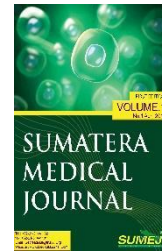




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Research Article

Overview of Kampung SAGU in Improving Knowledge and Self-Management of Diabetic Patients in Pakuan Baru Community Health Center

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ABSTRACT

Background: Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by elevated blood glucose levels. Indonesia ranks seventh in global diabetes prevalence, with approximately 10.7 million individuals affected. Community Health Center, as a primary healthcare provider, emphasizes promotive and preventive efforts to implement the 5 Pillars of DM. Kampung Sadar Gula (SAGU) is a program run by the Pakuan Baru Community Health Center that provides education, health examinations, and routine medication to improve the quality of life of people with DM within the community. **Objective:** to determine the impact of Kampung SAGU program in improving the knowledge and self-management of DM patients in Pakuan Baru Community Health Center in Jambi City. **Methods:** Descriptive research was conducted using purposive sampling and research instruments such as questionnaires and interviews with program implementers. **Results:** most of the population demonstrated good knowledge of DM (54.5%). However, a significant portion of respondents still showed low levels of self-care (45.4%), physical activity (54.5%), and medication adherence (45.4%). **Conclusion:** the level of achievement in independent eating, physical activity, and medication compliance is still low among the community of Kampung SAGU. Therefore, further monthly education for patients with uncontrolled blood sugar levels and their families is recommended.

Keywords: community health center, diabetes mellitus, knowledge, self-management

1. Introduction

Chronic diseases are diseases that cause disability with permanent characteristics and require long-term care. The World Health Organization (WHO) stated that diseases included in the category of chronic diseases are cardiovascular diseases, particularly heart disease, stroke, cancer, chronic respiratory diseases, and diabetes [1]. Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by high blood sugar levels exceeding normal limits. DM can cause death and disability, thus affecting the entire body physically, mentally, socially, and economically in patients [2].

According to the Indonesian Ministry of Health, diabetes not only causes premature death, but is also a major cause of heart disease, blindness, and kidney failure. The International Diabetes Federation (IDF) states that 537 million people aged 20-79 worldwide had diabetes in 2021, meaning that 1 in 10 people are affected

by this disease. This number has been predicted to rise even more in the future, reaching 643 million in 2030 and 783 million in 2045. Diabetes was responsible for 6.7 million deaths in 2021, which is 1 death every 5 seconds [3].

Of the seven world regions, the Arab-North Africa and Western Pacific regions exhibited the highest burden of diabetes among individual aged 20-79 years, ranking first and second with prevalence of 12.2% and 11.4%, respectively. Meanwhile, the Southeast Asia region, where Indonesia is located, ranked third with a prevalence of 11.3%. Furthermore, IDF also estimated the number of individuals with diabetes among population aged 20-79 years across countries worldwide and identifies 10 countries with the highest number of affected individuals. China, India, and the United States occupied the top three positions with estimated 116.4 million, 77 million, and 31 million people with diabetes, respectively. Indonesia ranked 7th among the 10 countries with the highest number of people with diabetes, with approximately 10.7 million affected individuals. Indonesia was the only country from Southeast Asia included on the list, suggesting its disproportionate contribution to the prevalence of diabetes in Southeast Asia [2].

The 2018 Basic Health Research (Riskesdas) survey assessed the prevalence of diabetes mellitus patients among individuals aged ≥ 15 years in Indonesia. The result indicated that the prevalence of diabetes mellitus in Indonesia based on physician diagnosis was 2% in this age group. This figure represented an increase compared to the 2013 Riskesdas, which reported a prevalence of 1.5%. However, the prevalence of diabetes mellitus based on blood glucose measurements increased from 6.9% in 2013 to 8.5% in 2018. This discrepancy indicates that only approximately 25% of people with diabetes are aware of their condition [2].

Knowledge is a very important domain for shaping a person's actions. Knowledge is the main foundation for proper diabetes treatment and prevention. Individuals with insufficient knowledge on diabetes mellitus will find it difficult to prevent the onset of diabetes mellitus, and individuals with diabetes mellitus who lack knowledge will be more prone to complications of DM [4,5]. Patient knowledge is a tool that can help individuals manage their diabetes. Therefore, the more patients know about diabetes mellitus, the more they can change their behavior, including being able to practice good self-management. This can control the condition of the disease so that people with diabetes can live longer with a better quality of life [6,7]. According to the American Diabetes Association (ADA), self-management plays an important role in evaluating the ability of people with DM to manage their daily lives in order to prevent acute and chronic complications and even reduce the risk of death. Self-management behaviors can include diet, physical activity or exercise, medication adherence, and blood sugar monitoring. Increasing knowledge and implementing self-management in people with diabetes mellitus is not only important for individual disease control but also has broad implications for public health through reducing the social and economic burden of diabetes [4,8,9,10]. Considering the large number of people with diabetes mellitus in Indonesia, if no action is taken by the community regarding diabetes mellitus, there will be an increase in the number of people with diabetes in the future. DM greatly affects the quality of human resources and has an impact on a significant increase in health costs [11].

Kampung Sadar Gula, hereafter abbreviated as Kampung SAGU, is a neighborhood unit at the RW (neighborhood association) or hamlet level or equivalent with certain criteria where there is continuity of the community health center program as a primary health service that prioritizes promotional and preventive efforts to uphold the 5 Pillars of DM in an effort to improve the quality of life of the community, especially people with diabetes mellitus and those with risk factors for diabetes mellitus. Kampung SAGU is managed by a team called "Kelompok Kerja" or also known as Pokja and executed monthly. Activities carried out in Kampung SAGU include counseling, health examinations including blood sugar level checks, and providing routine diabetes medication. However, based on the number of visits to Kampung SAGU from January to September 2024, it was found that many patients were absent and had uncontrolled blood sugar levels. Therefore, the researchers were interested in determining the effectiveness of the SAGU Village program in improving the knowledge and self-management of DM patients in the coverage area of the Pakuan Baru Community Health Center in Jambi City.

2. Methods

This research article is a descriptive study. The descriptive research method in this study was used to describe or illustrate the implementation of the Kampung SAGU program at the Pakuan Baru Community Health Center. This study was conducted from October 1, 2024 to December 31, 2024. The research samples were taken using a purposive sampling approach. The samples were patients who attended Kampung SAGU from October 1, 2024 to December 31, 2024 and met the inclusion criteria. The inclusion criteria were: (1) individuals diagnosed with diabetes mellitus; (2) aged >29 years; (3) enrolled and attended the Kampung SAGU program during the period of current study; (4) able to comprehend Indonesian language; (5) absence

of physical or mental conditions that could interfere with participation; and (6) willing to participate in the study.

Data was collected by directly measuring capillary blood sugar levels using an EasyTouch glucose meter and distributing questionnaires to patients. The questionnaire used in this study is a simplified version of Diabetes Self-Management Questionnaire-Revised (DSMQ-R) which consisted of about individual knowledge of diabetes mellitus, daily physical activity, independent meal planning, and medication adherence [12]. If the respondent could not read or write, researcher would read the questionnaire aloud. The completed questionnaires were collected immediately by the researchers. Additionally, secondary data was obtained through direct interviews with officers in charge of Kampung SAGU program. The collected data was analyzed using univariate analysis with frequency and percentages to obtain an overall picture and presented in the form of tables and narratives.

3. Results

3.1. Characteristics of Respondents

The distribution of the characteristics of the research respondents can be seen in Table 1. The research respondents ranged in age from 38 to 69 years old, with a predominance in the 19-59 age group, namely 7 respondents (63.7%). The majority of respondents were female, namely 9 people (81.1%). Most respondents had a high school education level, namely 6 people with a percentage of 54.5%, and on average, respondents had a profession as a housewife with a percentage of 63.6% (7 people).

Table 1. Distribution of Respondent Characteristics Based on Age, Gender, Education, and Occupation

Characteristic of Respondent	Frequency (n)	Percentage (%)
Age		
• 19-59 years	7	63,7%
• ≥ 60 years	4	36,3%
Gender		
• Male	2	18,2%
• Female	9	81,8%
Education		
• No schooling	0	-
• Elementary	3	27,3%
• Junior High School	2	18,2%
• High School	6	54,5%
• Bachelor	1	9,1%
Occupation		
• Housewife	7	63,6%
• Not working	0	-
• Student	0	-
• Merchant	3	27,3%
• Civil employees	0	-
• Entrepreneur	1	9,1%
Total	11	100,0

3.2. Level of Knowledge on Diabetes Mellitus

Based on the analysis of respondents' responses to the questionnaire regarding their knowledge (Table 2), it appears that most respondents have a good level of knowledge about diabetes mellitus, namely 6 people (54.5%). This indicates that Kampung SAGU program has contributed positively to community understanding of diabetes mellitus.

Table 2. Level of Knowledge

Level of Knowledge	Frequency (n)	Percentage (%)
Low	1	9,1%
Sufficient	4	36,4%
Good	6	54,5%
Total	11	100,0

3.3. Level of Independent Eating Accomplishment

Based on interviews with officers in charge of Kampung SAGU, there is no specific data recording on the accomplishment of independent eating considering the 3Js (Jadwal Makan, Jumlah Makanan, Jenis Makanan) or adherence to meal schedules, appropriate food portions, and appropriate food types. However, comprehensive education has been provided to all DM patients during the implementation of Kampung SAGU. Education is also continued monthly for patients with uncontrolled blood sugar levels as part of counselling during Kampung SAGU.

Table 3. Level of Independent Eating Accomplishment

Level of Independent Eating Accomplishment	Frequency (n)	Percentage (%)
Low	5	45,4%
Sufficient	3	27,3%
Good	3	27,3%
Total	11	100,0

Table 3 shows that the majority of respondents have a low level of independent eating, namely 5 people (45.4%).

3.4. Level of Physical Activity

Interviews with officials in charge of the Kampung SAGU program at the Pakuan Baru Community Health Center revealed that there is no specific data recording on patients' physical activity. A routine exercise was planned to be held every month as part of Kampung SAGU, however patients do not come at the same time, making it difficult to gather patients and execute the planned exercises together.

Table 4. Level of Physical Activity

Level of Physical Activity	Frequency (n)	Percentage (%)
Low	6	54,5%
Sufficient	3	27,3%
Good	2	18,2%
Total	11	100,0

Data shows that the majority of participants in Kampung SAGU have low levels of daily physical activity, namely 6 people with a percentage of 54.5% (Table 4).

3.5. Level of Medication Adherence and Glycemic Control

Based on the analysis of respondents' responses to the medication adherence questionnaire (Table 5), it appears that most participants have low medication adherence, namely 5 people (45.4%). During interviews with patients in Kampung SAGU, it was found that patients had been given sufficient medication by health workers, but there were obstacles preventing them from taking their medication regularly, such as only taking medication when they had symptoms, frequently forgetting, having no family members to remind them, and fearing the side effects of taking medication regularly. The downstream impact of these behaviors is visible in Table 6, where the number of patients with uncontrolled blood glucose rose from 5 in October to 7 in December and there is a dynamic trend in the number of patients visiting Kampung SAGU despite ongoing program activities.

Table 5. Level of Medication Adherence

Level of Medication Adherence	Frequency (n)	Percentage (%)
Low	5	45,4%
Medium	4	36,4%
High	2	18,2%
Total	11	100,0

Table 6. Number of Visit and Glycemic Control

No	Month	DM		Number of DM Patient Visits		Number of DM Patients
		Controlled	Uncontrolled	Frequency (n)	Percentage (%)	
		Frequency (n)	Frequency (n)			
1	October	1	5	6	27,3%	22
2	November	1	2	3	15,8%	19
3	December	0	7	7	33,3%	21

Overall, these findings highlight a persistent disparity between knowledge acquisition and behavioural adherence, underscoring the importance of tailored education, continuous behavioral reinforcement, and family involvement to maintain long-term glycemic control within Kampung SAGU program.

4. Discussion

4.1. Level of Knowledge on Diabetes Mellitus

Knowledge is an important component that will influence a person's health behavior. Knowledge includes a person's ability to understand, process, and utilize information to make the best decisions to improve health. Therefore, knowledge is the foundation in the process of forming healthy attitudes and behaviors. People with good knowledge tend to be more concerned and have a higher awareness of avoiding health risks. Good understanding also enables individuals to adapt and deal with health problems more effectively [13,14,15]. Thus, knowledge about diabetes mellitus plays an important role in its management. The better and broader an individual's understanding of diabetes mellitus, the more optimal the application of self-management, such as the implementation of a diabetes mellitus diet and high treatment compliance. An adequate level of knowledge, accompanied by behavioral changes to control the disease, will help improve quality of life, both in terms of duration and quality [4,5].

This study found that most patients of Kampung SAGU had a good level of knowledge on diabetes mellitus (54.5%). This shows that implementation of Kampung SAGU over the past year has had a positive impact on patients' knowledge level on diabetes mellitus. It is likely due to the program's community-based education model, which emphasizes repeated counseling and peer interaction in daily life settings. Such approach allows participants to learn from both health professionals and peers who share similar experiences, reinforcing information retention and practical understanding. However, the level of knowledge can be influenced by various factors, such as education, age, occupation, and environment. Education influences the learning process; the higher a person's education, the easier it is for them to receive information. With most respondents having a high school education (54.5%), this is a factor in the good level of knowledge of most respondents in this study. Age is a factor that influences knowledge because as a person ages, their physical and psychological development improves, but eventually deteriorates again. This is due to a decline in sensory functions such as hearing, vision, response, and feelings, which are degenerative in nature. Most of the respondents in this study were young adults aged < 60 years (63.7%), whose learning abilities are likely not yet affected by this degenerative process, resulting in a good level of knowledge among many respondents [16]. Meanwhile, occupation affects the level of knowledge, as when a person works, information is more easily obtained due to the sources of information or experiences available at work. When information is easily accessible, the sources of knowledge and the level of knowledge will increase. However, people with diabetes mellitus, whether they work or not, can participate in health education provided by health workers to increase their knowledge about diabetes mellitus [13,17,18].

4.2. Level of Independent Eating Accomplishment

A combination of pharmacological and non-pharmacological therapies in the form of meal schedules, portion sizes, and food types is important for successful blood sugar control. This study found that most respondents had a low level of independent eating achievement (45.4%). In interviews with patients participating in Kampung SAGU, it was found that shifting dietary plans following 3J recommendation was still a struggle. High sugar consumption and double carbohydrate foods were commonly found, as well as frequent consumption of sweet drinks. These irregular eating patterns led to larger portions in subsequent meals. Diet therapy aims to control the weight of patients, especially those with diabetes mellitus and obesity. In diet therapy, the number of calories according to individual needs is the main concern rather than the number of meals. Thus, lipid, metabolic, and blood pressure levels can be controlled. In addition, the selection of food types also needs to be considered [19,20]. Kampung SAGU participants need a further approach so that they can apply a balanced proportion of carbohydrates, protein, fat, fiber, and other micronutrients. There needs to be a restriction on the consumption of fatty oils and the use of granulated sugar, which is still found to be excessive in everyday life. With most respondents having a good level of knowledge, this study shows that individuals with a good level of knowledge do not necessarily have good dietary behavior [21].

One factor that is thought to influence the level of independent eating accomplishment is gender. According to previous studies, women are twice as likely to have low diet management compliance. With many respondents being female, this may have contributed to the lack of independent eating achievement in this study. However, the success of a diet is greatly influenced by various other internal and external factors, such as attitude, family support, health worker support, and social support [18]. Independent eating patterns are expected to be a good start for the prevention and treatment of diabetes mellitus among participants in the Kampung SAGU Pakuan Baru Community Health Center.

4.3. Level of Physical Activity

Physical activity is any regular movement that has been proven to help prevent and overcome non-communicable diseases (including heart disease, stroke, and diabetes). From the data obtained, it was found that the majority of participants in Kampung SAGU have a low level of activity (54.5%). This may be because most patients are housewives and elderly. Based on several previous studies, it is said that a person's level of physical activity is influenced by various factors, one of which is age. As a person ages, their organ function declines, which affects organ function, and as they age, their level of physical activity also declines [22]. Meanwhile, in a previous study by Purwanti et al. [7] it was found that women tend to stay at home more and do less programmed physical activity. In addition, previous studies have also mentioned that people with low socioeconomic backgrounds have relatively less time to do programmed physical activities compared to people with high socioeconomic backgrounds [23].

The low level of physical activity among the residents of Kampung SAGU needs to be addressed and improved; at the very least, patients need 30 minutes of physical activity every day. Regular physical activity is a good preventive measure and can help control blood sugar levels in patients with diabetes mellitus. In people with diabetes mellitus, regular physical activity or exercise can control glucose levels by converting carbohydrates into energy, thereby increasing insulin and reducing blood glucose. This is in line with research by Astutisari et al. [22], which found a significant relationship between physical activity levels and blood sugar levels. They found that patients who were more active tended to have controlled blood sugar levels.

4.4. Level of Medication Adherence and Glycemic Control

This study found that most participants in Kampung SAGU had low and medium medication adherence, namely 5 people (45.4%) and 4 people (36.4%). Medication adherence is a condition in which patients are willing to accept the recommended therapy, starting from taking the medication and consuming it according to the recommendations of the health service. This level of medication adherence is influenced by various factors such as knowledge level, age, education, availability of facilities and services, supervision, motivation, support, and the perceptions of each individual [24].

In this study, most respondents had a good level of knowledge, but their medication adherence was still low. This indicates that knowledge level is not the most dominant factor in determining medication adherence. Based on further interviews with program administrators, it was found that some patients were unable to attend due to certain commitments, so they decided to buy their own medication at pharmacies outside the program, while other patients never attended monthly check-ups without any reason. A study by Pramudyatma, et al. [18] also found that age and education level were not significantly related to medication adherence in patients with diabetes mellitus. These findings reinforce the assumption that medication adherence is not influenced by a

single dominant factor, but rather by various factors simultaneously. Research by Purwanti et al.[7] shows several reasons commonly expressed by people with diabetes mellitus regarding non-compliance with medication, namely forgetfulness, busyness, lack of concern about the disease, financial factors, an unsupportive environment, and misconceptions about medication (such as medication being poisonous because it can damage the kidneys).

In a study by Siregar et al.[25] it was found that family support is a form of caring within the family, whether in the form of emotional, informational, or instrumental support. Family support can provide comfort and security for people with diabetes mellitus, thereby increasing their motivation to comply with diabetes mellitus treatment. This is in line with research by Bar et al.[26], which found a significant relationship between family support and medication adherence in patients with diabetes mellitus ($p < 0.012$) and also found a significant relationship between medication adherence and regular blood sugar level checks ($p = 0.002$). Regular blood glucose monitoring is one form of self-monitoring of blood glucose (SMBG). A study by Sendekie et al.[27] emphasized that patients who practice SMBG in their daily lives tend to have more controlled blood sugar levels compared to patients who do not practice SMBG. This is because the habit of controlling blood sugar levels helps diabetics monitor daily fluctuations in blood sugar levels. With regular blood sugar level checks, people with diabetes can adjust their diet, exercise, and antidiabetic medication or insulin doses to avoid hyperglycemia and complications from diabetes mellitus. Regular blood sugar level checks also help patients assess the progress of their therapy, while increasing their motivation to comply with medical recommendations, including medication adherence. In addition, consistent blood sugar level monitoring also provides important data for healthcare professionals to adjust treatment plans according to the patient's condition, thereby improving the overall effectiveness of diabetes control. Therefore, in an effort to improve medication adherence and controlled blood sugar levels in diabetes mellitus patients in Kampung SAGU, it is advisable to conduct education using a holistic approach that also involves the patient's family. The Kampung SAGU model shows promise as a culturally adapted and community-driven approach to diabetes self-management. Its strength lies in utilizing local leaders and peer educators to disseminate health messages in a relatable and sustainable manner. Yet, the program's future success depends on structured follow-up, standardized evaluation tools, and intersectoral collaboration with local health offices.

5. Conclusion

According to the analysis on DM patients in Kampung SAGU, a low level of independent eating accomplishment was attributed to the absence of monthly community-based education sessions. Physical activity levels were also low, as patients rarely visited at the same time, making group exercises difficult to organize. Low medication adherence was caused by patients taking medicine only when symptoms appeared, forgetting doses, lacking family support, and fearing side effects, which contributed to poor blood sugar control. Therefore, monthly community-based education on dietary self-management, physical activity, and medication use is needed for all diabetes patients and their families to increase patients' motivation and awareness, followed by continuous monitoring and counselling at Pakuan Baru Community Health Center or reminders via WhatsApp by Pakuan Baru health workers. While the decline in the number of visits to Kampung SAGU can be addressed through re-screening to ensure the number of diabetic patients and issuing participant cards to achieve the five pillars of diabetes management.

6. Data Availability Statement

Due to ethical and privacy considerations, the datasets used in this study are not publicly available but may be accessed from the corresponding author upon reasonable request.

7. Ethical Statement

This study was approved by the Research Ethics Committee of Jambi University (Ethical Clearance No.: 2586/UN21.8/PT.01.04/2024, Date: September 30th, 2024)

8. Author Contributions

Each author has contributed substantially to the study's conception, design, execution, data collection, analysis, and interpretation. All authors participated in drafting and critically revising the manuscript, approved the final version, and agreed on the choice of journal. In addition, all authors also accept responsibility for the integrity and accuracy of the work.

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11. Conflict of Interest

The authors declare no conflict of interest.

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