications assessed from the physiological aspect from the results of the first evaluation to the fourth evaluation after being given the m-health application "Halo Manis" in the intervention and control groups can be seen in the figure 1.

Figure 1 shows that the average evaluation score for prevention of postpartum complications assessed from physiological aspects in the intervention group was higher than the control group with a constant increase at each visit. The higher the evaluation score, the higher the health status. The conclusion of the graph above is that for respondents in the intervention group, the reduction in the incidence of complications was better than in the control group. The intervention group in the assessment period of 29-41 days postpartum showed that there were no respondents who had postpartum complications. The intervention group that used the "Halo Manis" application 20-25 times during the postpartum period could prevent postpartum complications.

Prevention of Postpartum Complications (Physiological Aspects)

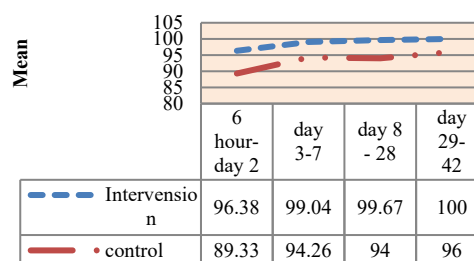


Figure 1: Prevention of Postpartum Complication (Physiological Aspects)

3.4 The Effectiveness of the M-Health Application "Halo Manis" in Preventing Postpartum Complications Is Assessed from the Psychological Aspect

The results of the normality test on the postpartum complications variable are not normally distributed so the next parametric test uses non-parametric tests, namely the Friedman and Mann-Whitney tests. The results of the analysis of the effectiveness of the "Halo Manis" application in preventing postpartum complications assessed from the psychological aspect can be shown in the table 4.

Table 4. shows that the average evaluation score for the prevention of postpartum complications in the psychological aspect with the lowest results was in the intervention group compared to the control group in the assessment period of days 29-42 postpartum, namely 6.90 or the average of respondents in normal conditions without any Symptoms of postpartum complications are assessed from the psychological aspect.

Table 4: Effectiveness of the M-health Application "Halo Manis" in Preventing Postpartum Complications (Psychological Aspect)

Postpartum Complications (Psychological Aspect)	Group		P-Value ^a
	Intervention (Mean ± SD)	Control (Mean ± SD)	
Day 3-7	8,23±2,54	10,10±2,52	0,005*
Day 29-42	6,90±1,32	9,00±1,68	0,0001*
Total	7,57±1,74	9,07±1,94	0,0001*

^aUji Mann-Whitney*level of significance sig <0,05

The results of the Mann Whitney test showed a p-value of 0.005 ($p\text{-value} < 0.05$), meaning that the group given the "Halo Manis" application was more effective in preventing postpartum complications, assessed from a psychological aspect, compared to providing education with KIA books at 3 - 7 days postpartum. Postpartum complications at the second assessment on days 29-42 and the total score for evaluating the psychological health status of postpartum mothers between the two groups were found to both have a p-value < 0.0001 ($p\text{-value} < 0.05$) which can be interpreted as a significant difference. The value of the evaluation results of psychological problems between the two groups or it can be concluded that giving the "Halo Manis" application is more effective for postpartum mothers in preventing postpartum complications is assessed from the psychological aspect.

The change in the mean value of postpartum complications assessed from the psychological aspect from the results of the first evaluation to the second evaluation after being given the m-health application "Halo Manis" in the intervention and control groups can be seen in graphic figure 2.

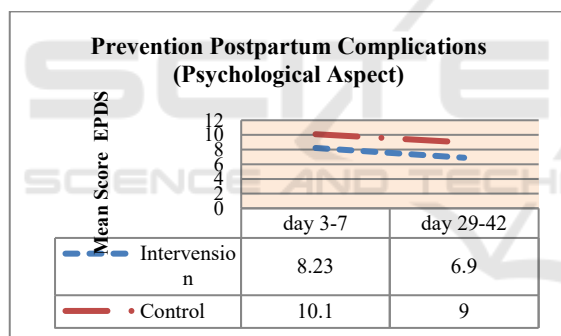


Figure 2: Changes in Mean Evaluation Scores for Prevention of Postpartum Complications in Psychological Aspects

Figure 2 shows that the average evaluation score for the prevention of postpartum complications assessed from the psychological aspect in the intervention group was lower than the control group. The conclusion of the graph above is that for respondents in the intervention group, the reduction in postpartum blues symptom scores or the incidence of postpartum complications assessed from a psychological aspect was higher than in the control group. The intervention group in the assessment period of 3-7 days and 29-41 days postpartum showed that there were no respondents who had symptoms of postpartum blues or were in normal condition. The intervention group that used the "Halo Manis"

application 20-25 times during the postpartum period could prevent postpartum complications as assessed from the psychological aspect.

4 DISCUSSION

4.1 Postpartum Complications Are Assessed from Physiological Aspects

The results of the effectiveness test from the results in Table 4.3 show that the results of the effectiveness test of the "Halo Manis" application against postpartum complications were assessed at the first visit or in the 6-hour – 2-day period, the results were no difference or not effective. This is related to the short duration of use of the application and at the beginning of the postpartum period, the mother is more focused on the baby and recovering her health due to postpartum fatigue so she neglects other activities. This is in line with the results of preliminary tests at RSIA Sakinan Idaman, which showed that all 4 people interviewed felt tired after giving birth (Irianti, Wahyuningsih, & Suwarsi, 2019). Apart from that, from the results of filling out the questionnaire, some mothers experienced bleeding, which was related to their nutritional status and health status during their previous pregnancy. This is in line with the results of research regarding the relationship between anemic mothers and the number of respondents 1082 pregnant women with iron deficiency anemia and the incidence of postpartum hemorrhage. The results showed that there was a relationship between iron deficiency anemia and the incidence of postpartum hemorrhage (Terence T. Lao, Lulu L. Wong, 2022).

This is different from the results of the total postpartum complication score assessment which proves that giving the M-health application "Halo Manis" used by postpartum mothers for 2 hours within 42 days of the postpartum period with use 20-25 times is effective as a method of providing postpartum education packages compared to in the group that only used the MCH book in preventing postpartum complications both from physiological and psychological aspects. In calculating the effect size to see how effective the application is, the result was a Cohen's value of 1.051, or very good effectiveness. The results of this research are in line with research regarding providing postpartum mommy applications to increase mothers' knowledge and skills compared to the group that was only given

information on postpartum care which obtained a p-value < 0.05 (N. A. Putri et al., 2021). This is also supported by research regarding mobile E-Postpartum services on the knowledge, attitudes and behavior of postpartum mothers showing that the third p-value is < 0.05 or has an effect on increasing the knowledge, attitudes, and behavior of postpartum mothers (Khairunnisa et al., 2021).

Increasing maternal knowledge and behavior in carrying out self-care will be related to the incidence of postpartum complications. If the mother has good knowledge, it will stimulate changes in her self-care behavior during the postpartum period so that postpartum problems can be avoided. This is supported by the results of research conducted to determine the relationship between a mother's knowledge and the incidence of postpartum infection. The result was a p-value of 0.003, which means that the better the mother's knowledge, the lower the risk of postpartum infection (Pinem, 2022).

Changes in a person's behavior will occur if knowledge and attitudes also change. Providing education using application media as a complete package will facilitate the transfer of information to users which will lead to suggestions for decision-making in this case, namely preventing complications with appropriate postpartum care (Fifiantyas Amalia, S.A. Nugraheni, 2018). The use of application media on smartphones can produce stimulation and a more comprehensive understanding (N. A. Putri et al., 2021).

The education in the application features explains some information about postpartum complications that can occur. The use of text, audio, and video self-care tutorials in the application makes it easier for respondents to get information easily because audio-visual media uses hearing and seeing elements or uses more than one sense (Alini, 2018). In the "Halo Manis" application, apart from providing educational packages, there is also a midwife chat room as well as independent health evaluations regarding postpartum complications in physiological and psychological aspects. Even though there is no midwife appointment room menu for postpartum repeat visits at health services or home visits, having a midwife chat room will make it a little easier for midwives and postpartum mothers to carry out long-distance counselling. The speed of access that users get to health workers can also reduce the incidence of complications, as well as differential diagnosis (Sunjaya, 2019). This is in line with research by Wihua Xie et al regarding the results of a meta-analysis of 32 RCT (Randomized controlled Trial) studies regarding the effectiveness of providing

telehealth (telemedicine) to pregnant women who have GDM (Gestational Diabetes Mellitus) which shows that there is a significant reduction in HbA1c or glycemic levels. in GDM mothers and reduces the risk of complications in the baby/fetus compared to the control group given standard care (Xie et al., 2020).

4.2 Postpartum Complications Are Assessed from Psychological Aspects

The results of the effectiveness of the "Halo Manis" application on postpartum complications seen from the psychological aspect also show effective results compared to the group that was only given education using the KIA Book. The effect size test was 0.815, which can be interpreted as having effectiveness against postpartum complications assessed from a very good psychological aspect. This is in line with research regarding the provision of IEC in preparation for childbirth and the incidence of postpartum blues. The results obtained were influential with a p-value of 0.024 (Dwi Winarni, Krisdiana Wijayanti, 2017). This is also supported by the results of the test of the relationship between maternal knowledge and the incidence of postpartum blues 1-7 days postpartum, which obtained a p-value < 0.05 (0.015). Mothers who have good knowledge about how to care for themselves during the postpartum period so that complications can be avoided so that mothers are also ready to go through the postpartum period and to face any changes that occur (Winarni, D., Wijayanti, K. & Ngadiyono, 2017).

Postpartum complications were assessed from the psychological aspect in the intervention group after being given access to the "Halo Manis" application, research results showed that an average of 8.23 postpartum mothers did not experience symptoms of postpartum blues. This is in line with research regarding the application of Parenting counseling via WhatsApp in preventing Postpartum Blues during the Covid-19 pandemic, showing good results or all respondents who were treated had normal psychology (Setianingsih, Putri, Dewi, & Indriyastuti, 2021). The features in the "Halo Manis" application also provide a midwife chat service which will make it easier for respondents or users to conduct question-and-answer counseling regarding their health status. This can also be a form of support from health workers, especially midwives, to be another source of information so that mothers feel accompanied during the postpartum period. Good

social support will reduce the mother's burden and stress in going through the postpartum phase (Marwiyah et al., 2022).

The application feature used has information about postpartum blues and how to prevent and treat it. In prevention efforts, researchers added Mozart's music which visualizes natural scenes. This will make it easier for the mother to relax when the postpartum mother is breastfeeding or during her rest time. Several previous research results regarding giving Mozart classical music to postpartum mothers can reduce the symptoms of postpartum blues suffered by mothers. This is in line with the results of systematic review research regarding the provision of therapeutic music, one of which is Mozart's classical music to mothers with postpartum depression in Indonesia, which is effectively given by midwives (Restuning Widiasih, Yulia Rais, 2021). Listening to classical music for 20-30 minutes which has a soft rhythm, the tones that sound can stimulate alpha waves and reduce contractions in the limbic brain, and body muscles, decrease pulse frequency, blood pressure, and pain to provide a sense of relaxation for the listener and anxiety gradually decreases is lost (Arisdiani, Anggorowati, & Naviati, 2021; H. Putri & Putri, 2022).

5 CONCLUSIONS

The results of this study concluded that the Android-based "Halo Manis" M-health application was more effective in preventing postpartum complications assessed from physiological and psychological aspects compared to the control group who only received standard education using the KIA book with a p-value <0.0001. The Halo Manis application can be a solution to the problem of postpartum complications which are still high, and can increase the awareness of postpartum mothers to continue to empower themselves with guidance through the postpartum period. Further research can improve the "Halo Manis" application by creating a reminder notification feature that can appear even when the data is offline, the midwife's appointment room can be accessed by iPhone/iOS users, can assess the effectiveness of using the application and what features influence visit compliance and prevention of complications. It is also hoped that the healthcare centers can socialize and implement the use of the "Halo Manis" application by postpartum mothers as one of the programs to ensure compliance with postpartum visits and prevent postpartum complications.

REFERENCES

- Alini, I. (2018). Efektivitas Promosi Kesehatan Melalui Audio Visual Dan Leaflet Tentang SADARI (Pemeriksaan Payudara Sendiri) Terhadap Peningkatan Pengetahuan Remaja Putri Tentang SADARI Di SMAN 1 Kampar Tahun 2018. *Jurnal Ners Universitas Pahlawan*, 2(2), 1-9. <https://doi.org/https://doi.org/10.31004/Jn.V2i2.187>
- Arisdiani, D. R., Anggorowati, A., & Naviati, E. (2021). Music Therapy As Nursing Intervention In Improving Postpartum Mothers Comfort. *Media Keperawatan Indonesia*, 4(1), 72. <https://doi.org/10.26714/Mki.4.1.2021.72-82>
- Dinas Kesehatan Kabupaten Semarang. (2020). *Profil Kesehatan 2020. Angewandte Chemie International Edition*, 6(11), 951-952.
- Dwi Winarni, Krisdiana Wijayanti, N. (2017). Pengaruh Pemberian KIE (Komunikasi Informasi Edukasi) Persiapan Persalinan Dan Nifas Terhadap Kejadian Postpartum Blues. *Jurnal Kebidanan*, 6(14), 1-8. <https://doi.org/10.31983/Jkb.V6i14.2886>
- Fifiyantas Amalia, S.A. Nugraheni, A. K. (2018). Pengaruh Edukasi Gizi Terhadap Pengetahuan Dan Praktik Calon Ibu Dalam Pencegahan Kurang Energi Kronik Ibu Hamil. *Jurnal Kesehatan Masyarakat (E-Journal)*, 6(5), 370-377. <https://doi.org/https://doi.org/10.14710/Jkm.V6i5.2060>
- Gagnon, M., Ngangue, P., Payne-Gagnon, J., & Desmartis, M. (2016). M-Health Adoption By Healthcare Professionals: A Systematic Review. *Journal Of The American Medical Informatics Association*, 23(1), 212-220. <https://doi.org/10.1093/Jamia/Ocv052>
- Gessica Kyvia Soare De Lima Et Al. (2017). Self-Care Of Adolescents In The Puerperal Period: Application Of The Orem Theory. *Journal If Nursing UFPE On Line*, 11(10), 4217-4225. <https://doi.org/10.5205/1981-8963-V11i10a231185p4217-4225-2017>
- Ghassani, M., Martini, N., Susanti, A. I., Nirmala, S. A., & Handayani, D. S. (2020). Pengetahuan Ibu Nifas Mengenai Penyembuhan Luka Perineum Dengan Menggunakan Media Booklet. *Jurnal Kebidanan Malahayati*, 6(3), 368-375. <https://doi.org/10.33024/Jkm.V6i3.2676>
- Hada, A., Kubota, C., Imura, M., Takauma, F., Tada, K., & Kitamura, T. (2019). The Edinburgh Postnatal Depression Scale: Model Comparison Of Factor Structure And Its Psychosocial Correlates Among Mothers At One Month After Childbirth In Japan. *The Open Family Studies Journal*, 11(1), 1-17. <https://doi.org/10.2174/1874922401911010001>
- Herlina, Fatmasari, Diyah, Sri, R., & Pujiastuti, E. (2020). Application Of " Puerperal Healthy " Of Optimization Of Postpartum Mother Knowledges That Given Effleurage Relaxation Massage. *International Journal Of Innovative Science And Research Technology*, 5(7), 152-155. Retrieved From <https://www.ijisrt.com/Application-Of-Puerperal-Healthy-Of-Optimization-Of-Postpartum-Mother->

- Knowledges-That-Given-Effleurage-Relaxation-Massage
- Ika Murtiyarini, Yuli Suryantu, A. G. W. (2020). Pemberdayaan Kader Dalam Deteksi Dini Komplikasi Masa Nifas Di Desa Penyengat Olak Kecamatan Jambi Luar. *Jurnal Binakes*, 1(1), 5–9.
- Ika Yuli Krisdiana, Rahajeng Siti Nur Rahmawati, S. (2019). Kepatuhan Kunjungan Ulang Ibu Nifas Dengan Reminder “BUFAS” Di Puskesmas Sumberejo. *Jurnal Informasi Kesehatan Indonesia*, 5(2), 133–140. <https://doi.org/10.31290/Jiki.V5i2.1358>
- Irianti, N. E., Wahyuningsih, M., & Suwarsi, S. (2019). Pengaruh Terapi Pijat Punggung Terhadap Skor Stres Pada Ibu Postpartum Di RSIA Sakina Idaman. *Jurnal Keperawatan Respati Yogyakarta*, 6(3), 690. <https://doi.org/10.35842/Jkry.V6i3.390>
- Kementerian Kesehatan Republik Indonesia. (2020). Profil Kesehatan Indonesia. (W. W. Boga Hardhana, Farida Sibuea, Ed.). Jakarta: Kementerian Kesehatan Republik Indonesia. Retrieved From <https://www.kemkes.go.id/downloads/resources/download/pusdatin/profil-kesehatan-indonesia/profil-kesehatan-indonesia-tahun-2020.pdf>
- Khairunnisa, R., Sumarni, S., & Supriyana, S. (2021). E-Postpartum Mobile Application To Increase Postnatal Knowledge Care. *MEDISAINS*, 19(3), 84. <https://doi.org/10.30595/Medisains.V19i3.11999>
- Khamidah Achyar, I. R. (2016). Pengaruh Kunjungan Nifas Terhadap Komplikasi Masa Nifas Di Wilayah Puskesmas Sokaraja 1 Kabupaten Banyuman. *Medisains Jurnal Ilmiah Ilmu-Ilmu Kesehatan*, 14(2), 59–64. <https://doi.org/10.30595/Medisains.V14i2.1056>
- Lambermon, F., Vandenbussche, F., Dedding, C., & Duijnhoven, N. Van. (2020). Maternal Self-Care In The Early Postpartum Period: An Integrative Review. *Midwifery*, 90(102799), 1–9. <https://doi.org/10.1016/j.midw.2020.102799>
- Li, J., Davies, M., Ye, M., Li, Y., Huang, L., & Li, L. (2021). Impact Of An Animation Education Program On Promoting Compliance With Active Respiratory Rehabilitation In Postsurgical Lung Cancer Patients. *Cancer Nursing*, 44(2), 106–115. <https://doi.org/10.1097/NCC.0000000000000758>
- Marcolino, M. S., Oliveira, J. A. Q., D’Agostino, M., Ribeiro, A. L., Alkmim, M. B. M., & Novillo-Ortiz, D. (2018). The Impact Of Mhealth Interventions: Systematic Review Of Systematic Reviews. *JMIR Mhealth And Uhealth*, 6(1), E23. <https://doi.org/10.2196/mhealth.8873>
- Marmi. (2017). *Asuhan Kebidanan Pada Masa Nifas* (Ketiga). Yogyakarta: Pustaka Belajar.
- Marwiyah, N., Suwardiman, D., Mutia, H. K., Alkarimah, N. A., Rahayu, R., & Uzzakiyyah, I. (2022). Determinant Factors Influencing The Incidents Of Postpartum Blues In Puerperium Mothers. *Falatehan Health Journal*, 9(1), 89–99. <https://doi.org/https://doi.org/10.33746/Fhj.V9i01.298>
- Menteri Kesehatan Republik Indonesia. (2021). *Permenkes No 21 Tahun 2021*.
- Noviyanti, N. I., & Gusriani, G. (2021). Kepatuhan Ibu Nifas Dalam Pemanfaatan Buku KIA Terhadap Pencegahan Komplikasi Masa Nifas Di Kota Tarakankepatuhan Ibu Nifas Dalam Pemanfaatan Buku KIA Terhadap Pencegahan Komplikasi Masa Nifas Di Kota Tarakan. *Journal Of Issues In Midwifery*, 5(2), 77–86. <https://doi.org/10.21776/Ub.JOIM.2021.005.02.4>
- Nuryati, S., & Yanti, R. D. (2017). Efektivitas Penggunaan Media Sosial Terhadap Peningkatan Pengetahuan Perawatan Nifas Dan Kepatuhan Kunjungan Ulang Pada Ibu Nifas Di Kota Bogor. *Midwife Journal*, 3(01), 52–59. Retrieved From <http://jurnal.ibjabar.org/efektifitas-penggunaan-media-sosial-terhadap-peningkatan-pengetahuan-perawatan-nifas-dan-kepatuhan-kunjungan-ulang-pada-ibu-nifas-di-kota-bogor/>
- Pinem, J. (2022). Hubungan Pengetahuan Ibu Nifas Dan Kepatuhan Kunjungan Masa Nifas Dengan Kejadian Infeksi Nifas Di BPM Kabanjahe Kabupaten Karo Tahun 2021. *Jurnal Mutiara Kebidanan*, 8(2), 5–24. Retrieved From <http://36.91.220.51/Ojs/Index.php/JMK/Article/View/183>
- Putri, H., & Putri, F. (2022). How To Cope With Baby Blues: A Case Report. *Journal Of Psychiatry Psychology And Behavioral Research*, 3(1), 13–15. <https://doi.org/10.21776/Ub.Jppbr.2022.003.01.4>
- Putri, N. A., Hilmanto, D., & Zulvayanti, Z. (2021). Pengaruh Aplikasi “Mommy Nifas” Terhadap Peningkatan Pengetahuan Dan Keterampilan Ibu. *Jurnal Kesehatan*, 12(1), 139. <https://doi.org/10.26630/Jk.V12i1.2328>
- Restuning Widiasih, Yulia Rais, N. F. Et Al. (2021). Intervention For Preventing Postpartum Depression: A Systematic Review Of Studies In Indonesia. *British Journal Of Midwifery*, 29(7). <https://doi.org/https://doi.org/10.12968/Bjom.2021.29.7.410>
- Ria Gustirini. (2021). Perawatan Payudara Untuk Mencegah Bendungan ASI Pada Ibu Post Partum. *Midwifery Care Journal*, 2(1), 9–14. <https://doi.org/https://doi.org/10.31983/Micajo.V2i1.6653>
- Rr. Arum Ariasih, D. P. (2020). Postpartum Depression During The Covid-19 Pandemic Situation. In *International Conference On Health Science (ICH)* (Pp. 8–13). Retrieved From <https://proceeding.unived.ac.id/index.php/univedich/article/view/14>
- Setianingsih, N. J., Putri, A., Dewi, S., & Indriyastuti, H. I. (2021). Application Of Parenting Counseling By Whatsapp In Preventing Postpartum Blues During Pandemic Time Of Penerapan Konseling Parenting Via Whatsapp Dalam Pencegahan Postpartum Blues Di Masa Pandemi Covid-. In *Proceeding Of The 14th University Research Colloquium 2021: Bidang Kesehatan* (Pp. 436–445). Jawa Tengah: Konsorsium LPPM/PTA STIE Muhammadiyah Cilacap. Retrieved

- From
[Http://Repository.Urecol.Org/Index.Php/Proceeding/Article/View/1603](http://Repository.Urecol.Org/Index.Php/Proceeding/Article/View/1603)
- Sunjaya, A. P. Potensi, Aplikasi Dan Perkembangan Digital Health Di Indonesia, 69 Journal Of Indonesian Medical Association 167–169 (2019).
<https://doi.org/10.13140/RG.2.2.31918.66886>
- Susilawati, S., & Kasron, K. (2019). Identification Of The Puerperium Infection Characteristics. *JURNAL KEBIDANAN*, 9(2), 153.
<https://doi.org/10.31983/Jkb.V9i2.5302>
- Tengah, D. K. P. J. (2019). *Profil Kesehatan Provinsi Jawa Tengah Tahun 2019* (Vol. 3511351).
- Terence T. Lao, Lulu L. Wong, S. Y. A. H. & D. S. S. (2022). Iron Deficiency Anaemia And Atonic Postpartum Haemorrhage Following Labour. *Reproductive Sciences*, 29, 1102–1110.
<https://doi.org/https://doi.org/10.1007/S43032-021-00534-1>
- Tri Maharani. (2020). Pengetahuan Ibu Nifas Tentang Perawatan Luka Jahitan Perineum. *Jurnal Kebidanan : Jurnal Medical Science Ilmu Kesehatan Akademi Kebidanan Budi Mulia Palembang*, 10(2), 66–70.
<https://doi.org/10.35325/Kebidanan.V10i2.242>
- Winarni, D., Wijayanti, K. & Ngadiyono, N. (2017). Pengaruh Pemberian KIE (Komunikasi Informasi Edukasi) Persiapan Persalinan Dan Nifas Terhadap Kejadian Postpartum Blues (2017). *Jurnal Kebidanan*, 6(14), 1–8. Retrieved From
https://www.researchgate.net/publication/326863483_Pengaruh_Pemberian_Kie_Komunikasi_Informasi_Edukasi_Persiapan_Persalinan_Dan_Nifas_Terhadap_Kejadian_Postpartum_Blues
- Xie, W., Dai, P., Qin, Y., Wu, M., Yang, B., & Yu, X. (2020). Effectiveness Of Telemedicine For Pregnant Women With Gestational Diabetes Mellitus: An Updated Meta-Analysis Of 32 Randomized Controlled Trials With Trial Sequential Analysis. *BMC Pregnancy And Childbirth*, 20(1), 1–14.
<https://doi.org/10.1186/S12884-020-02892-1>
- Yuanita Viva Avia Dewi. (2020). *Buku Ajar Asuhan Kebidanan 3*. Bandung: Media Sains Indonesia.