

The Effect of DEHY PRO (Dehydration Prevention) in Improving Preventive Behaviour among Parents toward Diarrhea Dehydration in Children Under Five

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ABSTRACT

The main cause of infant mortality in diarrhea is dehydration. Children under five are often brought to health services in deteriorating conditions to severe dehydration. Children under five deaths due to diarrhea are likely to be prevented if parents are able to recognize the signs of dehydration in children and take appropriate initial treatment. This study aims to determine the effect of the Dehy Pro application improves parents' behavior in preventing diarrhea dehydration in children under five. This study is a pre-experimental study with a one-group pre-posttest design. The research begins with the development of the Dehy Pro application through 4 stages: Define, Design, Develop, and Disseminate. Dehy Pro was introduced and used by 50 mothers with children under five in Karangrejo Village, Summersari-Jember District selected by using a purposive sampling technique. The independent variable of this study was the Dehy Pro application, meanwhile, the dependent variable of the study was the preventive behavior of diarrhea dehydration which was measured in the form of knowledge, attitudes, and prevention of diarrhea dehydration. The statistical test used is the Wilcoxon Sign Rank Test <0.05 . Dehy Pro significantly affected maternal behavior by increasing knowledge ($p<0.000$), attitude ($p>0.000$), and prevention practice of diarrhea dehydration ($p<0.000$). Dehy Pro can be an effective health promotion in reducing the number of diarrhea dehydration among children under five through increasing knowledge and the role of parents to take steps to prevent dehydration due to diarrhea.

Keyword: Dehy Pro, Preventive Behaviour, Diarrhea Dehydration, Children Under Five

ABSTRAK

Penyebab utama kematian balita akibat diare yaitu dehidrasi. Balita seringkali dibawa ke pelayanan kesehatan dalam kondisi sudah memburuk akibat dehidrasi berat. Kematian balita akibat diare sangat mungkin dicegah apabila orang tua dapat mengenali tanda-tanda dehidrasi pada anak dan dapat melakukan penanganan awal yang tepat saat anak diare. Penelitian ini bertujuan untuk mengetahui pengaruh aplikasi Dehy Pro dalam meningkatkan perilaku orang tua dalam pencegahan dehidrasi diare pada balita. Penelitian ini merupakan penelitian pre-experiment dengan desain one grup pre-posttest design yang. Penelitian diawali dengan pengembangan aplikasi Dehy Pro melalui 4 tahap: Define, Design, Develop, Disseminate. Dehy Pro kemudian dikenalkan dan digunakan oleh 50 ibu dengan balita di Kelurahan Karangrejo Kecamatan Summersari-Jember yang dipilih menggunakan teknik purposive sampling. Variabel independen penelitian ini adalah aplikasi Dehy Pro, sedangkan variabel dependen penelitian yaitu perilaku pencegahan dehidrasi diare yang diukur dalam bentuk pengetahuan, sikap, dan tindakan pencegahan dehidrasi diare. Uji statistik yang digunakan yaitu Wilcoxon Sign Rank Test $\alpha<0,05$. Dehy Pro mempengaruhi perilaku ibu secara signifikan dengan meningkatkan pengetahuan ($p<0,000$), sikap ($p>0,000$), dan tindakan pencegahan dehidrasi diare ($p<0,000$). Dehy Pro dapat menjadi upaya promosi kesehatan yang efektif dalam menekan angka dehidrasi diare balita melalui peningkatan pengetahuan dan peran orang tua untuk melakukan tindakan pencegahan dehidrasi akibat diare.

Kata Kunci: Dehy Pro, Perilaku Pencegahan, Dehidrasi Diare, Balita

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Introduction:

Globally, diarrhea causes 600,000 deaths of children under five each year and a morbidity rate of 1.7 billion per year (Samuel et al, 2018). Meanwhile, in Indonesia, the Ministry of Health states that 31.4% of infant deaths and 25% of children under five deaths are caused by diarrhea (KEMENKES, 2019). Based on the East Java Health Profile in 2018, diarrhea cases in Jember Regency were 38,103 cases within the highest incidence of diarrhea in the Sumpster District (DKPJT, 2018).

The main factor causing infant mortality in diarrhea is dehydration due to the active loss of fluids and electrolytes through feces (Van Der Westhuizen et al., 2019). The more severe the degree of dehydration, the higher the risk of death in children. So that the main principle of diarrhea management is to replace lost fluids to prevent dehydration which started at home. Parental knowledge is the most associated factor with the incidence of dehydration in under-five-age children (Christy, 2014). Parents' lack of knowledge regarding the early treatment of diarrhea at home properly and how to recognize signs of dehydration in children causes parents to be late in seeking help (Marissa, 2015). So that under-five-age children are often brought to health services in a deteriorating condition due to severe dehydration.

Death of children under five with diarrhea due to dehydration is very likely to be prevented if parents have adequate knowledge about the management of diarrhea at home. A study proves that the management of fluid administration at home is significantly related to the level of dehydration of children whereas the parents who provide adequate fluids while at home show the majority of their children under five are not dehydrated (Zubaidah&Maria, 2020). Health promotion related to the prevention and early treatment of diarrhea using booklets, leaflets, and videos has been done many times, but it has some drawbacks. Some of these weaknesses include paper media, which is easily torn, unattractive, and mainly has material coverage related to handling diarrhea in general. So that parents are not guided to be able to determine the appropriate

initial treatment while at home according to the conditions of each child.

One of the efforts that can bridge the limitations of providing health education related to diarrhea management in children under five is by developing smartphone-based applications that are adapted to the needs of parents such as the "Dehy Pro" application. This application contains a visual guide in the form of pictures and videos about signs of dehydration, diarrhea, and how to perform a simple physical examination independently so that parents can determine whether there are signs of dehydration in children. In this application, there is a screening menu that parents need to fill out to assess the degree of dehydration experienced by the child. It is managed based on the Manajemen Terpadu Balita Sakit (MTBS) developed by KEMENKES RI (2019) such as how to make a salt sugar solution and when parents should contact the nearest health service. With this application, parents can have a structured guide to independently carry out the initial treatment of diarrhea at home so that diarrhea dehydration can be prevented.

Methods:

The research design used in this study was a pre-experimental study with a one-group pre-post-test design. The population of this research is all mothers who have under-five-age children in Karangrejo Village, Sumpster PUSKESMAS Working Area, Jember Regency, as many as 325 mothers. The inclusion criteria in this study were: mothers who take care of their children (not working), can read, write, and understand Indonesian, smartphone users, and participate in research activities fully. Based on the inclusion criteria set by the researcher, the number of research samples was 50 people who were selected using the purposive sampling technique.

This research begins with developing smartphone-based Dehy Pro application that involves an information system expert. The development of the Dehy Pro application was carried out in 4 main stages, namely Define, Design, Develop, and Disseminate. The explanation of each level is as follows:

1. Define

In the define stage, the researcher collects information from parents who have children related to their experiences in preventing and handling diarrhea and the problems encountered through structured interviews. Next, the researchers compiled menus and entries in the Dehy Pro application using credible and up-to-date literature, one of which MTBS 2019.

2. Design

At the design stage, researchers collaborate with experts in the field of information systems to design application prototypes.

3. Develop

At the development stage, an expert appraisal was carried out to assess the feasibility of the application using the MHealth App Usability Questionnaire (MAUQ). The experts involved in the expert appraisal consisted of 1 lecturer with information technology expertise, two pediatric nursing lecturers, two nurses in charge of the Integrated Management of Sick Children (MTBS) at PUSKESMAS. The experts were asked to provide input on four aspects of the application, namely: the appearance of the application, the language used, the application menu, and the ease of using the application. Researchers made improvements and application development according to the expert's recommendations, followed by testing the application prototype on ten mothers who have children under five

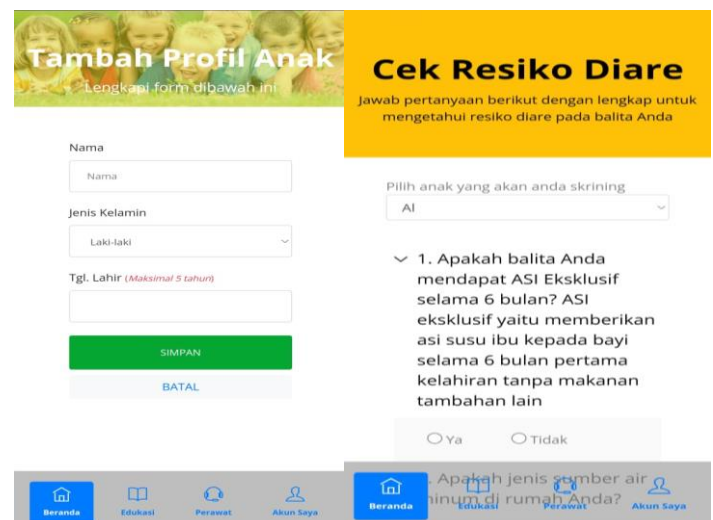
4. Disseminate

In the dissemination stage, the application was introduced to 50 research respondents.

The menus available in the Dehy Pro application are (1) Child profile, in this menu, parents can fill in the child's identity and include the child's name, gender, and date of birth; (2) Diarrhea risk screening, this menu displays 9 questions compiled by researchers based on theories and previous research which relate to the diarrhea in children under five, such as the history of breastfeeding, clean and healthy living behavior, and factors of mothers and toddlers' environment. The risk of diarrhea in children under five is classified into 4 categories, namely: very low risk, low risk, moderate risk, and high

risk; (3) Education, on this menu, parents get information related to diarrhea, prevention of diarrhea, diarrhea dehydration, signs of diarrhea dehydration, treatment of diarrhea dehydration based on the degree of diarrhea dehydration, as well as several educational videos such as videos on how to check skin turgor, make salt sugar solution, and give zinc tablets; (4) Dehydration Diarrhea, this menu displays 7 questions compiled by researchers based on the classification of diarrhea dehydration and its signs according to the MTBS 2019. After filling in the questions on diarrhea dehydration screening, parents can see the results of the degree of dehydration in children under five along with recommendations for handling them. Each recommendation for handling dehydration and diarrhea is prepared based on the MTBS 2019; (5) Contact nurses, there are 3 names and contact numbers for researchers who also have a nursing education background that parents can contact if they want to ask questions about children's health. This menu is also added to the location of the nearest health service around Summersari District, Jember Regency.

The appearance and menu of Dehy Pro can be seen in Figure 1:



The screenshot shows two main sections of the application. On the left, there is a form titled "Tambah Profil Anak" (Add Child Profile) with the subtitle "Lengkapi form dibawah ini" (Complete the form below). The form includes input fields for "Nama" (Name), "Jenis Kelamin" (Gender) with a dropdown menu set to "Laki-laki" (Male), and "Tgl. Lahir (Maksimal 5 tahun)" (Date of Birth, Maximum 5 years). Below these fields are two buttons: a green "SIMPAN" (Save) button and a blue "BATIL" (Cancel) button. On the right, there is a yellow header for "Cek Resiko Diare" (Check Diarrhea Risk) with the instruction "Jawab pertanyaan berikut dengan lengkap untuk mengetahui resiko diare pada balita Anda" (Answer the following questions completely to know the risk of diarrhea in your child). Below this is a question: "1. Apakah balita Anda mendapat ASI Eksklusif selama 6 bulan? ASI eksklusif yaitu memberikan asi susu ibu kepada bayi selama 6 bulan pertama kelahiran tanpa makanan tambahan lain" (1. Does your child get Exclusive Breastfeeding for 6 months? Exclusive breastfeeding is giving breast milk to the baby during the first 6 months of birth without any other food additions). There are two radio button options: "Ya" (Yes) and "Tidak" (No). At the bottom, there is a navigation bar with icons for "Beranda" (Home), "Edukasi" (Education), "Perawat" (Nurse), "Akun Saya" (My Account), and "Beranda" (Home) again. A small pop-up question is visible at the bottom right: "Apakah jenis sumber air minum di rumah Anda?" (Is the type of water source in your house?).

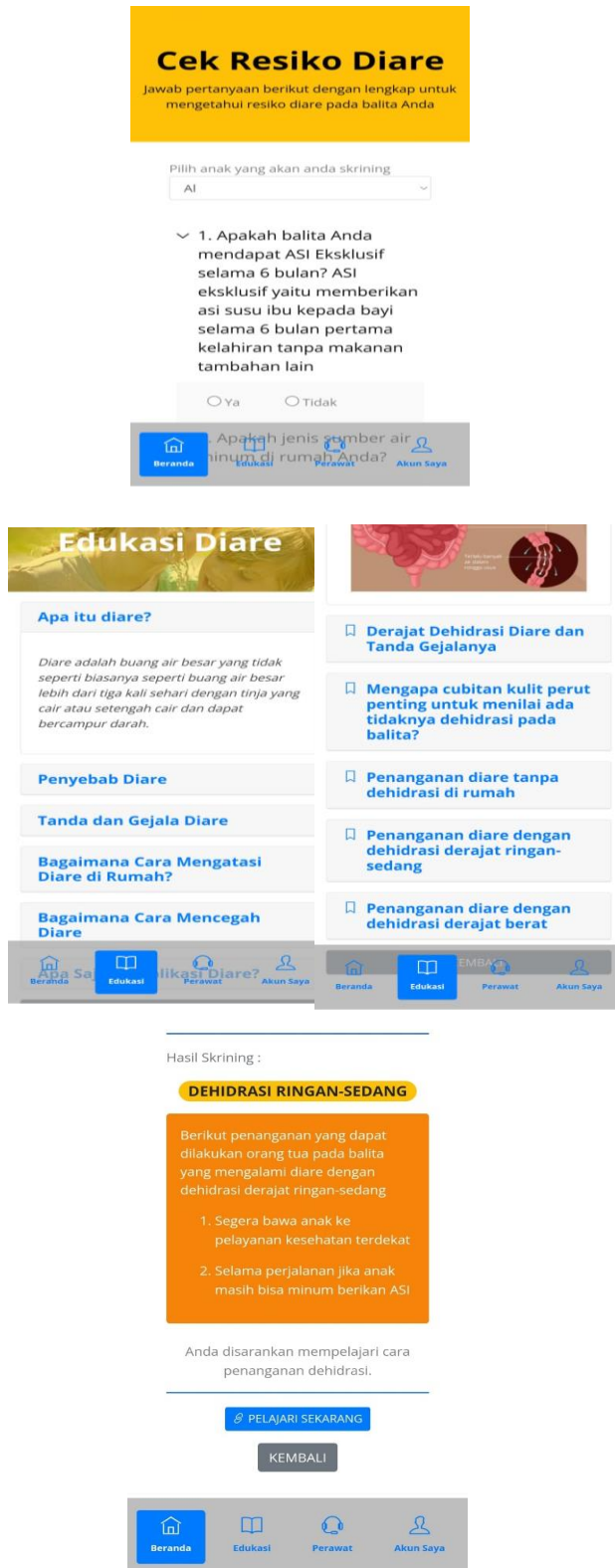


Figure 1. Menu of Dehy Pro

The researchers first introduced the use of the application and explained all the menus in the application including to explain how to fill out the diarrhea risk screening and diarrhea dehydration screening on September 3, 2022. The existence of this application has become a form of health promotion effort that aims to make mothers, who use the Dehy Pro application able to check signs of dehydration that appear in under five children with diarrhea, can screen for diarrhea dehydration at home, and know the steps for early handling of diarrhea independently at home to prevent diarrhea dehydration. Respondents were given 5 days to study and use the application at home before the post-test activity carried out on September 8, 2022. The independent variable of this study was the Dehy Pro application, meanwhile, the dependent variable of the study was diarrhea dehydration prevention behavior measured in the form of knowledge, attitude, and prevention of diarrhea dehydration.

There are 3 instruments used in this study, including knowledge questionnaires on the prevention of diarrhea dehydration, a questionnaire on attitudes to prevent diarrhea dehydration, and a checklist sheet for observing mothers' practice skill in preventing diarrhea dehydration. The three instruments have a validity expert process to assess the validity of the contents in the instrument involving 2 pediatric nursing lecturers. Experts were asked to rate each question/statement item on the questionnaire in terms of relevance, clarity, and readability. Each instrument is assessed by the I-CVI (Item-Content Validity Index) and S-CVI (Scale-Content Validity Index) aspects. According to Polit & Beck (2006), the I-CVI and S-CVI scores should not be less than 1.00, if there are less than 5 experts involved. The three instruments used in this study have I-CVI and S-CVI values of 1.00 each, which means that all items on the three instruments have superior validity. The questionnaire on knowledge and attitude to prevent dehydration of diarrhea consists of 10 questions. The diarrhea dehydration prevention checklist sheet consists of

5 activities that include: mentioning the steps in assessing the degree of dehydrating diarrhea, checking abdominal skin turgor, giving oral dehydration solution (ORS), making salt sugar solution, and giving zinc tablets. Assessment of dehydration prevention measures consists of three categories, namely not done (point 0), done but still wrong (point 1), and done correctly (point 2). This research has received an ethical certificate from KEPK, Faculty of Dentistry, the University of Jember within number 1576/UN25.8/KEPK/DL/2022.

Results:

The characteristics of research respondents obtained at the time's data collection are as follows.

Table 1. Tabulation of respondents' demographic data based on age, education, and the number of children in Karangrejo Village, Summersari District, September 3-14, 2022.

Characteristics	Parameter	Frequency	%
Age	18-25 years old	12	24
	26-31 years old	31	62
	>32 years old	7	14
	Total	50	100
Education	Elementary	8	16
	Junior High	10	20
	Senior High	28	56
	University	4	8
	Total	50	100
Number of children	1	22	44
	2	18	36
	3	8	16
	>3	2	4
	Total	50	100

The majority of respondents in the study were 26-31 years old, had a high school education, and had 1 child.

Table 2. Frequency distribution and statistical test of respondents' knowledge before and after intervention in Karangrejo Village, Summersari District, September 3-14, 2022

Variable	Pretest		Posttest		Wilcoxon P
	n	(%)	N	(%)	
Knowledge					0,000
Good	6	12	19	38	
Enough	33	66	31	62	
Less	11	22	0	0	
Total	50	100	50	100	

Before the intervention, most of the respondents (66%) had sufficient knowledge regarding dehydrating diarrhea prevention. There are 11 respondents with less knowledge and only 6 respondents with good knowledge. After being given the intervention, there was an increasing number of respondents with good knowledge about 19 people and there were no respondents with less knowledge. Table 2 shows that Dehy Pro affects knowledge as evidenced by the Wilcoxon sign rank statistical test with a p-value = 0.000.

Table 3. Frequency distribution and statistical tests of respondents' attitudes before and after intervention in Karangrejo Village, Summersari District, September 3-14, 2022

Variable	Pretest		Posttest		Wilcoxon P
	n	(%)	N	(%)	
Attitude					0,000
Good	0	0	10	20	
Enough	23	46	36	72	
Less	27	54	4	8	
Total	50	100	50	100	

Before the intervention, the majority of respondents (54%) had attitudes related to the prevention of diarrhea dehydration in the less category and none of the respondents had a good attitude category. After being given the intervention, there was an increase in the number of respondents with good knowledge by 10 people and a decrease in the number of respondents who had a category attitude of fewer than 27 people to 4 people. Table 3 shows that Dehy Pro affects attitudes as evidenced by the Wilcoxon signed rank test statistical test with p-value = 0.000.

Table 4. Frequency distribution and statistical tests of respondents' actions before and after intervention in Karangrejo Village, Summersari District, September 3-14, 2022.

Variable Value	Pretest		Posttest		Wilcoxon P
	N	(%)	N	(%)	
Action					0,000
Good	5	10	15	30	
Enough	29	58	35	70	
Less	16	32	0	0	
Total	50	100	50	100	

Before the intervention, the majority of respondents (58%) had adequate measures related to the prevention of dehydrating diarrhea. There are 16 respondents with actions in the less category. After being given the intervention, there was an increase in the number of respondents with good knowledge as many as 15 people, and no respondents who had dehydrating diarrhea prevention measures in the less category. Table 4 shows that Dehy Pro affects the action as evidenced by the Wilcoxon sign ranked test statistical test with a p-value of 0.000.

Discussion:

After using Dehy Pro, mothers can properly prevent dehydration diarrhea in at least four preventive measures, such as making a salt-sugar solution, giving ORS, checking abdominal skin turgor, and giving zinc tablets. It is said that health promotion efforts through the Dehy Pro application are significant in forming positive attitudes and behaviors of mothers in preventing dehydration diarrhea in children under five. This study's results were relevant to research of Mindiharto & Astutik (2019), which proves the increasing knowledge followed by an increase in attitudes toward preventing diarrhea. Kasjono & Suryani (2020) shows that a smartphone-based stunting prevention application called "GASING" has been known to be more effective in increasing stunting prevention behavior in high school students than leaflet media.

Smartphone-based Dehy Pro facilitates parents to get information related to preventing dehydration and diarrhea fast, easily and can be

read at any time without being constrained by place and time. It stated that someone who can access information easily and quickly would gain knowledge faster (Ar-Rasily & Dewi, 2016). Knowledge is the most important aspect which has to be mastered by someone as a basis for determining further action (Arbianingsih et al, 2018). Knowledge is the foundation for shaping one's actions and behavior. The existence of knowledge will increase a person's awareness which ultimately triggers him to behave according to the knowledge that they have (RaufHartati; Adhiwijaya, 2013; Siddharthan et al., 2016)

Health information can be obtained from various sources, both print media and electronic media, such as the mobile health application which is currently being massively developed globally (Jae et al., 2017) . Various types of research in the health sector utilize any type of technology such as smartphones that aim to optimize health programs to increase public participation in healthy living. Han & Lee (2018) showed that the use of mobile health applications had a positive impact on the formation of health behaviors and the achievement of good health status.

The success of health promotion can be influenced by several factors. One of them is the use of attractive audio-visual media and language that is easily understood by the target group. The information contained in Dehy Pro is equipped with pictures and videos that support the explanations given so that it will be easier for mothers to remember them. The information provided was packaged in a language that is easily understood by ordinary people so that mothers will be more interested in learning the information contained in the application. Previous research stated that health education using video significantly improves health literacy because the use of colorful and moving images can attract respondents' attention so that the information conveyed is easier to remember.

The videos on the Dehy Pro application include how to check for abdominal skin turgor to detect the dehydration status of children under five, how to serve oralyte solution and make a salt sugar solution, and how to give zinc tablets to

children under five. The portability of the smartphone allows mothers to play back the video anywhere when needed so that it can help mothers carry out the early treatment when children have diarrhea so that diarrheal dehydration can be prevented as early as possible.

In addition to the educational menu, one of the most vital menus in this application is screening for the degree of diarrhea dehydration. This menu allows mothers to conduct self-screening to determine the degree of dehydration that may be experienced by children under five. The results of the dehydration screening that appear after the mother have filled out all the screening questions then guide the mother to carry out treatment actions at home. The development of Dehy Pro was not intended to replace the role of health workers, on the contrary, by conducting independent dehydration screening as early as possible, mothers will know when to go to the nearest health service for help. So, it is hoped by this application, that children are not too late to get medical assistance. The research of Albeshan et al. (2020) proves that breast self-examination can increase a person's awareness to carry out early detection of breast cancer in health services. Breast self-examination and early detection of breast cancer can reduce the incidence of breast cancer that has reached a late stage.

The results of this study indicate that the use of Dehy Pro provides benefits to mothers by increasing knowledge, forming positive attitudes, and increasing the prevention practices of diarrhea dehydration in Karangrejo Village, Sumpersari Jember District in particular. Dehy Pro can be an effective health promotion in reducing the number of diarrhea dehydration in children under five through increasing knowledge and the role of parents to take steps to prevent dehydration due to diarrhea. Dehy Pro needs to be developed further so that more layers of society can use and benefit from the application. This study has several limitations, this study involved 50 mothers only and the mothers involved were not mothers of children with diarrhea. Future research should include mothers who are caring for their children who have diarrhea so the

effectivity of Dehy Pro can be evaluated in the real setting.

Conclusions:

Dehy Pro can improve the behavior of parents in preventing diarrheal dehydration through increasing knowledge, positive attitudes, and preventing diarrheal dehydration in Karangrejo Village, Jember Regency.

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