



Innovation Article

Progressive muscle relaxation application (PURE App) for dysmenorrhea

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ABSTRACT

Background: The prevalence of primary dysmenorrhea in Indonesia is 54.89%. Progressive Muscle Relaxation (PMR) exercises have proven to decrease the symptoms of dysmenorrhea. Nowadays, the android application can be widely accessed anywhere and anytime, thus saving time and costs. There has never been a study that applies PMR, especially android-based dysmenorrhoea.

Objective: The current study aimed to develop the PURE App, a PMR exercise android-based application, and to test the effectiveness of reducing the menstrual pain score of adolescents with primary dysmenorrhea.

Method: This study conducted Research and Development (R&D), which consists of 4 stages, namely information collection, application design, expert validation and revision, and trial.

Result: The PURE App has five features, ranging from pain screening to exercise. The trial results showed that the PURE App application effectively reduced menstrual pain in adolescents with dysmenorrhea. The treatment decreased pain score from 4.48 ± 0.71 to 1.98 ± 1.49 in the treatment group ($p < 0.001$). The treatment group's post-measurement pain score was also significantly different compared to the control group, 1.98 ± 1.49 and 4.90 ± 1.10 , respectively.

Conclusion: The PURE App benefits teenagers, especially those with primary dysmenorrhea. This application will make it easier for teenagers to overcome pain because the exercises on the application can be accessed anytime and anywhere.

INTRODUCTION

Dysmenorrhea can cause discomfort for women. Dysmenorrhea can be felt in several other parts of the body, such as pain in the lower back which is the pelvis, waist, and upper part of the calf.^{1,2} World Health Organization (WHO) data in 2017 stated that dysmenorrhea was 1,769,425 people (90%), of whom severe dysmenorrhea was 10-15%.³⁻⁵

The impacts caused by dysmenorrhea include absence from school, disruption of daily activities, anxiety, decreased female quality of life, female students' inability to study with concentration, and the pain felt decreases students' learning motivation. Dysmenorrhea can affect

the quality of life of young women.^{6,7} The results of studies on adolescents in Asia show that the majority of Asian girls express unwillingness to use drugs to treat primary dysmenorrhoea because they are worried about dependence and its side effects.⁸

Dysmenorrhea can be overcome with non-pharmacological therapy to relieve the symptoms of dysmenorrhoea without medications and has no side effects, such as relaxation, which can be chosen as a complementary therapy for adolescents with dysmenorrhoea.⁹ Progressive Muscle Relaxation (PMR) therapy is a treatment for dysmenorrhea. PMR is a therapy carried out by tensing, relaxing muscles, ranging from facial muscles to leg.¹⁰ Most therapeutic implementations

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require a companion by the practitioner/therapist and are not targeted to be healthy independently. If it is not done confidently, the efforts will be in vain.¹¹ PMR is significant because this relaxation technique is relatively easy, does not require imagination, does not require an instructor, involves mind-body therapy, and is one of the alternatives to overcome dysmenorrhea in adolescents.¹²

The rapid development of technology today allows obstetric services to be provided through smartphones based on android. It is estimated that today, 90% of adults use smartphones.¹³ Teenagers in the modern era spend most of their time finding, choosing, and using mobile apps.¹⁴ The rapid development of technology, the more fields that need to be developed.¹⁵ Digital health technology has excellent potential as a learning resource for adolescents and has an essential influence on health knowledge and behaviors.¹⁶

Currently, no studies have made the application helps in reducing menstrual pain. Similar studies only provide treatment by providing progressive muscle relaxation exercises face-to-face or sending video recordings of exercises. This study aims to create an android-based application that makes it easier for teenagers to overcome menstrual pain independently, which can be done anytime and anywhere.

METHOD

The method used in this study is Research and Development (R&D) by adopting the simplified Borg & Gall method. It consists of 4 stages: Stage 1 (Information Collection), Stage 2 (Application Design), Stage 3 (Expert Validation and Revision, and Stage 4 (Application Trial).¹⁷

Stage 1 Information Collection

This stage collected information from the literature and 2 class teachers, and two counseling guidance teachers. This information will be a reference for creating the product.

Stage 2 Application Design

Information collection becomes a reference source in creating a rough framework (framework) application called the PURE App. Applications are designed by researchers and created by information technology experts. The application is made based on android.

Stage 3 Expert Validation and Revision

Conduct expert validation tests to test the feasibility of the PURE App created before use. The test was conducted on five experts: PMR movement experts, two obstetricians, information technology experts, and sports teachers. The application is expertly tested to assess whether this application is worth using. They are testing using an ISO

9126 questionnaire. After conducting expert validation, researchers revise the design before being tested. Testing is done to produce effective and efficient applications.

Stage 4 Application Trial

Product trials using the Quasy Experimental type of research with a Nonequivalent control group design. The research was conducted at Junior High Schools 25 and 34 Pekanbaru City in March-April 2022. The population was all young women. The sample in this study was 80 respondents who used simple random sampling. The intervention group was given the PURE App, and the control group was given education through a leaflet. The measured variable is menstrual pain—data analysis used by Wilcoxon and Mann Whitney test.

RESULTS

Results of Information Collection

Based on literature studies and interviews, young women have difficulty coping with the menstrual pain they experience. Teenagers in the modern era spend most of their time finding, choosing, and using mobile apps.¹⁴ Therefore, the PURE App application is designed to make it easier for teenagers to overcome menstrual pain by doing pain screening, getting an education about dysmenorrhea and progressive muscle relaxation, and doing exercises that can be accessed anytime and anywhere independently.¹³

Application Development Results

The PURE App has five features available. After the application is downloaded, a login page will appear to enter the application (Figure 1). After logging in, a menu page will appear on the application (Figure 2). Feature 1 is screening for pain experienced by adolescents during menstruation (Figure 3), while Feature 2 (Figure 4) is information about primary dysmenorrhea. Feature 3 is information about progressive muscle relaxation (Figure 5), and Feature 4 is exercise, where teens can do exercises by following the video in the application (Figure 6). Teens can save workouts so their workout history can appear on the main page. Feature 6 (Figure 7) is the result of filled pain development. PURE App can be downloaded at the following link: <https://drive.google.com/drive/folders/18wrkJfrtdcOR5-d9n99Jv7X1yPdOyL3y?usp=sharing>

Expert Validation and Revision Result

Five experts conducted application testing and obtained 93.8% results with very high categories. Based on the results of expert validation, this application must be added several colors to make this application more attractive. Researchers have changed the color of the display design to a combination of several colors. It means that this application is per its functions and is worth using.

Trial Results

After the respondent used this application and learned and practiced the material, the trial results found that the reduction in menstrual pain in the intervention group was higher than in the control group ($p < 0.05$). (Table 1).

Table 1. Differences in pain scale, mean \pm SD (n=80)

| Pain Scale | Intervention Group | Control Group | p-value** |
|------------|--------------------|-----------------|-----------|
| Pre | 4.48 \pm 0.71 | 4.45 \pm 0.55 | 0.784 |
| Post | 1.98 \pm 1.49 | 4.90 \pm 1.10 | 0.0001 |
| p-value* | 0.0001 | 0.007 | |
| Difference | -2.50 \pm 1.17 | 0.45 \pm 1.01 | 0.0001 |

*Wilcoxon Test; **Mann-Whitney Test

DISCUSSION

Features in the PURE App app are pain screening, dysmenorrhea education, progressive muscle relaxation, and exercise. The essential thing in the application is the exercise menu which contains progressive muscle relaxation exercise videos. Teenagers can access the exercise menu and do it at any time by following the video online.¹⁵ There is also a pain screening menu that uses a Numeric Rating Scale questionnaire, which helps determine the pain level based on what adolescents feel. Then the results of pain screening can be seen on the menu of pain development results. The educational menu is also found in the PURE App application, where this menu explains dysmenorrhoea and progressive muscle relaxation.¹⁸ The educational feature serves to add knowledge to adolescents to know about pain and its treatment. The menus in the application are designed to make it easier for teenagers to access every feature and make each menu attract the attention of teenagers.

The expert validation test is a practical test to assess the design of application models carried out by several validators such as IT experts, progressive muscle relaxation experts, obstetricians, and sports teachers. Expert validation tests are carried out to make the resulting application more valid or trustworthy. The validation test used the ISO 9126 questionnaire, which obtained 93.8% results with a very high category.¹⁹ Based on the advice of experts, this application can be added several colors to make the application more attractive. This application has been changed and then for the better because the color of the application has become not monotonous.

The study found that before and after menstrual pain in the intervention group and the control group were different.

The difference between dysmenorrhea pain in the intervention group decreased by 2.5, while the control group had an average difference of 0.45. This means there was a more significant decrease in the menstrual pain score of the intervention group than in the control group. The intervention group given by the PURE App application, which is an application that focuses on Progressive Muscle Relaxation exercises in general, can relax muscles from the face to the feet, lower blood pressure and heart rate to cause feelings of relaxation, decreased pain, anxiety, stress, decreased premenstrual syndrome, and insomnia.^{10,20}

In a relaxed body, the brain will produce endorphins that are useful as a natural pain reliever, reduce physical complaints, and improve mood so that the individual feels comfortable. If the individual feels comfortable or relaxed, the quality of life will also increase so that the individual can carry out activities as usual.²¹ If menstrual pain decreases, there will be an improvement in the quality of life in adolescents.²²

A previous study proved that progressive muscle relaxation effectively reduces the intensity of dysmenorrhea pain ($p < 0.0001$).²³ Another study said that if progressive muscle relaxation exercises are not followed according to the procedure and the steps properly and correctly, it will affect the scale of dysmenorrhea pain. The intervention was carried out on 30 adolescents who were given Progressive Muscle Relaxation exercises three times a day on the first day of menstruation for 15 minutes, reducing the scale of dysmenorrhea pain ($p < 0.05$).²⁴

Smartphones are a support system that is a breakthrough in overcoming challenges related to health problems that can be assessed in terms of cost-effectiveness and access to services.²⁵ Obstetrics services through smartphones are possible during the rapid development of this technology.¹³ By incorporating progressive muscle relaxation exercises application, educational services for adolescents in supporting access oriented to the quality of individual health because adolescents in the modern era spend most of their time finding, choosing, and using mobile applications.¹⁴ So, the PURE app is here to help teenagers overcome menstrual pain that is felt and can be done anytime and anywhere. The PURE App can make it easier for teenagers to access information about dysmenorrhoea. Teenagers can do progressive muscle relaxation exercises on the application three times a week and daily during menstruation to decrease their menstrual pain.

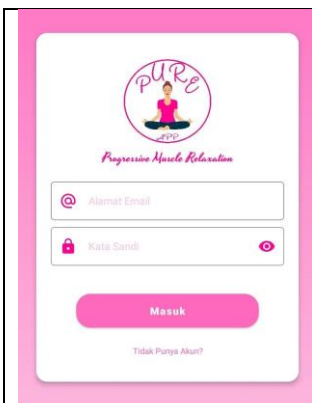


Figure 1. Login



Figure 2. Menu Application



Figure 3. Features 1 Pain Screening

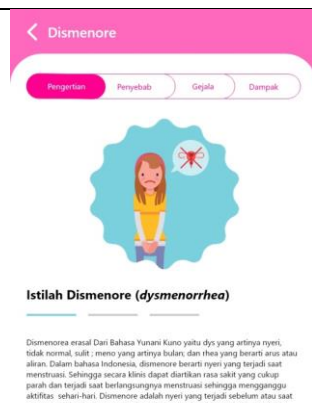


Figure 4. Feature 2 Dysmenorrhea Education



Figure 5. Features 3 PMR Education

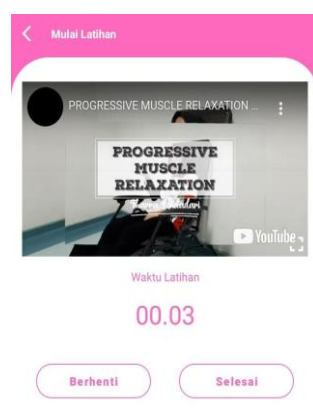


Figure 6. Features 4 PMR Exercises



Figure 7. Features 5 The Development of Pain

After the product trial, researchers evaluated it by providing questionnaires to adolescents who used this application. The evaluation results showed that respondents' average assessment score of the PURE App was 96.25%, or very high criteria. The problem raised by the respondents was that there were application features that became annoying or inconvenient for users. After being traced by researchers, the problem was found in the PMR exercise feature, where when doing PMR exercises, respondents could not speed up the video, and there was a minimum time to do exercises in order to have a history of exercise so that according to respondents there was no need for such a thing. However, because this study requires exercise supervision, researchers provide this feature to monitor respondents during PMR exercises.

CONCLUSIONS AND RECOMMENDATION

The PURE App is an obstetrics service using android-based technology that helps adolescents overcome primary dysmenorrhea. The materials and exercises listed in this application can provide efficiency and effectiveness to adolescents dealing with primary dysmenorrhea. Health workers and school teachers can take advantage of this

application and give it to teenagers to reduce menstrual pain.

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