Self Management and Immune Status
Diabetes Mellitus Patients

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Abstract: Dabetes mellitus (DM) self management can improve health problems due to diabetes mellitus. DM Patients are susceptible to various infections due to decreased immunity. Research on the effect of self management on the immune status of patients with diabetes mellitus is still limited. Increased blood glucose for a long time and not getting good management can have an impact on all body systems, including the immune system which triggers the emergence of infectious diseases and the public perception of DM patients getting sick easily becomes something that is considered true. This study aimed to investigated the relationship between self management and the immune status of diabetes mellitus patients. We use questionnaires concerning self management and seeing the results of laboratory examinations for leukocyte types. This study involved the participation of 40 patients. The median score of self management was 2,5 days in 7 days prior to treatment. the lowest self-management behavior was physical exercise and foot care with a median was 1.3 and 1.25 days, and the highest was diet regulation behavior as much as 2.8 day. The median of leukocytes, lymphocytes and monocytes were 12.4, 25.2, and 4.2 mg/dl. There was no correlation between self management and the immune status of DM. Although there is no relationship between self management and immune status but all patients have self management behavior below 50%. Self management also needs to be improved so that the immune status is better.

Keywords: diabetes mellitus, self management and immune status

INTRODUCTION

Diabetes Mellitus is a chronic non-communicable disease, caused by insulin ineffectiveness due to deficiency or decrease of insulin sensitivity and become blood glucose increases (Cho et al., 2018; Soelistijo et.al., 2015) Cases of diabetes mellitus are very high both in the world and in Indonesia. Base on data recorded from Diabetes Federation (IDF), there were 436 million people with Diabetes Mellitus in the world in 2019 (95% CI: 369–601 million) an increase of 9.3%, and is predicted to continue to increase by 10.2% (578 million). In 2030 and 10.9% (700 million) in 2045 (Cho et al., 2018) This increase in sufferers also occurred in Indonesia by 4% from 2013 to 2018 (Kemenkes RI, 2018)

Increased blood glucose for a long time and not getting good management can have an impact on all body systems, including the immune system which triggers the emergence of infectious diseases and the public perception of DM patients getting sick easily becomes something that is considered true. The decrease of the immune system of DM patients due to the effects of hyperglycemia reduces the ability of the immune system where the process of phagocytosis and chemotaxis is reduced due to free radicals caused by hyperglycemia. DM patients very susceptible to infection (American Diabetes Association, 2020). Patients with DM experienced an infection of 3.6% and required hospitalization. This condition causes an increase in mortality in people with DM (Chang et al., 2019; Cho et al., 2018)

There is no specific standard of management for improving the immune system of DM patients So far. The immunity of DM patients is improved by controlling blood sugar and preventing or improving complications that occur (American Diabetes Association, 2020) The action taken is to improve self-management in accordance with the four pillars of DM management. The action taken is to improve self-management in accordance with the four pillars of DM management (American Diabetes Association, 2020; Putra & Berawi, 2015; Adi, 2019)

Diabetes Mellitus cannot be cured but DM can be controlled or prevented by controlling blood glucose which can be improved by self management. DM self-management is a behavior carried out by DM patients to improve blood glucose and prevent complications due to the inability to control blood glucose. Self-management is carried out in accordance with the four pillars of DM management including diet, activity and blood glucose control with medication added to foot care (Putra & Berawi, 2015)

Research on the benefits of good self-management has been widely carried out, namely it can lower blood glucose (Mulyani, 2016) affect HbA1c values and improve quality of life (Cunningham et al., 2018) However, whether self-management of DM patients can affect the patient's immune status still needs to be investigated. This study aims to prove whether there is a correlation between self-management and the immune status of DM patients.

METHODS

The research method used is quantitative descriptive analytic with a cross sectional research design. A total of 40 DM patient were recruited and selected by consecutive sampling from hospitalized at Ungaran Hospital. The inclusion criteria were list as: (1) had

the results of the leukocyte count examination written in the medical record, (2) DM patients who were treated during of November 2019. The collecting site were in hospital ward. The data collection tool used was a self-management questionnaire, namely SDSCA (The Summery of Diabetes Self Care Activities) which has been tested for validity and reliability (r = 0.80 and cronbach's a = 0.74). The questionnaire included 16 items and 5 dimensions: 5 question of specific diet, 2 question of exercise, 2 question of medication taking, 2 question of blood glucose testing and 5 question of foot care. Self management using a linier scale 1 to 7. Higher scores indicated better self management. All question all items ask the patient's compliance during a week before being hospitalized. Self management data was collected using a questionnaire filled out by the patient or family. If the data is incomplete or the patient or family cannot fill it out, the researcher will read the questions and write down the patient's answers in the questionnaire. The patient's leukocytes data was taken from the results of the patient's medical record. The data obtained from the questionnaire will be inputted into SPSS version 21. Descriptive or univariate analysis was used to describe the data, including descriptions of the respondent's character and research variables. Furthermore, data analysis was carried out using the Spearman rho statistical test.

RESULT AND DISCUSSION

Characteristics of The Patients

Total of questionaaires were retrieved and that were valid. The majority of the participants were female (23 participants), the ages range from 41 to 72 years and the mean age was 61 years. The ages of respondents ranges from 41-72 years supports the occurrence of DM after the age of 40 years, DM can start at reproductive age, but the older the age is the higher the risk of developing type 2 diabetes mellitus. Most often after the age of 45 years as in the results of the study the average age the respondent is 61 years old. Aging is associated with a decrease in physiological function (Adi, 2019). Self-management behavior of DM patients in Ungaran Hospital has a very low score, in a 7-day assessment, patients only do 2.5 days. The patient's low self-management behavior in almost all behaviors. This supports the reason the patient is admitted to the hospital.

Score of Self Management Behavior and Leukocyte Count

The median score of self management was 2,5 days in 7 days prior to treatment. The lowest self-management behavior was physical exercise and foot care with a median was 1.3 and 1.25 days , and the highest was diet regulation behavior as much as 2.8 day. The median of leukocytes, lymphocytes and monocytes were 12.4, 25.2, and 4.2 mg/dl (table 1).

The score of self management DM this study was poor, because all of participants have self management below of 50 %. This is different from the research of Mingjun et al (Huang et al., 2014) who said that the self-management of type 2 DM patients was good. This self-management improvement is due to education or health promotion. The majority respondens were female 56.1%. Many women suffer DM due to supporting factors, such as obesity 29.6%, lack of physical activity 52.5%, pregnancy 3.6%, patients smoking 26.9%, often consuming fat 16.7%, less consuming fruit and vegetables 97.3% (Wahyuni & Alkaff, 2013).

The low self-management behavior has an impact on blood glucose as in the study it had a median of 229 mg/dl. High blood glucose can cause a decrease the patient's immune status which can be seen from the levels of leukocytes, lymphocytes and monocytes. The results obtained by leukocytes and other types of leukocytes are still within normal limits, although many studies say that the higher the blood glucose level, the higher the leukocytes, uncontrolled type 2 DM patients have a higher absolute lymphocyte count and a higher absolute number of leukocytes and neutrophils. lower than those with controlled type 2 DM (Santoso & Rachmawati, 2018) while Siti et al stated that the higher the fasting blood glucose level make the lower the leukocyte level (Pandelaki, 2013)

Correlation Analysis Between Self Managemen and Immune Status
The non parametric test spearman Rho, the results correlation analysis revealed that there was no correlation between self management and the immune status of DM patients (p value >0,05) (table 1). This study stated that there was no relationship between leukocytes and blood glucose levels. Good self-management has an impact on the immune status of DM patients, but this study did not show a correlation between self-management and immune status. The results obtained were low self-management but leukocytes, lymphocytes and monocytes count still had normal levels. It is concluded that the immune status of DM patients is not only influenced by self-management but there may be other influencing factors and limited status immune indicators.The lowest behavior is physical activity and foot care. Physical activity is very much needed in DM patients which helps glucose metabolism used for energy and can increase insulin sensitivity, so that the increase in blood glucose can be reduced (Boniol, Dragomir, Autier, 2017). Good DM foot care management can reduce ulcer complications in DM, reduce long treatment and frequency of visits to the hospital (Adiewere et al., 2018).

Monitoring blood glucose independently and the use of oral hypoglycemic drugs are also still relatively low. Self-monitoring of glucose can also control blood glucose and HbA1c (NClar, Barnard, Cummins, Royle, 2017) The use of hypoglycemic drugs both orally and insulin injections is at 2.2 days a week. This condition can occur due to the patient's lack of knowledge about the treatment being carried out, the patient does not know since when it was diagnosed and the side effects of DM that make the patient not use the drug. DM patients really need medication to lower glucose if other management is not good. Appropriate treatment can reduce complications due to uncontrolled blood glucose. Treatment does not have an impact on cognitive loss, length of stay or physical disturbances, but has an impact on the economy (Huiskes et al., 2017)

Diet regulation is better than other management behaviors, although it still needs attention. Dietary regulation is very necessary for people with diabetes by reducing fat, carbohydrates and increasing fiber and protein intake to control blood glucose and reduce DM complications (Meng et al., 2017)

Table 1. Correlation Analysis Between Self Management and Immune Status

Items	Median	p value				
		Leukocytes	Lymphocytes	Monocytes	Hemoglobin	Blood glucose
Self management	2,5	0,21	0,51	0,06	0,66	0,95
Specific Diet	2,8	0,32	0,76	0,12	0,77	0,7
Exercice	1,3	0,72	0,98	0,75	0,61	0.90
Medication taking	2,25	0,76	0,55	0,98	0,28	0,66
Blood glucose testing	1,25	0,89	0,39	0,72	0,29	0,61
Foot care	1,3	0,22	0,56	0,3	0,04	0,12
Leukocytes	12,4					
Lymphocytes	25,2					
Monocytes	4,2					
Hemoglobin	13,6					
Blood glucose	229					

CONCLUSION

Self management of the patient in Ungaran Hospitals is poor condition but the immune status indicated by the leukocyte count is still good. There is no correlation bethween self management and the immune status of DM patients. It is necessary to do research on how to improve self-management to increase the immunity of DM patients. This research can also be used as the basis for further research by improving the indicators of immune status

AUTHOR CONTRIBUTION

Conceived, designed, performed the study, analyzed the data and wrote the paper.

CONFLIC OF INTEREST

The author declare there is no conflict of interest

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