Poltekita: Jurnal Ilmu Kesehatan
http://jurnal.poltekkespalu.ac.id/index.php/JIK

Vol.17 No.3 November 2023: Hal. 529-534
p-ISSN: 1907-459X e-ISSN: 2527-7170

Original Article

The Effect of 4 Pillars of Health Education on Blood Sugar Levels in Type 2 Diabetes Mellitus

Irsanty Collein[1*]

[1]Department of Nursing, Politeknik Kesehatan Kementerian Kesehatan Palu, Palu, Central Sulawesi, Indonesia

(Correspondence author's: collein2002@gmail.com)

ABSTRACT

Diabetes mellitus occurs more frequently in rural areas than urban areas and occurs more frequently in groups with low education. Type 2 Diabetes Mellitus disease management through the implementation of the four pillars of diabetes treatment, including education, dietary nutrients, exercise, and pharmacology. The study aimed to determine the effect of the 4 pillars of DM health education on blood sugar levels. Pre-experimental research design with a one-group pre-test and post-test design approach using paired t-test. The number of samples is determined by the sample formula to test the hypothesis on the average of two populations with a 33 sample. The samples involved in this study were selected by simple random sampling who met the criteria, namely DM > 3 months, could read and write and were willing to participate in the study. The results of this research is the 4 pillars of health education gave a change in the blood sugar levels of patients before and after health education with a P value of 0.0005 and did not affect the length of suffering from DM. The conclusion is there is an effect of health education on the 4 pillars of DM on the value of blood sugar levels. It is hoped that health workers will maximize health education on the 4 pillars of DM.

Keywords: *Health Education, DM, 4 Pillars.*

https://doi.org/10.33860/jik.v17i3.2290

INTRODUCTION

Non-communicable diseases (NCDs) have become a public health problem, both globally, regionally, nationally and locally. One non-communicable disease is Diabetes Mellitus (DM). Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both [1]. Diabetes Mellitus is a serious threat to health development because it can cause blindness, chronic kidney disease, diabetic foot (gangrene), cardiovascular problems even stroke[2]. In patients with type 2 DM, there is insulin resistance or impaired insulin secretion characterized by increased levels of glucose in the blood called as hyperglycemia[1]. Hyperglycemia is the most serious condition that causes patients to be hospitalized and increases patient morbidity and mortality [3,4].

Patients who experience hyperglycemia mostly deny that they have a history of high blood sugar levels [3]. Increased blood sugar levels are caused by several factors, including too much consumption of carbohydrates [5] not even adhering to taking insulin or insulin therapy [6].

According to [7], Diabetes Mellitus is also a chronic disease capable of causing a decrease in quality of life. In chronic conditions, the patient must make some adjustments in his life to maintain health. Patients suffering from DM must experience sudden changes in their

lives, such as taking regular medication, exercising regularly, controlling blood sugar, and setting a strict diet throughout. It's called 4 pillars DM [8,9]. The changes that occur suddenly in DM patients cause patients to become stressed and unable to manage themselves properly [10].

It is not easy to achieve the desired blood sugar target because one of the reasons is that most patients often only rely on drugs [1,11]. Whereas medicine is not the determining factor main descent blood sugar levels [12]; many other factors that can affect, and help achieve the desired blood sugar level. The most important thing what is done is to regulate the food consumed, the amount, type, how to consume it, and do physical activity [4] even a person's basic knowledge about diabetes is also very important [13,14].

The Ministry of Health stipulates that the management of DM in preventing further complications consists of four main pillars, namely, nutrition management, physical exercise, anti-diabetic drug therapy, education. [6]. The Objective of management education 4 pillars of DM namely support success carry out self-care activities that are good and independent [15,16.] A number of study conclude good education especially by using the 4 pillars of DM model can cause decrease blood sugar levels of which there are difference blood sugar levels in DM patients who did not received 4 pillars of education for control and intervention patients at the health center Cimareme Bandung regency; in line with research [13] that education conducted on patients with will cause patient capable controlling blood sugar levels, obesity, family history and life style [8,17]. Based on background behind the on this study aims was to determine effect health education using 4 pillars of DM on blood sugar levels DM patients in the work area of the Health Center Kintom where is the Health Center Kintom is located in one district in Luwuk City.

METHOD

The design was a pre-experimental design with a *one group-pretest and posttest design approach* [18,19]. The population was diabetes mellitus patients at the Kintom Health Center, Kintom District, Banggai Regency, with a total of 91 people registered at the primary Health Center. Kintom Regency is a border area between the district capital and the countryside. This research has ethical clearance from the ethical commission of the Poltekkes of the Ministry of Health Palu with number 0065/KEPK-KPK/VI/2022. The number of samples is determined by the sample formula to test the hypothesis on the average of two populations [19]. Respondents who participated in this study were 33 people who were diabetes mellitus patients >3 month in the Kintom Health Center area. Study conducted in April 2022. Data collection was carried out for 4 weeks. Data was collected by asking directly to respondent, diagnosis from doctor and then measure level blood sugar of patients. Variables independent in this research is the 4 pillars of health education DM patients and the dependent variable was patients blood sugar levels. The recommended blood glucose examination is an enzymatic examination of glucose with venous blood plasma material to establish the first diagnosis while monitoring the results of treatment can be done with a glucometer as was done in studies using sticks [1]. Blood sugar levels were measured 1 month after the intervention using leaflets and flipchart.

Data collection was carried out by providing education using leaflets, filling out questionnaires and measuring blood sugar levels before and after providing education. In addition, characteristic data were collected respondent in the form of data age, occupation, education level and duration of suffering from DM to obtain supporting data whether there is connection between duration of illness and change mark blood sugar level.

Data were analyzed using univariate analysis to collect demographic data, Data on the educational influence of the 4 pillars of DM were analyzed using bivariate analysis, namely the paired t-test analysis*)* to find out difference blood sugar levels pre and post health education using 4 pillars DM.

RESULTS

Research results described by demographic data. As for demographic data depicted as following respondent youngest 46 years old. Respondents aged 46-55 years and 56-65 years are at the same value of 45.5%. So got concluded a lot of DM patients are also in the range age <55 years.

Table 2 shows average DM patient 's sugar level decrease lowest as much as 14.72 mg/dl and the highest is 29.10 mg/dl. Research

results show there is difference blood sugar levels before and after health education treatment with a p value of 0.0005.

DISCUSSION

Results show there is difference mark blood sugar levels before and after the DM education using 4 pillars. The self-management patient DM will influence quality life can be better obtained through DM education 4 pillars [20] can manage stress well [21]. Self-management treatment plans are individually developed in consultation with a variety of health care professionals such as doctors, nurses, dietitians, and pharmacists [21]. One indicator of management good self can assessed as stable blood sugar levels by means of regular monitoring routine [22].

Stable blood sugar level influenced by interest and motivation patient himself to remain maintain pressure his blood stable [23, 24].

Table 1. Demographic Data

Variable	Frequency	Percentages	Means	Min	Max	SI
Age						
46-55 Y	15	45.5	56,76	44	80	7,7
56-65 Y	15	45.5				
>65 Y	3	9,1				
Occupation						
Work	19	19				
Not working	14	14				
Education						0.8
Basic	23	69,7				
Intermediates	3	9,1				
University	7	21,2				
Sex						0.4
Male	23	69,7				
Female	10	30,3				
Duration of Suffering DM			48	3	67,3	63.

Table 2. GDS level t test before and after education

	Paired differences					t	df	Sig-2 tailed
	Means	SD	SE	Lower	Upper			
Pre and post test	21.91	20,27	3.53	14.72	29,10	6,21	32	0.0005

Educators who provide health education and duration education given [25], as well discipline patient to comply education [8,21].

Stable blood sugar level influenced by interest and motivation patient himself to remain maintain pressure his blood stable [23,24], educators who provide health education and duration education given [25], as well discipline patient to comply education [17,21].

Apart from that, the factor of health workers are also very influential education provided among them attitudes and skills health workers when giving education [14,26]. For acutely ill patients admitted to hospital, the ability to identify those at high risk of inpatient death is helpful for health workers, as well as for patients and their families. In addition, the role of the nurse is in charge of maintaining the patient's blood sugar levels to remain stable by adjusting the diet and eating pattern, taking medication or injecting insulin regularly according to the recommended dosage [27].

Patients will not be allowed to go home if they are not proficient in injecting insulin and promise to have regular health checks. In addition to being treated at the hospital, many diabetes mellitus patients also undergo outpatient care. The success of therapy and meeting the goals of outpatient sugar blood level is highly dependent on the patient himself so that education in the hospital has a huge impact on the patient's independent care at home. Selection of pharmacotherapy for outpatient glycemic management must consider various factors such as the patient's ability to follow treatment recommendations, availability of support systems, patient's cognitive status and assurance of patient safety[27].

Patients who have not been able to master proper and accurate insulin injection techniques should be considered using non-insulin therapy upon discharge, whereas patients with conditions that require a stable decrease in GD due to comorbidities such as infection or are at risk of developing ketoacidosis should continue to use insulin upon discharge [11].

Patient own control full to education or counseling provided which is influenced by the patient's education level. The higher the level of education, the better the self-management [28]. Patients who get counseling own mark blood sugar levels are more stable and can down compared to the non- getting group education [14]. Besides influenced by the education, provided another thing to consider when giving education is a health worker who provides education and learning media [14]. So got concluded obedience patient to maintain his blood sugar level still stable besides influenced by internal factors originating from within patient but also influenced by external factors especially health workers who have role strategic.

Fill in the education given to the patient is the way control blood sugar levels through diet , drink drug in a manner regular. Doing activities physique in a manner routine at least 30 minutes in healthy and management good [29].

Education needs to be given to DM patients with the aim of promotion of life healthy and like effort prevention. Change blood sugar levels. Patients are greatly affected by adherence on diet or food consumed everyday and do sports or activities physical. So that a number of education that needs to be given to the patient is put less sugar in, burn off remaining sugar. Besides control what to eat patients also need to be given what will happens to his body when his blood sugar levels always high or unstable. Possible effect what happens is damage to the heart, kidneys and liver. Heart attack, fatty liver, cirrhosis, foot ulcers and diabetic neuropathy [3]. These complications will have a negative impact on the patient's health and lead to an increase in health financing

CONCLUSION

There was a significant effect on the 4 pillars of DM education using educational media to stabilize the blood sugar levels on DM patient .

Suggestion for health workers to give more intensively education on the 4 pillars of DM by using more interactive learning media. Not recomended advice using a oral communication when the patient visit. Besides the patient can given education in a manner special foods whatever causes rate glucose increased drastically.

In addition, it is necessary to have a DM special educator who is trained in a manner special especially for health centers because many DM patients are controlled by the primary health service and are motivated society to be routine check with Posbindu once a month. Taking a medication in a manner regularly do not consume drugs free to decrease blood sugar levels.

ACKNOWLEDGMENTS

The researchers would like to thank the head of center for research and community service Poltekkes Kemenkes Palu for their much support for this research. Furthermore, to the respondents who are willing to spend their time and actively participate in this research.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCE

1. Soelistijo SA, Novida H, Rudijanto A, Soewondo P, Suastika K, Manaf A, Sanusi H, Lindarto D, Shahab A, Pramono B, Langi Y. Konsensus pengelolaan dan pencegahan diabetes melitus tipe 2 di Indonesia 2015.

Jakarta: PB Perkeni. 2015;2(1):1-93.
2. Grory BM, Piccini JP, Yaghi S, Poli S, De Havenon A, Rostanski SK, Weiss M, Xian Y, Johnston SC, Feng W. Hyperglycemia, risk of subsequent stroke, and efficacy of dual antiplatelet therapy: a post hoc analysis of the point trial. Journal of the American Heart Association. 2022 Feb 1;11(3):e023223.
3. PERKENI. Tatalaksana pasien dengan hiperglikemia di rumah sakit. 2022.
4. Asadollahi K, Beeching N, Gill G. Hyperglycaemia and mortality. Journal of the Royal Society of Medicine. 2007 Nov;100(11):503-7.
5. Khoshnoudi-Rad B, Hosseinpour-Niazi S, Javadi M, Mirmiran P, Azizi F. Relation of dietary insulin index and dietary insulin load to metabolic syndrome depending on the lifestyle factors: Tehran lipid and glucose study. Diabetol Metab Syndr [Internet]. 2022;14(1):1–11. Available from: https://doi.org/10.1186/s13098-022-00968-w
6. Black JM, Hawks JH. Medical-Surgical Nursing: Clinical Management for Positive Outcomes Eigth Edition. Vol 1. eigth Edit. St Louis Missiouri: Elsevier Ltd; 2009.
7. Kementerian Kesehatan Republik Indonesia. Hasil utama RISKESDAS 2018. Jakarta; 2019.
8. Buston E, Efendi P, Heriyanto H. Pengaruh Implementasi 4 Pilar Penatalaksanaan Diabetes Melitus Terhadap Status Nutrisi Pada Penderita Diabetes Melitus Di Puskesmas Kandang Kota Bengkulu. Jakiyah J Ilm Umum dan Kesehat Aisyiyah. 2021;6(1):15–21.
9. Kementerian Kesehatan RI. Tetap produktif, cegah, dan atasi Diabetes Melitus 2020. Pusat Data dan Informasi Kementerian Kesehatan RI. 2020.
10. LeMone P, Burke K, Bauldoff G. Medica–Surgical Nursing Critical Thinking in Patient Care; 2011.
11. Syauqy A, Mattarahmawati SA, Pramono A. Food Consumption in Relation to Hyperglycemia in Middle-Aged Adults (45− 59 years): A Cross-Sectional National Data Analysis. Jurnal Gizi dan Pangan. 2022 Nov 30;17(3):187-94.
12. Fung J. The Diabetes Code. Canada: Greystone Books; 2018. 1–276 p.
13. Wandini E. Hubungan empat pilar pengendalian diabetes melitus dengan kadar gula darah dan munculnya komplikasi pasien diabetes melitus tipe 2 di RSUD Idaman kota Banjarbaru. Institutional Repos Stikes Husada Borneo [Internet]. 2019;1–2. Available from: https://repository.stikeshb.ac.id/284/
14. Fardiansyah MA. Konseling Empat Pilar Penanganan Diabetes Melitus Terhadap Penurunan Kadar Gula Darah. J Kesehat Budi Luhur. 2020;13(1):254–62.
15. Rantung, J., Yetti, K., & Herawati T. Hubungan Self-Care Dengan Kualitas Hidup Pasien Diabetes Mellitus (Dm) Di Persatuan Diabetes Indonesia (Persadia) Cabang Cimahi. J Sk Keperawatan. 2015;1(01).
16. Sumakul V, Suparlan M, Toreh P, Karouw brigita. Edukasi Diabetes Melitus Dan Pemeriksaan Kadar Glukosa darah Umat Paroki St. Antonius Padua Tataran. J Pengabdi Kpd Masy MAPALUS. 2022;1(1):18–25.
17. Jasmani J, Rihiantoro T. Edukasi dan kadar glukosa darah pada pasien diabetes. Jurnal Ilmiah Keperawatan Sai Betik. 2017 Jan 30;12(1):140-8.
18. Creswell JW. Research design Qualitative, quantitative, and mixed methods approachs. Second edi. Sage; 2003.
19. Sastroasmoro S, Ismael S. Dasar-dasar metodologi penelitian klinis. 5th ed. Jakarta: Sagung Seto; 2014. 522 p.
20. Sakraida TJ, Robinson M. Health Literacy Self-Management by Patients With Type 2 Diabetes and Stage 3 Chronic Kidney Disease. 2009;627–47.
21. Carpenter R, Dichiacchio T, Barker K. International Journal of Nursing Sciences Interventions for self-management of type 2 diabetes : An integrative review. Int J Nurs Sci [Internet]. 2019;6(1):70–91. Available from: https://doi.org/10.1016/j.ijnss.2018.12.002
22. Yunitasari T. The Effectiveness of Four

Pillars Management Type 2 Diabetes Mellitus on Knowledge, Attitude, and Behavior of Prolanis Participants. J Ris Gizi. 2019;7:1–4.
23. Windarwati HD, Lestari R, Hidayah R. Determinant of Effective Family Communication among First-Grade High School Adolescents Aged 15 – 16 Years : A Multi-Centre Cross-sectional Study. 2022;10(2):107–14.
24. Hidayah M. Hubungan Perilaku Self-Management Dengan Kadar Gula Darah Pada Pasien Diabetes Mellitus Tipe 2 Di Wilayah Kerja Puskesmas Pucang Sewu, Surabaya. Amerta Nutr. 2019;3(3):176
25. Rismayanti IDA, Sundayana IM, Ariana PA, Heri M. Edukasi Diabetes terhadap Penurunan Glukosa Darah pada Penderita Diabetes Mellitus Tipe 2. J Telenursing. 2021;3(1):110–6.
26. Leite SA, Locatelli SB, Niece SP, Oliveira AR, Tockus D, Tosin T. Impact of hyperglycemia on morbidity and mortality, length of hospitalization and rates of re-hospitalization in a general hospital setting in Brazil. Diabetol Metab Syndr. 2010;2(1):1–6.
27. Barmanray RD, Cheuk N, Fourlanos S, Greenberg PB, Colman PG, Worth LJ. In-hospital hyperglycemia but not diabetes mellitus alone is associated with increased in-hospital mortality in community-acquired pneumonia (CAP): a systematic review and meta-analysis of observational studies prior to COVID-19. BMJ open diabetes Res care. 2022;10(4).
28. Kartika IR, Wahyuni A, Dewi NF. Diabetic Self-Management Education – Effect on Self-Management Care of Type-2 Diabetic Patients. Media Karya Kesehat. 2021;4(2):183–93.
29. Hati Y, Fadillah F, Pase M. Health Locus of Control Dan Self-Efficacy Pasien Dm Tipe 2 Dengan Penerapan Modifikasi Psikoedukasi. J Keperawatan Prior. 2021;4(1):9–17.