Self-Management and Detection of Diabetes Mellitus Emergencies

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Abstract. The severity of diabetes mellitus in the form of hypoglycemia and hyperglycemia can occur at any time and is life-threatening for sufferers. Prolonged treatment of diabetes mellitus, apart from the risk of diabetes mellitus emergencies, patients can also experience decreased motivation, hopelessness, and capacity to manage diabetes. The purpose of this study was to analyze self-management and detect diabetes mellitus. The research method used in this study was analytic with a cross-sectional approach. The population in this study was diabetes mellitus patients at four Community Health Centers in Surabaya, with an average of 165 people every month. The sample size were 103 respondents, calculated based on the Isaac & Michael table with an error rate of 10%. The sampling technique in this study used non-probability sampling purposive sampling. Data analysis used Spearman rho. The study results show ed that more than half of self-management with a high ability to detect emergencies is sufficient (56.4%). Self-management was in the medium category; more than half of respondents' detection of diabetes emergencies was lacking (54.2%), and if self-management is lacking, then the ability to detect diabetes emergencies is also lacking. The test results showed that there was a positive relationship between self-management and emergency detection, with a strong correlation. It is hoped that patients and families will be able to identify and monitor the symptoms of hypoglycemia and hyperglycemia so that they can be treated immediately and, in the long term, can improve the quality of life.

Keywords: Self-Management, Emergency Detection, Diabetes Mellitus

1. Introduction

Diabetes mellitus in Indonesia is now the leading cause of morbidity and the world's sixth-largest healthcare problem, impacting costs and burdening individuals and countries. The most common problem in diabetes mellitus is the emergence of emergencies not realized by people with diabetes mellitus. The emergency of diabetes mellitus is related to acute complications of diabetes mellitus, which can be life-threatening. There are hypoglycemia and hyperglycemia crises, including diabetic ketoacidosis, hyperosmolar hyperglycemic state, and lactoacidosis coma [1]. The care of diabetes is complex, requiring long-term care and support. Diabetic patients face their own challenges in managing themselves by making the right decisions every day, so patients with diabetes

mellitus often experience decreased motivation, hopelessness, decreased capacity to manage diabetes, and difficulty reducing ongoing habits or routines [2].

Emergencies in patients with diabetes mellitus are hyperglycemia and hypoglycemia crises. Hyperglycemia crisis is an acute complication of diabetes characterized by a high increase in blood glucose levels (300-600 mg/dL), accompanied by acidosis and strong positive plasma ketones. Hyperosmolar Hyperglycemia status is a state of very high blood glucose increase (600-1200 mg/dL), without signs and symptoms of acidosis, very increased plasma osmolarity (330-380mOs/mL), ketone positive/negative plasma [3].

Hypoglycemia is characterized by blood glucose less than 70 mg/dl. Hypoglycemia coma and hypoglycemia reaction are frequent emergency conditions characterized by pallor, diaphoresis, cognitive impairment, behavioral changes, psychomotor disorders, seizures and coma, and adrenergic signs in the form of trembling cold sweat. Emergency conditions in hypoglycemia generally consist of mild hypoglycemia and severe hypoglycemia. Patients at risk of hypoglycemia should be checked for symptomatic or asymptomatic hypoglycemia at every opportunity. Both of these emergencies cause high morbidity and mortality rates that require hospitalization [4].

Self-management allows patients to develop problem-solving skills, increases self-confidence, and supports real-life application of knowledge. The existence of problem-solving skills in diabetes mellitus allows patients to make decisions about the best management for themselves. Research proves that patients with good self-management behavior have a lower risk of complications and a higher quality of life [5–8].

Early detection is a secondary prevention effort. This activity includes periodic blood sugar checks by patients, identifying dietary patterns, recognizing signs and symptoms of hyperglycemia and hypoglycemia, and identifying neuropathy and other complications. Patient involvement in all aspects of chronic disease and its implications, such as changes in medical treatment, social and occupational roles, and individual coping, is urgently needed [9]. Self-management is continuous due to collaboration between sufferers, doctors, other health workers, and other groups in caring for themselves, which the patient does. Self-management of patients with diabetes mellitus and early detection of emergencies in patients with diabetes mellitus are procedures and preventive efforts useful for preventing morbidity and mortality [10].

2.   Materials and Methods

The research design used was analytic research, that studied two or more variables to obtain information about the relationship between variables. This study was designed with a cross-sectional approach. The population were all T2DM clients in the Surabaya Health Center area. Based on data from Surabaya City Health Office Report, there were 1,989 T2DM patients in 2019, divided into 12 months, so the average of every month was around 165 people. The sample were a part of the population of T2DM clients, with inclusion criteria being clients diagnosed with T2DM, aged more than 30 years, in the Surabaya Health Center area. The sample size based on the Isaac & Michael table with an error rate of 10% is 103 respondents. Samplings were done by non-probability

sampling, purposive sampling, a sampling technique with specific considerations. The self-management measuring tool uses a questionnaire consisting of self-monitoring, positive reinforcement (self-reward), contracts or agreements with oneself (self-contracting), and mastery of stimuli (stimulus control), while detection of diabetes emergency based on a questionnaire consisting of signs and symptoms of hyperglycemia and hypoglycemia. The Test of this research instrument's validity and reliability was using thirty different sample respondents. Validity was tested using Pearson's Product Moment Correlation formula, and reliability was measured using the Cronbach alpha technique. The question items on the research variables were valid because the correlation coefficient is positive, and the significance level is less than 0.05. The results of the instrument reliability test in this study were all reliable, with a value of > 0.70. This research had received a decree to carry out research from the Poltekkes Kemenkes Surabaya based on SK number HK. 01.07/1/8071/2021, a permit from Bakesbangpolinmas Surabaya, and an ethical certificate from the Poltekkes Kemenkes Surabaya No. EA/687/KEPK-Poltekkes_Sby/V/2021.

3.   Results

3.1   Demographics of Respondents

Table 1 shows that almost all of the diabetic respondents' characteristics that 76.7% were female, 94.2% were Muslim, most (64.1%) had secondary education, all were Javanese, most had hypertension comorbidities (53, 4%), and a small proportion (35.9%) stated that there were no comorbidities and very few remaining had other comorbidities such as heart disease, kidney disease and so on. The average age of respondents was 60.16 years, the median age was 62 years, with a standard deviation of 8.14 years. The youngest was 31 years old, and the oldest was 85 years. The average length of illness of the respondents was 8.81 years, and the median length of illness was 7 years, the standard deviation length of illness was 6.3 years, the minimum length of illness was 1 year, and the maximum length of illness was 35 years.

Table 1. Distribution of Diabetic subject characteristics (n=103)

Characteristics	Category	Frequency	Percentage
Gender	Male	24	23,3
	Female	79	76,7
	Total	103	100
Religion	Islamic	97	94,2
	Catholic	1	1,0
	Christian	5	4,9
	Total	103	100
Education	Elementary	28	27,2

Characteristics	Category	Frequency	Percentage
	Midle school	66	64,1
	High school	9	8.7
	Total	103	100
Ethnic	Javanese	103	100
Diseases associated	Stomach Acid	1	1.0
	Kidney Disease	2	1.9
	Hypertension	55	53.4
	Heart Disease	4	3.9
	Obesity	1	1.0
	Osteoarthritis	1	1.0
	Lung Disease	1	1.0
	None	37	35.9
	Vertigo	1	1.0
	Total	103	100
Age	60,16 62,00	8.141	31 - 85
Length of illness	8.81 7.00	6.332	1 - 35

3.2   Variable self-management and emergency detection

Table 2 shows that of the 103 respondents, 78% had high self-management at 75.7%. It also shows that emergency detection is in the moderate category at 51.5%.

Table 2. Distribution of self-management variables and diabetes emergency detection (n=103)

Variabel	Category	Frequency	Percentage
	Low	1	1
Self -Management	Medium	24	23.3
	High	78	75.7
	Total	103	100
	Lack	35	34
Emergency Detection	Moderate	53	51.5
	Good	15	14.6
	Total	103	100

3.3 The relationship between self-management and emergency detection of diabetes mellitus

Table 3 shows that 78 respondents have high self-management and the ability to detect emergencies, most of which were sufficient (56.4%), a few were poor (26.9%), and very few were good (16.7%). Suppose the respondent's self-management is in the medium category. In that case, most of the respondents' diabetes emergency detection were poor (54.2%), while if self-management is lacking, the ability to detect diabetes emergencies is also poor. The test results showed that there was a positive relationship between self-management and emergency detection, p=0.000 (p<0.05), with a strong correlation (r=0.661).

Table 3. Cross Tabulation of Self-Management with Emergency Detection Diabetes Mellitus

Self-Management	Emergency Detection			Total	p	r
	Low	Medium	High			
	%	%	%	%		
Low	1	0	0	1		
	100	0	0	100		
Moderate	13	9	2	24	0.000	0,661
	54.2	37.5	8.3	100		
High	21	44	13	78		
	26.9	56.4	16.7	100		
Total	35	53	15	103		
	34	51.5	14.6	100		

4. Discussion

4.1 Self-management

The results of this study found that self-management was generally in the high category. This is different from research conducted by Nejaddadgar, which stated that most diabetes patients had low self-management scores [11]. This study and Alrahbi's study found that patients with longer DM duration tended to have better self-management. This is because patients who have suffered from diabetes for longer may have more experience and a better understanding of the disease process and its management [12]. Patients with a longer duration of diabetes also tend to have developed better adaptive strategies for self-managing diabetes than those with a shorter duration of diabetes [13–15]. However, some patients with longer disease duration tend to have lower self-management, one of which is due to complications.

Low self-management in this study was also found more in elderly respondents. The challenge for patients at this age is decreased physical, psychological, and cognitive function due to a degenerative process [16]. Such conditions make it difficult for patients to take medication on time

and according to the dosage due to poor memory. Likewise, patients will experience difficulties in routine sports due to decreased physical abilities. On the other hand, self-management requires the ability to manage symptoms while adapting therapy to the condition of the disease. Decreased cognitive abilities, elderly patients will tend to experience failure in self-management [16]. This study shows that the average age is the elderly. Other research has found that elderly people have good self-management if they have family support or caregivers who help them carry out self-management at home [17].

4.2   Diabetic Emergency Detection

The results showed that half of the early detection of diabetes mellitus in diabetes mellitus patients was in the sufficient category. Detection of emergencies in diabetes mellitus is part of diabetes self-management in general, namely client involvement in all aspects of chronic disease and implications such as changes in medical treatment, social and work roles, and individual coping [18]. Self-management is a continuous result of collaboration between patients, doctors, other health workers, and other groups in caring for themselves, which the patient carries out. Emergency detection carried out by patients is part of secondary prevention.

Diabetes emergency detection uses the interview method to identify signs and symptoms that patients have felt. Several studies say there is a correlation between the duration of diabetes mellitus and gender. Based on the length of time they have been suffering, it is known that most patients have suffered from diabetes mellitus for an average of more than 8 years. This allows for further complications that impact emergencies if the patient does not recognize the signs and symptoms of hypoglycemia and hyperglycemia. The longer a person has diabetes mellitus, the higher the incidence of complications experienced by the patient.

4.3   Self-Management and Emergency Detection of Diabetes

The results of this study indicate that self-management has proven to affect the detection of diabetes mellitus significantly. Self-management means that a person suffering from T2DM must make choices and decisions about managing their life alongside diabetes mellitus. Self-management in T2DM patients can improve their quality of life and reduce the risk of complications. This can also help prevent complications in the form of diabetes mellitus.

Other research stated that there is an influence between the use of the self-management education model on increasing the ability to detect hypoglycemia [19]. This research can support research that self-management can influence the ability to detect diabetes emergencies, namely hypoglycemia and hyperglycemia. Self-management in this research is a composite of self-monitoring, positive reinforcement (self-reward), contract or agreement with yourself (self-contracting), and mastery of stimuli (stimulus control).

The self-monitoring ability of T2DM patients is related to eating patterns, such as eating schedules, types of food and the number of calories eaten, the use of oral hypoglycemic drug therapy, insulin therapy, or a combination of both, drug doses, types of drugs usually consumed by T2DM patients and the impact of taking them. Medication regularly. The next self-monitoring is blood sugar monitoring, which is carried out regularly. The risk of pain and complications will decrease by 32%. Meanwhile, the death rate decreases to 51% if patients monitor blood sugar regularly [20]. Regular foot care also needs to be monitored to prevent complications of foot ulcers. Foot care is a preventive measure that includes washing the feet, drying the feet, and

checking for wounds on the feet. Foot care should be done every day[21], because it can reduce diabetic foot disease by 50-60%, affecting the quality of life of diabetes patients [22].

Positive reinforcement (self-reward) in T2DM patients also needs to be done. Self-reward can be interpreted as giving appreciation to yourself. Self-rewarding can provide the main benefit of increasing enthusiasm to continue doing your best in the future. This positive energy can be obtained because someone succeeds in loving and respecting themselves. For their own good, T2DM patients will continue to strive to be better, then give other gifts as an appreciation for themselves for achieving a specific target in life.

Self-reward is not only done when someone wins or succeeds in getting something. Self-reward can be given as appreciation to oneself for trying to the maximum, whatever the result. Rewards don't have to be expensive, and they can even be free; they can be done by doing anything to make yourself happy and relieve boredom. For maximum self-management, you can also combine self-reward with self-punishment consistently.

Contract or agreement with yourself (self-contracting) to motivate yourself in T2DM treatment. This contract with oneself consists of making a plan to change the thoughts, behavior, and feelings one wants, believing that everything one wants to change can happen, collaborating with friends/family in carrying out the self-management program, and compliance with the T2DM therapy program. Stimulus control, part of self-management, emphasizes the rearrangement or modification of a predetermined environment, which causes specific behavior to occur or be carried out. Environmental conditions function as a sign/antecedent of a particular response [23].

The results of high self-management in T2DM patients with the ability to detect diabetes emergencies in the form of hypoglycemia and hyperglycemia tend to be sufficient and good. Good self-management must be consistently carried out to avoid diabetes complications, which can be fatal for many organs throughout the body. This complication causes prolonged suffering for patients, both physically and mentally, thereby reducing their quality of life. Research for 75 respondents in America also states that Self-Management Education has been shown to positively influence self-regulation abilities, in this case controlling blood glucose [24]. This means that if a person can control and self-regulate, then T2DM patients also have the ability to detect hypoglycemia and hyperglycemia. The self-management process includes monitoring perceived health and implementing strategies to manage treatments and medications, safety, symptoms, and other implications of chronic disease, including if you have T2DM the ability to recognize symptoms of hypoglycemia and hyperglycemia [25].

5.   Conclusion

Self-management was proven to have a significant positive effect on emergency detection. Consistent self-management is done to avoid diabetes complications, which can be fatal for many bodies. Self-management means that a person suffering from T2DM must make choices and decisions about managing his life alongside diabetes mellitus. Good detection by people with diabetes can improve their quality of life and reduce the risk of complications.

Acknowledgments

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