

## Effect of Diabetes Mellitus Patient Adherence in Following Prolanis Activities on HbA1C Profile at UPTD Puskesmas Nursing Ngletih Kediri

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Diabetes Mellitus (DM) is a chronic disease that has become a major health problem in Indonesia. The Chronic Disease Management Program (Prolanis) developed by BPJS Kesehatan in collaboration with First Level Health Facilities (FKTP) seeks to promote and prevent DM disease control. Efforts made include controlling the glycemic index to prevent microvascular and macrovascular complications that may occur with activities including medical consultation, counseling, home visits, club activities, and monitoring of health status.

**Aim :** The purpose of this study was to analyze the effect of DM patient adherence in participating in Prolanis activities on the patient's HBA1C profile.

**Method:** This study is an analytical study using a retrospective cohort design. The research data is secondary data obtained from the Medical Records of DM patients from January-April 2019. The research subjects were 42 DM patients who were registered as active Prolanis participants who had HBA1C data at the April 2019 examination.

**Result:** The results of this study showed that the mean HBA1C value in 22 patients who routinely followed prolanis activities ( $7.2 \pm 1.48$ )% was more controlled than the mean HBA1C in 20 patients who did not routinely participate in prolanis activities ( $9.27 \pm 2.06$ )% .

**Conclusion:** From this study it can be concluded that there is a significant difference between DM patients who adhere to the schedule of prolanis activities and patients who do not comply with the schedule of prolanis activities at the UPTD Puskesmas Nursing Ngletih Kediri City with a value of  $p = 0.001$  ( $p < 0.05$ ; CI = 95% )

Keywords: Diabetes Mellitus, Prolanis, HbA1C, FBS (Fasting Blood Sugar)

### 1. PRELIMINARY

Diabetes mellitus (DM) is a chronic disease characterized by a group of common metabolic disorders causing hyperglycemia. Hyperglycemia is a medical condition in which an increase in glucose levels in the blood exceeds normal limits. The factors causing hyperglycemia include reduced insulin secretion, decreased glucose use, and increased glucose production. The metabolic dysregulation associated with DM causes secondary pathophysiological changes in several organ systems. (Longo et al, 2012).

Currently, epidemiological research shows an increasing trend in the incidence and prevalence of type 2 DM in various parts of the world. The World Health Organization (WHO) predicts an increase in the number of people with DM which is a global health threat (Soelistijo et al, 2015).

According to the International Diabetes Federation (IDF), in 2017 there were 425 million people in the world suffering from diabetes and this will increase to 629 million in 2045. Indonesia is ranked 6th (sixth) in the world with 10.3 million sufferers and is predicted to increase to 16.7 million by 2045 (IDF, 2017)

According to the 2015 PERKENI consensus, the proportion of DM in Indonesia is 10.9%, impaired glucose tolerance (TGT) is 30.8% and disturbed fasting blood glucose (GDPT) is 26.3%. The proportion of the population in rural areas who suffer from diabetes mellitus is almost the same as the population in urban areas. The prevalence of DM based on this doctor's diagnosis increased from 1.5% in 2013 to 2.0% in 2018 (Perkeni, 2015; Riskesdas 2018).

DM disease if not managed properly will cause various chronic complications, such as cerebrovascular disease, coronary heart disease, leg vascular disease, eye, kidney and nerve disorders. Patients with diabetes are 2 times more likely to develop coronary heart disease and cerebral vascular disease, 5 times more likely to suffer from ulcers / gangrene, 7 times more likely to develop terminal renal failure, and 25 times more likely to become blind due to retinal damage than non-patients. DM. Efforts to heal back to normal are very difficult if things have occurred, because the damage will generally be permanent.

BPJS Kesehatan as the Implementing Body is a public legal entity established to administer health insurance programs for all Indonesians. As a real effort from BPJS to reduce the increase in the incidence and prevalence of DM-type 2, BPJS organized a Chronic Disease Management Program (Prolanis) (BPJS, 2014).

Prolanis is a health service system and a proactive approach that is implemented in an integrated manner that involves participants, health facilities and BPJS health in the context of health care for BPJS Kesehatan participants who suffer from chronic diseases to achieve an optimal quality of life. Apart from improving the quality of life for patients, this program is also expected to reduce the risk of complications and be able to take advantage of costs effectively and rationally. Prolanis consists of 6 activities, namely medical consultation, education, SMS gate-away, home visit, club activities, and monitoring of health status (Raraswati et al, 2017; Aldahmani et al., 2020; Ali et al., 2020; Ali, 2020; Alkamil et al., 2020).

Hemoglobin A1C (HbA1C) is a small component of hemoglobin (Hb) which is stable and is formed slowly through non-enzymatic Hb reactions with glucose continuously throughout the life of erythrocytes for  $\pm$  120 days. HbA1c examination is effective for monitoring long-term blood glucose for people with diabetes. A high HbA1c value is used as a measure of the development of diabetes complications (Indrayanti and Mulyono, 2008). Based on the results of previous studies, Prolanis in several areas was effective in reducing fasting blood sugar, HbA1c, and cholesterol levels in Diabetes Mellitus patients (Ahmad et al, 2017).

## 2. RESEARCH METHODS

This study is an analytical study using a retrospective cohort design. The location of the research was carried out at the UPTD Puskesmas Nursing Ngletih, Kediri City. The research data is secondary data obtained from the total sampling of medical records (RM) of patients diagnosed with DM and undergoing treatment either receiving insulin or oral antidiabetic drugs (OAD). Observations were made by taking the patient's RM data for 4 months, from January to April 2019.

The inclusion of this study were all male and female patients over 20 years of age, registered as members of the BPJS. The exclusion criteria were DM patients who did not have HBA1C results on measurements in April 2019.

A retrospective cohort study was conducted using 2 groups, namely a group that always participated in prolanist activities every month and a group that did not regularly participate in prolanis activities. Data analysis was performed normality test with the Shapiro – Wilk test. To determine the homogeneity of the distribution of characteristics of each group with the chi-square test. The comparative hypothesis test was conducted to determine whether there was a difference between the two groups, an independent t-test was used if the data were normally distributed or the Mann Whitney test if the data were not normally distributed. To find out the correlation between the GDP value and the HbA1C value in DM patients, Pearson test was performed. The result of statistical test is significant if  $p < 0.05$  with a confidence interval of 95%. Data management uses the Statistical Package for the Social Sciences (SPSS) program.

## 3. RESEARCH RESULT

From the results of collecting data on the RM records in January-April 2019, there were 42 patients with records of HBA1C values in April 2019. The description of type 2 DM patients who participated in Prolanis activities at the UPTD Puskesmas Nursing Ngletih can be seen in table 3.1.

**Table 3.1** Basic Characteristics of Diabetes Mellitus Patients

Patient Characteristics	Group 1 (Routinely participate in Prolanis activities)		Group 2 (does not regularly participate in Prolanis)		P
	Frequenc y (n = 22)	Percentage (%)	Frequency (n = 20)	Percentage (%)	

<b>Gender</b>					
Male	4	18.18%	3	15%	P = 0.703
Women	18	82.82%	17	85%	
<b>Age Distribution</b>					
35-45	1	4.5%	1	5%	P = 0.256
46-55	4	18.18%	5	25%	
56-65	5	22.72%	9	45%	
> 65	12	54.55%	5	25%	
<b>Medicines used</b>					
Insulin	2	9.00%	3	15%	P = 0.946
Sulfonyl Urea (SU)	5	27.27%	4	20%	
Metformin	1	4.53%	1	5%	
SU + Metformin	13	59.20%	12	60%	
<b>Long Suffering from DM</b>					
0-4 years	9	40.91%	6	30%	P = 0.576
5-10 years	10	45.45%	10	50%	
> 10 years	3	13.64%	4	20%	

\* Homogeneity test with the Chi-square test

In table 3.1 it can be seen that the majority of DM patients were women, namely 82.82% with mean age  $63.82 \pm 9.63$  years in group 1 (one) and 85% with mean age  $58.45 \pm 9.46$  years in group 2 (two). After the homogeneity test, it was found that the baseline characteristics of the patients were similar in the two groups. A homogeneity test was performed to check whether the patient's initial characteristics were confounding variables or not.

Treatment received by DM patients was not significantly different between the two groups with p value = 0.762). Routine treatment received is in accordance with the guidelines published by PERKENI. On average, patients received combination treatment with Sulfonyl Urea (SU) and metformin. Referral patients receive insulin therapy to control their blood sugar on average.

**Table 3.2** Mean HbA1C values in the two groups

Group	HbA1C Value				P	Average HbA1C	P
	<7%		>7%				
	(N)	%	(N)	%			
<b>Group 1 (Prolanis)</b>	13	59.09%	9	40.91%	0,000	7.2 ± 1.48%	0.001
<b>Group 2 (Not a routine)</b>	0	0%	8	40%		9.27 ± 2.06%	

Source: Medical Records of the UPTD Puskesmas Nursing Ngletih

Table 3.2 shows the results of measuring the GDP of DM patients who routinely participate in prolanic activities for 3 consecutive months from January to March and also shows the results of measuring the HbA1C profile in April 2019. Table 3.2 shows that the HbA1C profile in group 1 shows the profile which is more controlled when compared to the HbA1C profile in group 2. The mean HbA1C profile in group 1 is equal to  $7.2 \pm 1.48\%$  and the mean HbA1C profile in group 2 was  $9.27 \pm 2.06\%$ . Independent t-test was carried out to test whether there was a difference in the HbA1C value in the two groups, from this difference

test it was found that there was a significant difference in the HbA1C value in group 1 and group 2 with a value of  $p = 0.001$  ( $p < 0.05$ ; CI = 95 %).

**Table 3.3** Fasting Blood Sugar Profile in both groups

Group	Fasting Blood Sugar (GDP)				HbA1C				P
	<126 mg / dl		> 126 mg / dl		<7%		> 7%		
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	
<b>Group 1 (Prolanis Routine)</b>	11	50%	11	50%	13	59.09%	9	40.91%	$p = 0.000$ $r = 0.655$
<b>Group 2 (Not routine prolanis)</b>	0	0%	20	100%	0	0%	8	40%	$p = 0.000$

In table 3.3, it can be seen from the results of the fasting blood sugar (GDP) examination carried out, DM patients in group 1 had a controlled GDP profile of 50%, this was much better when compared to the GDP profile in group 2 where none of the patients had GDP. <126 mg / ml. Both GDP and HbA1C parameters were also tested for correlation using the Pearson test which states that GDP and HbA1C have a strong correlation ( $p = 0,000$ ;  $r = 0.655$ ; CI = 95%).

#### 4. DISCUSSION

From the results of the study, it was found that most DM sufferers were women as much as 82% in group 1 and 85% in group 2. This is in line with the results of the 2018 Riskesdas which showed that the prevalence of DM was higher in women (1.8%) than men (1, 2%). Many factors are thought to cause the high prevalence of DM in women, including genetic factors, environment, lifestyle, low physical activity, obesity to a history related to parity such as a history of gestational diabetes and a history of having given birth to a baby weighing more than 4000 grams (Nuryanti and Bantas, 2014).

The results also showed that there were 31 DM patients (73.8%) who were in the elderly category. DM disease in the elderly should be more aware of the progression of DM disease towards its complications. According to a study, the risk of uncontrolled diabetes mellitus in the elderly can lead to various chronic complications by 73.1% and the largest proportion is hypertension (Rosyada and Trihandini, 2013).

In the study, it was found that the number of patients suffering from DM for less than 10 years was 50%, the longer a person has diabetes, the greater the risk of complications. Like Yuliani's research, it was found that 81.8% of the proportion of coronary heart disease occurred in patients who had diabetes > 10 years (Yuliani et al, 2014). If DM control is done properly, the risk of complications in patients can be reduced.

The choice of OAD use is in accordance with the patient's clinical condition. A total of 59.20% patients in group 1 and 60% of patients in group 2 received combination SU and metformin therapy. The metformin-SU combination has the same level of safety as other blood glucose-lowering therapies used for DM 2 (Sillars et al, 2010, Medsen et al, 2016).

Blood sugar control is the most important aspect in the management of DM, it is the basis for reducing the mortality and morbidity of DM disease (Katema and Kibret, 2015). Plasma glucose control in DM patients can be assessed by measuring glycated hemoglobin (HbA1c), fasting blood sugar (GDP), and postprandial plasma glucose (GPP) (Swetha, 2014; Katema and Kibret, 2015).

In this study, the GDP value of patients in group 1 was more controlled than GDP in group 2. There was a significant difference in the value of GDP in the two groups. Patients who had controlled FBG levels had controlled HbA1c values as well, through the correlation test, it was found that there was a strong correlation between GDP and the patient's HbA1C values ( $p = 0.000$ ;  $r = 0.655$ ; CI = 95%) This is in line with a meta-analysis study which stated that seven of the studies included in the meta-analysis found better correlation between GPP and HbA1c while the remaining three studies reported better correlation between GDP and HbA1c targets (Katema and Kibret, 2015).

The results showed that the HbA1C profile in group 1 showed a more controlled profile when compared to the HbA1C profile in group 2. The mean HbA1C profile in group 1 was  $7.2 \pm 1.48\%$  and the mean HbA1C profile in group 2 was  $9.27 \pm 2.06\%$ . From the results of different tests with independent t-test, it shows that there is a significant difference in the HbA1C value in the two groups with a significance value ( $p = 0.001$ ).

In group 2, RM data were obtained which indicated that the patient did not routinely control so that the adequacy of his OAD drug was not achieved. OAD is given at intervals of 2 weeks, so that if the patient is not treated it is assumed that the patient will not take OAD until the next prolanic visit.

The indicator of the success of implementing Prolanis in a health center is 75% of participants have "good" results on specific examinations for DM disease according to clinical guidelines (BPJS, 2014). Based on the results of the above study, it can be seen that the data in the RM of recording the patient's GDP, only 11 patients (26.2%) of the total sample had controlled GDP ( $<126$  mg / ml) and 13 patients (30.95%) had an HbA1C value.  $<7\%$ . This achievement was only achieved in group 1, so there were significant differences in groups 1 and 2 in terms of the achievement of controlling GDP with a significance of  $p = 0.000$  and in the HbA1C value with  $p = 0.001$ .

Prolanis consists of 6 activities, namely medical consultation, education, SMS gate-away, home visit, club activities, and monitoring of health status. These six activities, when implemented together, include: 4 pillars of DM management according to PERKENI. Education for Prolanis patients is carried out in the form of joint counseling to all Prolanis participants and individual counseling for those who have poor laboratory test results. Physical activity is carried out by holding prolanic gymnastics and club activities which are a series of activities. This prolanic exercise is only done once a month when there is a laboratory examination. The frequency of Prolanis exercise is still considered insufficient to maintain the physical activity of Prolanis participants. Medical nutritional therapy is carried out every 2 weeks according to the DM patient control schedule. Pharmacological interventions in patients are administration of OAD such as SU, Metformin or a combination of SU and Metformin. Adherence to taking the medication of Prolanis participants has not been detected optimally because the sms gateway has not been implemented, one of which functions is to remind the schedule for taking medication. It is also felt that drug counseling is not optimal due to the limited time allocated for pharmacological services. PsienProlanis received OAD for the next 14 years, if the patient does not come for the next control, then the patient may not take oral diabetes drugs is large.

The limitations of this study are other uncontrollable factors in the study that greatly affect the success of the level of glycemic control in DM patients, including: ease of access to public health centers, patient education level, socioeconomic level, patient diet, smoking habits, frequency of physical activity. This limitation is also in line with other studies conducted in various regions in Indonesia (Ahmad et al, 2017; Raraswati, 2018)

Even so, the results obtained from the comparison of the two groups, there was a significant difference between the group who routinely participated in prolanis activities and those who did not routinely participate in prolanis activities. This shows that Prolanis activities are very much needed to support the successful management and prevention of chronic diseases in Indonesia. The implementation still needs a lot of improvement so that the target achievement in the form of indicators of the success of implementing Prolanis in a health center is 75% of participants who have "good" results on specific examinations of DM disease according to clinical guidelines can be achieved. Failure to achieve a controlled glycemic index due to non-adherence to treatment schedules is probably because the patient did not receive enough OAD until the time of the next visit.

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusion

The optimal utilization of Prolanis activities is very effective in controlling fasting blood sugar and HbA1c in patients with Type 2 diabetes so that it indirectly prevents complications. This is evidenced by the significant difference in the HbA1C value of DM patients in the group that routinely participates in prolanis activities and in groups that do not routinely participate in prolanis activities. Rmean HbA1C values in patients who routinely participated in prolanis activities ( $7.2 \pm 1.48\%$ ) were

more controlled than the mean HBA1C in patients who did not routinely participate in prolanis activities ( $9.27 \pm 2.06$ )%.

## 5.2 Suggestions

1. Carrying out drug counseling sessions for type-2 DM patients to improve patient compliance in the use of prolanis activities and routine control of their disease to the Puskesmas.
2. Monitoring DM patient compliance is carried out by providing a treatment card so that DM patients know the treatment schedule that has been determined and pharmacists can see the patient's medication adherence.

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