The Effect of Android-Based Health Education on the Autonomy of Postpartum Primipara Mothers in Neonatal Care.

Dwi Kartika Sari[1], Werna Nontji [2], Syafruddin Syarif [3], Sundari [4], Erlyn Limoa[5], Burhanuddin Bahar [6]

[1,2]*Department of Midwifery, Postgraduate School, Universitas Hasanuddin Makassar,*
[3]*Department of Electrical Engineering, Faculty of Engineering, Universitas Hasanuddin, Makassar*
[4]*Faculty of Public Health, Universitas Muslim Indonesia, Makassar*
[56]*Faculty of Medicine, Universitas Hasanuddin Makassar*

email: dwikartikasari88@gmail.com

Abstract

Background: Primiparous postpartum mothers cannot independently take care of their babies due to a lack of knowledge about baby care. This study aims to determine the effect of android-based health education on the autonomy of primiparous postpartum mothers in neonatal care. Methods: The research design was a quasi-experiment with a pretest-posttest design with a controlled group design with a total sample of 19 pregnant women each of TM III primigravida (Gestational Age ≥ 38 weeks) in both of the intervention group and the control group. The sampling technique used was purposive sampling. The research was conducted at Public Health Centre of Kelayan Timur and at the PBM Clinic of Mrs. NM in Kelayan Timur Banjarmasin during September - October 2019. Data were collected using pretest and post-test containing questions about digital knowledge, skills, and independence in digital observation sheets. Data analysis was carried using the Wilcoxon test and the Mann-Whitney Test. Results: The Wilcoxon Test results showed that there were differences in the knowledge of respondents in the intervention group before and after joining Android-based health education with a value of p= 0.000. The results of the Mann-Whitney Test showed that there were differences in knowledge about neonatal care between the intervention group and the controlled group with a value of p= 0.004, there were differences in skills in neonatal care in the intervention group and the controlled group with a value of p= 0.012 for the skills of bathing babies, p= 0.016 for umbilical cord care skills and p= 0.009 for correct breastfeeding skills, and there were differences in independence in neonatal care between the intervention group and the control group. These results revealed an effect of android-based health education on the autonomy of neonatal care with a value of p= 0.001 for the autonomy in bathing babies, p= 0.006 for the autonomy in caring for the umbilical cord and p= 0.017 for the autonomy in breastfeeding. Conclusion: Android-based health education affects mothers' autonomy in neonatal care during primiparous postpartum.

Keywords: Android-Based Health Education, Knowledge, Skills, Autonomy, Neonatal Care, Primipara Postpartum Mothers

INTRODUCTION

Primiparous postpartum mothers will experience psychological changes caused by a role change from a single woman role without children to the role of motherhood due to her baby's presence (1). The primiparous postpartum mother's duties and responsibilities begin to increase with her new role (2). One of the roles of primiparous postpartum mothers is the role of baby care (3).

Neonates or newborns are babies aged 0-28 days which are very susceptible to infection and even lead to death due to low immunity (4). The Infant Mortality Rate (IMR) worldwide in 2016 was 30.5 per 1000 births. Most of these occurred in the neonatal period, an estimated 75% of IMR deaths. The main direct causes of neonatal mortality were due to pre-term birth (28%), severe infection (26%), asphyxia (23%), sepsis (16%) and neonatal tetanus (7%) (5). Meanwhile, indirect factors are caused by parental ignorance, i.e., lack of maternal knowledge and baby care errors during the neonatal period (6). Ineffective care for newborns led to a lack of attention to babies and increased infant mortality at age less than one (7).

Conducting neonatal care correctly and appropriately will reduce IMR. It is in line with Minister of Health Decree no. 53 the year 2014 concerning essential neonatal services carried out after birth 6 (six) hours to 28 (twenty-eight) days including how to keep the baby warm, take care of umbilical cord, breastfeed and take care of a baby at home (8). The common problem of neonatal care encoutered by the majority of new mothers is the lack of autonomy in newborns care. The autonomy here means that the mothers cannot take care of their babies on their own since lack of knowledge in newborn care (9). Based on the results of Priscilla's (2015) research on the independence of postpartum mothers in newborns' care using the "mother-baby care" (M-BC) model approach, the level of awareness of all 20 postpartum mothers (100%) in newborn care before intervention were low and led to dependency towards others. After the intervention, there was an increase in awareness of 16 (80%) postpartum mothers in independent newborn care (10).

One of the efforts to increase Primiparous postpartum mothers' knowledge, skills and independence in newborns' care is to provide health education (11). Health education is a part of care, health promotion, and disease and complications prevention to ensure the primiparous postpartum mother to be able to adapt to all changes that occur and can play the role of a good parent (12). The method in delivering health education is customized to the needs, targets and current developments, where smartphones are widely used in daily lives

(13). The existence of the Android operating system makes the use of smartphones as a means of communication and a means of searching for information (14).

Dynamic, practical, and familiar innovations in technology for neonatal care media to help prevent problems in newborns are based on its *user interface* (UI) and *user experience* (UX)(15). Therefore, the researcher presents an android-based health education media in the form of an application called '*Bubi Care*' as an alternative to access information about neonatal care to increase the independence of primiparous postpartum mothers in carrying out their baby care.

METHOD

This research was carried under quasi-experimental design with *pretest* and *post-test* for data collection and control group for result comparison. Respondents were divided into two groups, the intervention group, which was given health education based on android and the controlled group without any treatment. The research was conducted at the Public Health Centre of Kelayan Timur for the intervention group and at the Clinic of Mrs Ny. NM of Kelayan Timur in Banjarmasin City for the controlled group during period September - October 2019.

The participants were 240 trimester III pregnant women who resided in the study area from January to December 2019 with an average population of 20 women every month. The number of samples is 19 respondents for each group based on Isaac and Michael's tabulation, with an error rate of 5%. The sampling technique used was purposive sampling. The research instrument was the application *Bubi Care* containing questions about neonatal care and observation sheets on the skills and autonomy of mothers in carrying out baby care (picture 1). Data analysis used the Wilcoxon Test and the Mann-Whitney Test.

Two media and material experts validated the Bubi Care application before the treatment was carried out. This research has received ethical approval from the Ethics Commission of the Faculty of Public Health, Hasanuddin University Makassar No. 7190 / UN4.14.1 / TP.02.02 / 2020.

Data collection was carried out in two meetings. The first meeting for the intervention group was held at D-14 before delivery based on the estimation of labour. The meeting consisted of administering a pretest, providing an explanation of neonatal care material, determining a three-week independent study approximately on D-14 of labour to D+5 of postpartum, scheduling the second meeting in D+5 postpartum, and guiding the installation of the *Bubi Care* application. Whereas for the controlled group, the first meeting was held at

D-13 of delivery based on the estimation of labour consisting of the pretest, explaining that there will be a post-test and making a contract for the second meeting at postpartum H+5. After all data at the first meeting were collected, the second meeting was conducted in approximately H+5 to H+10 postpartum to do a post-test on knowledge, observation of skills and maternal independence in neonatal care.

Picture 1. Application *Bubi Care*
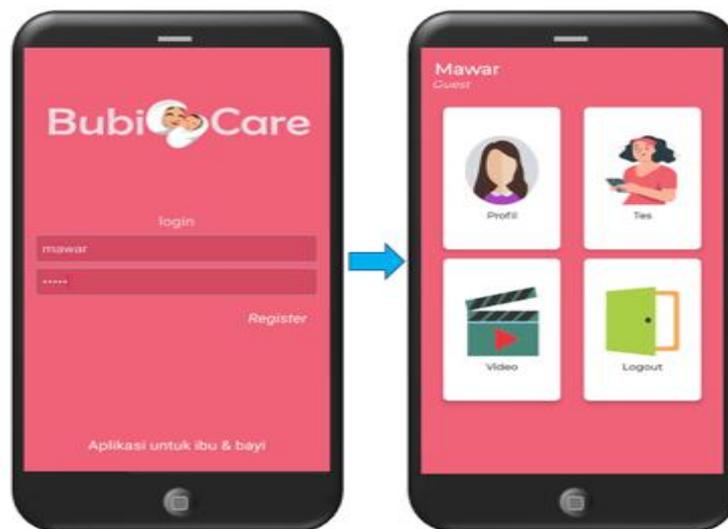
RESULTS

Most of the respondents of this study, nine people of (47%) the intervention group and 12 people (63%) of the controlled group, aging 20-25 years old. Based on their educational background, 17 people (89%) in both groups have high education. Based on their workplace, most of the respondents, 17 out of 20 people (90%), were housewives (Table 1).

Table 1. Characteristics of Respondents

Characteristics of Respondents in	Intervention Group		Controlled Group	
	n	**%**	**n**	**%**
Age				
<20	2	11	4	21
20-25	9	47	12	63
26-30	4	21	3	16
31-35	4	21	0	0
Total	19	100	19	100

Education				
High (Senior High School and above)	17	89	17	89
Low (Junior High and Elementary)	2	11	2	11
Total	19	100	19	100
Occupation				
Housewives	17	90	17	90
Private	1	5	2	10
Teacher	1	5	0	0
Total	19	100	19	100

Table 2. Comparison of the level of knowledge, skills and independence of respondents between the Intervention Group and the Controlled Group

Variable		Intervention	Control	P-value
		Median (Min-Max)	Median (Min-Max)	
Knowledge	Before	53 (33-67)	53 (33-73)	
	After	75 (50-90)	60 (33-80)	.004[b]
		P = 000[a]	P = 102[a]	
	Difference	22 (17-23)	13 (0-7)	
Skills for	Bathing babies	67(50-90)	60(45-80)	0,012[b]
	Taking care for the umbilical cord	67(56-89)	67(44-78)	0,016[b]
	Proper Breastfeeding	76(53-88)	65(47-82)	0,009[b]
Independence in	Baby Bathing	83(60-88)	63(45-83)	0,001[b]
	Taking care for the umbilical cord	83(50-83)	61(44-83)	0,006[b]
	Proper Breastfeeding	82(56-88)	71(47-82)	0,017[b]

Significance at p <0.05
a = Wilcoxon Signed Rank Test
b = Mann-Whitney

There was an increase in the median value of knowledge from 53 points to 75 points in the intervention group, which were 22 points. Additionally, it can be seen through the results of the Wilcoxon test that the obtained value was $p= 0.000$ ($p<0.05$). It showed some improvements in the knowledge before and after being given android-based education. Meanwhile, in the controlled group, an increase was indicated by the median score from 53 points to 60 points with a difference of 7 points. However, the control group had no change in the *pretest* and *post-test* scores of knowledge indicated by the value $p= 0.102$ ($p> 0.05$) (table 2).

The Mann Whitney test results showed a difference in knowledge about neonatal care between the intervention group and the controlled group (p = 0.004). There is also a difference in neonatal care skills between the intervention group and the controlled group, the value of $p= 0.012$ for bathing skills, $p= 0.016$ for umbilical cord care skills and $p= 0.009$ for proper breastfeeding skills, where each skill has $p<0, 05$. Additionally, there were also differences in the autonomy of mothers in neonatal care between the intervention group and the controlled group, the obtained value of $p= 0.001$ for the autonomy in bathing babies, $p= 0.006$ for the autonomy in the umbilical cord care and $p= 0.017$ for the autonomy in breastfeeding, where respectively each category has $p<0.05$ (table 2).

DISCUSSION
The Difference in Knowledge Before and After treatment between the Intervention and the Controled Groups

The study consists of a structured demonstration to easily understand and imitate the materials explained. Then, the stage was followed by a group discussion to allow respondents to ask questions. Media is also included to maximize the impact of health education given to the respondents. The media used in this study is an android *smartphone* application called *Bubi Care*. Android-based health education has been proven effective in increasing knowledge of its users (16). This was indicated by an increase in the median value of knowledge before and after being given Android-based health education with a difference in the median value of 22 points (table 2). The median value of knowledge in the intervention group is greater than the controlled group. It is assumed that the increase in knowledge achieved by the respondents is due to the learning process.

Age and education are factors that affect the increase in knowledge of primiparous postpartum mothers (17). Nine respondents (89%) in the intervention group are 20-25 years old. They are in the proper age for acquiring and analyzing new information. Another factor is education; most of the respondents in the intervention group (89%) are highly educated (above SMA) (table 1). The higher a person education, the quicker they can understand the instructions. More educated respondents are more easily to absorb counselling materials provided by health workers so that there is an increase in knowledge about neonatal care. It is in line with the research conducted by Rohani, and it was found that age and education influenced the mother's knowledge in infant care (P <0.005) (18).

Health education has many advantages. It has an attractive appearance, various materials, and video tutorials. Every material and video provided can be accessed easily to encourage respondents in learning about neonatal care anywhere and anytime. This study showed an increase in knowledge before and after using the *Bubi Care* application in the intervention group (*p*= 0.000) (table 2). It is in line with Lestari's research regarding the knowledge differences in the pretest and post-test results for pregnant women about labour preparation in the group given counselling using the android application media. The usage of android application media shows better results than counselling without using any media (19).

Meanwhile, the control group also experienced an increase in the median value before and after with a difference in the median value of 13 points (table 2). The increase in knowledge was due the autonomy of respondents trying to find information about baby care from family, friends, books and electronic media (television or mobile phones). It is in line with the *World Health Organization* (WHO) 's theory that a person's knowledge can be obtained from personal experience and other parties, such as parents, officers, friends, books and other communication media (20). However, it can be seen through the result of the *Wilcoxon test* that p-value = 0.102 (*p*<0.05) which means that there is no difference in the knowledge of respondents in *pretest and post-test* since there was no treatment given to control group (table 2).

Differences between the Intervention and Controlled Group Knowledge about Neonatal Care

Knowledge results from perceiving things using human senses (sight, hearing, smell, taste and touch) (21). Knowledge is the dominant factor in building primiparous postpartum mothers' independence in performing neonatal care (22). Based on the Mann-Whitney test results, it was found that the value of *p*= 0.004 (table 2). It means that a difference in

knowledge level about neonatal care in the intervention group and the controlled group that proved the effectiveness of android-based health education towards respondents' knowledge.

The intervention group have received android-based health education in the form of application containing audiovisual information to stimulate their senses of hearing and sight. Thus, the respondents can learn better than learning from a single stimulus either visual or audio. It is in line with the research conducted by Bert, et al., that the use of the *m-health* application for health promotion and as a source of health information can increase knowledge of users (16).

Android-based media is very useful since it encourages curiosity to get better information and better knowledge about the disease and health care (23). Respondents who used *Bubi Care* they began to know and familiarize themselves with the application. The familiarity then attracted the respondents to explore the apps more. Adequate stimulus from *Bubi Care* will eventually lead to new behaviours. Bubi Care's existenc*e* provides a good cognitive stimulus so that the primiparous postpartum mothers can increase their knowledge of neonatal care (24).

Differences in the Neonatal Care Skills between the Intervention and Controlled Groups

In this study, the skills of respondents in carrying out neonatal care are examined from three aspects, (1) baby bathing skills, (2) umbilical cord care skills, and (3) proper breastfeeding skills.

Skills are the application of knowledge so that a person's skill level is related to the knowledge level (25). In the intervention group, the respondents have a good level of knowledge about neonatal care to have high skills in carrying out baby care. A person's knowledge will aid their skills. It can be seen that the difference in the median value of each skill in the intervention group is higher than the control group (Table 2). It is in line with Nazura's research in which there is a significant relationship between mothers' knowledge and skills in caring for their babies, including baby bathing and proper breastfeeding techniques and other baby care (26).

Health education is a process of transformation in a person. It is related to the successful fulfilment of individual and community health goals (13). Based on the results of statistical tests using the *Mann-Whitney test,* each skill's p-value had *p*<0.05 means that there were differences in neonatal care skills in the intervention group and the controlled group (Table 2). It is assumed that the use of android-based health education for respondents in the intervention group causes changes in their skills in performing neonatal care. This study

results are in line with Breland et al., who explains that applications can improve the skills of its users (27).

An activity administered repeatedly will affect people's behaviour, including attitudes, behaviours, and skills (28). It happens to respondents in the intervention group that is introduced to the *Bubi Care* application. The respondents can watch video tutorials at any time every day and anywhere repeatedly to get information on neonatal care. This behaviour led the respondents in the intervention group to have better skills than the controlled group. It is in line with Hawkes, et al., that explaining the use of the *m-health* application increases knowledge and skills (29).

Mothers' care skills such as baby bathing, the umbilical cord care and proper breastfeeding should be learned from pregnancy. Therefore, health workers, especially midwives, can use the *Bubi Care* application as a medium for health education to pregnant women during their pregnancy or ANC classes. The *Bubi Care* aims to act as a learning guide for primiparous postpartum mothers in improving their baby care skills.

Differences in Respondents' Autonomy in Neonatal Care

In this study, the independence level of primiparous postpartum mothers in carrying out neonatal care was assessed by three aspects: (1) baby bathing, (2) umbilical cord care, and (3) proper breastfeeding. These three aspects of autonomous skills are assessed on the 5-10th day of postpartum or in the *taking hold* phase. This time range was allocated for independent observations since the respondent was ready to carry out his new role to do independent care. In this study research, the psychological condition of the respondent is the most important. Therefore, only when the respondent is psychologically ready and willing to care for the baby so that the observation on the respondent's independence can be carried out (3).

An independent primiparous postpartum mothers show the ability to do things independently, not dependent on others and know-how to explore her potential to meet her own and her baby's needs and overcome difficulties (30). This study reveals several factors that affect primiparous postpartum mothers' independence, including knowledge, age, educational background, and occupational background (31).

Knowledge is dominant to build one's independence. Based on the study results, most of the intervention group respondents received good knowledge that led to a better understanding of skills and higher independence level in carrying out baby care. It can be seen through the difference in the median where the intervention group noted higher score than the comparator group (table 2). It is in line with Fajarsari et al. that showed a very

significant relationship between knowledge and the autonomy of postpartum mothers in performing umbilical cord care. Twenty-two postpartum mothers (73.3%) who have good knowledge can do umbilical cord care autonomously (32).

Moreover, age also affects the independence of respondents in carrying out the baby care. Most of the respondents aged between 20-25 years old (89%), categorized as quite mature. With this maturity level, they can fulfil their new role as mothers to independently take care of their newborns (Table 1). It is in line with Priscila's research that showed most respondents (16 postpartum mothers or 80%) in the age range of 20-35 years could independently take care of their newborns (10).

Additionally, education can also affect mother's independence in caring for the baby. The research data show that 17 respondents (79%) are highly educated (SMA and above) (Table 1). It indicates that the higher a person's education, the wider his/her perspectives. Fajarsari supports the study results, et al. She explained a very significant relationship between education and the independence of postpartum mothers in carrying out infant care (P = 0.000) (32).

Another factor that affects independence is an occupational background. Occupation has great influence in willingness to do baby care. Some respondents are housewives (17 respondents or 90%) who have plenty of time to take care of their babies at home independently and can focus on caring for their babies (Table 1). The results of this study are in the same vein with the results of research by Khusawa, S. And Mohanta, showing that the level of work of the mother has a significant relationship with the ability of mothers to care for babies (P <0.005) (4).

One of the important factors to increase the independence of primiparous postpartum mothers in neonatal care is Android-based health education media as a guide during pregnancy to childbirth. It means that health education can be delivered face-to-face and can be done independently and repeatedly by respondents wherever and whenever they need (31). Accessible health education with attractive appearance leading to behavioural health change and contributing effectively to improved health outcomes (33). It can be seen that there are differences in independence for the intervention group and the controlled group ($p<0.005$) (table 2). It also means that android-based health education impacts on the autonomy of mothers in neonatal care, including the autonomy for bathing babies, caring for the umbilical cord and properly breastfeeding. This study results are in line with the study by Marswariaty et al., showing the effect of health education using the SDIDTK booklet + application on family independence in monitoring the development of children under five (34).

The way to deliver the information to the respondent in this study is arranged to follow current developments using android-based health education media. This media is *user friendly* and easy for users to operate when accessing the information within the application. It also has an attractive appearance and non-monotonous display with audiovisual content. This way, *Bubi Care* can be accepted and understood well by respondents.

CONCLUSIONS AND SUGGESTIONS

The *Bubi Care* is an Android-based application for health education media that can influence primiparous postpartum mothers' autonomy in neonatal care. The android application is expected to be an alternative media for health education. Using the *Bubi Care* application, respondents can access information about baby care easily, anytime and anywhere. It provides knowledge to improve the ability of primiparous postpartum mothers in carrying out daily baby care independently.

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