

RELATIONSHIP BETWEEN LONG-SUFFERING AND DIABETES DISTRESS WITH DIETARY ADHERENCE AMONG DIABETES MELLITUS PATIENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: The prevalence of diabetes mellitus is increasing significantly. Dietary adherence in people with diabetes mellitus is difficult to achieve because it requires regular long-term changes throughout their lives. It also has an impact on the psychology of people with diabetes mellitus to experience distress. **Purpose:** Analyze the relationship of long suffering and diabetes distress with dietary adherence in diabetes mellitus patients. **Methods:** This research uses analytical methods with a cross-sectional design. There were 71 respondents who were taken from 1320 diabetes mellitus patientin Puskesmas Talango by simple random sampling method. Data collection was using the Diabetes Distress Scale and Perceived Dietary Adherence Questionare Questionnaires. chi square was used for bivariate analysis. **Results:** The results showed that dietary adherence had a significant relationship with diabetes distress ($p=0.001$) but had no relationship with long-suffering ($p=0.100$). **Conclusion:** There is a significant relationship between education, income, and diabetes distress with dietary adherence.

Keywords: diabetes mellitus type 2, diabetes distress, dietary adherence.

INTRODUCTION

Diabetes Mellitus (DM) is a chronic disease that requires lifelong treatment. According to data released by the International Diabetes Federation (IDF), 463 million adults aged 20 to 79 had diabetes mellitus in 2019. There are more and more people with diabetes mellitus (DM) in several nations, including Indonesia. According to IDF (2019), Indonesia is among the top 7 nations with the greatest number of individuals suffering from diabetes mellitus (10.7 million in 2019), and the figure is expected to rise until it reaches 16.6 million in 2045. The Baseline of Health Research Data showed that the incidence of DM in the population aged ≥ 15 years was 1.1% in 2007, increased to 2.1% in 2013 until it decreased to 2.0% in 2018. East Java is among the top five regions with the highest prevalence of diabetes mellitus in Indonesia where 2.0% of the population suffers from diabetes mellitus (Kementerian Kesehatan Republik Indonesia, 2018).

A preliminary study at the Sumenep District Health Service showed that the number of diabetes mellitus sufferers in 2019 was 15,497 sufferers and increased to 33,504 sufferers in 2020. Based on secondary data from the Talango Community Health Center in 2020, Talango District was one of the districts in Sumenep Regency with the 10th highest incidence of diabetes mellitus. The incidence rate increased from 2018 to 2020, reaching 1320 victims. The current research's state of the art is that it seeks to examine The duration of their suffering and their level of diabetes distress are the two main variables that may have an impact on their adherence to a diet for people with diabetes.

Management to prevent DM complications can be grouped into five pillars, such as: education, medical nutritional therapy, physical exercise, pharmacological therapy, and monitoring (PERKENI, 2019). Complying with DM management, especially medical nutrition therapy (diet management), can be a burden for DM sufferers due to lifestyle changes and demands to adapt to several changes that will occur in daily life routinely throughout their lives (Prabowo dan Hastuti, 2015; Dewi *et al.*, 2018; Toruan *et al.*, 2018). Research by Dewi *et al.*, (2018) stated that 91.7% of respondents

with DM did not adhere to the diet they were on.

The longer a person is diagnosed with diabetes mellitus, the smaller the possibility of the sufferer complying with the diet they are following (Elmita *et al.*, 2019; Bertalina dan Purnama, 2016). This is because diabetes mellitus is classified as a lifelong disease along with the risk of boredom or monotony. Thus, it takes a long time and is routine. Additionally, treating DM patients costs a lot of money (Ardhiyanto *et al.*, 2019; Nuari, 2018).

Diabetes mellitus not only has physiological but also psychological impacts on patients. The psychological impacts on DM sufferers due to sudden life changes include anger, increased anxiety, and distress (Maghfirah *et al.*, 2015). Distress is a possibility for the majority of individuals with diabetes mellitus. Diabetes mellitus is frequently accompanied by diabetes distress (Islam *et al.*, 2014). This study was novel since it demonstrated that a number of hospital patients who were receiving treatment experience distress. This study tried to analyze the distress conditions in outpatients at the Talango Community Health Center and correlate it with diet compliance.

If the distress experienced by diabetes mellitus sufferers is not treated immediately, this can worsen their health. The length of the illness also has an adverse effect on DM patients' adherence to the prescribed diet; the longer the illness is present, the less adhered to the diet is (Elmita *et al.*, 2019). If diabetes mellitus sufferers do not follow their diet seriously or in accordance with the recommendations of health workers, it is very likely that control of blood sugar levels in DM sufferers will be difficult to achieve, thereby risking the emergence of other serious disease complications. The American Diabetes Association (2018) states that the incidence of DM can increase health costs and potential economic losses caused by absenteeism, decreased productivity, and disability for patients of productive age.

Based on the description above, the researcher aims to analyze the relationship between long suffering and diabetes distress with diet compliance in diabetes mellitus patients.

METHOD

This research was an analytical research with a cross sectional research design. This research was conducted in the Talango Community Health Center Working Area, Sumenep Regency. Research data collection was carried out from September to April 2022. The population of this study was all diabetes mellitus sufferers in the working area of the Talango Community Health Center, Sumenep Regency, which was 1320 people. There were 71 randomly sample people selected using the simple random sampling method. The inclusion criteria for diabetes mellitus sufferers based on Talango Health Center medical record data were able to communicate well and domiciled in Talango. However, the exclusion criteria were not being able to remember his diet for the last 7 days. The independent variables studied consisted of individual characteristics of type 2 diabetes mellitus sufferers (age, gender, education, income, and occupation), duration of illness, and diabetes distress. While, the dependent variable was the diet compliance of type 2 diabetes mellitus sufferers. Diabetes Distress Scale (DDS) Questionnaire was used to

measure the level of distress of sufferers/respondents through interviews. The range of the distress score was 1 to 6. ≤ 2 denoted not distressed/normal, and $x > 2$ denoted distress in the distress group. The degree of dietary adherence is determined using the Perceived Dietary Adherence Questionnaire (PDAQ). Values for dietary compliance ranged from 0 to 7 days. If $x = 32$ or less, the category was considered compliant; if $x = 31$ or less, it was considered non-compliant. Following processing, the data was shown as a frequency table and cross-tabulation. Bivariate analysis used the chi square test. This research has passed the ethical test number 142/KEPK/FKM_UNEJ/XII/2021. Informed consent was taken orally from each respondent.

RESULT

Characteristic of Type 2 Diabetes Mellitus Patients

The characteristics of type 2 diabetes mellitus sufferers in the Talango health center working area, Sumenep district were presented in the following table.

Table 1. Characteristics of Diabetes Mellitus Sufferers in the Working Area of Talango Health Center, Sumenep Regency in 2021

Individual Factor	Total	Percentage (%)
Sex		
Male	43	60,6
Female	28	39,4
Total	71	100
Age		
Adult (26-45 years)	22	31,0
Elder (>45 years)	49	69,0
Total	71	100
Education		
Low (≤ 9 years)	40	56,3
High (>9 years)	31	43,7
Total	71	100
Occupation		
Employment	52	73,2
Unemployment	19	26,8
Total	71	100
Income		
\leq Rp1.954.705	47	66,2
$>$ Rp1.954.705	24	33,8
Total	71	100
Suffering Duration		
<5 years	32	45,1
>5 years	39	54,9
Total	71	100

Source: Primary Data, 2021

Based on Table 1, it can be seen that the majority of type 2 diabetes mellitus sufferers

were male (60.6%). The majority of respondents were elderly (69.0%), and their

level of education was mostly the low category (≤ 9 years (Primary School-JHS) at 56.3%) than the high category (> 9 years (SHS-university) at 43.7%) for this group. The majority of respondents (73.2%) were employer; most have

an income that was either above or below the Sumenep Regency regional minimum wage (66.2%); and 54.9% have had type 2 diabetes mellitus for longer than five years.

Diabetes Distress

Table 2. Level of Diabetes Distress for Diabetes Mellitus Patients in the Working Area of Talango Health Center, Sumenep Regency in 2021

Diabetes Distress	Total	Percentage (%)
Normal	35	49,3
Distress	36	50,7
Total	71	100

Source: Primary Source, 2021

Table 2 showed the distribution of distress levels for type 2 diabetes mellitus sufferers at the Talango Community Health Center, Sumenep Regency, who experienced distress (50.7%), more than type 2 diabetes mellitus sufferers who did not experience distress or were normal (49.7%), although the difference was not significant.

Table 3 showed the distribution of the highest levels of distress in the categories/domains of emotional burden distress (93%) and treatment distress (81.7%). The majority fall into the typical group when it comes to interpersonal and health worker discomfort.

Table 3. Diabetes Distress Levels according to Domains in Diabetes Mellitus Sufferers in the Working Area of Talango Health Center, Sumenep Regency in 2021

Diabetes Distress	Category	Total	Percentage (%)
Emotional Burden Distress	Normal	5	7,0
	Distress	66	93,0
Distress towards doctors/health workers	Normal	64	90,1
	Distress	7	9,9
Treatment Distress	Normal	13	18,3
	Distress	58	81,7
Interpersonal Distress	Normal	67	94,4
	Distress	4	5,6
Total		71	100

Source: Primary Data, 2021

Table 4. Average Level of Diabetes Distress according to Domain in Diabetes Mellitus Sufferers in the Working Area of Talango Health Center, Sumenep Regency in 2021

Diabetes Distress	Mean	Minimum	Maximum
Emotional Burden Distress	1,93	1,00	2,00
Distres terhadap dokter/ Tenaga Kesehatan	1,10	1,00	2,00
Distress towards doctors/health workers	1,82	1,00	2,00
Distres Interpersonal	1,06	1,00	2,00

Source: Primary Data, 2021

Table 4 provided information that the highest mean value of diabetes distress for type

2 diabetes mellitus sufferers was emotional burden distress, namely 1.93.

Dietary Compliance

Table 5. Level of Diet Compliance in Diabetes Mellitus Sufferers in the Talango Public Health Center Working Area, Sumenep Regency in 2021

Dietary Compliance	Total	Percentage (%)
Obey	17	23,9
Disobedient	54	76,1
Total	71	100

Source: Primary Data, 2021

in Table 5 that the majority of diabetes mellitus sufferers in the Talango Community Health Center working area, Sumenep Regency

did not comply with the diabetes mellitus diet (76.1%).

Correlation of Length of Illness with Dietary Compliance

Table 6. Correlation of Length of Diabetes Mellitus with the Level of Dietary Compliance in Type 2 Diabetes Mellitus Patients in the Working Area of Talango Health Center, Sumenep Regency, 2021

Variable	Dietary Compliance						p-value	OR Value (CI 95%)
	Comply		Not Comply		Total			
	N	%	N	%	n	%		
Length of Suffering								0.900 (0.302-2.685)
<5 years	8	25.0	24	75.0	32	45.1	1.000	
>5 years	9	23.1	30	76.9	39	54.9		1

Source: Primary Data, 2021

Table 6 showed that the length of illness in Type 2 diabetes mellitus patients uncorrelated with the level of dietary compliance in Type 2 diabetes mellitus patients (p=1.000; OR=0.900; 95% CI=0.302-2.685). An OR value <1 indicates that duration of

illness <5 years is a protective factor for the level of dietary compliance. Based on the results of cross tabulation, it can be seen that the level of compliance is greater in those with length of illness <5 years, compared to diabetes mellitus patients with >5 years length of illness.

Correlation between Diabetes Distress and Diet Compliance

Table 7. Correlation between Diabetes Distress and the Level of Dietary Compliance in Type 2 Diabetes Mellitus Patients in the Working Area of Talango Health Center, Sumenep Regency, 2021

Variable	Dietary Compliance						p-value	OR Value (CI 95%)
	Comply		Not Comply		Total			
	n	%	n	%	n	%		
Normal Distress Level								0.078 (0.016-0.379)
	15	42.9	20	57.1	35	49.3	0.001	
Distress	2	56	34	94.4	36	50.7		1

Source: Primary Data, 2021

Table 7 showed that diabetes distress was significantly related to the level of dietary compliance in people with type two diabetes mellitus (p=0.001 ≤ α; OR=0.078; 95% CI=0.016-0.379). The OR value <1 indicated that the distress variable in the normal category was a protective factor for dietary compliance. Normal conditions increased dietary compliance by 0.078 times greater than distress conditions.

earlier/younger a person is diagnosed with diabetes mellitus, the longer a person with diabetes mellitus will experience the disease. Although diabetes mellitus is mostly experienced by people over the age of 40, due to changes in increasingly modern lifestyles (characterized by low physical activity, a sedentary lifestyle, unhealthy eating patterns and high stress due to work pressure) diabetes has already experienced by people at the age of 20-year-old or 30-year-old. Rofiah (2016) in his research explains that diabetes mellitus sufferers are exposed to the influence of lifestyle and are unable to properly care for and control their diet. These findings are in accordance with the results of this study, where the majority of respondents had non-compliance with the diabetes mellitus diet. Diabetes mellitus sufferers who do not adhere to their diet and have an unhealthy lifestyle have an impact on the duration or length of the illness (Utami et al., 2014). According to Suryati et al., (2019), respondents who had a duration of illness more than 5 years were due to the low

DISCUSSION

The research results showed that the majority of respondents had suffered from diabetes mellitus for more than 5 years. The >5 years duration of illness number was greater since the age of the respondents in this study was classified as elderly, which physiologically as a risk factor for length of duration. This condition was strengthened by the research from Bertalina dan Purnama (2016), stating that the duration of illness was related to the age at which a person was first diagnosed with diabetes mellitus. This means that the

level of preventive efforts taken to control blood glucose levels. Diabetes mellitus patients do not utilize treatment, both pharmacological and non-pharmacological.

Diabetes Distress

Diabetes distress is often experienced by diabetes mellitus patients, as shown in the results of this study, specifically in the Talango health center, Sumenep Regency. The high number of diabetes mellitus patients who experienced distress in this study was majorly caused by low income level factor. Istianah *et al.* (2020) explained in her research that low income level was associated with increased stress. This took place since someone who experienced a low income tended to have low access to treatment facilities for their illness. Increased stress caused disruption of endocrine function through stimulation of neuroendocrine system disorders.

Apart from being influenced by income level, the level of diabetes distress in people with diabetes mellitus is also influenced by age. Suprianti *et al.* (2017) in his research showed that the older a person is, the higher the level of stress that person experience. By over 50-year-old, commonly, people begin to experience a decline in both their physical and psychological conditions. Not only that, sometimes the changes that occur in the lives of elderly people were related to work and their role and influence in society. Changes in the role of people with diabetes mellitus in society can caused stress. Adults usually have more ability to control stress than children and the elderly. In other words, elderly people generally have lower stress tolerance (Putra *et al.*, 2017). Most of the people with diabetes mellitus in this research were in the elderly category. This may be the cause of the high level of diabetes distress experienced by respondents. Stressors that influence a person's distress can come from within themselves or from environmental factors. Various stressors can influence the increase in blood sugar levels in people with diabetes mellitus. Uncontrolled blood sugar levels in the body caused increased production of the cortisol hormone, which led to prolonged emotional distress (Fathoni *et al.*, 2019).

Diabetes distress is divided into 4 domains: distress related to emotional burden, distress related to doctors/health workers,

medication burden distress, and interpersonal relationship distress. In accordance with research results in the diabetes distress domain, the highest mean value is found in emotional distress (1.93). Emotional distress is an individual's emotional reaction when facing a stressor (Permana, 2017). Noe *et al.*, (2019) stated that emotional distress is stress that occurs due to reactions from various types of stressors, arised either from within themselves or from the environment. The cause of this reaction is the presence of something that is felt to be a threat to a person's well-being. People with diabetes mellitus must accept the fact that many of the pleasures of life will be reduced or limited, such as limiting sugar consumption, the risk of the disease getting worse, and the expectation that death will get closer. This was what caused emotional burdens in people with diabetes mellitus. Managing or controlling emotions was highly recommended for people with diabetes mellitus. If left untreated, it can lead to unhealthy eating behavior. Fasah dan Retnowati (2014) in their research explained that the emotions that arise in people with diabetes mellitus can be seen through a person's poor eating behavior.

Dietary Compliance

Based on the results of this research, the level of diet compliance of people with diabetes mellitus at the Talango Community Health Center is still low, indicating that most are in the category of non-compliance with the diabetes mellitus diet. The age of people with diabetes mellitus in this study, most of whom were elderly, also contributed to the level of dietary compliance. Legi *et al.*, (2019) stated that factors that can cause people with diabetes mellitus to not comply to their diet included that they often forget, as the respondent ages, their memory decreased. This was in accordance with this research, that the majority of people with type 2 diabetes mellitus were elderly, which became the reason for the poor level of compliance with the diabetes mellitus diet. Human brain function will decreased when a person enters elder ages, thus elderly people with diabetes mellitus will experienced a decrease in their ability to plan daily meals. This is because brain function is related to a person's memory (Rudini *et al.*, 2018). The increasing age of people with diabetes mellitus is associated with memory which tends to decline.

People with diabetes mellitus will feel disturbed by the obligation to control the food they consume and the rules for taking medication, which causes them to feel bored with this routine. The duration of diabetes mellitus experienced by respondents made them feel bored with the diet arrangement, until finally they chose to violate the diet they had agreed with their health workers. Risnasari (2014) in her research explained that the longer someone suffers from diabetes mellitus, the poorer their compliance with the diabetes mellitus diet due to boredom. In this study, the majority of respondents had a long illness duration of more than five years. This could be the reason for the low level of dietary compliance in people with diabetes mellitus. The level of dietary compliance was higher in those who have just been diagnosed with diabetes mellitus and there will be a decrease in compliance after six months of suffering (Jilao, 2017).

This is in line with research conducted by Reliance (2018) that patients with newly diagnosed diabetes mellitus tend to be more compliant with dietary recommendations than patients with diabetes mellitus who have been diagnosed with diabetes mellitus for a long time, because patients with longer disease duration have started to get bored and bored with the treatment therapy undertaken.

The number of people with diabetes mellitus who experience distress in this study can also be a factor in the low level of dietary adherence of people with diabetes mellitus. Kusnanto *et al.*, (2019) explained that the stress felt by people with diabetes mellitus occurred due to unpleasant and troublesome dietary rules, so that not a few respondents found it difficult when resisting temptation to finally choose unhealthy foods to consume and eating time was not in accordance with the recommended schedule.

Correlation of length of illness with dietary adherence

Chi square correlation analysis showed that the length of time suffering from type 2 diabetes mellitus did not correlate with dietary compliance in patients with type 2 diabetes mellitus. This is in line with several previous studies which also showed the same results (Bertalina and Purnama, 2016; Novasatryantarini, 2021). In contrast to

research conducted by Simbolon *et al.*, (2019) who found evidence that there is a relationship between length of illness and dietary compliance in patients with type 2 diabetes mellitus.

Respondents who have had diabetes mellitus for a long time usually accept their illness well. Patients with diabetes mellitus will take care of diabetes mellitus such as maintaining food and drink consumption patterns, having the motivation to be able to live a healthy life by following dietary compliance in accordance with the recommendations of health workers. Risti and Isnaeni (2017) in their research explained that the length of suffering in patients with diabetes mellitus showed a positive relationship with dietary compliance. The experience and learning felt by people with diabetes mellitus during illness is the reason for the high level of dietary compliance of people with diabetes mellitus because the longer they are sick, the more education and experience they receive. In addition, someone who has a short duration of illness still has not experienced long-term complications, so that people with diabetes mellitus are more relaxed in carrying out their diet (Anindita *et al.*, 2019).

The length of time used by people with diabetes mellitus in carrying out diabetes mellitus therapy is one of the reasons that people with diabetes mellitus have received a lot of learning or knowledge from doctors or nutritionists at health centers and hospitals so that this can increase the knowledge and skills of sufferers. The knowledge that has been obtained by patients with diabetes mellitus is a provision for these patients to determine their next attitude and behavior (Astuti *et al.*, 2015). Research produced Yulia (2015) explained that the longer the time of illness, the higher the level of acceptance of patients with diabetes mellitus towards their disease. This of course can affect the knowledge or information obtained by people with diabetes mellitus related to dietary management or management.

In contrast to the theory above, patients who have just been diagnosed with diabetes mellitus have positive behavior towards dietary compliance. Patients with diabetes mellitus who have been diagnosed with diabetes mellitus for a long time will feel bored and desperate with the diet program that has been implemented. As according to the opinion of Harahap *et al.*,

(2021) that the length of time patients with diabetes mellitus carry out their dietary recommendations will affect the decrease in the level of patient compliance in carrying out the treatment program.

The results of this study indicate that length of illness is not associated with dietary compliance with type 2 diabetes mellitus. The same evidence was obtained in the research of Ulum *et al.*, (2015) explained that a possible factor causing the absence of a relationship is due to psychological factors experienced by people with diabetes mellitus. A person who is diagnosed with diabetes mellitus, both new and old, has the same emotional psychological state. Patients with diabetes mellitus will feel angry, anxious and try to deny their health condition. According to Hariani *et al.*, (2020) stated that there is a relationship between the length of time suffering from DM and the level of patient depression. This causes sufferers to experience boredom and become desperate to stick to a diet. This often triggers people with diabetes mellitus to seek healing through alternative medicine. This is in line with the results of interviews with several people with diabetes mellitus that they continue to eat as they wish or do not comply with the diet recommended by health workers but are still balanced by consuming plants that are believed to be able to lower their blood sugar pressure such as kersen leaves. Compliance is the main stage of diabetes mellitus management, where at this stage people with diabetes mellitus will comply if they feel supervised by health workers. This reason makes patient compliance in undergoing a diet does not depend on the duration or length of diagnosis of diabetes mellitus.

Relationship between diabetes distress and dietary adherence

This research shows that diabetes distress is significantly associated with dietary adherence in patients with type 2 diabetes mellitus. The same thing was also shown by previous studies which showed a correlation between diabetes distress and dietary adherence of patients with type 2 diabetes mellitus (Putra *et al.*, 2017; Kusnanto *et al.*, 2019). Stress experienced by people with diabetes mellitus has an effect or impact on treatment / care behavior or diabetes management management that cannot be fully understood by health workers or health services. Stress felt by people

with diabetes mellitus can also affect a person's ability to manage their disease, thus adversely affecting their mental and physical functions (Putra *et al.*, 2017). Widodo (2012) also explained that stress is a threat faced by someone both in terms of mental, emotional, spiritual, and physical health of people with diabetes mellitus. Environmental demands or situations that are too heavy and cannot be balanced with the resources they have and changes in situations that cause difficulties in the adaptation process can be the reason for the onset of stress in people with DM. Diabetes mellitus is a degenerative disease whose recovery cannot be done in total but this disease can be controlled with a diet that is in accordance with the recommendations of health workers. This is a very important reason for patients to always have strong motivation and discipline to carry out a balanced menu diet program as recommended by health workers. Various obstacles and difficulties will certainly be faced by sufferers while carrying out their diet and this can certainly cause stress in people with diabetes mellitus. Setyorini (2017) in her research explained that the difficulties and obstacles felt by people with diabetes mellitus in undergoing a diet have an impact on the psychological health of sufferers. Patients with diabetes mellitus will easily experience stress due to the diet they are on, so proper stress management is needed by people with diabetes mellitus so that they can comply with the diet program and blood glucose levels can be well controlled.

Stress can cause an increase in glucose content in the blood blood caused by stressful conditions can stimulate endocrine organs to produce ephinefrin. Ephinephrine has an influence in triggering the process of glyconeogenesis that occurs in the liver. Glyconeogenesis will cause the release of glucose into the blood in a short time. This process triggers an increase in blood glucose levels during stressful or tense conditions (Adam dan Tomayahu, 2019). When a person experiences emotional stress, the body responds to stress that can trigger an increase in adrenaline hormone levels, which can convert glycogen reserves in the liver into glucose which is then flowed into blood vessels and target cells. The simultaneous increase in glucose levels can trigger complications in people with diabetes mellitus, both acute

complications and chronic complications (Sari dan Hersianda, 2019).

Zainudin *et al.*, (2018) in his research explained that diabetics who experience severe stress tend not to be able to implement a meal schedule on time and are easily triggered to eat unhealthy foods. Stress has a dichotomous effect, on the one hand it can increase appetite and on the other hand it can cause sufferers to be "very hungry" especially in foods that are high in carbohydrates and saturated fats. This is the basis that stress can be the most dangerous enemy for dietary management. For efforts to control blood sugar levels, it is very important that patients understand the concept of stress as a trigger for increased blood glucose levels and it is important to control stress (Widodo 2012).

CONCLUSION

The conclusion produced in this study is that there is a relationship between diabetes distress and dietary compliance in patients with type 2 diabetes mellitus and there is no relationship between length of illness and dietary compliance for patients with type 2 diabetes mellitus.

SUGGESTION

Based on these results, it is recommended that people with diabetes mellitus can carry out dietary rules and routinely carry out health controls. Suggestions for health services to empower the community through health cadres through the formation of peer groups, and maximize the implementation of self-care for people with diabetes mellitus by conducting regular Diabetes Self-Management Education.

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CONFLICT OF INTEREST

The author has no conflict of interest.

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AUTHOR CONTRIBUTION

Aisyah Tri Purwanti was in charge of data collection, manuscript writing, literature review and conceptual research, references. Leersia Yusi Ratnawati is in charge of research themes and methods, guided data collection, revised manuscript. Ninna Rohmawati is in charge of writing methodology, references.

REFERENCES

- Adam, L., & Tomayahu, M. 2019. Tingkat Stres dengan Kadar Gula Darah pada Pasien Diabetes Melitus. *Jambura Health and Sport Journal*, 1(1), 1-5.
- Anindita, M., Diani, N., & Hafifah, I. 2019. Hubungan Efikasi Diri dengan Kepatuhan Melakukan Latihan Fisik pada Pasien Diabetes Mellitus Tipe 2. *Nusantara Medical Science Journal*, 4(1), 19-24. <https://doi.org/10.20956/nmsj.v4i1.5956>
- Ardhiyanto, M., Kusnanto, Nastiti, A., & Arifin, H. 2019. Kecerdasan Spritual dalam Self-Management pada Pasien Diabetes Melitus Tipe 2. *Jurnal Keperawatan Medikal Bedah dan Kritis*, 8(1), 56-61. <https://doi.org/10.20473/cmsnj.v8i1.13278>
- American Diabetes Association. 2018. Economic Cost of Diabetes in the US in 2017. *Diabetes Care*, 41(5), 917-928. <https://doi.org/10.2337/dci18-0007>
- Astuti, S., Paratmanitya, Y., & Wahyuningsih. 2015. Tingkat Pengetahuan dan Dukungan Keluarga Tidak Berhubungan dengan Kepatuhan Menjalani Terapi Diet Penderita Diabetes Mellitus Tipe 2 di Puskesmas Kasihan II Bantul Yogyakarta. *Jurnal Gizi dan Dietik Indonesia*, 3(2), 105-112. [http://dx.doi.org/10.21927/ijnd.2015.3\(2\).105-112](http://dx.doi.org/10.21927/ijnd.2015.3(2).105-112)
- Badan Penelitian dan Pengembangan Kementerian Kesehatan RI. 2018. Laporan Nasional Riset Kesehatan Dasar 2018. Jakarta: Kementerian Kesehatan RI.
- Badan Pusat Statistik. 2019. *Sumenep Dalam Angka 2019*. Sumenep: BPS Kabupaten Sumenep.

- Bertalina, & Purnama. 2016. Hubungan Lama Sakit, Pengetahuan, Motivasi Pasien dan Dukungan Keluarga dengan Kepatuhan Diet Pasien Diabetes Mellitus. *Jurnal Kesehatan*, 7(2), 329-340. <https://doi.org/10.26630/jk.v7i2.211>
- Dewi, T., Amir, A., & Sabir, M. 2018. Kepatuhan Diet Pasien DM Berdasarkan Tingkat Pengetahuan dan Dukungan Keluarga Di Wilayah Puskesmas Sudiang Raya. *Media Gizi Pangan*, 25(1), 55-63. <https://doi.org/10.32382/mgp.v25i1.60>
- Elmita, R., Arifin, S., & Rosida, L. 2019. Faktor-Faktor yang Berhubungan dengan Kepatuhan Kontrol pada Penderita Diabetes Melitus Tipe 2 di Puskesmas Teluk Dalam Banjarmasin. *Jurnal Mahasiswa Pendidikan Dokter Homeostasi*, 2(1), 55-66. <https://doi.org/10.20527/ht.v2i1.428>
- Fassah, D., & Retnowati, S. 2014. Hubungan antara Emotional Distress dengan Perilaku Makan Tidak Sehat pada Mahasiswa Baru. *Jurnal Psikologi*, 10(1), 11-17. <http://dx.doi.org/10.24014/jp.v10i1.1174>
- Fathoni, A., Purnamawati, D., & Syafitri, I. 2019. Pengaruh Senam Ergonomis Terhadap Distress Lansia dengan Diabetes Mellitus. *Jurnal Keperawatan Terpadu*, 1(2), 65-75. <https://doi.org/10.32807/jkt.v1i2.39>
- Harahap, S., Hariati, & Hayati, K. 2021. Faktor Determinan yang Berhubungan dengan Kepatuhan Penderita Diabetes Mellitus dalam Kegiatan Prolanis BPJS Kesehatan. *BEST Journal (Biologi Education, Sains and Teknologi)*, 4(2), 145-151. <http://dx.doi.org/10.30743/best.v4i2.4675>
- Hariani, Abd. Hady, Nuraeni Jalil, & Surya Arya Putra. 2020. Hubungan Lama Menderita dan Komplikasi DM Terhadap Kualitas Hidup Pasien DM Tipe 2 Di Wilayah Puskesmas Batua Kota Makassar. *J Ilmu Kesehatan Diagnosis*. 15(1), 56-63.
- International Diabetes Federation. 2019. *IDF Diabetes Atlas Ninth Edition 2019*. International Diabetes Federation.
- Islam, M., Islam, S., Karim, R., Alam, U., & Yesmin, K. 2014. Predictors of Diabetes Distress in Patients with Type 2 Diabetes Mellitus. *Bulletin of Pharmaceutical and Medical Sciences (BOPAMS)*, 2(1), 2108-2117.
- Isnaeni, F., Risti, K., Mayawati, H., & Arsy, M. 2018. Tingkat Pendidikan, Pengetahuan Gizi dan Kepatuhan Diet pada Pasien Diabetes Mellitus (DM) Rawat Jalan di RSUD Karanganyar. *MPPKI (Media Publikasi Promosi Kesehatan Indonesia): The Indonesian Journal of Health Promotion*, 1(2), 40-45. <https://doi.org/10.56338/mppki.v1i2.116>
- Isnaini, N., & Saputra, M. 2017. Pengetahuan Dan Motivasi Meningkatkan Kepatuhan Diet Pasien Diabetes Mellitus Tipe II. *Jurnal Ilmiah Ilmu-ilmu Kesehatan*, 15(3), 135-141.
- Istianah, I., Septiani, & Dewi, G. 2020. Mengidentifikasi Faktor Gizi pada Pasien Diabetes Mellitus Tipe 2 di Kota Depok Tahun 2019. *Jurnal Kesehatan Indonesia*, 10(2), 72-78.
- Jilao, M. 2017. Tingkat Kepatuhan Penggunaan Obat Antidiabetes Oral pada Pasien Diabetes Mellitus di Puskesmas KOH-LIBONG. *Central Library of Maulana Malik Ibrahim*.
- Kementerian Kesehatan Republik Indonesia. 2018. Buku RISKESDAS dalam Angka Indonesia Tahun 2018. Laporan Nasional 2018.
- Kusnanto, Sundari, P., Asmoro, C., & Arifin, H. 2019. Hubungan Tingkat Pengetahuan dan Diabetes Self-Management dengan Tingkat Stres Pasien Diabetes Melitus yang Menjalani Diet. *Jurnal Keperawatan Indonesia*, 22(1), 31-42. <https://doi.org/10.7454/jki.v22i1.780>
- Legi, N., Pasambuna, M., Purba, R., & Kasiati, O. 2019. Media Video Makanan Terhadap Pengetahuan dan Kepatuhan Diet Serta Pengendalian Kadar Glukosa Darah Pasien Diabetes Melitus Tipe II. *Jurnal Gizido*, 11(2), 81-87. <https://doi.org/10.47718/gizi.v11i2.768>
- Maghfirah, S., Sudiana, I., & Widyawati, I. 2015. Relaksasi Otot Progresif Terhadap Stres Psikologis dan Perilaku Perawatan

- Diri Pasien Diabetes Mellitus Tipe 2. *Jurnal Kesehatan Masyarakat*, 10(2), 137-146.
<https://doi.org/10.15294/kemas.v10i2.3374>
- Noe, F., Kusuma, F., & Rahayu, W. 2019. Hubungan Tingkat Stres dengan Eating Disorder pada Mahasiswa yang Tinggal di Asrama Putri Universitas Tribhuwana Tungadewi (Unitri). *Nursing News*, 4(1), 159-170.
<https://doi.org/10.33366/nn.v4i1.1499>
- Novasatryantarini, I. G. 2021. Faktor – Faktor yang Berhubungan dengan Kepatuhan Pasien Diabetes Mellitus dalam Melaksanakan Dietnya, di Puskesmas Kediri I, Tabanan. *Doctoral Dissertation Stikes Bina Usada Bali*.
- Nuari, N. A. 2018. Diabetes Burnout Syndrom dengan Self Care Agency Pasien Diabetes Mellitus Tipe II (Diabetes Burnout Syndrom With Self Care Agency Diabetes Mellitus Type 2 Patient). *Journal of Health Science and Prevention*, 2(2), 78-82.
<https://doi.org/10.29080/jhsp.v2i2.122>
- Prabowo, A., dan Hastuti, W. 2015. Hubungan Pendidikan dan Dukungan Keluarga Dengan Kepatuhan Diit pada enderita Diabetes Mellitus di Wilayah Puskesmas Plosorejo Giribangun Matesih Kabupaten Karanganyar. *Jurnal Keperawatan GSH*, 4(2), 1-12.
- Pemerintah Daerah Kabupaten Sumenep. 2018. *Masterplan Smart City Kabupaten Sumenep Tahun 2019-2028*. Sumenep: Pemerintah Daerah Kabupaten Sumenep.
- Perkumpulan Endokrinologi Indonesia. 2019. *Pedoman Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 Dewasa di Indonesia 2019*. Jakarta: PB. PERKENI.
- Permana, Y. I. 2017. Hubungan antara Lama Sakit dengan Tingkat Distress pada Pasien Diabetes Mellitus Di Rumah Sakit Islam Surakarta. *Keperawatan Muhammadiyah Surakarta*, 1-13.
- Putra, A., Widayati, N., & Sutawardana, J. 2017. Hubungan Diabetes Distress dengan Perilaku Perawatan Diri pada Penyandang Diabetes Melitus Tipe 2 di Wilayah Kerja Puskesmas Rambipuji Kabupaten Jember. *e-Jurnal Pustaka Kesehatan*, 5(1), 185-192.
- Reliance, R. 2018. Kepatuhan Pasien Diabetes Melitus dalam Menjalani Terapi Insulin di RSUP H. Adam Malik Medan. *Jurnal Keperawatan Sumatera Utara*.
- Risnasari, N. 2014. Hubungan Tingkat Kepatuhan Diet Pasien Diabetes Mellitus dengan Munculnya Komplikasi di Puskesmas Pesantren II Kota Kediri. *Jurnal Efektor*, 1(25), 15-19.
- Risti, K., & Isnaeni, F. 2017. Hubungan Motivasi Diri dan Pengetahuan Gizi Terhadap Kepatuhan Diet DM pada Pasien Diabetes Mellitus Tipe II Rawat Jalan di RSUD Karanganyar. *Jurnal Kesehatan*, 10(2), 94-103.
<https://doi.org/10.23917/jk.v10i2.5538>
- Roifah, I. 2016. Analisis Hubungan Lama Menderita Diabetes Mellitus dengan Kualitas Hidup Penderita Diabetes Mellitus. *Jurnal Ilmu Kesehatan*, 4(2), 7-16. doi: /10.32831/jik.v4i2.84
- Rudini, D., Sulistiawan, A., & Yusnilawati. 2018. Analisis Pengaruh Kepatuhan Pola Diet DM Terhadap Kadar Gula Darah DM Tipe II. *Jurnal Keperawatan Universitas Jambi*, 3(2), 1-16.
- Sari, S., & Hersianda. 2019. Hubungan Tingkat Stress dengan Kadar Gula Darah pada Pasien Diabetes Melitus di Poli Penyakit Dalam Rumah Sakit Bhayangkara Palembang Tahun 2019. *Jurnal Kesehatan: Jurnal Ilmiah Multi Sciences*, 9(2), 116-121.
<https://doi.org/10.52395/jkjims.v9i02.160>
- Supriati, L., Kusumaningrum, B. R., & Setiawan, H. F. 2017. Hubungan Tingkat Kecerdasan Emosional Dengan Tingkat Stres Pada Penderita Diabetes Mellitus Di Rumah Sakit Tentara Dr.Soepraoen Malang. *Majalah Kesehatan*, 4(2), 79-87
<https://doi.org/10.21776/ub.majalahkesehatan.2017.004.02.4>
- Setyorini, A. 2017. Stres dan Koping pada Pasien dengan DM Tipe 2 dalam Pelaksanaan Manajemen Diet di Wilayah Puskesmas Banguntapan II Kabupaten Bantul. *Health Sciences and Pharmacy*

- Journal*, 1(1), 1-9.
<https://doi.org/10.32504/hspj.v1i1.3>
- Simbolon, Y., Triyanti, & Sartika, R. 2019. Faktor-Faktor yang Berhubungan dengan Kepatuhan Diet pada Penderita Diabetes Melitus Tipe 2 di Puskesmas Kecamatan Pasar Minggu Tahun 2018. *Jurnal Kesehatan Komunitas*, 5(3), 110-117.
<https://doi.org/10.25311/keskom.Vol5.Is3.336>
- Suryati, I., Primal, D., & Pordiati, D. 2019. Hubungan Tingkat Pengetahuan dan Lama Menderita Diabetes Mellitus (DM) dengan Kejadian Ulkus Diabetikum pada Pasien DM Tipe 2. *Jurnal Kesehatan Perintis (Perintis's Health Journal)*, 6(1), 1-8.
<https://doi.org/10.33653/jkp.v6i1.214>
- Toruan, D., Karim, D., & Woferst, R. 2018. Hubungan Motivasi Diri dengan Kepatuhan Diet Pada Penderita Diabetes Melitus Tipe 2. *Jurnal Online Mahasiswa Perpustakaan Fakultas Keperawatan*, 5(2), 137-145
- Ulum, Z., Kusnanto, & Widyawati, I. 2015. Kepatuhan Medikasi Penderita Diabetes Mellitus Tipe 2 Berdasarkan Teori Health Belief Model (HBM) di Wilayah Kerja Puskesmas Mulyorejo Surabaya. *Critical Medical and Surgical Nursing Journal*, 4(1), 1-11.
<https://doi.org/10.20473/cmsnj.v4i1.12294>
- Utami, D., Karim, D., & Darwin . 2014. Faktor-Faktor yang Mempengaruhi Kualitas Hidup Pasien Diabetes Mellitus dengan Ulkus Diabetikum. *Jurnal Online Mahasiswa Program Studi Ilmu Keperawatan*, 1(2), 1-7.
- Widodo, A. 2012. Stress pada Penderita Diabetes Mellitus Tipe-2 dalam Melaksanakan Program Diet di Klinik Penyakit Dalam RSUP Dr. Kariadi Semarang. *Medical Hospitalia*, 1(1), 53-56.
<https://doi.org/10.36408/mhjcm.v1i1.41>
- Yulia, S. 2015. *Faktor-Faktor yang Mempengaruhi Kepatuhan dalam Menjalankan Diet pada Penderita Diabetes Mellitus Tipe 2*. (Master's thesis Universitas Negeri Semarang).
- Zainudin, S., Bakar, K., Abdullah, S., & Hussain, A. 2018. Diabetes Education and Medication Adjustment in Ramadan (DEAR) Program Prepares for Self-Management during Fasting with Tele-Health Support from Pre-Ramadan to Post-Ramadan. *Therapeutic Advances in Endocrinology and Metabolism*, 9(8), 231-240.
<https://doi.org/10.1177%2F2042018818781669>