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The Relationship Between Self-Regulation and Quality of Life of Patients with Diabetes Mellitus at Gunungpati Public Health Center

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ABSTRACT

Diabetes Mellitus occurs due to an increase in blood glucose levels in the body due to a decrease in insulin secretion. The increase in the incidence of this disease is followed by an increase in the incidence of complications that cause deaths. To minimize it, a person needs to regulate himself manage the disease properly so that it can affect his quality of life. The purpose of this study was to determine the relationship between self-regulation and the quality of life of people with diabetes mellitus. This research design uses a cross-sectional approach. The sampling technique used was consecutive sampling with a total sample of 107 respondents with type 2 Diabetes Mellitus in area of Gunungpati Public Health Center. Data were collected using the Treatment Self-Regulation Questionnaire (TRSQ) and Diabetes Quality of Life (DQOL) questionnaires. The results of statistical tests using Spearman Rank obtained p value of 0.000 (<0.05), which means that there is a significant relationship between self-regulation and quality of life of people with Diabetes Mellitus (correlation coefficient of 0.540). In conclusion, there is a relationship between self-regulation and quality of life of people with diabetes in the working area of Gunungpati Public Health Center. Therefore, it is reccomended that health workers could pay more attention to and improve self-regulation by providing support to the people with diabetes that they can manage their disease properly, so that it will have effect on improving the quality of life of people with diabetes.

INTRODUCTION

Diabetes Mellitus is caused by an increase in blood sugar/blood glucose levels due to a gradual decrease in insulin secretion that is caused by insulin resistance. Initially, it occurs since there is a genetic and clinical metabolic disorder which is homogeneous. This situation can affect all organs of the body and cause various symptoms so that it

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is mostly callled as silent killer (Fatimah, 2015; Haryono & Dwi, 2018; Soegondo et al., 2015).

Diabetes is a chronic disease which continues to increase every year. According to data from the IDF (International Diabetes Federation) in 2019, there were around 436 million adults (aged 20-79 years) living with diabetes; besides, it had been predicted that by 2045, it will increase to 700 million people (Kemenkes RI, 2019). Furthermore, Indonesia was ranked in the top 10 with the most Diabetes Mellitus in the world, which was ranked 7th with a number of cases of around 10.7 million, this value had increased from the previous year of 10.3 million cases (RISKESDAS, 2018). Diabetes Mellitus was a noncommunicable disease with the second highest incidence rate of 20.57% or about 7 million cases in Central Java Province in 2018. It has increased from 2017 as many as 19.22% or about 6 million cases (Central Java Provincial Health Office, 2019). In Semarang City, non-insulin diabetes has the second highest prevalence with 32.318 thousand cases. Meanwhile, insulin-dependent diabetes is only 6.518 thousand cases. According to data from the Gunungpati Public Health Center in 2020 there were 147 cases of people with Type 2 Diabetes Mellitus (Semarang City Health Office, 2020).

Along with the increase in the prevalence of Diabetes Mellitus cases globally, it will be followed by an increase in the incidence of complications of Diabetes Mellitus. Moreover, complications of Diabetes Mellitus begin with metabolic disorders resulting in hyperglycemia. Complications which are experienced by people with diabetes mellitus can be minimized if they have the compliance, knowledge, and ability to manage disease through self-care (Gaol, 2019). In fact, the incidence of diabetes mellitus complications continues to increase due to poor levels of disease management/self-care in people with diabetes mellitus (Mariye et al., 2018).

Disease management with the four pillars of DM management is the core of the management which should be conducted by people with diabetes mellitus, including health education, physical exercise, a continuous diabetic diet and the selection of drugs that are in accordance with the current condition of people with diabetes (Decroli, 2019). The pillars of DM management are conducted to support changes in self-care management behavior (Sudirman, 2018). In order to achieve that, it requires comprehensive education related to motivation for behavior change to perform self-care (Berawi & Putra, 2015; Suciana et al., 2019). In addition, the form of management as the basic for success in supporting the management of Diabetes Mellitus is determined by self-control in conducting self-care management to control the symptoms felt and

prevent complications so that it can improve the quality of life (Kusuma & Hidayati, 2013).

Self-care management for people with Diabetes Mellitus has been developed by the American Association of Diabetes Educators, It is mentioned that effective self-care includes, diet (diet), physical exercise, monitoring blood glucose levels, taking regular medication, solving problems and reducing risk, complications and healthy coping (AADE, 2014). According to Putri, (2017) self-regulation of people with diabetes mellitus affects compliance in self-care management.

Self-regulation is the way a person controls and directs his own behavior in order to achieve the desired goals. It is influenced by external/environmental and internal/individual behavior factors (Nurjanah, 2017). If self-regulation is not good, it will interfere individuals in healthy living behaviors, including physical activity, consuming healthy foods, and complying with medical care (Miller et al., 2020). In the research of Wang et al., (2018), it was stated that self-regulation of people with diabetes mellitus has an effect on self-care; especially, dietary behavior and physical activity. In line with this research, Estuningsih et al., (2019) stated that self-regulation is able to influence self-care management; especially, dietary behavior in people with Diabetes Mellitus so that it has a positive impact on quality of life.

Quality of life is a feeling of satisfaction and happiness in living daily life in people with chronic diseases; especially, Diabetes Mellitus (Hartati et al., 2019). Maintaining the quality of life of people with diabetes is seen from all aspects including physical, psychological, social and environmental relationships (Ekasari et al., 2018). Moreover, in the research which had conducted by Rantung et al., (2015), it stated that the factors which affect the quality of life are age, income, length of suffering from DM, depression, and self-care management. In line with this research, Luthfa & Fadhilah, (2019) stated that self-care management has an impact on the quality of life of people with Diabetes Mellitus.

Based on the description of the problem above, self-regulation in people with diabetes mellitus has a relationship with self-care behavior which will appear in the person's condition including good or bad quality of life. This study uses quantitative methods in order to determine the relationship between self-regulation and quality of life in people with diabetes mellitus.

METHODS

This study was a quantitative study using a cross-sectional approach. Meanwhile, research design was conducted by measuring or observing simultaneously or examining exposure and

disease status at the same time (Hidayat, 2017). This design aimed to observe the relationship between self-regulation with the quality of life of people with diabetes mellitus at the Gunungpati Public Health Center.

The population of this study was people with type 2 Diabetes Mellitus in the working area of the Gunungpati Public Health Center in 2020 as many as 147 people. Moreover, the sampling technique of this study used a consecutive sampling technique. The numbers of samples in this study were 107 respondents. In addition, data collection tools in this study were a self-regulation questionnaire (Treatment Self-Regulation Questionnaire) with an alpha value of 0.839 and a quality of life questionnaire (Diabetes Quality of Life) with an alpha value of 0.963.

Univariate data analysis to explain each variable characteristic in this study was conducted in the form of a quantitative description. In bivariate data analysis to determine the relationship between variables, the researcher used the Spearman Rank statistical test, where the significance level used was 5% (0.05).

RESULTS AND DISCUSSION

Result

1. Univariate Analysis
   a. Characteristics of respondents

Table 1 Frequency Distribution of Respondents' Characteristics in the Working Area of Gunungpati Public Health Center

Characteristics of Respondents	f	(%)
Age		
Adult (20-59)	52	48,6
Elderly (≥ 60)	55	51,4
Gender		
Male	30	28,0
Female	70	72,0
Education		
No education	12	11,2
Elementary School	49	45,8
Junior High School	20	18,7
Senior High School	17	15,9
College	9	8,4
Complications		
No complication	40	37,4
Complications occur	67	62,6
Total	107	100,0

Based on table 1, data shows that the majority are elderly (≥60 years) as many as 55 respondents (51.4%). In the characteristics based on gender, the majority are female with 77 respondents (72%). Based on education, the majority have elementary school education background as many as 49 respondents (45.8%). Based on the characteristics based on the complications, the data showed that the majority have complications from other diseases as many as 67 respondents (62.6%).

b. Characteristics of respondents based on duration suffering from Diabetes Mellitus

Table 2 Frequency Distribution of Duration Suffering from Diabetes Mellitus in Respondents in the Working Area of Gunungpati Public Health Center

Mean	Mode	SD	Min-Max
6,54	5	4,695	1-20

Based on table 2, data shows that the average length of suffering from Diabetes Mellitus is 6.54 years, the data which appears the most is 5 years, the minimum is 1 year and the maximum is 20 years. Meanwhile, the results of the standard deviation value are 4.695 to determine the distribution of existing data.

c. Overview of self-regulation of people with Diabetes Mellitus

Table 3 An Overview of Respondents' Self-Regulation in the Working Area of Gunungpati Public Health Center

Self-Regulation	f	(%)
Good	82	76,6
Not good	25	23,4
Total	107	100,0

Based on table 3, data shows that the majority have good self-regulation as many as 82 respondents (76.6%).

d. An overview of the quality of life of people with Diabetes Mellitus

Table 4 An Overview of Respondents' Quality of Life in the Working Area of Gunungpati Public Health Center

Quality of Life	f	(%)
Low	0	0,0
Medium	33	30,8
High	74	69,2
Total	107	100,0

Based on table 4, it shows that the majority have a high quality of life as many as 74 respondents (69.2%).

2. Bivariat Analysis

Table 5 Analysis of the Relationship between Self-Regulation and Quality of Life for People with Diabetes Mellitus in the Working Area of Gunungpati Public Health Center

Variable	r	*P value*
Self Regulation-Quality of Life	0,540	0,000

The results of the statistical test analysis using Spearman Rank show a p value of 0.000 (<0.05). It means that there is a significant relationship between self-regulation and the quality of life of people with Diabetes Mellitus in working area of Gunungpati Public Health Center, with a relationship strength of 0.540, which is moderate; besides, it has a positive correlation direction, where if the regulatory value is high, it will be followed by an increase in the value of quality of life, and vice versa.

Discussion

1. Characteristics of Respondents

a. Age

The results of the age analysis are grouped based on WHO, (2015) where the majority of respondents in this study are elderly (≥60 years) with a total of 55 respondents (51.4%). The age factor causes a decrease in the body's work system, including the endocrine system. Increasing age can affect insulin resistance which has an impact on unstable blood sugar. Thus, it is one of the causes of the incidence of Diabetes Mellitus at a degenerative age (Isnaini and Ratnasari, 2018).

According to Manurung, (2018) someone over the age of 65 years tends to be at high risk of experiencing insulin resistance since the state of the body has begun to decline. In addition, the incidence of diabetes mellitus in the elderly can be caused by several other factors; such as, lack of physical activity, reduced muscle mass, the effects of drugs, the presence of comorbidities, or decreased insulin secretion (Atun, 2010).

The results of this study are in line with the research which had conducted by Sudyasih and Asnindari (2021) which stated that the majority of respondents are in the late elderly category (56-65 years) as many as 33 people (52.5%).

b. Gender

The results of the gender analysis show that the majority of the respondents' gender in this study is female with a total of 77 respondents (72%). The incidence of diabetes mellitus; especially, type 2 diabetes mellitus, is more common in female than male. It is due to a decrease in estrogen levels which is caused by menopause. Furthermore, the hormone estrogen has the function of maintaining a balance in blood sugar levels and increasing fat reserves. In addition to these hormones, progesterone has a function to normalize blood sugar levels and use fat as energy since during menopause women experience a decrease in production of both hormones, so that the body's cells experience problems in responding to insulin (Prasetyani & Martiningsih 2019).

In addition, women also have a great opportunity to increase their body mass index and have different levels of sex hormones with men. Fat tissue in women's bodies is more than that of men; as a result women will experience insulin sensitivity disorders caused by decreased estrogen hormone. Therefore, body fat distribution accumulates in the abdomen and results in increased fatty acids. It causes insulin

resistance (Milita et al. al. 2021; Pardede, Rosdiana, & Christianto, 2017).

The results of this study are supported by a similar study from Ismonah, Ryandini, and Megawati (2016), which was conducted in Tawang Mas Village. It shows that 42 out of 57 respondents are female (74%).

c. Education

The results of the analysis based on education, it shows that the majority of data as many as 49 respondents (45.8%) have the last education of elementary school. People with low education have a higher risk of developing diabetes mellitus because of a lack of knowledge about how to pay attention to lifestyle and diet to prevent the disease (Notoatmodjo, 2011).

According to Agustina and Muflihatin (2020), education is one aspect which causes Diabetes Mellitus. The level of education affects a person's knowledge with high education someone will have extensive knowledge. However, Wawan and Dewi (2010), stated that someone with low education does not necessarily have low knowledge of health or other things. In the research which had conducted by Isabella et al. (2014), it was found that there is no relationship between the last level of education and the incidence of type 2 diabetes mellitus.

The results of this study are strengthened by the research which had conducted by Nugroho (2021). It shows that most of the respondents in the treatment group have the last education of Elementary School by 40%.

d. Duration Suffering from Diabetes Mellitus

The results of the analysis on duration suffering shows that the average length of suffering from Diabetes Mellitus is 6.54 years, with the longest suffering duration is 5 years, a minimum of 1 year and a maximum of 20 years, and the standard deviation value of 4.695 which is used to determine the distribution of the data.

Long suffering from Diabetes Mellitus in a person is caused since it is a chronic disease which cannot be cured. Diabetes Mellitus is a progressive chronic disease which will continue to be suffered so that the longer it will increase the possibility of complications from other diseases. However, the length of suffering from the disease depends on the person doing self-care management to prevent complications. Thus, blood sugar levels in the body can be controlled (Selano , Tri, and Nono, 2020).

According to Suwanti, Andarmoyo, and Purwanti (2021), a long period of suffering from Diabetes Mellitus sometimes does not describe a person's actual disease process since many people with Type 2 Diabetes Mellitus have just been diagnosed, but they are already experiencing complications. In addition, people with diabetes mellitus who have a long duration of suffering from the disease will usually have good self-care management behavior. Someone who has long suffered from Diabetes Mellitus will learn how to do self-care from the experience gained during the disease process (Putri & Hastuti, 2016).

The results of this study are in line with research which had conducted by Restada's (2016) which shows that the majority of respondents as much as 36% have long duration of suffering from Diabetes Mellitus with moderate duration (5-10 years).

e. Complications

The results of the analysis based on complications in this study shows that as many as 67 respondents (62.6%) have other disease complications. The incidence of complications is usually caused since glucose levels in the body continue to increase for a long time; it shows that there is an error in the person's self-care management (Sulistyo, 2018; Usman, 2019).

The incidence of complications can actually be minimized by conducting various self-care management efforts; such as, diet, physical sports activity, attending health education related to Diabetes Mellitus, and routine blood sugar control (Soelistijo et al., 2019). However, cases are often found that people with Diabetes Mellitus are not obedient in conducting treatment and self-care so that it can lead to an increase in the severity of their illness and the emergence of other disease complications (Primahuda & Sujianto, 2016).

Based on research which had conducted by Putri and Hastuti's research (2016), it showed that people with Diabetes Mellitus with a duration of suffering >5 years will experience an adjustment of the body's mechanisms to glucose needs; especially, in the muscles, brain, and liver. As a result, the body of a person with Diabetes Mellitus will lose the ability to synthesize proteins that are used as targets for binding receptors. In addition, the loss of tissue and the disruption of cell function can trigger the emergence of complications of other diseases even if the person conducts self-care management.

2. Overview of Self-Regulatory Diabetes Mellitus

   The results of the analysis on self-regulation of people with Diabetes Mellitus in the working area of Gunungpati Public Health Center mostly have a good picture of self-regulation with a total of 82 respondents (76.6%).

   In this study, the level of self-regulation is measured by using the Treatment Self-Regulation Questionnaire (TSRQ) where each statement point in the questionnaire is related to the 4 pillars of Diabetes Mellitus management and self-care management; such as, knowledge regards to the disease, blood sugar control, medication, diet, and physical exercise. All of these factors are used as a reference for measuring one's self-regulation since in the implementation of the disease a person is determined by self-regulation (Ariani et al., 2012).

   Self-regulation is very influential on the compliance of people with type 2 Diabetes Mellitus in conducting self-care management, by increasing self-regulation in the form of motivation; a person will avoid complications of other diseases (Castonguay, Miquelon, & Boudreau 2018).

   In addition, a person's self-regulation is influenced by external factors (family support and health workers), which triggers a person with Diabetes Mellitus to conduct self-care management properly. This statement is supported by research which had conducted by Sari and Simanjuntak (2020), which showed that there is a relationship between self-regulation and social support from the family. It helps people with Diabetes Mellitus to continue to regulate themselves in managing the disease.

   A person's success in implementing self-care management depends on the habit of self-regulation. Thus, based on this statement, good self-regulation can have a positive impact on self-care management, which will be seen from a person's good quality of life.

3. Overview of the Quality of Life for People with Diabetes Mellitus

   The results of the analysis on the quality of life of people with Diabetes Mellitus in the working area of Gunungpati Public Health Center show that the majority have a high quality of life as many as 74 respondents (69.2%).

   In this study, researchers uses a Diabetes Quality of Life (DQOL) questionnaire in order to assess the level of quality of life; especially, for people with diabetes mellitus. Each question item describes the satisfaction and impact felt by people with Diabetes Mellitus in

the past week regarding their health condition and management which has been conducted where the indicators for the assessment include physical condition, social, psychological, and environmental relationships (Azila, 2016).

In the research which had conducted by Suciana, Marwanti, and Arifianto (2019), it shows that Diabetes Mellitus can have an influence on a person's quality of life. Achieving a good quality of life is the goal in treating people with diabetes mellitus (Laoh & Tampongangoy, 2015).

The longer the patient suffers from the disease, the more complications occur. According to Ferawati and Sulistyo (2020), complications in people with Diabetes Mellitus have an impact on the decrease in a person's quality of life which can affect all life activities. However, it is undeniable that someone who has experienced complications still has a good quality of life since they can conduct self-care management properly; such as, obey to conduct routine treatment, controlling diet, and exercising regularly. Therefore, someone who is able to do this well will have a positive impact on the quality of his life (Setyorini & Wulandari, 2017).

4. The Relationship of Self-Regulation with Quality of Life for People with Diabetes Mellitus

In this study, researcher analyses the relationship between self-regulation and quality of life for people with diabetes mellitus in the working area of Gunungpati Public Health Center by using the Spearman Rank statistical test. Correlation test results obtained p value 0.000 (<0.05) which means Ha is accepted. It shows that there is a significant relationship between self-regulation and quality of life for people with Diabetes Mellitus in the working area of Gunungpati Public Health Center with a strength of relationship 0.540 which is quite strong/moderate; besides, it has the direction of positive correlation with meaning, if the value of self-regulation is high, then the value of quality of life will be high, and vice versa.

Diabetes Mellitus occurs due to impaired insulin function which can be seen from the increase in the body's blood glucose levels. A person with diabetes mellitus is at high risk of experiencing complications that will reduce the quality of life if they do not regulate themselves properly to conduct proper self-care management (Wahyuni & Anna, 2014).

In this study, it shows that the average respondent has Diabetes Mellitus for 6.54 years. It is followed by high self-awareness to

visit health facilities; such as, public health centers. In addition to this possibility, the high awareness of people with diabetes mellitus for treatment can be caused by complaints from their disease. Awareness in conducting treatment and self-care is influenced by the high level of self-regulation based on reasons, understanding, and knowledge of the need for treatment and care. Thus, a person with good self-regulation does not only pay attention to his health condition, but also believes in the importance of it (Ridwan, Heryaman, & Kusumawati, 2019).

A person with Diabetes Mellitus conducts self-regulation which is influenced by internal factors which arise from within themselves as well as external factors from the surrounding social environment (Maghfirah, 2016).

In the research which had conducted by Estuningsih et al. (2019), it stated that someone who is able to conduct self-care management well is influenced by good self-regulation so that it has a positive impact on the quality of life. The creation of a good quality of life requires self-awareness of people with Diabetes Mellitus in compliance with medication and lifestyle control since it is largely determined by self-regulation (Castonguay et al., 2018; Sari, 2016).

There are other things which can affect the quality of life for people with Diabetes Mellitus, one of which is a long period of suffering from the diseaseq, it can show a person's good adaptation to his disease which is seen from adherence to treatment and how to maintain a healthy lifestyle (Setyorini & Wulandari, 2017). In addition, some people who have long suffered from Diabetes Mellitus can adapt to their current condition so that it has a positive influence on their quality of life (Roifah, 2017).

Good quality of life is not only seen in terms of physical, but also psychological and social conditions. Controlling symptoms of the disease which should be conducted for life by people with Diabetes Mellitus becomes a separate stressor for the sufferers in which lead to psychological distress that can appear in the form of stress, anxiety, even depression which will directly or indirectly have an impact on physical health (Sasmiyato, 2019).

From the results of this study, it shows that respondents with an average length of suffering from Diabetes Mellitus of 6.54 years have a good self-awareness to take treatment and care for their disease which is proven by their high quality of life. It is due to people with Diabetes Mellitus in the working area of Gunungpati Public Health Center has awareness in self-regulation both internally and externally (social

support) to conduct self-care management properly so that it has an impact on a good quality of life.

CONCLUSION

The overview of self-regulation in people with diabetes mellitus shows that almost all respondents have good self-regulation with a total of 82 respondents (76.6%). The overview of the quality of life in people with Diabetes Mellitus shows that the majority of respondents have a high quality of life as many as 74 respondents (69.2%). Based on the results of statistical test which is conducted to analyze the relationship, a p value of 0.000 (<0.05) is found, which means that there is a significant relationship between self-regulation and the quality of life of people with Diabetes Mellitus in the working area of Gunungpati Public Health Center where the strength of the relationship is 0.540, which is quite strong/moderate with a positive correlation direction.

Suggestion

a. For Health Services
   The results of this study are expected that health workers can pay attention to self-regulation by providing support for people with diabetes mellitus so that they are always consistent in implementing self-care management. Thus, it will affect their quality of life.
b. Educational Institution Researcher
   The results of this study are expected to add scientific insight regards to the importance of paying attention to respondent characteristics; such as, age, gender, education, complications, and duration of suffering which can lead to decreased self-regulation and quality of life in people with chronic diseases.
c. For Further Research
   Based on the results of this study, it is expected that further research will explore more detailed data related to self-regulation and quality of life for people with Diabetes Mellitus in the form of qualitative research; besides, can add other characteristic variables which can affect the quality of life; such as, the respondent's work or other factors.

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