



THE EFFECT OF COGNITIVE BEHAVIORAL THERAPY ON THE SELF-MANAGEMENT AND SELF-CARE BEHAVIOR OF TYPE 2 DIABETES MELLITUS PATIENTS

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ABSTRACT

Diabetes mellitus (DM) is a metabolic condition characterized by chronic hyperglycemia (the increase of glucose levels in the blood) caused by an insulin secretion defect. One of the non-pharmacological therapies used to decrease the symptoms of type 2 DM is cognitive-behavioral therapy. The research objective was to identify the effect of cognitive behavior therapy (CBT) on the self-management and self-care behavior of type 2 DM patients. The research used a quasi-experimental method with a two-group pretest-posttest design. The samples were 70 respondents, 35 of them being in the intervention group and the other 35 being in the control group, taken using a consecutive sampling technique. The data were gathered using the Diabetes Self-Management Questionnaires (DSMQ) and the Summary of Diabetes Self-Care Activities (SDSCA) questionnaires. The gathered data were analyzed by using the paired t-test and independent t-test. The study results showed significant differences in the mean scores of self-management and self-care behavior between the intervention group ($t=13.24$; $p=0.00$) and the control group ($t=14.63$, $p=0.00$), respectively. It is recommended that cognitive behavior therapy be used as one of the non-pharmacological therapies to change self-care behavior in type 2 DM patients.

Keywords: Cognitive behavioral therapy; self-management; self-care behavior; type 2 diabetes mellitus



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INTRODUCTION

Diabetes mellitus (DM) is a metabolic condition characterized by the occurrence of chronic hyperglycemia (the increase of blood sugar levels) caused by defective insulin secretion. Hyperglycemia is followed by acute symptoms, such as extreme dehydration, fatigue, and frequent urination. The data from (Atlas, 2015) estimates that the incidence of type 2 DM is higher than the incidence of type 1 DM. During 2015-2018, the incidence of type 2 DM reached 415 million patients from several countries, including the United States of America with a prevalence of around 10-15%, Caucasias 4-6%, and Africa 2-4%. It is estimated that, by 2040, the incidence of type 2 DM will increase to 642 million people in the world.

According to (Dany et al., 2020), the prevalence of diabetes mellitus in Indonesia is around 3.4% of the total population,

or around 265 million people. In Southeast Asia, Indonesia is ranked second with the incidence rate of diabetes mellitus at 8.4 million people, and it is projected to increase 2.5 times or to around 21.2 million people annually.

A survey by Basic Health Research showed that the number of type 2 DM patients in North Sumatra was at 1.4% of the population (Milita, Handayani, & Setiaji, 2021). The highest incidences were in Deli Serdang Regency (1.9%), Medan City (1.7%), Langkat Regency (1.8%), Simalungun Regency (1.6%), and Asahan Regency (1.5%) (Wijaya, 2019). Meanwhile, in Medan, the total number of type 2 DM patients is ranked third after hypertension and coronary heart disease (CHD), with the highest prevalence from each area existing in North Sumatra. The data originating from the Health Agency of Medan in 2017 showed that from 39 community health centers in Medan, the total number of

type 2 DM patients that underwent treatment was 20,103 people (Rini, Afriadi, & Purnomo, 2019).

The increased prevalence of type 2 DM is caused by the failure of someone to perform self-care in daily life, such as poor self-management and self-control, no regularities, and no self-discipline to prevent type 2 DM (Zai et al., 2019). Cognitive-behavioral therapy is a psychotherapy that changes the process of an individual's maladaptive mindset (cognitive distortion) and overreactions (Elliott, 2012). The goal of CBT intervention is to help an individual to change irrational cognition into rational cognition. CBT consists of 8-12 sessions or more, where the patient is led to learn how to identify and change thoughts that are having a bad impact on behavior. Therefore, CBT can improve patients' self-care behavior with type 2 DM (Daniels, 2015).

Self-management is a psychiatric therapy that can change the process of an individual's thought patterns (cognitive), which are maladaptive and improve an individual's behavior (Daniels, 2015). Self-management aims to increase the patient's participation, involvement, and activation in positive health behaviors by facilitating knowledge, skills, and abilities to increase self-care competence (Davies et al., 2018). The existence of self-management combined with CBT intervention will lead to a patient's self-care behavior. Good self-care behavior in type 2 DM patients includes a healthy diet, physical activity, blood sugar level control, drug management, foot treatment, and not smoking (Eid et al., 2018a).

The purpose of this study was to examine the effect of CBT on the self-management and self-care behavior of Type 2 Diabetes Mellitus patients at Padang Bulan Health Center and Puskesmas Teladan, Medan City.

METHOD

Study Design

This study was a quantitative study using a quasi-experimental design.

Participant

This study's population was all type 2 DM patients in Padang Bulan Community Health Center and Teladan Community Health Center, Medan, with 70 types 2 DM respondents conducted between October and November 2020. This study's respondents were 35 respondents; each

group was calculated using power analysis and consecutive non-probability sampling (Delice, 2001). The sample size was calculated based on a previous study (Adib Hajbaghery, Nabizadeh-Gharghozar, & Bolandianbafghi, 2019). They reported that the mean and the standard deviation of pre and post-intervention were 2.96 ± 1.01 and 2.18 ± 1.10 . Despite this, the subjects in the intervention group still followed the DM protocol therapy as well.

Instruments

The study instruments were the Diabetes Self-Management Questionnaire (DSMQ) and the Summary of Diabetes Self-Care Activities (SDSCA). It was validated by three experts from the Faculty of Psychology and Universitas Sumatera Utara Hospital. The DSMQ consisted of 14 items, and the SDSCA was composed of 14 items. The instruments of the DSMQ and SDSCA had a good content validity index (0.94 and 0.97, respectively). Meanwhile, the reliability of the DSMQ was 0.86 and for the SDSCA was 0.74.

Intervention

The CBT intervention consisted of 5 sessions where each session was 30 minutes to 1 hour in duration. The intervention was conducted for four weeks. The researchers used several methods to perform the intervention: education, exercise, discussion, and role-play.

Data Collection

Data were collected in Padang Bulan Community Health Center and Teladan Community Health Center, Medan, conducted between October and November 2020.

Data Analysis

Data were analyzed using a computer software. Descriptive statistics (e.g., mean, median, frequencies, and standard deviation) were used to describe the study variables. The paired sample t-test and independent sample t test were employed to assess differences of self management and self-care behavior between intervention and control group. The level of statistical significance for statistical analysis was at 0.05.

Ethical Consideration

This study gained ethical approval from the Health Research Ethics Committee of the Faculty of Nursing, University of Sumatera Utara (No. 1891/VIII/SP/2019).

RESULT

Table 1. Frequency and percentage of the characteristics of respondents in the intervention and control groups (n=70)

Data	Intervention Group (n=35)		Control Group (n=35)	
	f	%	f	%
Age				
Early adulthood (46 – 55 years old)	10	28,6	6	17,1
Late adulthood (56 – 65 years old)	25	71,4	29	82,9
Gender				
Male	6	17,1	10	28,6
Female	29	82,9	25	71,4
Marital status				
Married	26	74,3	31	88,6
Divorced/widowed	9	25,7	4	11,4
Tribe				
Batak	18	51,4	25	71,4
Aceh	6	17,1	3	8,6
Malay	5	14,3	-	-
Javanese	4	11,4	7	20,0
Others	2	5,7	-	-

Data	Intervention Group (n=35)		Control Group (n=35)	
	f	%	f	%
Religion				
Protestant	12	34,3	18	51,4
Catholic	6	17,1	7	20,0
Moslem	17	48,6	10	28,6
Education				
Elementary school	6	17,1	0	0
Junior high school	13	37,1	13	37,1
Senior high school	13	37,1	17	48,6
Diploma	1	2,9	1	2,9
Bachelor	2	5,7	4	11,4
Occupation				
Army/police	1	2,9	0	0
Civil servant	4	11,4	2	5,7
Labor	6	17,1	7	20,0
General employee	1	2,9	3	8,6
Others	23	65,7	23	65,7
Income				
>1.500.000	35	100,0	35	100,0
Length of time suffering from type 2 DM				
>3 years	35	100,0	35	100,0

Table 1 shows that the majority of the respondents in the intervention group (71.4%) were in late adulthood (56-65 years old), and for the control group, the majority (82.9%) were in late adulthood (56-65 years old). More than half of the total respondents were female; the intervention group was 29 people (82.9%), and in the control group, it was 25 people (71.4%). Most respondents' marital status was married; the total from the intervention group was 26 people (74.3%), and from the control group, it was 31 people (88.6%). Most of the respondents were Batak - 18 people (51.4%) in the intervention group and 25 people (71.4%) in the control group. The majority of the respondents were Moslems: 17 people (48.6%) and 18 people (51.4%) from

the intervention and control groups. Based on the education level, the majority of the respondents in the intervention group (37.1%) were high school graduates (13 people), and the total in the control group was 17 people (48.6%). By occupation, the majority were categorized as housewives, both in the intervention group and the control group were 23 people (65.7%). The respondents' income in the intervention group and the control group was more than IDR 1,500,000, and the total was 70 people (100%). The responses from 35 people (100%) in the intervention group suffered from type 2 DM for more than three years. Similarly, the control group respondents or 35 respondents (100%) also suffered from type 2 DM for more than three years.

Table 2. Mean score of self-management and self-care behavior in type 2 DM patients between the two groups before the intervention (N=70)

Variable	Intervention Group		Control Group		t	p
	m	SD	m	SD		
Self-management	20,54	4,13	21,11	3,19	-0,65	0,52
Self-care behavior	42,86	7,50	42,77	7,50	0,05	0,96

Based on Table 2, the mean score of self-management in the intervention group was 20.54 and 4.13 for SD, while in the control group, it was 21.11 for the mean score and 3.19 for SD. Also, the mean score for self-care behaviors in the intervention group was 42.86 and 7.50 for SD, while the control group had 42.77 for the mean score and 7.50 for SD.

Therefore, it could be concluded that there was no difference in the mean score of self-management ($t=-0.65$; $p=0.52$) and self-care behaviors ($t=0.05$; $p=0.96$) between the intervention group and the control group before applying the self-management-based CBT.

Table 3. The difference in the mean score of self-management in type 2 DM patients at pretest and posttest in the intervention group (n=35)

Variables	Intervention Group		t	p
	m	SD		
Self-management				
Pretest	20.54	4.13	-193.09	0.00
Posttest	47.37	3.68		
Self-care behaviors				
Pretest	42,86	7,61	-55,42	0,00
Posttest	78,20	11,17		

Table 3 shows that the mean score of self-management (mean=47.37; SD=3.68) and self-care behavior (mean=78.20; SD=11.17) in the intervention group was

higher after participating in the self-management-based CBT program than in the control groups. This result indicated that there was a difference between the mean

score of self-management and self-care behaviors in the intervention group before and after the treatment ($t=-193.09$; $p=0.00$ and $t=-55.42$; $p=0.00$).

Table 4. The differences in the mean score of self-management and self-care behavior in type 2 DM patients between the intervention and the control groups at the posttest (n=70)

Variable	Intervention Group (n = 35)		Control Group (n = 35)		t	p
	m	SD	m	SD		
Self-management	47.37	3.67	36.11	4.27	13.24	0.00
Self-care behavior	78.20	11.17	47.71	5.19	14.63	0.00

Table 4 depicts that the mean score of self-management (mean=47.37; SD=3.67) and self-care behaviors (mean=78.20; SD=11.17) in the intervention groups were higher than those in the control group. There were significant differences in the mean score of self-management ($t=13.24$; $p=0.00$) and self-care behavior ($t=14.63$; $p=0.00$) between the two groups.

DISCUSSION

After participating in the self-management-based CBT intervention, self-care behaviors in intervention group and control group can be seen from the statistical result. It shows that the intervention group's score was higher after participating in the program (mean=74.57; SD=13.32) than the score before (mean=42.86; SD=7.61).

Meanwhile, the control group's self-care behavior score was higher after participating in the self-management-based program (mean=45.37; SD=8.229) than the score before (mean=42.77; SD=7.50). This result shows a difference in the mean score of self-care behavior in the intervention group before and after the treatment ($t=-20.590$; $p=0.00$).

The mean scores of self-management and self-care behavior in intervention group were higher than those in the control group. This is because they received a structured form of CBT intervention. The respondents played active roles in participating in each session during the intervention. CBT can change people's attitudes and behaviors by focusing on the thoughts and beliefs (cognitive process) and how they are connected to how they behave. A study conducted by (Munshi, 2017) also supported the fact that the cognitive-behavioral model can significantly increase self-care behavior in patients from chronic diseases.

The study results show that CBT's implementation provided a significant influence on increasing self-care behavior in patients with hypertension. This is in line with a study conducted by (Eid et al., 2018b), which showed that CBT effectively decreases the severity of the diagnosis and changes the self-care behavior of type 2 DM patients. (Uchendu & Blake, 2017) claimed that cognitive-behavioral therapy significantly improved the self-care of maintaining blood glucose in the short term for patients with diabetes.

There is a difference in self-care behaviors between the intervention and control groups before and after the self-management-based CBT. The analysis results show that the score for self-care behaviors in the intervention group was higher (mean=78.20; SD=11.17) than the score before (mean = 47.71; SD = 5.19). The results found a difference in the mean score of self-care behaviors in the intervention and control groups after the treatment ($t=14.63$; $p=0.00$).

A study conducted by (Chernyak et al. 2010) showed that the CBT approach effectively decreased irrational belief and stress. The result is also in line with the health belief model theory in (Daniels, 2015), which stated that someone who

has obtained information and skills related to their disease would have a good perception towards their disease, and will form and strengthen their self-care behavior, and this is especially true for type 2 DM patients. It can be concluded that cognitive-behavioral therapy effectively increases the awareness of type 2 diabetes patients of the importance of performing optimal self-care behavior in daily life.

According to Gratzner and Khalid-Khan (2016), CBT can be an effective therapy for various problems, such as anxieties, chronic pains, depression, sleep disorders, dietary problems, and other. (Yang, Li, & Sun, 2020) claimed that CBT effectively reduces the severity of the symptoms and improves both the psychological and physiological symptoms of diabetes mellitus. The method of CBT also plays an important role. Providing information about diabetes, monitoring blood sugar regularly, and making a list of healthy menus, specifically diabetes, can also improve the expected outcome results (Pan et al., 2020).

Chronic diseases, such as type 2 DM, need a patient-centered approach (patient empowerment), emphasizing a collaborative approach that facilitates better behavioral changes. It is relevant that CBT is an educational tool aimed at educating patients to be therapists for themselves and emphasizing preventive actions (Gonzalez et al., 2010). With a combination of education and counseling that involves active patient participation, CBT will help patients change behavior and think adaptively and improve skills to make decisions related to diabetes (Harvey, 2015).

Limitations of the Study

This study has some limitations. This study setting limited in two community health centers in Medan City. The study had relatively a small sample size. This study intersects with the Ministry of Health's for elderly program.

CONCLUSION AND RECOMMENDATION

Cognitive behavior therapy (CBT) positively impacts the self-management and self-care behaviors of type 2 DM patients. CBT improves people's attitudes and behaviors with type 2 DM by focusing on the thoughts and beliefs they hold (their cognitive processing) and how they are connected with the way they behave.

The health services should consider using accurate interventions, such as cognitive-behavioral therapy intervention, to maximize recovery and medical treatment programs. It can be done by providing training on CBT to the healthcare staff, especially nurses, and then collaborating with psychologists to support the recovery of type 2 DM patients optimally. For future studies, it is suggested to conduct a study with different respondents and to use different locations. It is also suggested that it be better to use measurement scales as instruments, such as observation sheets. The research assistant is required to support the success of interventions provided to patients in future studies. The use of a long time is required to get good

intervention results given to respondents before and after the interventions.

REFERENCES

- Adib Hajbaghery, M., Nabizadeh-Gharghozar, Z., & Bolandianbafghi, S. (2019). Comparative study of nursing Ph.D.: Education system and curriculum in Iran and Alberta school of nursing. *Military Caring Sciences*, 6(1), 69–78. <https://doi.org/10.29252/mcs.6.1.69>
- Atlas, D. (2015). International diabetes federation. IDF diabetes atlas, 7th Edn. Brussels, Belgium: International Diabetes Federation.
- Chernyak, N., Kulzer, B., Hermanns, N., Schmitt, A., Gahr, A., Haak, T., ... Giani, G. (2010). Within-trial economic evaluation of diabetes-specific cognitive behaviour therapy in patients with type 2 diabetes and subthreshold depression. *BMC Public Health*, 10(1), 625. doi: 10.1186/1471-2458-10-625.
- Daniels, S. (2015). Cognitive behavior therapy for patients with cancer. *Journal of the Advanced Practitioner in Oncology*, 6(1), 54-56. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/>
- Dany, F., Dewi, R. M., Tjandrarini, D. H., Pradono, J., Delima, D., Sariadji, K., ... Kusumawardani, N. (2020). Urban-rural distinction of potential determinants for prediabetes in Indonesian population aged ≥ 15 years: A cross-sectional analysis of Indonesian Basic Health Research 2018 among normoglycemic and prediabetic individuals. *BMC Public Health*, 20(1), 1–9. <https://doi.org/10.1186/s12889-020-09592-7>
- Davies, M. J., D'Alessio, D. A., Fradkin, J., Kernan, W. N., Mathieu, C., Mingrone, G., ... Buse, J. B. (2018). Management of hyperglycaemia in type 2 diabetes, 2018: A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia*, 61(12), 2461–2498. <https://doi.org/10.2337/dci18doi: -0033>
- Delice, A. (2010). The sampling issues in quantitative research. *Educational Sciences: Theory & Practices*, 10(4), 2001–2018. Retrieved from <https://files.eric.ed.gov/fulltext/EJ919871.pdf>
- Eid, L. P., Leopoldino, S. A. D., Oller, G. A. S. A. de O., Pompeo, D. A., Martins, M. A., & Gueroni, L. P. B. (2018a). Factors related to self-care activities of patients with type 2 diabetes mellitus. *Escola Anna Nery*, 22(4). <http://dx.doi.org/10.1590/2177-9465-ean-2018-0046>
- Eid, L. P., Leopoldino, S. A. D., Oller, G. A. S. A. de O., Pompeo, D. A., Martins, M. A., & Gueroni, L. P. B. (2018b). Factors related to self-care activities of patients with type 2 diabetes mellitus. *Escola Anna Nery*, 22(4), 1–9. <https://doi.org/10.1590/2177-9465-ean-2018-0046>
- Elliott, S. (2012). Cognitive behavioural therapy and glycaemic control in diabetes mellitus. *Practical Diabetes*, 29(2), 67–71. <https://doi.org/10.1002/pdi.1661>
- Gonzalez, J. S., McCarl, L. A., Wexler, D. J., Cagliero, E., Delahanty, L., Soper, T. D., ... Safren, S. A. (2010). Cognitive-behavioral therapy for adherence and depression (CBT-AD) in type 2 diabetes. *Journal of Cognitive Psychotherapy*, 24(4), 329–343. doi: <https://dx.doi.org/10.1891/2F0889-8391.24.4.329>
- Gratzer, D., & Khalid-Khan, F. (2016). Internet-delivered cognitive behavioural therapy in the treatment of psychiatric illness. *CMAJ*, 188(4), 263–272. doi: <https://dx.doi.org/10.1503/2Fcmaj.150007>
- Harvey, J. N. (2015). Psychosocial interventions for the diabetic patient. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 8, 29–43. <https://doi.org/10.2147/DMSO.S44352>
- Milita, F., Handayani, S., & Setiaji, B. (2021). Prevalence of Diabetes Mellitus Type II on Elderly in Indonesia (Analysis of Basic Health Research 2018). *Jurnal Kedokteran dan Kesehatan (Journal of Medical and Health)*, 17(1), 9-20. doi: <https://doi.org/10.24853/jkk.17.1.9-20>
- Munshi, M. N. (2017). Cognitive dysfunction in older adults with diabetes: What a clinician needs to know. *Diabetes Care*, 40(4), 461–467. <https://doi.org/10.2337/dc16-1229>
- Pan, X., Wang, H., Hong, X., Zheng, C., Wan, Y., Buys, N., ... Sun, J. (2020). A group-based community reinforcement approach of cognitive behavioral therapy program to improve self-care behavior of patients with type 2 Diabetes. *Frontiers in Psychiatry*, 11(July), 1–10. <https://doi.org/10.3389/fpsy.2020.00719>
- Rini, A., Afriadi, A., & Purnomo, D. S. (2019). Self care level and the compliance of type II diabetes mellitus outpatients at Sentosa Baru health center Medan. *Jurnal Dunia Farmasi (Journal of World Pharmacy)*, 3(2), 61–68. <https://doi.org/10.33085/jdf.v3i2.4499>
- Uchendu, C., & Blake, H. (2017). Effectiveness of cognitive-behavioural therapy on glycaemic control and psychological outcomes in adults with diabetes mellitus: a systematic review and meta-analysis of randomized controlled trials. *Diabetic Medicine*, 34(3), 328–339. <https://doi.org/10.1111/dme.13195>
- Wijaya, Y. D. (2019). Mental health in Indonesia: Now and future. *Buletin Jagaddhita (Jagaddhita Bulletin)*, 1(1), 1-4. Retrieved from <https://buletin.jagaddhita.org/media/276147-kesehatan-mental-di-indonesia-kini-dan-n-b871dafa.pdf>
- Yang, X., Li, Z., & Sun, J. (2020). Effects of cognitive behavioral therapy-based intervention on improving glycaemic, psychological, and physiological outcomes in adult patients with diabetes mellitus: A meta-analysis of randomized controlled trials. *Frontiers in Psychiatry*, 11(July), 1–18. <https://doi.org/10.3389/fpsy.2020.00711>
- Zai, Y.C., Telaumbanua, J.I., Siregar, M.C., Bohalima, K., & Kaban, K. (2019). The effect of diabetes self-management education program on decreased blood glucose levels in patients with DM Type II at Royal Prima Hospital Medan Year 2019. *Jurnal Ilmiah PANMED (Pharmacist, Analyst, Nurse, Nutrition, Midwifery, Environment, Dentist)*, 14(2), 1–8. <https://doi.org/10.36911/panmed.v14i2.464>