The Effectiveness of Self-Management Book in Patients with Diabetes Mellitus

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ABSTRACT

Background: *Diabetes mellitus (DM) is a non-communicable disease that causes complex health problems globally and nationally. In addition to high prevalence and mortality rates, it has an adverse socio-economic impact. To reduce the adverse impacts of diabetes mellitus on the quality of a patient's life, education on self-management is required. This study aimed to determine the effectiveness of self-management books for people with diabetes in improving their self-management.*

Method: *The research was quantitative, with a quasi-experimental design. The samples were people with diabetes mellitus who never received health education or were not respondents to the chronic/PROLANIS disease service program. The total number of samples was 312 people. Data were collected using guided interviews before the intervention from June 26, 2022, to July 10, 2022, and after the intervention from July 28, 2022, to October 27, 2022. Data were processed through editing, coding, transferring, and tabulating. They were analyzed by univariate and bivariate analysis using a paired t-test, with a 95% confidence degree (α = 0.05). They were descriptively presented in tables.*

Results: *The average value of self-management before and after the intervention was 46.37 and 50.42, respectively. The paired t-test showed a p-value of <0.05 (0.001 < 0.05). Based on the results, a self-management book was effective in increasing the self-management of people with diabetes. In the future, it is necessary to carry out further research to determine the impact of using this book on improving the quality of life of DM sufferers, especially its impact on the stability of blood sugar in DM sufferers.*

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Article History
Received 9 September 2022
Revised 21 November 2022
Accepted 24 November 2022
Available Online 7 December 2022

Keywords
Patient book
Self-management
Diabetes mellitus

DOI
10.14710/jpki.18.1.34-43

INTRODUCTION

Diabetes mellitus (DM) is a non-communicable and metabolic disease that cannot be cured and causes complex problems and burdens.[1] One of the efforts that can control DM is maintaining blood sugar stability.[2] Experts have produced many support models or systems to improve the quality of life and self-care independence in patients with DM, in addition to various treatments.[3] Efforts to improve self-efficacy and self-care are closely related to education. Health education is crucial to provide the correct information to guide healthy behavior.[4] For people with DM, health education aims to prevent and manage DM holistically.[5] It is considered effective in dealing with DM cases, especially changes in lifestyle and self-care of people with DM.[6] It may increase the knowledge and awareness of patients,[7,8] and even reduce hospital treatment costs.[9]

One factor that significantly affects health education's effectiveness is the media. The media play a significant role in health education.[3] Media can be an educator, supporter, promoter of activities, and supplement. Print media such as books or booklets are proven helpful for the elderly.[10,11] Books/booklets as educational media can record concise information and pictures in a durable time.[12] For people with DM, books are one of the health education media highly used by DM sufferers and health workers[13] to reduce barriers to knowledge about self-management practices, as well as guidelines and protocols of diabetes counseling.[14]

In connection with the advantages of books, researchers have researched information media for people with DM since 2019. The low quality of self-management is one of the control performances of people with DM, especially those in the chronic disease service program.[15]

Previous research suggested that a self-management book was suitable for people with DM.[16] Until now, the book had been developed three times, according to the needs of the patients, most of whom were elderly .The first stage of development was focused on developing recommended food content, which needs to be limited and avoided. Then, the second stage was related to listing the dosage and processing of traditional medicine that can lower blood sugar. In the third stage, the book was equipped by writing the biodata of DM sufferers, testing results, and pictures.[17] In this case, pictures related to "fill my plate", fruits and vegetables, and how to care for feet and nails for people with diabetes mellitus.

This book was developed by involving people with DM and health workers in charge of non-communicable diseases at the Padang City Health Office and 12 primary healthcare centers of Padang City from 2020 to 2021. In this regard, this study aimed to determine the effectiveness of the self-management book in improving the self-management of people with DM.

METHOD

The research was a quantitative study with a quasi-experimental design with a one-group pre-test and post-test approach. It passed research ethics from the research ethics committee at Andalas Padang University, with an ethical approval number: 501/UN.16.2/KEP-FK/2021. The samples of this study were patients with DM who never attended health education or chronic disease service program. As many as 312 respondents sought treatment at the primary healthcare centers involving 24 working areas. Data collection was carried out through guided interviews using a questionnaire. It was adapted from the diabetes self-management questionnaire and a summary of diabetes self-care activities (SDSCA) questions related to patients' experience of blood sugar checks, physical exercise, eating arrangements, medicine intake, participation in health education, and difficulties in performing a healthy lifestyle). The questions were multiple choice using the Likert scale. Interviews were conducted twice carried out by non-communicable disease officers from 24 working areas of primary health care centers. The quality of self-management towards DM was assessed before counseling and book distribution from June 26, 2022, to July 10, 2022. Books were given after the respondents filled out the questionnaire (pre-test). To assess their understanding and practice, the respondents were asked to explain the book's contents after using and applying it daily. The second assessment (post-test) was carried out from July 28, 2022, to October 27, 2022. The collected data were processed through editing, coding, transferring, and tabulating. Univariate and bivariate data analyses were performed using a paired t-test with a 95% confidence degree (α=0.05). Data were then descriptively presented in tables.

RESULTS AND DISCUSSION

The characteristics of the respondents include gender, age, occupation, education, marital status, duration of suffering from DM and comorbidities, as well as primary healthcare centers where the respondents took treatment. In detail, the respondents' characteristics can be seen in Table 1.

Table 1. Characteristics of respondents

Characteristic	n	%
Sex		
Male	92	29.5
Female	220	70.5
Age (years)		
60-74	112	35.9
75-90	13	4.2
45-59	187	61.9
Profession		
Casual daily laborer	14	4.5
Housewife	178	57.1
Retired	33	10.6
Civil servants	34	10.9
Driver	6	1.9
Self-employed	30	9.6
Farmer	3	1,0
Unemployment	14	4.5

Level of education		
Primary school	65	20.8
Junior high school	52	16.7
Senior high school	113	36.2
College	75	24.0
No School	5	2.2
Marital Status		
Single	4	1.3
Widower	4	1.3
Widow	63	20.2
Married	241	77.2
Long Suffering from Diabetes Mellitus (years)		
10-15 years	56	17.9
5-10 years	121	38.8
Less than 5 years	135	43.3
Comorbidities		
Hypertension	101	32.4
Stomach Acid	7	2.2
Uric Acid	6	1.9
Hypertension, cholesterol	6	1.9
Heart	5	1.6
Hypertension, heart	3	1.0
Tuberculosis	3	1.0
Cholesterol	3	1.0
Hypertension, osteoarthritis	3	1.0
Cholesterol, uric acid	2	0.6
Hypertension, acid stomach	2	0.6
Hypertension, asthma	2	0.6
Uric Acid, cholesterol	2	0.6
Hypertension, hyperlipidemia	2	0.6
Hypertension, hyper cholesterol	2	0.6
Hypertension, kidney disorders	2	0.6
Uric Acid, tuberculosis	1	0.3
ASHD	1	0.3
Cholelithiasis	1	0.3
Breast cancer	1	0.3
Hypertension, gastritis	1	0.3
Hypertension, gastroesophageal reflux disease	1	0.3
Coronary heart	1	03
Hypertension, gout	1	0.3
Hypertension, stroke	1	0.3
Hypertension, vertigo	1	0.3
Hypertension, uric acid	1	0.3
Rheumatism	1	03
Strokes	1	0.3
None	148	47.4
Origin of primary healthcare centers		
Air Dingin	10	3.2
Air Tawar	14	4.5
Alai	14	4.5
Ambacang	14	4.5
Anak Air	10	3.2

Belimbing	10	3.2
Bungus	10	3.2
Dadok Tunggul Hitam	12	3.8
Ikur Koto	7	2.2
Kuranji	12	3.8
Lapai	13	4.2
Lubuk Begalung	24	7.7
Lubuk Buaya	10	3.2
Lubuk Kilangan	30	9.6
Nanggalo	15	4.8
Padang Pasir	12	3.8
Parak Karakah	8	2.6
Pauh	27	8.7
Pemancungan	10	3.2
Pengambiran	20	6.4
Rawang Barat	11	3.5
Seberang Padang	9	2.9
Ulaakarang	10	3.2
Air Dingin	10	3.2
Total	**312**	**100**

Based on Table 1, most of the respondents are female (70.5%), at the age of 45-59 years or middle (61.9%), and mothers (57.1%). For the education aspect, senior high school graduates were dominant (36.2%); regarding marital status, most respondents were married (77.2.1%), suffering from DM for less than five years (54.5%), and not having comorbidities (47.4%). However, this study found a number of people who suffered from hypertension (32.4%) or other diseases such as stomach acid, gout, cholesterol, and others (8.97%). This means that almost 50% of DM sufferers experience hypertension.

All of the testing components were asked in the questionnaire before and after the intervention. The results of the difference in the average value before and after the intervention are shown in Table 2. Table 2 shows the difference in the average value of component testing before and after the intervention. In general, there is an increase in the average value of each component measured before and after the intervention. The reason for checking blood sugar needs to be explored related to the specific character of the target. This component has the highest difference in average value compared to other components. This is related to the reason for checking blood sugar. Most answers are "self-aware" without being motivated by other people. The Self Management Book is explained in detail: the purpose of checking blood sugar, fasting blood sugar standards according to WHO (World Health Organization) and PERKENI (Indonesian endocrine expert organization), and the frequency of checking blood sugar in a month. Essential things are things that can be prevented by checking blood sugar regularly. So educational efforts through the Self-Management Book for DM sufferers have raised awareness for DM sufferers of the importance of sugar pressure for their health. This condition usually occurs when programmed by a health service such as PROLANIS,[18] but it was carried out independently in this research. This is from the questions related to the place to check blood sugar, for the choice of answers to this question has the highest point, namely when checking blood sugar at home with their device. This is what is expected with self-management activities for DM sufferers. In this case, the role of the family is very decisive. Research shows that the family-based Diabetes Self Management Education program dramatically influences the quality of life of DM sufferers.[19]

However, in this study, the opposite happened. The average value of family support in checking blood sugar was lower after being given education. It is interesting to study more deeply about the lack of family support. It could be because most of these DM sufferers are elderly. Respondents (63.4%) are 45-59 years old, so they are more independent WHO (2013) mentions that age dramatically affects one's ability to receive and digest information.[20] Another interesting thing relates to reasons for not checking blood sugar in the last two weeks. The average score for this question has decreased. This is natural because this question is negative, meaning that DM sufferers have no reason not to check their blood sugar if the value decreases.

Table 2. The difference in average values of testing components before and after the intervention

Self-Management Components	Before		After		Difference
	n	Mean	n	Mean	
Blood Sugar Check					
Experience of blood sugar check in the last two weeks	221	0.71	243	0.78	0.07
Frequency of blood sugar check in two weeks	263	0.84	279	0.89	0.05
Reasons for checking blood sugar	755	2.42	842	2.70	0.28
Place to check blood sugar	696	2.23	792	2.54	0.31
Family support in checking blood sugar	679	2.18	671	2.15	-0.03
Reasons for not checking blood sugar in the last two weeks	462	1.48	406	1.30	0.18
Physical Exercise/Sports					
Frequency of physical exercise for more than 30 minutes in the final week	698	2.24	771	2.47	0.23
Frequency of specific exercise activities (e.g., swimming, walking, or cycling) in the past two weeks.	627	2.01	665	2.13	0.12
Diet					
Following a healthy meal plan in the final week.	580	1.86	729	2.34	0.48
Average days for planning a weekly healthy meal.	590	1.89	757	2.43	0.54
Duration (days) for consuming at least five servings of fruit and vegetables within a week	868	2.78	950	3.04	0.26
Duration (days) for consuming high-fat foods such as red meat or full-fat dairy products within a week	1,625	5.21	1,700	5.45	0.24
Experience fasting in the final week	172	0.55	191	0.61	0.06
Drug					
Experience taking medication to lower blood sugar in the last two weeks.	508	1.63	531	1.70	0.07
Experience using traditional medicine or herbs in the last two weeks.	148	0.47	141	0.45	-0.02
Experience in using insulin.	69	0.22	67	0.21	-0.01
Education					
Securing access to information about DM in the last two weeks	273	0.88	291	0.93	0.06
Getting information about foot and nail care	138	0.44	216	0.69	0.25
Finding a source of information about DM	280	0.90	377	1.21	0.31
Difficulty in self-management					
Difficulties in regular medication	1,131	3.63	1,184	3.79	0.17
Difficulties in meal arrangements	914	2.93	970	3.11	0.18
Difficulties in physical activities/sports	835	2.68	899	2.88	0.21
Difficulties in emotions/stress management	918	2.94	996	3.19	0.25
Difficulties in access to information about a healthy DM lifestyle	1,089	3.49	1,166	3.74	0.25

Table 3 displays different values of patients' self-management before and after the intervention. The difference is 3.5982, and this shows that the use of a self-management book results in improving patients' awareness better. The results of patients' self-management before and after book usage can be seen in Tables 3 and 4. The statistical test shows a decrease in self-management after the intervention from the standard deviation value and the standard error value in Table 4. With a p-value of 0.002, using self-management books effectively improved the quality of patient's self-management. In connection with this, the following discussion relates to changes in the average value of each component, which is indirectly related to the contents of the self-management book for DM sufferers, which is used as an educational medium in this study so that the discussion of any changes to the self-

Table 3. Differences in patients' self-management before and after the intervention

	Mean	N	Std. Deviation	Std. Error Mean
Pre-test	46.60	312	13.76	0.79
Post-test	50.75	312	13.14	0.74

Table 4. T-test results of the effectiveness of self-management book for DM sufferers

	Mean	SD	SE	95% CI		t	Sig. (2-tailed)
				Lower	Upper		
Pre & post test	-4.150	11.71	0.66	-5.455	-2.845	-6.259	0.001

management component in this study is closely related to matters contained in the Self-Management Book.

For the physical exercise/sports component, the one that gets the highest difference is related to the frequency of physical exercise for more than 30 minutes in the final week, meaning that most DM sufferers at this stage can only do this activity, not yet at the frequency stage of specific exercise activities (swimming, walking, cycling) in the past two weeks. If the contents of the material from the Self-Management Book are described in detail about the objectives of physical activity and sports activities, the principles of good and correct physical activity, examples of light physical activity, exercise suitable for people with DM, such as brisk walking, cycling, swimming, lifting weights, the duration of physical activity in one week sourced from the circular of the Ministry of Health of the Republic of Indonesia. So that the material presented in this book is more about reinforcement because sufferers already know it in everyday life. Research shows that physical exercise like this is effective in controlling blood sugar.[21]

For the dietary component of the five aspects assessed, the one that experienced a very high increase in average value successively was average days for planning a weekly healthy meal, then following a healthy meal plan in the final week, duration (days) for consuming at least five servings of fruit and vegetables within a week and duration (days) for consuming high-fat foods such as red meat or full-fat dairy products within a week. Of all the components, the diet problem for DM sufferers is significant because the wrong diet arrangement will directly affect the blood sugar of DM sufferers. This research proves that so far, what DM sufferers have experienced is difficulty in planning healthy meals for DM sufferers, be it daily or weekly. Many sufferers admit that they are unable to plan. This happens because they do not know or do not care, so efforts to increase awareness about complications, knowledge about diet, attitudes, and practices that lead to disease control need to be made,[8,22,23] so with this Self-Management Book, they can already know and care about their diet planning. For dietary issues, this book describes in detail the food sources of carbohydrates, animal protein, and vegetable protein, which are recommended, limited, and avoided by DM sufferers originating from the health promotion installation at Dr. M. Djamil Central Hospital, Padang City, so that DM sufferers know for sure about their diet settings. This book also clearly describes the diet of DM sufferers: amount, type, and schedule. Then it also explained the measurements of the contents of the plate "fill my plate" and the composition of food in one serving based on carbohydrates, protein, and fat. However, this regulatory pattern can be adjusted according to personal and cultural food preferences as appropriate and can be adjusted to caloric needs for weight control and diabetes prevention and management.[24]

Then the less important point is the duration (days) for consuming at least five servings of fruit and vegetables within a week, which also experienced an increase in average value. This means that initially, DM sufferers did not know how to consume fruit and vegetables every week. There were doubts about vegetables and fruit that could and could not be consumed. DM sufferers should get a higher fruit intake and green leafy vegetables, yellow vegetables, and fiber-rich vegetables.[25] This Self-Management Book is equipped with a list of fruits and vegetables that are recommended, limited, and avoided by DM sufferers, sourced from the health promotion installation of the Dr. M. Djamil Central Hospital, Padang City. In addition, this book is also equipped with an introduction to local fruits and vegetables around DM sufferers, so they do not feel burdened with those not around. This book is equipped with clear and colorful pictures and writing that can be read by the elderly.

For the drug component, the highest average difference was the experience of taking medication to lower blood sugar in the last two weeks, while the use of traditional medicines and insulin decreased. This means that DM sufferers know the importance of taking drugs in controlling blood sugar. The Self-Management Book explains that it is essential that DM sufferers take medication regularly according to the dosage and directions for use. At the end of this section, it is emphasized that taking medication is not to cure the disease but to normalize blood sugar and prevent organ damage or complications due to high blood sugar. This is the information emphasized in the book. Apart from that, this book also contains traditional medicines that can be used as an alternative to lowering blood sugar, accompanied by methods of processing and dosage. However, DM sufferers are more focused on using drugs that health services or community health centers have provided. Support from all parties involved is needed to improve the regularity of taking this medicine between the health service and the family, so holistic services are needed.[26] Compliance with taking this drug is also closely related to the length of suffering from DM and the level of education.[27] This study also found that some DM sufferers had suffered from DM for 5-10 years, and some even had more than ten years, even though the number was small. So to maintain this condition of adherence is by health education and maintaining the availability of drugs. And this study also found that some DM sufferers had suffered from DM for 5-10 years, and some even had more than ten years, even though the number was small. So to maintain this compliance condition is health education and drug availability.[28]

For the educational component, two aspects were found that had the highest average difference, namely Finding a source of information about DM and Getting information about foot and nail care. For finding a source of information about DM, most DM sufferers obtain information from the media, especially online media, after which information is obtained from health workers when visiting community health centers. This is very interesting that DM sufferers can access information from online media in this era of information technology. Research also proves that this method is effective, especially during a pandemic.[29] Even using this media is more effective if it is interactive through messages via internet media than sending text messages via cellular is also effective in controlling sugar levels. However, experts recommend still involving related parties, meaning not fully submitting the online information,[30] so that sufferers still get direction or guidance from health workers considering that most of them are elderly with senior high school education (36.2%), more below that, and only a few above it (24.0%) so they will get information that is appropriate to the condition of the disease they are experiencing. This is also related to this study finding several people who suffered from hypertension (32.4%) or other diseases such as stomach acid, gout, cholesterol, and others (8.97%). This means that almost 50% of DM sufferers experience hypertension.

For the last component, this research also adds things related to difficulty in self-management. The aim is to explore the difficulties experienced by DM sufferers in terms of difficulties in regular medication, meal arrangements (diet), physical activities/sports, emotions/stress management, and access to information about a healthy DM lifestyle. The result is that most of them have an increase in average value. In other words, most of them state that they are getting better at self-management. Based on the difference in mean scores, the two aspects that experienced a higher increase were difficulties in emotions/stress management and difficulties in accessing information about a healthy DM lifestyle. For the aspect of difficulties in emotions/stress management, this is very important. This self-management companion book describes in detail the impact of the inability to control emotions/stress on blood sugar imbalances, especially for people with type 2 diabetes.[31] This change in average value indicates that they are very aware of this. Because the book also explains the signs of stress, sources of stress, then the strategy for DM sufferers to live during the pandemic, and how to control emotions/stress based on religion because all sufferers are Muslim, so they are taught as Muslims. This section also explores the experience of fasting in the final week because other studies have also proven the effects of fasting on blood sugar control.[32] Regarding the difficulty in accessing information about a healthy DM lifestyle, in this study, DM sufferers also stated that they had no difficulty obtaining information about a healthy DM lifestyle. When reviewed in more depth, most of the contents are related to the way of life of DM sufferers. Starting from the signs and symptoms of DM, including symptoms that are often ignored, and what is very important is education about foot and nail care. This is important because DM sufferers are susceptible to skin and foot problems, especially nails.[33] Thus, regular assessment of blood vessels, neuropathic status, and skin is required to prevent complications.[34] It is hoped that this book can help DM sufferers in taking care so that their skin and nails are always clean and healthy.

In addition, the respondents also have more free time to use the book since most of them are homemakers. Research shows that the smaller the family burden, the better the health status of people with diabetes mellitus.[17] Likewise, the level of education and duration of suffering from DM can support the book's effectiveness. The book

was found to control patients' lifestyles in dealing with their illnesses independently.[35] The intervention can be a preventive effort to improve DM management.[4] Many studies have found the effectiveness of education in dealing with diabetes cases. Education can positively affect lifestyle changes and the self-care of people with diabetes.[6]

The book distributed to the respondents increased their knowledge about good self-management in daily life.[36] Since the book consists of notes and pictures, and patients can model the content independently.[10] In connection with this, this self-management book can support patients in learning the restrictions of diabetes mellitus. DM sufferers can adjust to using the book anytime and share the information with their family and friends.[37] The book also can reduce the need for note-taking and provide durable content for a specific segment of groups. However, DM sufferers might have different interests in diabetes aspects they want to study. Several studies have shown that books are widely used by the elderly with diabetes to express their emotions.[38] This book is expected to be a language that empowers people with diabetes to manage their disease.[39]

CONCLUSION

This study found that using a self-management companion book improved the quality of self-management of patients with DM. In the future, it is necessary to carry out further research to determine the impact of using this book on improving the quality of life of DM sufferers, especially its impact on the stability of blood sugar in DM sufferers.

ACKNOWLEDGEMENT

The writers would like to express gratitude to the Head of Health Ministry Polytechnic of Padang, the Padang City Health Office, all health workers, and parties for helping in the research.

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