PROLANIS IMPLEMENTATION EFFECTIVE TO CONTROL FASTING BLOOD SUGAR, HbA1c AND TOTAL CHOLESTEROL LEVELS IN PATIENTS WITH TYPE 2 DIABETES

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ABSTRACT

Introduction: Diabetes mellitus (DM) is a global disease endemic and causing of 4.6 million deaths in the world. The Indonesian government and health insurance *[BPJS Kesehatan]* formulate a Chronic Disease Care Program *[Program Pengelolaan Penyakit Kronis (PROLANIS)]* for type 2 diabetes that aimed at controlling the glycemic status and the risk factors of macro and microvascular complications. The purpose of this study was to analyze the correlation between the implementation of *PROLANIS* and fasting blood sugar, HbA1c, and total cholesterol levels in patients diagnosed with type 2 diabetes at Antang and Pampang community health centers, Makassar, Indonesia. **Methods:** This study used descriptive correlation design with cross-sectional study approach. Subjects were 40 patients diagnosed with type 2 diabetes who joined *PROLANIS* at PUSKESMAS Antang and Pampang, Makassar, with sampling technique used was total sampling. The data were analyzed using correlation test to assess the significance *(p)*, the direction *(+/-)*, and the strength of the correlation *(r)*. The implementation of *PROLANIS* was measured by using the observation sheets developed based on *BPJS Kesehatan* criteria, while the laboratory checked the fasting blood sugar, HbA1c, and total cholesterol levels. **Results:** The mean of the implementation of *PROLANIS* was 15.05 (SD ± 5.62), while the mean levels of fasting blood sugar, HbA1c, and total cholesterol were as followed: 191.80 mg/dL (SD ± 85.15); 8.4% (SD ± 2.08); and 192.87 mg/dL (SD ± 45.07). Using the Spearman's rho test, the study result showed that there was a significant and negative correlation between the implementation of *PROLANIS* and the levels of fasting blood sugar ($p= 0.001$; $r= -0.724$), HbA1c ($p= 0.001$; $r= -0.870$), and total cholesterol ($p= 0.029$; $r= -0.35$) in patients diagnosed with type 2 diabetes at Puskemas Antang and Pampang, Makassar. **Conclusions:** The optimal implementation of the *PROLANIS* is very effective to control the levels of fasting blood sugar, HbA1c, and total cholesterol in patients type 2 diabetes.

Keywords: Fasting Blood Sugar, HbA1c, PROLANIS, Primary Health Center, Type 2 Diabetes.

INTRODUCTION

Diabetes mellitus (DM) can be defined as a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both. Chronic hyperglycemia in diabetes associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels (Abdel-Rahman 2011). Besides being a metabolic disease, diabetes is also a global disease endemic. The incidence of diabetes globally is estimated increase from 366 million to 552 million in 2030 and will present itself as a major health challenge that can be shown by the data of global DM (Shaw, JE, Sicre, RA, & Zimmet 2010).

If no action is taken, the number is estimated to rise to 552 million in 2030 and will be the cause of 4.6 million deaths (Federation 2011). In Indonesia, the number of people with diabetes as many as 292.715 people, or about 1.8% of the total participants Social Health Insurance (BPJS Kesehatan 2015).

The number of cases of diabetes in the province of South Sulawesi in 2014 (282 patients) consisted of reported DM (207 patients), unreported DM (160 patients) and Dependent DM on insulin (72 patients) (Sul-Sel. 2014). Increasing cases of diabetes occurred in Makassar. In 2012, The case of DM was ranked fifth leading cause of death with 191 deaths (Dinkes Kota Makassar 2012), while in 2013 rose to fourth with 217 (Dinkes Kota Makassar 2013). Data of DM patients at Puskesmas Antang Makassar, from January to December 2015 was 725 patient so that the average patient with type 2 diabetes per month was estimated to 61 people, while in January and February 2016 at least 136 people and the average patient per month was 68 people (Rekam Medik Puskesmas Antang Kota Makassar. 2016).

Prevention of chronic complications is not only to control blood glucose levels itself but needed a good diabetic control. Control of diabetes should be done thoroughly, including

blood glucose, HbA1c, lipid (cholesterol Low-Density Lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides (Semiardji, 2003). Therefore, the development of new strategies to improve diabetes control and its complications would be very helpful (Bianchi, C., Miccoli, R., Daniele, G., Penno, G., & Del Prato 2009). In Indonesia, one of the new strategies developed is management program of chronic diseases (PROLANIS). PROLANIS developed by BPJS. The main objective of PROLANIS is to reduce the risk of complications and achieve a better quality of life with the use of cost-effective and rational. PROLANIS program is a system of governance of health services and health education for Social health Insurance participants who suffer from hypertension and type 2 diabetes mellitus to achieve the optimal quality of life independently (Idris 2014). The implementation of PROLANIS in Indonesia took place since 2010. This program is a chronic disease management with integrated promotive and preventive action form. One of the chronic diseases handled at this time one is type 2 diabetes mellitus (Idris 2014).

Activities of PROLANIS itself consists of a medical consultation for PROLANIS participants: consultation schedules agreed between participants with health facility managers, high-risk educational clubs (PROLANIS Club) is an activity to improve health knowledge in an effort to restore the disease and prevent a resurgence of the disease and improve the health status for PROLANIS attendees, reminder or activities to motivate participants to make regular visits to health facilities manager through consultation schedule reminding to go to the health facilities manager, and home visit such as service activities of home visits of PROLANIS participants for the provision of information /self health education and the environment for PROLANIS participants and family (BPJS Kesehatan 2015).

Previous research (Alexander, 2012) have confirmed the effectiveness of PROLANIS program at family doctor. Nonetheless, PROLANIS effectiveness evaluation in health centers is still limited. Therefore, this study aimed to analyze the correlation between the implementation of PROLANIS with fasting blood sugar, HbA1c and total cholesterol in patients with type 2 diabetes mellitus in PuskesmasAntangand Pampang Makassar. It can be concluded that PROLANIS is very effective in controlling health status and improve the quality of life of patients with type 2diabetes mellitus.

Based on the explanation, researchers interested in analyzing the correlation of PROLANIS implementation with fasting blood sugar, HbA1c, and total cholesterol in type 2 diabetes mellitus at Antang and Pampang community health centers Makassar.

METHODS

This study was a quantitative study with descriptive correlational design, as for the collection of data using cross-sectional study approach. The study was conducted during one month at Antang and Pampang community health centers Makassar. The population in this study were all patients with type 2 Diabetes mellitus, male and female of PROLANIS participants in Makassar, as many as 66 (37 patients in Antang community health centers) and 29 patients (Pampang community health centers). Calculation of the number of samples is 64 people, but the samples obtained in this study were 40 people. 24 patients issued or Drop Out (DO) due to the complications of Coronary Heart Disease (CHD) and referred to the hospital as many as 12 persons, refused to be respondent five people and was never present during the study were seven people.

The samples in this study were patients with type 2 diabetes, PROLANIS participants at Antang and Pampang community health centers Makassar who met the inclusion criteria: male or female $\geq$ 35 years old, suffered no injuries diabetes and willing to participate in this study and signed the informed content. The exclusion criteria: patients with concomitant diseases such as acute renal failure or chronic renal failure, heart failure/cardiac arrhythmia, chronic liver disease/acute lung tumors or other malignancies, gastrointestinal disease, and patients are not willing to participate in the study.

Data were analyzed using univariate and bivariate analysis. For numerical data in the form of respondent characteristics such as age,

old diagnosed with type 2 diabetes,the duration been a participant of PROLANIS, and the research variables, namely, the implementation PROLANIS, fasting blood sugar, HbA1c and total cholesterol levels using the mean and standard deviation (± SD), whereas for categorical data such as gender, occupation, education is presented in the form of n (%). Data normality test using Shapiro-Wilk test. Bivariate analysis using the correlative method. If the types of data are numerical data and normally distributed, using Pearson Correlation test, whereas when the data type is not normally distributed using Spearman's test (Dahlan 2015).

RESULTS

From 40 respondents, most respondents

are women (67.5%), does not work or as House Wife (65%), the level of education of junior high school (27.5%), Senior high school (25.0 %) and University (27.5%). The average age of respondents are 55.83 years (± SD 8:04), old diagnosed with Type 2 diabetes mellitus is 10.85 years (SD ± 4.63), and the duration average following PROLANIS program that is 17.55 months (SD ± 11.64) (Table 1)

The average score of PROLANIS implementation is 15.05 (SD ± 5.62), fasting blood sugar 191.80 mg/dl (SD ± 85.15), HbA1c is 8.36% (± SD 2:08), and total cholesterol 192.87 mg/dl (SD ± 45.07). This distribution is based on the implementation of PROLANIS, fasting blood sugar, HbA1c and total cholesterol can be seen in Table 2.

Table 1 Distribution of Individual Characteristics

Variable	Frequency (n = 40)	Percentage (100%)
Age (years) mean (± SD)	55.82	8.04
Gender		
Male	13	32.5
Female	27	67.5
Employment		
Farmers/ Labor	1	2.5
Enterpreanurer	6	15.0
Civil Cervant / TNI-Police / Retired	7	17.5
Unemployment/ House Wife	26	65.0
Education		
No School / Not completed primary school	1	2.5
Elementary School	7	17.5
Junior High School	11	27.5
Senior High School	10	25.0
University	11	27.5
Old diagnosed with type 2 diabetes (years) mean (± SD)	10.85	4.63
Duration Following PROLANIS (months) mean (± SD)	17.55	11.64

Table 2. Distribution of respondents by the Implementation of PROLANIS, Fasting Blood Sugar, HbA1c, and Total Cholesterol in Patient wit Type 2 Diabetes mellitus (n = 40)

Variable	Mean	± SD
PROLANIS implementation.	15.055	62
Fasting Blood Sugar	191.80	85.15
HbA1c	8.37	2.08
Total Cholesterol	192.87	45.07

Table 3. Relationship of PROLANIS Implementation and Fasting Blood Sugar, HbA1c and Total Cholesterol in Patients with Type 2 Diabetes mellitus

Variable	Fasting Blood Sugar		HbA1c		Cholesterol	
	r	p	R	p	R	p
PROLANIS implementation	-0.72	0,001	-0.87	0.001	-0.35	0,029
Medical Consultation	-0.66	0,001	-0.77	0,001	-0.34	0,031
Activity Group	-0.68	0,001	-0.82	0,001	-0.33	0,037
SMS Gateway	-0.7	0,001	-0.81	0,001	-0.37	0,021
Home Visit	-0.39	0.047	-0:49	0:01	-0:36	0062

Based on Spearman rho test in Table 3, data showed that there is a relationship between PROLANIS implementation with Fasting Blood Sugar in Patients with type 2 diabetes mellitus at Antang and Pampang community health centers Makassar with significance value (p) 0.001 with the negative correlation direction (r = -0724) and the strength of strong correlation (r2 = 0.52). The correlation between the activity of PROLANIS namely medical consultation, group activities, SMS gateway, and home visit with Fasting Blood Sugar also showed a correlation (p = 0.001; 0.001; 0.001; and 0.047) with the negative correlation direction and the strength of strong and moderate correlation (r = - 0.66; -0.68; -0.70; and -0.39). It means that the maximum implementation of PROLANIS the lower levels of GDP with diabetes mellitus type 2. This relationship can be seen in Figure 1.
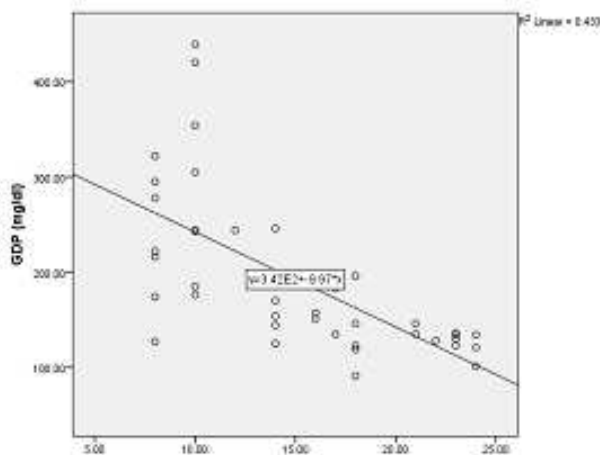
Based on *Spearman rho* test in Table 3 data showed that there is a relationship between implementation of PROLANIS with HbA1c with significance value (p) 0.001 with the negative correlation direction (-0.87) and the strength of strong correlation (r2 = 0.76). The correlation between the activity of PROLANIS namely medical consultation, group activities, SMS gateway, and home visit with HbA1c also show a correlation (p = 0.001; 0.001; 0.001; and 0:01) with the negative correlation direction and the strength of strong and moderate correlation (r = - 0.77; -0.82; -0.81; and -0.49). This means that the maximum implementation of PROLANIS the lower the levels of HbA1c with type 2 diabetes mellitus. This correlation can be seen in Figure 2.

Figure1. Correlationof PROLANIS implementation and Fasting Blood Sugar
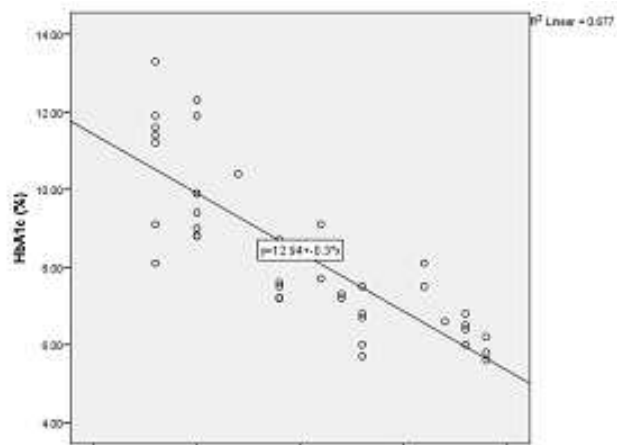

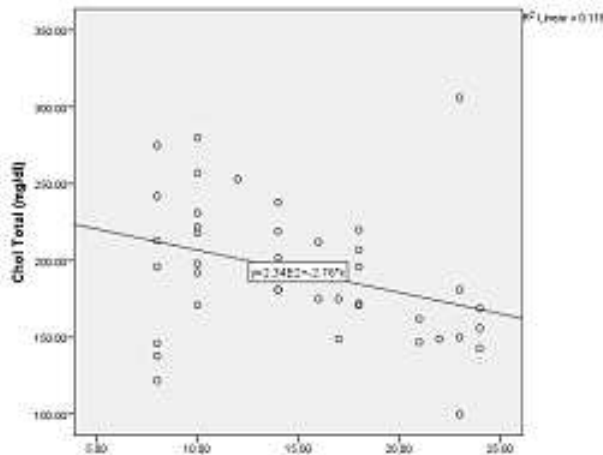Figure 2. Correlation of PROLANIS Implementation and HbA1c levels

Figure 3. Correlation Implementation
PROLANIS and total cholesterol

Based on Table 3 *spearman's rho* test data obtained that there is a relationship between implementation of PROLANIS with Total Cholesterol Levels with significance value (p) 0.029 with the negative correlation direction ($r = -0.35$) and the strength of weak correlation ($r2 = 0:11$). The correlation between the activity of PROLANIS namely medical consultation, group activities, and SMS gateway with total cholesterol also show a correlation ($p = 0.031$; 0.037; and 0.021) with the negative correlation direction and strength of moderate correlation ($r = -0.34$; -0.33; and -0.37). However, there is no correlation between a home visit with total cholesterol levels with $p = 0.062$. It means that the maximum implementation of PROLANIS the lower the total cholesterol with type 2 diabetes mellitus. This correlation can be seen in Figure 3.

DISCUSSION

PROLANIS Implementation is one of government program cooperate with BPJS to encourage participants with chronic illness in achieving optimal quality of life so as to prevent complications of the disease (BPJS Kesehatan 2015). PROLANIS activities are carried out at Antang and Pampang community health centers Makassar held every week on Saturday morning. According to researcher observations that PROLANIS activity is ongoing and routine activities and is strongly supported by the clinic by providing the facilities needed for these activities and often make activities to strengthen

kinship between participants and the public health centers crew such as holiday activity together. The clinic crew was there as the participant of PROLANIS so that it becomes an example or model for other participants. According to Green, LW & Kreuter (1999) suggest that with the habit, model, and the support of the environment in this case health care facilities, it forms a positive attitude to an individual. The positive behavior of patients with type 2 diabetes mellitus meant is awareness of the importance of maintaining a diet, control treatment and regular physical activity, medical consultations and all of that could be obtained if the participants are active in following the PROLANIS activities.

In addition, according to the theoretical concepts of precede proceeds say that the individual behavior is influenced by several predisposing factors, enabling and reinforcing. Predisposing factors reflected in the characteristics of respondents, supporting factors described from infrastructure support in implementing PROLANIS and reinforcing factors is reflected in the attitudes and behavior of Health Center officers who became a model for the implementation of the PROLANIS. The good behavior or lifestyle will either improve an individual's health status (Green & Kreuter, 1999). Health status meant is the control of blood sugar levels and risk factors for complications. This study shows that there is a strong negative correlation between the implementation of PROLANIS and fasting blood sugar in patients with type 2 diabetes mellitus which mean that the maximum implementation of PROLANIS the lower fasting blood sugar levels of Type 2 diabetic patient.

Activity in the implementation of PROLANIS activities includes medical consultation/education, home visit, reminder, club activities and monitoring of health status. Medical consultation exercises that the consultation activities undertook by participants along with health facility manager began with a contract time with medical personnel. Consultation includes a prognosis of disease, complaints about the health problem of participants and drugs control (BPJS Kesehatan 2015). This study shows there is a strong negative correlation between medical

Consultation with fasting blood sugar levels of respondents with a value of $p<0.05$ which means that the maximum value of the medical consultation exercise the lower the fasting blood sugar in Type 2diabetic patient by Salistyaningsih. Previously Salistyaningsih, W., Puspitawati, T., & Nugroho (2011) showed a link between adherence in consuming Oral Hyperglycemia Drug (Obat Hiperglikemi Oral (OHO)) with blood glucose levels in patients with type 2 diabetes mellitus in PuskesmasUmbulharjo II Yogyakarta where patients were wayward to drink OHO 86 times at risk increased blood sugar levels compared with patients who obey.

Hapsari (2014) also examined the treatment of type 2diabetes Mellitus. Research results indicate a negative and weak correlation with p <0.05d an r = -0064, $r^2 = 0.004$ between compliance in taking the drug with blood sugar levels. It means that the higher value of compliance in taking the drug, the lower the blood sugar level which indicates the success of the therapy. Besides Mona, E., Bintanah, S., &Astuti (2012) also examined the association frequency nutritional consultation with compliance diet and blood sugar levels in people with diabetes mellitus type 2 outpatient hospital Tugerejo Semarang showed a significant correlation between the frequency of nutritional counseling to compliance with diet and there is a correlation between diet compliance with the patient's blood sugar levels.

Club activity is an activity to improve health knowledge to restore the disease and prevent the return of disease and improve the health status of PROLANIS participants with physical activity (BPJS Kesehatan 2015). Physical activity is held every week on Saturday mornings and health education on diet and Type 2 diabetes treatment carried out two times a month. Based on the results of research conducted shows that there is a strong negative correlation between the activity and the group with a blood sugar value of $p = 0.001$ and $r = -0.68$, which means that the higher value of the implementation of PROLANIS the lower fasting blood glucose of Type 2 diabetic patient.

Other studies conducted by Putri, NH, & Isfandiari (2013) which aims to determine whether there is a correlation the application of the 4 pillars controlling diabetes with the average of blood glucose levels indicate that there is a relationship absorption education (p = 0.031) diet control (p = 0.002), sport (p = 0.017), medication adherence (p = 0.003) with the average of blood sugar levels.

Reminder or SMS gateway is an activity to motivate participants to make regular visits to Health Facility through a recall schedule (BPJS Kesehatan, 2015). SMS gateway activity at PuskesmasAntang and PampangMakassar includes recording Mobile numbers of participants, enabling a communication network (JARKOM) between participants and health centers, and evaluation of the activity of participants in a communication network and enable the participants to understand the content given. Hopefully, by the communication network formed, PROLANIS participants with Type 2 diabetes able to access information about the PROLANIS activities to be carried out either medical consultation, drug taking schedules and group activities that are held every week. Based on the results of research conducted shows that there is a strong negative correlation between the SMS gateway with fasting blood sugar of type 2 DM patients at Antang and Pampang community health centers Makassar with $p = 0.001$ and $r = -0.68$, which means that the higher value of the implementation of PROLANIS the lower the fasting blood sugar of people with type 2DM.

A home visit is a service activity visitation to the home of PROLANIS participants for the provision of information/self-health education and the environment for the PROLANIS participants and family. Terms of these activities include home visits in patients newly enrolled, patients who were not present at PROLANIS activity for three months in a row, and those recently completed in hospitalization. The results of the home visit are recorded in the book of health monitoring and reported to the clinic and BPJS (BPJS Kesehatan 2015). From the data obtained during the study, the implementation of the Home Visit conducted at PuskesmasAntanghas largely been carry out from 24 patients with Type 2 diabetes is 22 participants who had received home visits and only two people who never get home visits. Of the 22 participants were only three people who get a home visit of

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new participants registered and been hospitalized because of the deteriorating health and 19 other participant visitation to a new patient enrolled in PROLANIS. But the problem is every home visit, there was no record of activity or actions taken by health officers, only in the report form such as ever or never visited and dates of visits to be evaluation report.

In contrast to the PuskesmasAntang, PROLANIS participants with Type 2 diabetes at Puskesmas Pampang it is only a few ever get a home visit is from 16 patients with Type 2 diabetes only five people ever get a home visit and that too for newly registered competitors. The rest (11 participants) never get home visits, and no record of the activities carried out home visits in patient health monitoring book. It is what underlies that despite the results obtained there is a negative correlation between home visits with fasting blood glucose levels of Type 2 diabetes patients in Antang and Pampang community health centers Makassar with $p = 0.047$, but very weak correlation obtained namely $r = -0.39$ and $r^2 = 0{:}15$. It means, only 15% of the variation of home visits depicts fasting blood glucose levels of Type 2 diabetes patients at Antang and Pampang community health centers Makassar.

Hemoglobin HbA1C test results are highly accurate single examination to assess long-term glycemic status and are useful for all types of DM. This examination is beneficial for patients who need glycemic control. Increased levels of HbA1c> 8% indicate uncontrolled diabetes and risky to make long-term complications such as nephropathy, retinopathy, or cardiopathy (Soewondo, 2005). Based on the research data showed that average A1C Type 2 DM patients at PuskesmasAntang and PampangAntang uncontrolled Makassar City are 8.37%. A 1% decrease in HbA1c will reduce complications by 35% (Soewondo, 2005).

This research was also supported by research conducted by Alexander (2012), which aims to analyze the effectiveness of the PROLANIS in order to control the health status in patients with type 2 diabetes mellitus found that there are differences in cholesterol reduction, blood pressure systole and diastole, HbA1c, and improved quality of life significantly in the intervention group compared

with the control group ($p <0.05$), but there is no significant difference in BMI reduction between the intervention and control groups, with $p> 0.05$. Syuadzah (2015) aimed to examine the association between adherence to follow the activities PROLANIS with HbA1c levels in patients with Type 2 diabetes mellitus in Surakarta showed a significant association ($p = 0{:}04$). It can be concluded that PROLANIS is very effective in controlling health status and improve the quality of life of patients with diabetes mellitus type 2 (Burns, N., & Grove 2011).

Behavior that is intended is awareness of the importance of keeping your diet, medication control and regular physical activity, medical consultations and all that could be obtained if an active participant in all activities PROLANIS follow. Based on research done showed that type 2 diabetes patients at Antang and Pampang community health centers Makassar actively carry PROLANIS with an average value of 15.05 or over half of the total value of a maximum observation sheet is 25. The activity in PROLANIS implementation includes activity in the medical consultation/education, home visit, reminder, club activities and monitoring of health status. The medical consultation exercise that the consultation activities undertaken by participants along with health facility manager in this case are Antang and Pampang community health centers which began with a contract time with medical personnel. These activities include consultation regarding the prognosis of the disease, consultation regarding other complaints about the health problem participants and the most important is the control of drugs (BPJS Health, 2015).

Based on research done there is strong correlation and negative between medical consultation with HbA1c levels in diabetic patient with Type 2 in Antang and Pampang community health centers of Makassar with $p<0.05$ which means that the maximum value of the implementation of a medical consultation, the lower HbA1c levels in Type 2 diabetic patient. The research was also supported by research conducted by Mona, Bintanah, Astuti (2012), which aims to examine the relationship frequency nutritional consultation with compliance diet and blood sugar levels in people

with diabetes mellitus type 2 outpatient hospital Tugerejo Semarang showed a significant relationship between frequency nutrition consultation with diet adherence and there is a relationship between diet compliance with the patient's blood sugar levels.

Another study about the treatment of diabetes Type 2 is also performed by Yoga, A., Julianti, HP, & Pramono (2011) aimed to assess the relationship the application of the 4 pillars control of DM with the successful management of patients with diabetes Type 2, where the success of the measure of HbA1c levels of patients indicates that medication adherence is regularly provided statistically significant results with $p = 0.05$.

Group activity is an activity of physical activity and health education to improve their knowledge to restore the disease and prevent the return of disease and improve the health status of participants PROLANIS (BPJS Health, 2015). Based on research by testing spearmen's rho shows that there is a negative relationship and strong between the activities of the group with blood sugar levels in diabetic patient with Type 2 at Antang and Pampang community health centers Makassar with $p = 0.001$ and r - 0.68, which means that the higher value of the implementation of PROLANIS the lower HbA1c in type 2 DM patients.

Physical activity is held every week on Saturday morning at Antang and Pampang community health centers Makassar implemented in the form of gymnastic fit of elderly. Based on the results of research conducted by Yoga, Julianti & Pramod (2011) aimed to assess the correlation of implementation of the 4 pillars control of DM with the successful management of patients with diabetes Type 2, where the success of the measure of HbA1c levels of patients showed that the regularity of exercise has significant influence on the success of management on type 2 diabetes is the significant value of p = 0.00 and research by Ramadhanisa, A., Larasati, & Mayasari (2013) aimed to determine the relationship of physical activity with an HbA1c of people with type 2 diabetes mellitus in dr. H. Abdul Moeloek Bandar Lampung showed a significant association between physical activity levels of HbA1c, with p = 0.001. It can be

concluded that physical activity is very good for controlling blood sugar levels which can be viewed through an HbA1c.

In addition to physical activity in group activities also include education about diet and treatment of patients with diabetes Type 2 which according to the results of research conducted by Harum, A., Larasati, & Zuraida (2013) which aims to see the Relationship Between High Dietary Fiber With Levels of HbA1c Patients with DM Type 2 in Hospital Clinical Pathology laboratory Dr.Hi.AbdulMoeloek Lampung province with chi-square method showed a significant relationship between a high fiber diet with HbA1c levels (p-value 0.001).

Total cholesterol level is the amount of cholesterol found in the blood which includes LDL, HDL and TGL. Cholesterol levels are closely linked to fatty deposits in the human body. If the inside of the body a person has the amount of fat a lot of it is likely to cause various diseases such as heart disease and diabetes. For patients with DM, the amount of fat in the body of excess will aggravate the situation and accelerate the onset of complications due to fat very easily broken down into glucose in the blood due to insulin resistance. Based on the results of research conducted by Ekawati (2012) found that there is a significant correlation between fasting blood sugar and cholesterol levels of triglycerides in the blood in patients with DM are not well controlled in Clinical Hospital Jombang.

As already known that cholesterol is strongly influenced by physical activity and food intake of a person. According to research conducted by Anam (2010) with their regular dietary interventions and physical activity or sports as many as 3 times a week for 8 consecutive weeks can lower LDL cholesterol levels in the blood of 13.5 mg/dl and boost levels of HDL 7.5 mg/dl and research conducted by Sari (2014) with pre-post design for 6 weeks showed a difference in total cholesterol before and after aerobic exercise (p= 0.009). According to the analysis the researchers, this is the underlying average total cholesterol levels of PROLANIS participants with Type 2 diabetes patients at Puskesmas Antang and Pampang of Makassar is within the normal range 192.87 mg/dl because the average length of these

participants to follow PROLANIS activities are less over 18 months or for 72 weeks.

Physical activity and dietary interventions are one of the activities of PROLANIS implementation that group's activities. PROLANIS group activity is an activity to improve health knowledge to restore the disease and prevent the return of disease and improve the health status of participants PROLANIS with physical activity (BPJS Health, 2015). Physical activity is held every week on Saturday mornings and health education on diet and Type 2 diabetes treatment carried out twice a month. Based on the results of research conducted shows that there is a negative relationship between activity and weak group with total cholesterol levels of Type 2 diabetes patients at Antang and Pampang community health centers Makassar with $p = 0.037$ and r -0.33, which means that the higher the value of the implementation of PROLANIS the lower the total cholesterol levels in patients with type 2 diabetes.

In addition to group activities other activities included in PROLANIS implementation is medical consultation, Reminder or SMS gateway and home visit. The medical consultation exercise that the consultation activities undertaken by participants along with health facility manager in this case are the health centers and PampangAntang which began with a contract time with medical personnel. These activities include consultation regarding the prognosis of the disease, consultation regarding other complaints about the health participants problem and the most important is the control of drugs (BPJS Health, 2015). Physical activity is held every week on Saturday mornings and health education on diet and Type 2 diabetes treatment carried out twice a month. Based on the results of research conducted shows that there is a negative relationship between activity and weak group with total cholesterol levels of Type 2 diabetes patients in primary health centers and Pampang Antang Makassar City with p = 0.037 and r -0.33, which means that the higher the value of the implementation of PROLANIS it will the lower the total cholesterol levels in patients with type 2 diabetes.

Reminder or SMS gateway are activities to motivate participants to regular visits to Health Facility through a recall schedule (BPJS Kesehatan, 2015). SMS Gateway activity at Puskesmas Antang and Pampang includes recording Mobile numbers of participants, enabling a communication network (JARKOM) between participants and health centers, and evaluation of the activity of participants in JARKOM and enable the participants to understand the content of communication network given. Hopefully,by the communication network formed, PROLANIS participants with Type 2 diabetes able to access information about the activities to be carried out either PROLANIS the medical consultation, drug taking schedules and group activities that are held every week. Based on the results of research conducted shows that there is a negative correlation between the weak and SMS gateway with total cholesterol levels of Type 2 diabetes patients at Antang and Pampang community health centers Makassar with a value of $p = 0.021$ and r = -0.37, which means that the higher the value of PROLANIS implementation the lower the total cholesterol levels in patients with type 2 diabetes.

Home visit at Puskesmas Antang and Pampang based on previous explanation has not run optimally. According to the researchers this is why the assumption based on *spearman's rho* test found that there is no correlation between home visits with total cholesterol levels in patients with type 2 diabetes mellitus at Puskesmas Antang and Pampang Makassar with p = 0.062.

The Fourth PROLANIS activity shows that this event is a program that is highly complex and integrated as it includes activities associated with cholesterol levels in patients with type 2 diabetes This is what underlies that based spearman's rho test showed that, although weak, but still there is a relationship negative between PROLANIS implementation with total cholesterol levels. That is the higher value the implementation of PROLANIS the lower total cholesterol levels in patients with type 2 diabetes mellitus and at PuskesmasAntang andPampang Makassar.

CONCLUSIONS

Maximum PROLANIS implementation is very effective in controlling fasting blood sugar levels, HbA1c and total cholesterol in patients with Type 2 DM thus indirectly prevent complications. Therefore, it is suggested that PROLANIS should implement in each community health centers and primary health center and complies with the standards set by government health insurance. The evaluation process of PROLANIS focus on the quality of implementation, it can be seen from the impact and benefits to the target of the glycemic status of patients with type 2 diabetes in the form of measurable data.

REFFERENCES

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