

The Effect of Family Assistance Module Toward Family Role and Decrease of HbA1c Values in Type 2 Diabetes Mellitus in Solok Regional Hospital

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Abstract—Background: *This study was conducted to determine whether the intervention of family assistance module can improve the family role and decrease HbA1c values with type 2 Diabetes Mellitus (DM) in Solok Regional Hospital. Methods: This study was a quasi-experiment with one group pretest-posttest design. The samples consisted of 15 patients with type 2 DM who lived with their families, and the family was given an intervention in the form of a family assistance module. The role received by the patients from their family and also the patient's HbA1c were measured twice, before and after intervention. Data analysis was done to compare the mean difference and the result of $p = 0.001$ ($p < 0.005$). Results: There was a significant increase in the family role and decrease of HbA1c values before and after intervention with $p_{obtained} = 0.000$ ($p < 0.005$). The increase of family role occurred at nine units and decrease of HbA1c was 1.1 %. Conclusions: There was an increase in the family role and HbA1c value reduction in patients with type 2 Diabetes Mellitus after being given family assistance module.*

Keywords: *family support, type 2 DM, HbA1c*

I. INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia due to impaired insulin secretion, insulin work, or both. The chronic hyperglycemia from diabetes is related to long-term damage, impaired function, and failure of various organs, especially eyes, kidneys, nerves, heart and blood vessels (1). Based on etiology, DM is classified into four types, they are: a. Type 1 DM; b. Type 2 DM; c. Other types of DM and d. Gestational DM (2).

The diagnosis criteria for DM are as follows: a. HbA1c examination ($\geq 6.5\%$) or; b. The classic symptoms of diabetes mellitus and plasma glucose at ≥ 200 mg / dL (11.1 mmol / L). or; c. Classic symptoms of diabetes mellitus and fasting plasma blood glucose levels ≥ 126 mg / dL (7.0 mmol / L). or; d. Plasma glucose level 2 hours on oral glucose tolerance test (OGTT) ≥ 200 mg / dL (11.1 mmol / L) (1,2).

HbA1c has advantage compared with fasting glucose examination and 2-hour glucose tolerance test, however there are several conditions that can affect the value of HbA1c (3). HbA1c examination is recommended to be done routinely in DM patients. The first examination is to find out the glycemic situation at the early stage of handling, and the next examination is monitoring the successful control (4).

The International Diabetes Federation (IDF) statistical report states that there are now around 230 million people with diabetes (diabetics) and the number of occurrence goes up to three percent or 7 million people per year. ADA reports that every 21 seconds there is one person who has diabetes. It is estimated that the number of people with diabetes reaches up to 350 million by 2025, more than half of the patients are from Asia, especially India, China, Pakistan and Indonesia (5).

The World Health Organization (WHO) predicts there will be an increase in the number of people with DM which is one of the global health threats. WHO predicts an increase in the number of people with DM in Indonesia from 8.4 million in 2000 to around 21.3 million in 2030. This report shows that the number of people with diabetes doubles or triples by 2035. While the International Diabetes Federation (IDF) predicts an increase in the number of people with DM in Indonesia from 9.1 million in 2014 to 14.1 million in 2035.

The Riskesdas data in 2013 stated that the national prevalence of diabetes mellitus was 1.5%. Referring to the national prevalence, West Sumatera had a total prevalence of

DM 1.3%, where West Sumatera is ranked 14th out of 33 provinces in Indonesia.

Solok Regional General Hospital (RSUD) is one of type B hospitals with the visit from patients with diabetes mellitus from the city or Solok regency. The visit of DM patients in 2016 was 4980 visits and in 2016 it increased to 7000 visits. Based on the data obtained it was found out that in 2018 the number of patients with diabetes mellitus was 200 people. In 2017 diabetes mellitus was the first disease of the 10 most diseases in the polyclinic of the Solok regional General Hospital.

Diabetes is the fourth leading cause of death in the world. Every year 3.2 million people die from diabetes complications. Every ten seconds there is one person or every one minute there are six people who die because of the diseases related to diabetes. Even developed countries like America, the death rate due to diabetes reaches 200,000 people per year. The risk of death for diabetic patients is two times greater than non-diabetics caused by complications. The long journey of diabetes usually will lead to various complications which make the patients suffer even more, decreased quality of life, and rise of the treatment cost (5).

People with type 2 diabetes mellitus keep increasing due to unhealthy lifestyles. Frequent consumption of fast food is likely to have high calorie levels. Many people with diabetes mellitus still do not realize that they have it, so they are too late to control their blood sugar levels and eventually they experience complication. Even they realize that they have diabetes but they assume that diabetes mellitus can be cured in one examination. If this is not addressed immediately, the complications may appear.

One of the family functions is a family health care. Family health problems are interrelated and will influence one another among family members. Family is the leading health care unit in improving community health status. Therefore the role of the family is very supportive in achieving the successful care of DM clients at home (6,7).

A study found out that the dominators in the process of treating diabetic clients at home were couple (66%). Besides couples (husband or wife), children also become dominators (12%). But there are also DM clients who proactively care for themselves so that the family does not play a role (22%) (8).

Based on this background, it is known that the family role is one of the factors that influence the achievement of health success and the stability of DM patients' condition. The purpose of this study was to determine the effect of the family assistance module toward family role and the HbA1c value of DM patients.

II. METHODOLOGY

This research is categorized into quasi-experiment with one group pretest-posttest design. In this design, measurements were made twice, one taken before the experiment (O1) where the samples were given a stimulus,

and one conducted after the experiment (O2). The measurements were done to assess family roles and HbA1c values before and after being given a Family Assistance Module. This study involved 15 samples. The samples were taken using non-probability sampling by purposive sampling. The data was analyzed using univariate and bivariate with a paired t test.

A. The Sample Criteria

Willing to be a respondent, type 2 DM patients accompanied by families, patients with the same pharmacotherapy, patients aged 40-60 years with 5-10 years of diabetes, the same respondents measured only once and vital signs within the normal limit.

B. Ethical Consideration

The study protocol was approved by the Research Ethics Committee Team of the Medical Faculty of Andalas University Padang (approval date July 3, 2018; No. 427) and by the hospital where the study conducted (date of approval June 23, 2018). All patients gave written approval to participate in this study.

III. RESULTS AND DISCUSSION

In table 1, the majority of respondents were female (66.7%) with the highest level of education was high school (40%) and most of them were non civil servants (66.7%).

TABLE 1. FREQUENCY DISTRIBUTION OF RESPONDENTS BASED ON GENDER, EDUCATION AND EMPLOYMENT

Variable	Category	Amount	Percentage (%)
Gender	Male	5	33.3
	Female	10	66.7
Education	Elementary School	1	6.7
	Junior High School	4	26.7
	Senior High School	6	40
	University	4	26.7
Job	Civil Servant	5	33.3
	Non Civil Servant	10	66.7

The results of the analysis in table 2 found that the average age of respondents was 53.8 years. The youngest was 40 years old and the oldest was 60 years. The results of the interval

estimation can be concluded that the average age of patients with type 2 DM who visited the Internal Medicine Polyclinic in Solok regional General Hospital ranges from 50 - 57.6 years.

TABLE 2. ANALYSIS RESULTS OF AGE, DURATION OF DM, FAMILY ROLE, HbA1C VALUES BEFORE AND AFTER INTERVENTION

Variable	Mean	Median	SD	Min-Maks	95% CI
Age (year)	53.8	55	6.7	40 – 60	50-57.6
DM Duration (year)					
Family role before	6.8	6	2	5 – 10	5.7-7.9
intervention	46	49	8.6	25 - 58	41-50
Family role after intervention	55	56	5.3	41 – 61	52-57
HbA1c before					
intervention	6.8	6.5	1.5	4.8 – 11	5.9-7.7
HbA1c after intervention	5.7	6	0.9	4.3 -75	5.2-6.3

Furthermore, the average length of respondents suffering from type 2 diabetes mellitus was 6.8 years. The duration of suffering from the shortest DM was 5 years and the longest was 10 years. The results of the interval estimation can be concluded that the average duration of diabetes mellitus in type 2 DM patients who visited the Internal Medicine Polyclinic of the Solok regional General Hospital ranged from 5.7 - 7.9 years.

The average value of the family role of the before intervention was 46. The lowest role value was 25 and the highest was 58. The results of the interval estimation can be concluded that the average value of the family role before intervention ranged from 41-50.

The average value of family roles after intervention was 55. The lowest role value was 41 and the highest was 61. The results of the interval estimation can be concluded that the average value of the family role after intervention respondents ranged from 52-57.

The average HbA1c value before intervention was 6.8%. The lowest HbA1c value was 4.8% and the highest was 11%. The results of the interval estimation can be concluded that the average HbA1c value before intervention ranged from 5.9% - 7.7%.

The average HbA1c value after intervention was 5.7%. The lowest HbA1c value was 4.3% and the highest was 7.5%. Interval estimation results can be concluded that the average HbA1c value after intervention ranged from 5.2% - 6.3%.

Table 3 showed all respondents get an increase in the role of the family after intervention.

TABLE 3. ANALYSIS OF AN INCREASE IN FAMILY ROLES BEFORE AND AFTER INTERVENTION

No.	Family Role before Intervention	Family Role After Intervention	Information
1	53	60	Increase
2	50	53	Increase
3	58	61	Increase
4	52	56	Increase
5	50	56	Increase
6	44	60	Increase
7	25	50	Increase
8	45	58	Increase
9	46	49	Increase
10	39	58	Increase
11	32	41	Increase
12	49	59	Increase
13	53	56	Increase
14	45	51	Increase
15	51	57	Increase

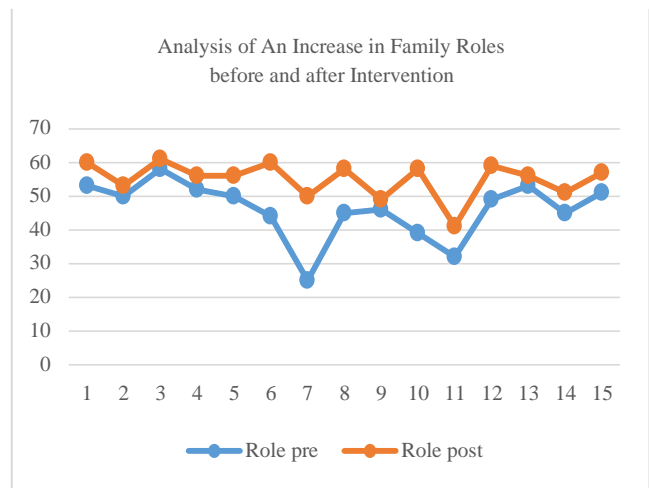


Fig 1. Analysis of an Increase in Family Roles before and after Intervention

Table 4 showed that almost all respondents experienced a decrease in HbA1c after the family was given a family assistance module intervention.

Table 5 showed the mean value of the family role before the intervention was 46 with a standard deviation of 8.6. After doing the provision of a family assistance module obtained mean value was 55 with a standard deviation 5.3. There was an average increase in the value of family roles before and after the intervention of 9 with a standard deviation of 3.3. The results of statistical tests obtained P Value = 0.001. This figure showed that there was a significant difference between family roles before and after the family assistance module intervention was given. The results of this study indicate that the provision of family assistance modules significantly

increased the family role of type 2 DM patients. This was proved by the results obtained from statistical tests that showed a significant difference.

TABLE 4. DECREASED ANALYSIS OF HBA1C BEFORE AND AFTER INTERVENTION

No.	HbA1c Values Before Intervention	HbA1c Values After Intervention	Information
1	6	6	Stable
2	7.8	6.5	Decrease
3	7.4	6	Decrease
4	4.8	5	Increase
5	5.7	5.7	Stable
6	9	6.6	Decrease
7	6.6	5	Decrease
8	5.9	4.4	Decrease
9	6.7	6	Decrease
10	6.4	6	Decrease
11	11	7.5	Decrease
12	6.5	5.9	Decrease
13	7.4	7	Decrease
14	5.5	4.3	Decrease
15	6.5	5	Decrease

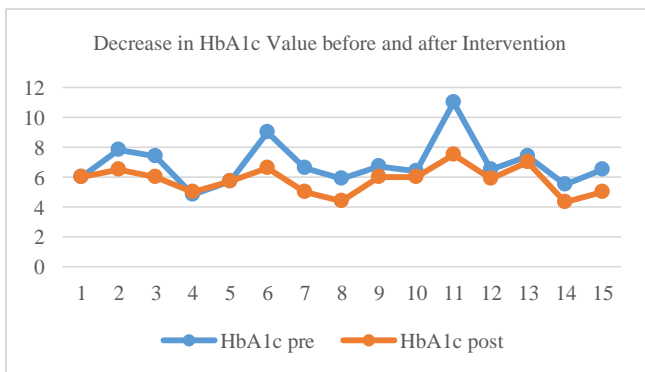


Fig. 2. Analysis of Decrease in HbA1c before and after the intervention

TABLE 5. ANALYSIS OF THE DIFFERENCES IN THE ROLE OF FAMILIES BEFORE AND AFTER INTERVENTION

Variable	Mean	SD	SE	P Value	N
Before	46	8.6		0.001	15
After	55	5.3			
Difference	9	3.3			

Giving modules is one of the methods in the education process. In process, family-based education in this study was carried out repeatedly and accompanied by follow-up. Diabetes-Self Management Education (DSME) recommends the process of health education done to improve selfmanagement of DM patients must be carried out continuously to obtain the knowledge, skills, abilities needed for self-care of diabetes (9). Health education carried out continuously is very effective in facilitating changes in care

behavior. The effect of family-based education programs was significant, because almost all respondents in the intervention group were more knowledgeable (10).

Family involvement in this study was intended to increase family support for patients in carrying out the 5 pillars of expected DM management. Family support for respondents has an important role in improving the implementation behavior of the 5 pillars of DM management. One of the basic supporting factors that can improve individual abilities is family support (11). The results of previous studies stated that family support had a significant effect on the behavior of the level of independence of patients with Diabetes Mellitus (12).

Family involvement in DM management is very necessary because the family is the primary caregiver as long as the patient is at home. The family environment can have a positive influence in attempt to implement the 5 pillars of DM management. Closeness to family members influences the family atmosphere in Indonesia. The values of affective function in family members influence the implementation of the 5 pillars of DM management. Family members involved in the education program can certainly increase the family's role in DM patients.

Family members were needed to help and support patients in independent management practices, helping patients with strategic planning, setting goals and solving problems. Effective feedback on negative perceptions of diabetes is used to exchange health information, reduce barriers to care and self-building emphasized by family members (13).

The provision of informative and interesting educational materials is necessary as a very strong supporter in providing education. Educational materials will increase understanding and stimulate the enthusiasm of patients and families in following the material presentation (7). Also previous research reported that support for self-management would improve self-care behavior (14). It can be analyzed that family support for self-management with the help of good educational materials will certainly produce knowledge effectiveness in patients. The module allows respondents and / families to reread, look for further information related to the material.

Therefore the existence of modules containing written information for families is an effective tool to understand the needs of type 2 DM patients. Based on this understanding, families can assist patients wisely, especially in implementing 5 pillars of management of type 2 DM.

Table 6 showed the average value of the respondent's HbA1c before the intervention was 6.8% with a standard deviation of 1.5%. After being given the family assistance module, the mean value was 5.7% with a standard deviation of 0.9%. There was an average decrease in the value of HbA1c before and after the intervention of 1.1% with a standard deviation of 0.6%. The results of statistical tests obtained the value of $p = 0.000$, this number indicated that there was a significant difference between the values of HbA1c before and after the intervention of the family assistance module.

TABLE 6. ANALYSIS OF DIFFERENCES IN HBA1C VALUES BEFORE AND AFTER INTERVENTION

Variable	Mean	SD	SE	P Value	n
Before	6.8	1.5	0.4	0.000	15
After	5.7	0.9	0.2		15
Difference	1.1	0.6			

Glycemic control in DM patients is important to prevent various complications. DM control is seen from two things, short-time blood glucose and long-term blood glucose. Short-time blood glucose monitoring is seen from fasting blood glucose and 2 hours post prandial, while longterm blood glucose control employed HbA1c examination. Examination of HbA1c levels reflects the average blood glucose control in the last 2-3 months. High levels of HbA1c are positively correlated with the occurrence of DM complications, both macro and micro vascular (15).

DM is incurable but blood glucose levels can be controlled. In the management and control of diabetes, it is important to monitor glycemic levels. Not only blood glucose, HbA1C levels are also important to check. Examination of fasting blood glucose and 2 hours post prandial after meals can only reflect blood glucose concentrations when measured and are strongly influenced by food, exercise, and drugs that have just been consumed. So, it cannot describe how to control long-term glucose concentration. While HbA1c can describe the average blood glucose during the last 2-3 months so that it can be used as treatment planning (15).

The addition of family knowledge scores gave a possibility of decreasing HbA1c levels. There was correlation between family knowledge and control of blood glucose levels in type 2 diabetes mellitus patients. The addition of attitude scores gave a possibility of decreasing HbA1c levels. There was correlation between family attitude and control of blood glucose levels in type 2 diabetes mellitus patients. The addition of knowledge and attitude score gives the possibility of decreasing HbA1c levels. Family members should take the time to increase their knowledge on controlling DM comprehensively so that they have a good attitude in caring. As a result, DM patients will be motivated and behave positively in self-care. Furthermore, blood glucose or HbA1c can be controlled, complications can be avoided, and quality of life gets better just like normal people (16).

Increasing family knowledge can influence the increase in DM patients' knowledge. Therefore in order to successfully manage the control of blood glucose levels of type 2 DM patients, it is necessary to involves family members in regular routine control in health services. Other knowledge that must be improved for both patients and families is knowledge of cause management, which includes controlling weight gain that may lead to obesity, management of complications emergence of other diseases, and planning of diet and exercise in accordance with guidelines for DM patients (16).

One of the methods used as an effort to provide effective education to families about the care of DM patients is giving a module. Information about caring the patients is given in a written form in order to be used by the family, especially when at home.

Educational interventions are expected to help health problems experienced by patients. For this reason, it is necessary to develop a specific diabetes care culture that focuses on family involvement by providing continuous information. Providing information about diabetes to the family and care skills will increase family knowledge. This is certainly effective to help families treating DM patients. One of the benefits is that with family involvement the management of DM will be done well, so that it will have an impact on stable glycemic control. One of the patient's stability conditions will be reflected in the patient's HbA1c value. Increased metabolic control will reduce the complications and mortality rates of DM patients.

IV. LIMITATIONS

Data collection and intervention were carried out with daily home follow-up, but researchers could not follow for 24 hours. This can lead to bias in research.

V. CONCLUSION

There was a Family Assistance Module on 5 pillars for managing type 2 DM. Also, there was an increase in the family role of 9 units and a decrease in the HbA1c value of 1.1%, after the intervention of family assistance module was given. With the module, it can increase the family's knowledge and skills in caring for DM patients. As a consequence, the family plays an important role and it can affect the decrease of HbA1c value on the patients.

Furthermore, it is necessary to involve the family in the education session of diabetes mellitus patients, so that they can maintain effective family knowledge and skills in treating diabetes mellitus patients.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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