

An Android-Based Aerobic Exercise Application to Easily Decrease Symptoms of Ischemic Stroke

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ARTICLE INFO

Article history:

DOI:

[10.30595/pshms.v3i.628](https://doi.org/10.30595/pshms.v3i.628)

Submitted:

Sept 28, 2022

Accepted:

Nov 27, 2022

Published:

Dec 28, 2022

Keywords:

Android-Based Aerobic
Exercise Application, Ischemic
Stroke Symptom Decrease

ABSTRACT

Background: Recurrent stroke occurs due to the lack of knowledge about symptom improvement in ischemic stroke, so many people ignore it. A researcher said aerobic exercise improves cardiovascular health, balance mobility, and endurance after a stroke. This has health consequences that can affect the occurrence of subsequent recurrent strokes. Aerobic exercise is an application designed as a medium for health education. **Objective:** This technological work aims to determine the application of Low Impact Aerobic Exercise to improve ischemic stroke symptoms. **Method:** At this stage, a trial was conducted on the features of the Aerobic Exercise application using an expert test, namely a trial conducted by consulting research instruments (applications) with experts or health experts. After that research was carried out. **Results:** Changes in improving ischemic stroke symptoms after using aerobic exercise applications on blood pressure, cholesterol, and muscle mobilization were found. **Conclusion:** The Aerobic Exercise application for respondents is easy to use, and they understand how to operate it.

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1. INTRODUCTION

According to data from 2010, there were 33 million stroke cases worldwide, with 16.9 million cases being the first stroke, and the remaining 16.1 million cases being the second. According to data from the American Heart Association (AHA), stroke is the second greatest cause of death in developed countries and ranks fourth globally among all causes of mortality, after heart disease, cancer, and chronic respiratory disease. (Putri & Herlina, 2021).

Ischemic stroke is caused by a focal blockage of blood arteries, which results in a reduction in the amount of oxygen and glucose reaching the affected area of the brain. When the arteries that supply the brain are thickened and hypertrophied, which results in decreased blood flow to the afflicted areas, stroke can happen. Atherosclerotic brain arteries may deteriorate, increasing the risk of an aneurysm developing. (Widiyanto et al., 2020). Aerobic gymnastics can be categorized as a health sport since it exhibits the typical characteristics of health sports, namely possessing the 5 M characteristics (Bulk, Easy, Cheap, Festive, Beneficial, and safe). According to findings made by researchers working in the area, aerobic exercise also exhibits the five characteristics of healthy sports. (Giriwijoyo, 2012). The only type of exercise that is suitable for senior people, especially those who have had an ischemic stroke, is low-impact aerobic exercise (Chin & Badri 2012). A low-impact aerobic exercise is a form of cardiovascular exercise that involves mild (or "light impact") movement that explores musical rhythm without using much power or muscle. (Arikunto, 2014). Applications are ready-to-

use programs that may be utilized by the intended target and are created to perform a function or other applications for users. There are a variety of perspectives on applications, including Applications are just ways of storing objects, data, problems, and effort in a way that may later be applied to something else in a new form (D.Darwis, 2020).

Android is an operating system for Linux-based mobile devices or smartphones that consists of an operating system, middleware, and core apps. Android offers a free and open development platform for developers to create their applications. (D. Darwis, 2020).

The main issue with recurrent ischemic stroke is that because so few people are aware that ischemic stroke symptoms can resolve, they often go untreated. A lack of knowledge on how to manage stroke symptom improvement can make the stroke worse, which has health consequences that may influence the frequency of stroke recurrences in the future.

Therefore, based on this phenomenon, the author intended to develop the Android application "Aerobic Exercise". Aerobic exercise application is designed as a medium for health education. This application has several features, including information on comprehending low-impact and aerobic exercise, as well as stroke patients' recommended diets, foods to maintain weight, low-impact aerobic exercise SOPs, and low-impact aerobic exercise videos. Aerobic exercise, one of the sports that can help with recurrent ischemic stroke symptoms, is utilized as an educational tool in health education for this condition. Aerobic Exercise Application Low Impact can be used for learning as well as implementing technology to keep up with the times.

2. RESEARCH METHOD

At this stage, a trial was carried out on the features of the Aerobic Exercise application using an expert test, namely, a trial carried out by consulting research instruments (applications) with experts or health experts, and then research was conducted after consulting the respondents.

3. RESULT AND DISCUSSIONS

3.1 Creating Aerobic Exercise Applications to Decrease Ischemic Stroke

This technological advancement aims to provide Android Jelly Bean 4.1 Aerobic Exercise Applications to help reduce the symptoms of ischemic stroke. Respondents may use it as necessary to provide details about decreasing the signs and symptoms of an ischemic stroke. This technological effort begins with the product's development, the manufacturing process, and a feasibility test. Then, respondents are given questionnaires to assess their thoughts on the usage of aerobic exercise applications for the treatment of ischemic stroke symptoms. The following is the display of the Aerobic Exercise Application.

a. First Page and Menu of Aerobic Exercise Application

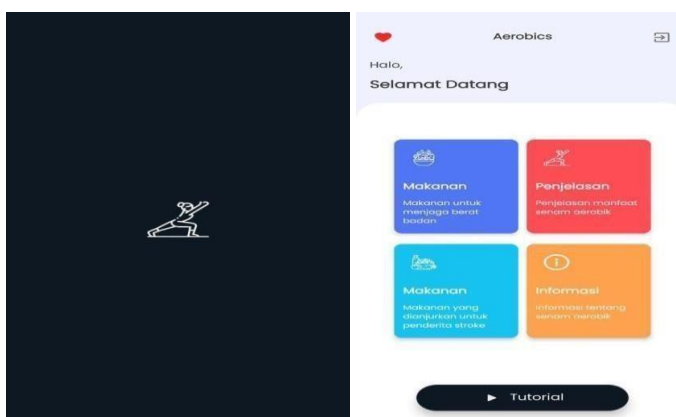


Figure 4.21 First Page and Menu of Aerobic Exercise Application

Figure 4.21 shows the home screen for The Android-Based Low Impact Aerobic Exercise, which includes the logo for the aerobic application of low-impact aerobic exercise movements. A sub in the form of food to maintain weight, food for patients with stroke, information on aerobic activity, explanations, and also a video tutorial for low-impact aerobic exercise is in the menu display, which is a display after the initial (first) display.

b. Display of the Food Menu to maintain weight and the display of the food menu for stroke sufferers

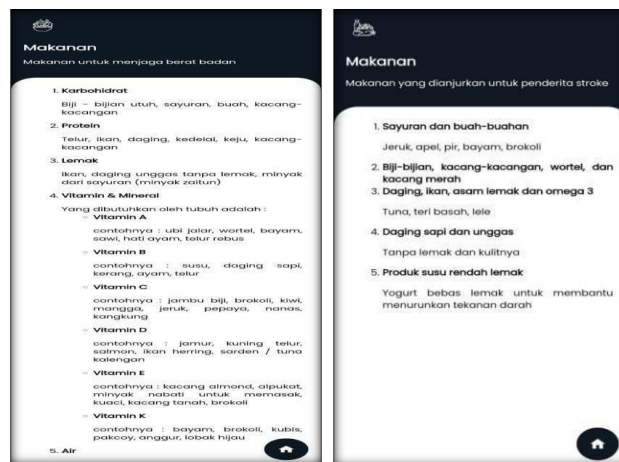


Figure 4. 22 Display of the Food Menu to maintain weight and the display of the food menu for stroke sufferers

Figure 4.22 depicts the "Food to maintain weight" submenu that displays once the user pushes or clicks on it. Since being overweight is harmful to one's health, especially for those who have had recurrent ischemic strokes, this submenu offers information about the types of food that can be consumed to maintain weight. Therefore, users of the application are greatly simplified. When choosing food from the stroke patient food display, patients with recurrent ischemic stroke should be more cautious.

c. Display on Menu Information and Explanation

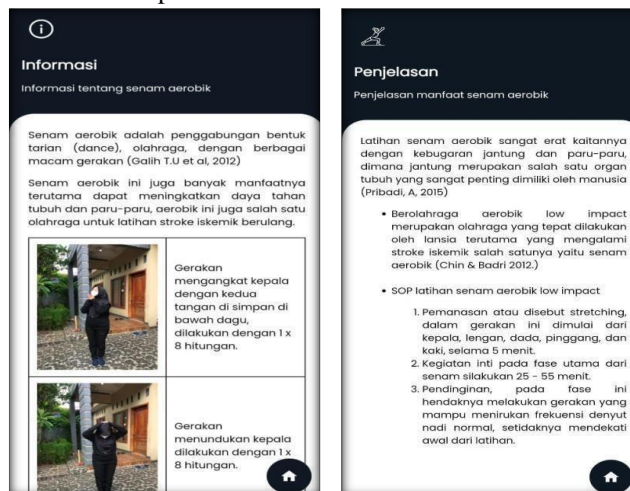


Figure 4. 23 Display Information and Explanation

Figure 4.23 depicts an information display that instructs users on how to warm up and cool down before and after an aerobic activity session. In the explanation of this submenu, the users are also informed on low-impact aerobic exercise, which is beneficial for people who have suffered recurrent ischemic strokes. There are also SOPs for low-impact aerobic exercise.

d. The Display of Video Tutorial Menu



Figure 4. 24 The Display of Video Tutorials

Figure 4.24 is about video tutorials that contain the *low-impact*, Cooling, and also Exercises for Repairing Stroke Symptoms.

3.2 Testing the effectiveness of Aerobic Exercise Applications for Ischemic Stroke Symptoms Alleviation

Table 4.3 Effectiveness of Aerobic Exercise Applications

No.	Characteristics based on Age	Characteristics based on Education Level	Characteristics based on Job	Easiness Level of Using Aerobic Exercise Application	Satisfactory Level of Ischemic Stroke Symptoms Changes
Mr. A	45 years old	Senior High School (SMA)	Businessman	Very Easy	Very Good
Mr. U	55 years old	Junior High School (SMP)	Businessman	Easy	Good

It can be seen from the above table that the youngest age is 45 and the oldest is 55.

According to the table above, 1 respondent graduated from basic education, (SMP/ Junior High School) and 1 respondent graduated from secondary education (SMA/ Senior High School).

It is seen from the table above that both respondents are businessmen. According to the results of the research on the simplicity of using the application of aerobic exercise in the table above, the respondents understood and thus were able to use the application of aerobic exercise once the researcher had described how to do so. The researcher described the application's features and how to use it.

Based on the aforementioned table, it can be concluded that out of the two respondents, one provided a good assessment of the Aerobic Exercise application, and the other provided a very positive assessment.

3.3 Identifying Changes in the Treatment of Stroke After Using Aerobic Exercise Applications

Table 4.4 Stroke Recovery Records

Respondent(s)	Week 1 21 June Meeting	Week 2 28 June Meeting	Week 3 11 June Meeting	Week 4 18 June Meeting
Mr. A 45 years old	-TD: 200/90 MmHG	-TD: 185/80 mmHG	-TD: 180/80 mmHG	-TD: 170/80 mmHG
	- Cholesterol	--Cholesterol	--Cholesterol	--Cholesterol
	Regular relapses because of poor diet maintenance	The dietary pattern can be controlled while continuing to eat recklessly.	The dietary pattern can be maintained	The dietary pattern can be controlled
	-The muscles in the left leg are weak to move, and the right hand is also weak to move, but can still be used for daily activities	-The mobilization of the muscles is still sluggish but rarely tingling.	-The mobilization of the left leg and right-hand muscles are still weak, they can last longer than before.	--The mobilization of hand-leg muscles is slightly more powerful than usual
Mr. U 45 years old	-TD: 190/80 MmHG	-TD: 185/90 mmHG	-TD: 185/80 mmHG	-TD: 180/80 mmHG
	- Cholesterol	- Cholesterol	- Cholesterol	- Cholesterol
	The dietary pattern was less controlled	The dietary pattern can be controlled while continuing to eat recklessly.	The dietary pattern can be maintained	The dietary pattern can be maintained
	-The mobilization of the right hand and leg muscles are less powerful, but they can still be moved, allowing for normal activities.	-Muscle mobilization is still ineffective but is less frequently tingling.	Right hand and right leg muscles are still weak but can exercise for longer periods than usual.	-Leg and hand muscles functioned a little more strongly than usual, but there was little tingling.

From the results of the study, table 4.4 shows that there are gradual changes in blood pressure, cholesterol, and muscular mobilization. However, medical intervention also has an impact.

3.4 Limitations of the Research

This implementation procedure is closely related to the research limitations of the researchers, who were unable to assess the effectiveness of the Aerobic Exercise application on patients until six months following an ischemic stroke. The recommended duration for symptom reduction is three months, but due to time limitations, the trial could only be conducted for one month. CONCLUSION

This application consists of 5 menus, namely food to maintain weight, recommended foods for stroke sufferers, information related to ischemic stroke, an explanation of ischemic stroke, and video tutorials on aerobic exercise. The effectiveness of the application of aerobic exercise to reduce stroke symptoms includes:

- a. Respondents report that using the Aerobic Exercise application is simple for them and that they are acquainted with how to use and operate it.
- b. Two respondents rated their satisfaction with the Aerobic Exercise application as "Good" and "Very Good," respectively.
- c. Changes in ischemic stroke symptoms occurred following the use of applications for blood pressure, cholesterol, and muscle mobilization during aerobic exercise.

Acknowledgments

Thank you to Allah SWT, both parents, and all comrades in arms who have helped from beginning to end.

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