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IMPROVING THE QUALITY OF LIFE OF DIABETES MELLITUS PATIENTS THROUGH THE USE OF HEALTH APPLICATIONS

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Abstract. *The use of health applications is proven to improve the knowledge and quality of life of diabetes mellitus patients. The information on the application is useful in preventing complications due to diabetes mellitus and improving therapy adherence. This community service aims to socialize the use of health applications and discover their effect on increasing knowledge about diabetes mellitus. The method used by this community service is Participatory Action Research (PAR). The partner in this activity is the Pharmaceutical Installation of PKU Muhammadiyah Hospital Bantul. The target of the activity is the elderly group assisted by PKU Muhammadiyah Bantul Hospital. Community service activities have been carried out on Saturday, May 29, 2023, at PKU Muhammadiyah Hospital Bantul. Activities were filled with the implementation of gymnastics, recitation, counselling materials about Diabetes Mellitus and socialization of the use of health applications to improve the quality of life of diabetes mellitus patients. Activities were evaluated through pretests and post-tests and testimonials from participants and activity partners. Participants' knowledge of diabetes mellitus and understanding of health applications also increased, as seen from their pre-test and post-test scores. It can be concluded that this community service activity can increase participants' knowledge of diabetes mellitus and understanding of the use of health applications.*

Keywords: *Diabetes Mellitus; Health Application; Quality of Life.*

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INTRODUCTION

According to the World Health Organization (WHO) data, the number of people with diabetes mellitus reaches more than 180 million people worldwide[1]. This incidence will more than double by 2030[2]. According to a survey conducted by WHO, Indonesia ranks 4th for the largest

[1] World Health Organization, *Global Report on Diabetes* (Geneva, Switzerland: WHO Press, 2016) <https://www.google.com/search?client=opera&q=Laporan+WHO+2016+tentang+diabetus+melitus&sourceid=opera&ie=UTF-8&oe=UTF-8.> [accessed 10 January 2024].

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number of patients with diabetes mellitus in the world after India, China, and the United States[3]. According to Ministry of Health data, the number of inpatient and outpatient diabetes mellitus patients in hospitals ranks first of all endocrine diseases[4]. It is estimated that the increase in cases will occur from 8.4 million people in 2000 to predicted fluctuations to 21.3 million people in 2030. The age range of people with type 2 diabetes mellitus is 55-64 years by 6.3% and 65-74 years by 6.03%[5].

Currently, efforts to overcome diabetes mellitus have not occupied the top priority scale in health services. However, it is known that the negative impacts are quite large, including chronic complications in chronic heart disease, hypertension, brain, nervous system, liver, eyes, and kidneys[6]. Diabetes mellitus is a disease that can be controlled with a healthy lifestyle, including proper food intake, diet, regular exercise and adherence to taking drugs. Some studies say that there are still many diabetes mellitus patients who have not adopted a healthy and regular lifestyle in taking drugs. Diabetes mellitus is a chronic disease that cannot be cured. Still, this disease has the potential to be prevented and treated in several ways, one of which is by providing education to patients related to the disease[7]. The provision of education is expected to provide new knowledge for people with diabetes mellitus so they can understand the dangers of the disease better and prevent complications earlier[8].

Unfortunately, although information related to health can be easily found on the internet, the spread of pieces of information is still doubtful[9]. Therefore, patients need a reliable and easily accessible source of information. The use of health technology could be an option for patients with

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diabetes[10]. Health applications are easily accessible, portable, convenient, and low-cost[11]. According to previous studies, using health applications improves the knowledge and quality of life of diabetes mellitus patients[12]. The information on the application is also useful in delivering insights on preventing complications due to diabetes mellitus.

Furthermore, systematic reviews showed that using applications by patients with diabetes could improve glucose control of HbA1c and fasting blood glucose[13]. Based on research by Faridah,[15] it was explained that there was a significant influence in increasing the quality of life of diabetic patients before and after using a health application model to control the blood sugar levels of users. Health applications can strengthen knowledge of self-care and self-management among diabetes patients[16]. The partner in this activity is the Pharmaceutical Installation of PKU Muhammadiyah Hospital Bantul. Based on PKU Muhammadiyah Bantul Hospital data in 2022, diabetes mellitus is among the top 10 outpatient diseases. It is under data by Riskesdas (2018) states that the number of diabetes mellitus cases in the Special Region of Yogyakarta occupies the 3rd highest position in Indonesia, while in Bantul Regency, the cases reach 3.3%[17]. PKU Muhammadiyah Bantul Hospital's pharmacy installation does not yet have a special health promotion program to improve the health of diabetes mellitus patients. Many patients who come to PKU Muhammadiyah Bantul Hospital have experienced various complications, making the treatment more complex.

Patients of PKU Muhammadiyah Bantul Hospital no one knows, let alone use health applications. Even though in the current era of digitalization, gadgets have become commonplace in society. Unfortunately, gadgets are not maximized to improve public health. Through this community service activity, it is hoped that it can socialize the use of health applications related to diabetes mellitus. The application is expected to provide credible information to increase the

[10] Jurnal Keperawatan dan Kebidanan Aisyiyah, Nur Isnaini, and Universitas Muhammadiyah Purwokerto Jawa Tengah Indonesia, 'Faktor Risiko Mempengaruhi Kejadian Diabetes Mellitus Tipe Dua', *Jurnal Kebidanan Dan Keperawatan Aisyiyah*, 14.1 (2018), 59–68 <https://doi.org/10.31101/JKK.550>.

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[16] Bráulio Cezar Bonoto and others, 'Efficacy of Mobile Apps to Support the Care of Patients With Diabetes Mellitus: A Systematic Review and Meta-Analysis of Randomized Controlled Trials', *JMIR MHealth and UHealth*, 5.3 (2017) <https://doi.org/10.2196/MHEALTH.6309>.

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knowledge of diabetes mellitus patients. In addition, it is hoped that PKU Muhammadiyah Bantul Hospital patients can use the health application appropriately. The application's content includes information on diabetes mellitus, such as definitions, causes, signs of symptoms, risk factors, and complications to management. The material provided uses simple language for laymen. The information provided in the application is certainly referenced from reliable sources. That way, it is expected that the information received will be very valid.

METHODS

The method used in this community service activity is Participatory Action Research (PAR). The PAR method aims to learn how to overcome problems, meet the practical needs of the community, and implement science[18]. Therefore, this approach is a means to raise a collective critical awareness of the existence of the ideology of globalization[19]. Community service activities are carried out systematically, collaboratively, and sustainably through the PAR method to create social transformation.

The partner in this activity is the Pharmaceutical Installation of PKU Muhammadiyah Hospital Bantul. The target of the activity is the elderly group assisted by PKU Muhammadiyah Bantul Hospital. In this activity, partner participation is as public relations and facilitates events. Partners are also responsible for coordinating with PKU Muhammadiyah Bantul Hospital to prepare venues and facilities for the event. Collaborators act as material verifiers and work with community service to prepare community service outcomes.

Community service activities have been carried out on Saturday, May 29, 2023, at PKU Muhammadiyah Hospital Bantul. Thirty-four participants attended these activities. All participants are members of the elderly group of PKU Muhammadiyah Bantul Hospital over 65 years old.

The implementation of activities was divided into three stages, namely:

a. Simple gymnastics practices.
b. Presentation of material related to diabetes mellitus.

   The patient was described regarding diabetes mellitus. The media used to deliver the material is PowerPoint. Service members explained the content of this health application.
c. Presentation of material related to diabetes mellitus health applications and socialization of its use.

[18] Norman K Denzin and Yvonna S Lincoln, *Handbook of Qualitative Research* (Yogyakarta: Pustaka Pelajar, 2009).
[19] Budhy Munawar-Rachman, *Islam Pluralis: Wacana Kesetaraan Kaum Beriman* (Jakarta: Paramadina, 2001) <//catalog.umj.ac.id%2Findex.php%3Fp%3Dshow_detail%26id%3D65042%26keywords%3D> [accessed 19 March 2024].

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Patients were explained about the information content in the health application and continued with the socialization of its use. The media used is a health application called Diary Diabetes. Service members explained the content of these health applications and the socialization of their use.

d. This activity was evaluated by filling out pretests and post-tests to assess participants' understanding of the material provided.

RESULT AND DISCUSSION

This activity was held on Saturday, May 29, 2023, at PKU Muhammadiyah Hospital Bantul. This activity was attended by the elderly group of PKU Muhammadiyah Bantul Hospital, which included as many as 34 people. This series of events began with the implementation of a pretest **(Figure 1).**

Figure 1. Pretest Implementation

The event continued with physical activity in the form of simple gymnastics **(Figure 2).** Physical activity is very beneficial for patients with diabetes mellitus, preventing complications and improving quality of life. Diabetes mellitus is a disease that can be controlled with a healthy lifestyle, including regular exercise. Some studies say that there are still many diabetes mellitus patients who have not applied a healthy lifestyle. Diabetes mellitus is a chronic disease that cannot be cured, but this disease has the potential to be treated in several ways, one of which is by applying a healthy lifestyle[20].

[20] Nazar and others.

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Figure 2. Implementation of Gymnastics

The next stage is delivering material related to diabetes mellitus and the socialization of the use of health applications in diabetes mellitus patients **(Figure 3).** Health applications using smartphone application-based education is an innovation that can be implemented in the health sector[21]. A real example of this smartphone application-based education in the health sector is the existence of m-health[22]. According to the WHO Global Observatory for eHealth (2011)[23], m-health is a practical medical and health method in the community supported by the existence of mobile devices, such as devices, computers, laptops, patient monitoring devices, personal digital assistants (PDAs), and also other wireless devices[24]. M-health can be interpreted as a technological innovation in other mobile/wireless devices used for health purposes, such as education, counselling and patient monitoring[25].

[21] John Doupis and others, 'Smartphone-Based Technology in Diabetes Management', *Diabetes Therapy : Research, Treatment and Education of Diabetes and Related Disorders*, 11.3 (2020), 607–19 <https://doi.org/10.1007/S13300-020-00768-3>.

[22] Joseane O.V. Paiva and others, 'Mobile Applications for Elderly Healthcare: A Systematic Mapping', *PloS One*, 15.7 (2020) <https://doi.org/10.1371/JOURNAL.PONE.0236091>.

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[25] World Health Organization.

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Figure 3. Presentation of Material Related to Diabetes Mellitus and socialization of the Use of Health Applications

The activity ended with post-test work by participants to assess the effectiveness of the training implementation. We evaluated participants' understanding of the material provided. The evaluation method carried out is a pretest carried out at the beginning of the activity and a post-test carried out at the end of the activity. The test comprised ten questions containing an understanding of health applications and knowledge about diabetes mellitus. All 34 participants attended this pretest and post-test activity.

Through the pretest, the results of the participants' level of understanding of the material to be given were low (57%). Meanwhile, based on the post-test results, there was an increase in participants' level of understanding to (64%), although still in the low category. The value of $p>0.05$ (0.30) means that there is no significant difference between the post-test and the pretest. These results show that the presentation of the material and training provided has not greatly impacted increasing participants' understanding **(Figure 4).** Delivering health materials through lectures with auxiliary media such as power points is not the right method to increase awareness of something or increase knowledge for the elderly. However, an existing review reported that no single model was a superior method for delivering diabetes education. Greater frequency and longer duration of intervention tended to show a greater impact[26].

The use of health applications among adults aged 50 and older is more common. Nevertheless, a previous study also stated that sometimes elderly patients feel less interested in using technology. Elderly patients sometimes cannot use health applications properly; therefore, they need more intensive guidance in using health technology applications. The support system of

[26] Jacqueline LaManna and others, 'Diabetes Education Impact on Hypoglycemia Outcomes: A Systematic Review of Evidence and Gaps in the Literature', *The Diabetes Educator*, 45.4 (2019), 349–69 <https://doi.org/10.1177/0145721719855931>.

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family members is helpful to overcome this issue[27]. This community service is an initiating activity that provides valuable insights for patients with diabetes to use health applications.

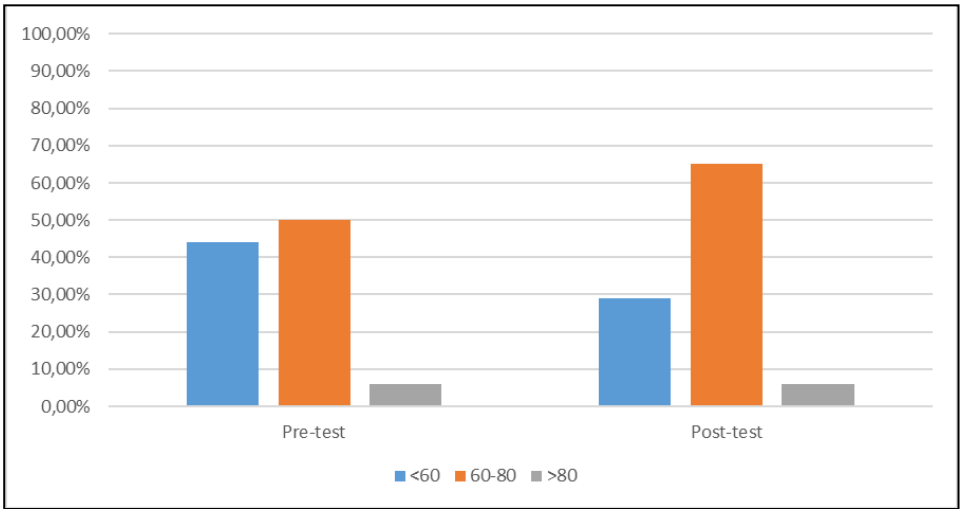

Figure 4. Pretest and Post-test Evaluation Results

In this activity, grants were also handed over through 50 souvenirs and two digital blood pressure measuring devices to measure participants' blood pressure during the elderly group meeting **(Figure 5).**

Figure 5. Grant Submission

This activity received very good appreciation from partners and participants; they were

[27] Thelma Androutsou and others, 'A Smartphone Application Designed to Engage the Elderly in Home-Based Rehabilitation', *Frontiers in Digital Health*, 2 (2020), 15 <https://doi.org/10.3389/FDGTH.2020.00015>.

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satisfied with this activity and found it very useful. It is hoped that similar community service can be carried out on an ongoing basis to increase the knowledge capacity of partners. The documentation of all activity participants is shown in **Figure 6.**

Figure 6. Documentation with Activity Participants

In the future, it is planned to implement a sustainable cooperation agreement between the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta (FKIK UMY) and PKU Muhammadiyah Bantul Hospital in community service. There are still many degenerative disease patients who need proper education. It is under the Indonesian Ministry of Health program, which aims to improve public health through disease prevention activities, not treatment. It is hoped that this health promotion program can not only improve the degree of public health but also reduce health financing due to lower medical costs.

CONCLUSION

This community service aims to socialize the use of health applications and discover their effect on increasing knowledge about diabetes mellitus. The implementation of these community service activities went well. This program has not been able to increase participants' knowledge about diabetes mellitus and its health applications. However, through these community service activities, we know that media and material delivery methods are allegedly unsuitable for participants who are classified as elderly. The use of health applications is less than optimal for the elderly who have experienced decreased vision and the ability to use technology, especially optimizing gadgets. For the elderly, the delivery of education is recommended to use the lecture method. Gadgets can also be used through the assistance of the patient's family.

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