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Cognitive Behavioral Therapy to Improve Life Quality and Blood Stability

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Abstract--*Diabetes is a severe chronic disease, ranked third out of four world non-communicable diseases. The prevalence of type 2 diabetes mellitus (DM) in Indonesia is 1.6 million and in Surakarta is 9484. This research aimed to determine the effect of cognitive behavioral therapy (CBT) in improving the life quality and blood sugar stability of patients with type 2 DM. The quasi-experimental (pre-test–post-test control group design) method used 84 subjects taken purposively. The results of the univariate analysis in the experimental and control groups showed that most of the subjects were housewives with high school education and some with an undergraduate degree. The participants were mostly women aged 51–60 years old, height 151–160 cm and body weight 51–60 kg. The results of the bivariate analysis showed that CBT could improve the life quality of patients with type 2 DM (p = 0.001); CBT can also help to stabilize fasting blood sugar (p = 0.023) and current blood sugar (p = 0.001). Health workers can help to change the mindset, beliefs and maladaptive behavior of DM patients using DM management.*

Key words--*cognitive behavioral therapy, diabetes mellitus management, type 2 diabetes mellitus*

I. INTRODUCTION

Management of diabetes mellitus (DM) is a very important issue, considering that the number of patients is increasing year by year, and it is the highest cause of death in the world adult population of 5 million deaths, beating HIV/AIDS (1.5 million), tuberculosis (1 5 million) and malaria (0.6 million) (International Diabetes Federation, 2007). The World Health Organization (WHO) estimates that DM will be the seventh cause of death in 2030: prevalence in the adult population (≥18 years) increased from 108 million sufferers (4.7%) in 1980 to 422 million sufferers (8.5%) in 2014 (World Health Organization, 2016).

The prevalence of type 2 DM in Indonesia is 1.6 million (Indonesia Ministry of Health, 2013). Diabetes in Central Java Province ranks second for non-communicable diseases and has increased from 15.77% in 2015 to 22.1% in 2016. The prevalence of type 2 DM in 2016 (second quarter) was 10,569 (Public Health Office, 2016). Based on preliminary research by Dr. Moewardi, the number of DM outpatients in 2015 reached 9792 cases, increasing to 10,483 cases in 2016. The number of hospitalizations was 3220 cases in 2015, rising to 2893 cases in 2016 (Moewardi, 2016).

Diabetes mellitus is a chronic endocrine disorder characterized by hyperglycemia due to absolute and relative insulin deficiency. As a result, patients must carry a label for the rest of their lives. Patients must always maintain their diet, have regular exercise, monitor glucose levels, maintain foot health, inject insulin and take

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medication regularly; it can even be said that to inhibit complications from this disease the whole pattern of life changes (Gonzalez et al., 2007).

Complications from diabetes are associated with hyperglycemia, high blood pressure and lipids (Coelli et al., 2016). Hyperglycemia is associated with microvascular disease (nephropathy, retinopathy, and neuropathy) that accelerates macrovascular complications such as stroke and coronary heart disease, which are the leading causes of early DM deaths (Dorajo et al., 2015). Blindness, kidney failure, heart attack, stroke, and leg amputation often accompany DM patients (International Diabetes Federation, 2015; World Health Organization, 2016).

Changing behavior/lifestyle and consistent management of DM are not easy for DM patients. Patients often experience substantial emotional stress and negative influences, including feelings of helplessness, hopelessness, anxiety, and depression (Gonzalez et al., 2007), all of which affects glycemic control, increases the risk of complications (Lustman, 2005) and decreases treatment compliance and life quality (Gonzalez et al., 2015).

Improved blood sugar control is indeed inseparable from treatment, but treatment will be more optimal if the patient can manage his behavior consistently Hunter, 2015). Changing patient behavior (lifestyle) can be done by giving educational guidance (Garcia-Perez et al., 2013). One such method is cognitive behavioral therapy (CBT), which helps to change the mindset and maladaptive behavior of DM management into healthier behavior (Turner and Swearer, 2010).

CBT is useful for reducing depression, anxiety, and anger, thus improving life quality (Hofmann et al., 2012). CBT affects functional and non-functional behavior, dysfunctional emotions and self-awareness, all of which are influenced by cortical and subcortical structures, the endocrine system and immunity (Jokić-Begić, 2010). Psychologically, CBT can reduce depressive symptoms, prevent major depression and improve glycemic control, mortality and cost-effectiveness (Petrak et al., 2012); CBT can also improve self-management and the management of diabetes care (Welschen et al., 2007).

The purpose of this research was to determine the effect of CBT on the management of type 2 DM patients to improve life quality and healthy blood sugar stability. This research is also expected to be a model for DM patient management and used for helping Puskesmas (Community Health Center) to improve their quality of care.

II. MATERIALS AND METHODS

The design of this research was quasi-experimental with a pre-test–post-test control group design. The independent variable (x) is the provision of CBT in the management of DM patients. The dependent variable (y) is the patient's life quality and regular/stable blood sugar levels. The number of samples was 84, taken purposively in the Sibela Surakarta Community Health Center. Inclusion criteria were not having a history of macrovascular complications and being 35–80 years old. Exclusion criteria were having a mental disorder and not wanting to be a respondent. The research was conducted in May-August 2018, and the instrument used, to measure patients' life quality was the CBT module WHOQOL-BREF. Life quality is divided into four domains:

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Physical (D1), Psychological (D2), Social Relations (D3) and Environment (D4). Laboratory tests measured fasting blood sugar (FBS) and current blood sugar (CBS).

Data collection was carried out after obtaining a research permit from the Surakarta City Planning, Research, and Development Agency and ethical clearance from Dr. Moewardi (KEPPKN registration number 3372041D). Data retrieval is done in four stages. The first stage (pre-test) is done after the respondent signs the Informed Consent form. On the same day, life quality data were taken using WHOQOL-BREF, FBS, and CBS checks and CBT treatment for DM management. The second and third stages were done by giving CBT treatment for nutrition management and activity management, respectively. One month later the final stage, a post-test, was carried out using WHOQOL-BREF and there was a check on patients' FBS and CBS.

The data were analyzed using SPSS Version 23 to describe patient identity, life quality, and blood sugar. A Wilcoxon pre-test–post-test was done to see the effect of CBT on life quality and blood sugar before and after the experiment. Figure 1 shows the relationship between variables.

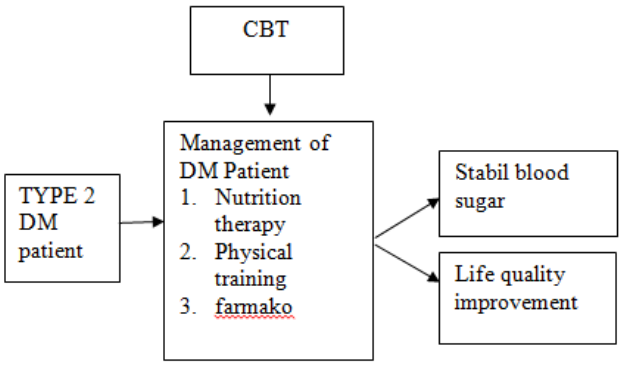

Figure 1. The relationship between variables

III. FINDINGS AND DISCUSSIONS

Univariate analysis

Subject description

Table 1. Occupation description

Occupation	Experimental		Control	
	N	%	N	%
Retired	2	4.8	4	9.6
Civil servant	15	35.8	11	26.2
Entrepreneur	6	14.4	10	23.9
Housewife	19	45.0	17	40.3

Table 1 shows that most of the respondents were housewives: 45% in the experimental group and 40.3% in the control group.

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Table 2. Education description

Education	Experimental		Control	
	N	%	n	%
Elementary school	8	19.0	6	14.4
Junior high school	8	19.0	5	11.9
Senior high school	17	40.3	24	57.1
Undergraduate degree	9	21.7	7	16.6

Table 2 shows that most of the respondents are high school graduates: 40.3% in the experimental group and 57.1% in the control group. Also, there are some respondents with bachelor degrees: 21.7% in the experimental group and 16.6% in the control group.

Table 3. Age description

Age (years)	Control			
	n	%	n	%
30–40	-		3	7.2
41–50	2	4.8	7	16.6
51–60	21	50.0	24	57.0
61–70	19	45.2	6	14.4
71–80	–		2	4.8

Table 3 shows that the majority of respondents are those aged 51–60 years: 50% in the experimental group and 57% in the control group.

Table 4. Gender description

0	Experimental	%	Control	%
Male	13	31	14	34
Female	29	69	28	66

Table 4 shows that most of the respondents are female: 69% in the experimental group and 66% in the control group.

Table 5. Body height description

Height (cm)	Experimental		Control	
	n	%	n	%
140–150	12	28.5	10	23.7
151–160	22	52.4	20	47.6
161–170	7	16.7	9	21.5

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171–180	1	2.4	3	7.2

Table 5 shows that the majority of DM patients have a height of 151–160 cm: 52.4% in the experimental group and 47.6% in the control group.

Table 6. Body weight description

Weight (kg)	**Experimental**		**Control**	
	n	**%**	**n**	**%**
40–50	5	11.8	6	14.2
51–60	18	42.9	21	50.0
61–70	10	23.8	5	11.8
71–80	7	16.7	9	21.6
81–90	2	4.8	1	2.4

Table 6 shows that most of the patients have body weights of 51–60 kg: 42.9% in the experimental group and 50% in the control group.

Life quality description

Table 7 shows the life quality of patients in the experimental group before being given the highest CBT at D4 (Environment), with a mean of 48.52 and a standard deviation (SD) of 9.693. After being given CBT, there was a marked change in life quality in D2 (Psychological), with a mean of 62.64 and an SD of 5.036.

Table 7. Life quality description

Experimental group	**Pre-test**	**Domain**	**Mean**	**SD**
		D1	45.48	11.606
		D2	47.17	10.014
		D3	48.19	10.131
		D4	48.52	9.693
	Post-test	D1	58.26	6.865
		D2	62.64	5.036
		D3	61.45	8.780
		D4	60.67	8.078
Control group	**Pre-test**	D1	56.98	4.556
		D2	58.17	5.600
		D3	57.86	8.274
		D4	61.55	5.882
	Post-test	D1	56.98	3.790
		D2	57.24	5.427
		D3	58.43	7.902

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		D4	61.69	6.135

Blood sugar description

Table 8. Blood sugar description

Experimental group	**Stage**	**Blood sugar**	**Mean**	**SD**
	Pre-test	GDP	177.86	85.985
		GDS	237.07	133.897
	Post-test	GDP	151.40	60.838
		GDS	221.60	109.820
Control group	**Pre-test**	GDP	168.24	47.237
		GDS	240.79	95.027
	Post-test	GDP	171.93	48.154
		GDS	246.07	93.205

Table 8 shows that in the experimental group there was a decrease in FBS score (mean, 26.46; SD, 25.147) after being given CBT, whereas in the control group there was an increase (mean, 3.69; SD, 0.917) after being given CBT.

The CBS score in the experimental group decreased by a mean of 15.47 (SD, 24.077) whereas in the control group there was an average increase of 5.28 and a decrease in SD of 1.822.

Bivariate analysis

Normality test

Table 9. Distribution normality of life quality data

Phase	**Domain**	**Statistics**	**p**
Experimental group pre-test	D1	0.127	0.085
	D2	0.142	0.034
	D3	0.239	0.001
	D4	0.236	0.001
Experimental group post-test	D1	0.136	0.049
	D2	0.243	0.001
	D3	0.281	0.001
	D4	0.314	0.001
Control group pre-test	D1	0.228	0.001
	D2	0.258	0.001
	D3	0.303	0.001

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Phase	Domain	Statistics	p
	D4	0.280	0.001
Control group post-test	D1	0,411	0.001
	D2	0,267	0.001
	D3	0,335	0.001
	D4	0,276	0.001

D1, Physical; D2, Psychological; D3, Social Relations; D4, Environment.

The Kolmogorov Smirnov test results in Table 9 show that a significance of $p < 0.05$ results in the abnormal distribution of life quality in experimental and control groups.

Table 10. Distribution normality of blood sugar data

Phase	Blood sugar	Statistics	p
Experimental group pre-test	GDP	0.182	0.001
	GDS	0.164	0.006
Experimental group post-test	GDP	0.193	0.001
	GDS	0.148	0.019
Control group pre-test	GDP	0.126	0.089
	GDS	0.180	0.002
Control group post-test	GDP	0.152	0.016
	GDS	0.179	0.002

Table 10 shows that a significance of $p < 0.05$ results in abnormal distribution of FBS and CBS in experimental and control groups.

Effect of CBT on life quality in experimental and control groups

Table 11. Difference in life quality for experimental group after CBT

Pre- and post-test	Mean	SD	P
D1 Pre	45.48	11.606	0.001
D1 Post	58.26	6.865	
D2 Pre	47.17	10.014	0.001
D2 Post	62.64	5.036	
D3 Pre	48.19	10.131	0.001
D3 Post	61.45	8.780	
D4 Pre	48.52	9.693	0.001
D4 Post	60.67	8.078	

D1, Physical; D2, Psychological; D3, Social Relations; D4, Environment.

Table 11 shows that a significance of 0.001 < 0.05 results in differences in quality of life before and after CBT in the experimental group.

In the control group there was no difference in life quality before and after CBT because the significance was

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0.001 > 0.05 (Table 12).

Table 12. Difference in life quality for control group after CBT

Pre- and post-test	Mean	SD	P
D1 Pre	56.98	4.556	0.709
D1 Post	56.98	3.790	
D2 Pre	58.17	5.600	0.142
D2 Post	57.24	5.427	
D3 Pre	57.86	8.274	0.046
D3 Post	58.43	7.902	
D4 Pre	61.55	5.882	0.317
D4 Post	61.69	6.135	

D1, physical; D2, Psychological; D3, Social Relations; D4, Environment.

Effect of CBT on blood sugar in experimental and control groups

Table 13. Differences in blood sugar of experimental groups after CBT

Data	FBS		CBS	
	Pre	Post	Pre	Post
Mean	177.86	151.40	237.07	221.60
SD	85.985	60.838	133.897	109.820
(-) Rank	27		15	
(+) Rank	38		4	
Ties	0		0	
P	0.023		0.001	

Table 13 shows that there were differences in FBS and CBS levels before and after CBT in the experimental group, with a significance of $p < 0.05$. 27 respondents experienced a decrease in FBS and 38 who experienced a decline in CBS.

In the control group, there was no decrease in FBS or CBS. The results of the Wilcoxon pre-test–post-test showed that the significance of FBS and CBS was $p < 0.05$ but the difference did not indicate blood sugar stability. In contrast, differences showed an increase in FBS and CBS in the control group after CBT.

In the experimental group, there was a decrease in FBS and CBS whereas in the control group there was an increase in FBS and CBS. In the control group only one respondent experienced a decline in FBS, 13 experienced no change in FBS and 28 experienced a rise in FBS (see Table 14).

Table 14. Difference in control group blood sugar after CBT

Data	FBS	CBS

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	Pre	Post	Pre	Post
Mean	168.24	240.79	171.93	246.07
SD	47.237	95.027	48.154	93.205
(-) Rank	1		0	
(+) Rank	28		34	
Ties	13		8	
p	0.001		0.001	

Effect of CBT on life quality

The results showed that CBT could affect the life quality of patients with type 2 DM in Sibela Surakarta Health Center. The life quality consists of Physical (D1), Psychological (D2), Social Relations (D3) and Environment (D4) domains. This influence of CBT is indicated by a significance value of $p = 0.001 < 0.05$.

Choi and Pak (2007) recommended the CBT approach as one of the non-pharmacological alternatives to improve the life quality of DM patients who have comorbid depression to reduce the use of anti-depressant drugs (Noorozi et al., 2017). This CBT approach is also used by Noorozi et al. in type 2 DM patients who have no comorbid depression, and the results show that CBT can also improve the life quality of these patients (Noorozi et al., 2017). According to Hofmann et al. (2012), CBT can enhance the quality of life by reducing depression, anxiety, and anger.

Before being given CBT, the average patient had the best life quality in the environmental domain of 48.52. The average patient still has a passion for a social life with family, neighbors, and coworkers. Maladaptive behavior that occurs in patients is related to treatment management, nutrition and exercise activities. After being given CBT, the psychological life quality, which previously had an average of 47.17, increased quite substantially to 62.64.

Antecedents are the most common causes of spiritual, psychosocial problems that affect DM management. Maladaptive behavior in the form of a misconception about diabetes means that patients do not pay attention to medication rules, nutritional intake or the correct activity for DM patients. Others feel that they are not cared for or supported by the family, they are worried about the future of others, and they feel they cannot meet the demands of the environment. The results showed that after being given CBT respondents increasingly enjoyed life, felt meaningful and had decreased negative feelings.

Egde et al. explained that the antecedents of DM patients are caused by fear of blood sugar, thereby reducing the self-management participation of DM patients. A decrease in self-management affects both blood sugar control and life quality (Egde et al., 2005).

According to Karlsen et al. the stress of DM patients is related to treatments that must be carried out throughout life, in addition to daily stress (Karlsen et al., 2004). Therefore, self-management becomes a non-pharmacological alternative that can help to free DM patients from the burden of always having to control blood sugar. According to Welschen et al. (2007), CBT can improve self-management and the management of diabetes care. Egde et al. (2005) explained that antecedents occur due to fear of blood sugar, thereby reducing the self-management participation of DM patients, which further reduces life quality.

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CBT is easy to apply to some problems with programs and interventions related to self-management. CBT helps individuals to identify their self-perceptions and thoughts about life experiences that influence emotional reactions causing them to behave maladaptively (Beck, 2011).

Effect of CBT on blood sugar

CBT also affects the stability of FBS in the normal direction in patients with type 2 DM. The results showed a significance of $p = 0.023 < 0.05$. Twenty-seven respondents experienced a significant decrease in FBS even though 15 respondents did not experience any decrease in blood sugar. When using a significance of $p = 0.001 < 0.05$ for blood sugar, 38 respondents experienced a decrease in CBS and only four respondents experienced a decrease in blood sugar.

Individual differences in self-management cause the diversity of success in reducing FBS and CBS in respondents. According to Rane et al. (2011) the success of DM management depends on personal responsibility. This is related to psychological and social situations. To change an individual's psychology, according to Lustman and Clouse (2005), a stressful situation management business is related to the ability to change thinking and behavior.

Cabello et al. (2005) explained that self-management education programs have a positive influence on DM patients about DM management knowledge and behavior, so they can be used to improve blood sugar control.

Conversely, in the control group, there was 1 respondent who experienced a decrease in FBS, 28 who experienced an increase in FBS, 13 who experienced FBS. 34 who experienced a rise in CBS and 8 who have the same CBS before and after treatment.

Not all DM patients experience a decrease in blood sugar, which may also be caused by a short session in the CBT approach. Beck (2011) usually gave CBT therapy for 9–11 courses, whereas in this research it only lasted for three sessions.

With the results of Roghieh's research (2017) showed that the decrease in blood sugar in type 2 DM patients was not significant after CBT. Three months later it was found that there was a substantial decrease in blood sugar, so it can be concluded that the results of the CBT approach can only be felt in the long run, not immediately.

IV. CONCLUSION

CBT can improve the life quality of patients with type 2 DM at the Sibela Surakarta Health Center (significance $p = 0.001 < 0.005$). Before being treated, patients had a life quality in the environmental domain (D4) with a mean of 48.52–60.67 and SD = 9.693–8.078. A sharp increase in life quality occurred in the psychological domain (D2), with a mean of 47.17–62.64 and SD = 10.014–5.036. In the physical domain (D1)

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life quality increased by a mean of 45.48–58.26, with SD = 11.606–6.865, and in the social relation domain (D3) it increased by a mean of 48.19–61.45 with SD = 10.131–8.780.

CBT can also help to stabilize FBS and CBS levels in patients. The significance for FBS is $p < 0.005$, which is equal to 0.023, and for CBS it is 0.001. Thus, during the two-month waiting period, the patient's blood sugar is stable. The mean FBS of patients decreases from 177.86 to 151.40, and SD decreases from 85.985 to 60.838. Furthermore, the mean CBS of patients decreases from 237.07 to 221.60 and SD decreases from 133.889 to 109.820.

On the other hand, in the control group, the mean FBS increases from 168.24 to 171.93 and SD increases from 47.237 to 48.154. The mean CBS increases from 240.79 to 246.07 and SD increases from 95.027 to 93.205.

CBT can be used to implement DM management nursing care and can also be carried out by health workers to change the mindset, beliefs and maladaptive behavior of DM patients to DM management. Research on DM management is more optimal if 9–11 sessions are conducted, but In this research, there were only three sessions due to time constraints.

V. SUGGESTION

CBT can be used to implement DM management nursing care. CBT can also be done by health workers to change the mindset, beliefs, and maladaptive behavior of DM patients to DM Management. Research on DM management is more optimal if 9 to 11 sessions are conducted. In this research there were only 3 sessions could be done due to time constraints.

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REFERENCES

1. Beck, J. (2011). *Cognitive behaviour therapy: Basic and beyond.* New York: The Guilford Press.
2. Cabello, I.R., Kontopantelis, E., Flurrie, S.L., & Dalton, A. (2005). Impact of the prevalence of concordant and discordant conditions on the quality of diabetes care in family pract.1370/afmices in England. *The Annals of Family Medicine*, *13*(6), 514-522.
3. Choi, B. & Pak, A.W.P. (2007). Multidisciplinarity, interdisciplinarity, and transdisciplinarity in health research, services, education and policy: Promotors, barriers, and strategies of enhancement. *Clinical and Investigative Medicine*, *30*(6), 224-232
4. Coelli, S., Soares, A., Moerira, M., Duarte, C., Souza, D., Zelmanovitz, T., & Silveiro, Ps. (2015). Determinants of glycemic and blood pressure control in type 2 diabetes patients: 606 outpatients diabetes cohort. *Diabetology & Metabolic Syndrome, 7*, A51.
5. Dorajo, D. & Boehm, B.O. (2015). Genetics of type 2 diabetes and clinical utility. *Genes (Basel)*, *6*(2), 372-384.
6. Egde, L.E., Nietert, P.J., & Zheng, D. (2005). Depression and all-cause and coronary heart disease mortality among adults with and without diabetes. *Diabetes Care*, *28*, 39-45.
7. Garcia-Perez, L.E., Alvarez, M., Dilla, T., Gil-Guillén, V., Orozco-Beltrán, D. (2013). Adherence to therapies in patients with type 2 diabetes. *Diabetes Therapy*, *4*(2), 175-194.
8. Gonzalez, J.S., Safren, S.A., Cagliero, E., Wexler, D.J., Delahanty, L., Wittenberg, E., Blais, M.A., et al. (2007). Depression, self-care, and medication adherence in type 2 diabetes. *American Diabetes Association*, *30*(9), 2222-2227.

DOI: 10.37200/IJPR/V24I8/PR280003
Received: 19 Jan 2020 | Revised: 06 Feb 2020 | Accepted: 12 Mar 2020

9. Gonzalez, J.S., Shreck, E., Psaros, C., & Safren, S.A. (2015). Distress and type 2 diabetes-treatment adherence: a mediating role for perceived control. *Health Psychology*, *34*(5), 505-513.
10. Hofmann, S.G., Vonk, I., Asnani, A., & Sawyer, A. (2012). The efficacy of cognitive behavioral therapy: A review of meta analyses. *National Institute Health*, *36*(5), 427-440.
11. Hunter, C. (2016). Understanding diabetes and the role of psychology in its prevention and treatment. *American Psychologist*, *71*, 515-525.
12. Indonesia Ministry of Health. (2013). *Basic Healthy Research Result*. Jakarta: Indonesia Ministry of Health.
13. International Diabetes Federation. (2015). *IDF Diabetes Atlas 7th ed*. UK: International Diabetes Federation.
14. Jokić-Begić, N. (2010). Cognitive-behavioral therapy and neuroscience: Towards closer integration. *Psychological Topics*, *2*, 235-254.
15. Karlsen, B., Idsoe, T., Dirdal, I., Rokne Hanestad, B., & Bru, E. (2004). Effects of a group-based counseling programme on diabetes-related stress, coping, psychological well-being and metabolic control in adults with type 1 or type 2 diabetes. *Patient Education Counseling*, *53*(3), 299-308.
16. Lustman, P.J. & Clouse, R.E. (2005). Depression in diabetic patients: The relationship between mood and glycemic control. *Journal of Diabetes Complications*, *19*(2), 113-122.
17. Moewardi. (2016). *Data Rekam Medis Pasien DM* [Medical Record Data of DM Patient]. Surakarta: Moewardi General Hospital.
18. Noorozi, Z., Hamidian, S., Homarmand, M.M.Z., Zargar, Y., Rashidi, H., & Dolatshashi, B. (2017). Improving depression, and quality of life in patients with type 2 diabetes: Using group cognitive behavior therapy. *Iranian Journal of Psychiatry, 12*(4), 281-286.
19. Petrak, F., Hautzinger, M., Plack, K., Kronfeld, K., Ruckes, C., & Herperetz, S. (2012). Cognitive behavioural therapy in elderly type 2 diabetes patients with minor depression or mild, and major depression: Study protocol of a randomized controlled trial (MIND-DIA). *BioMed Central Geriatrics*, *10*(21), 1471-2318.
20. Public Health Office. (2016). *Buku Saku Kesehatan Kesehatan Triwulan Dua Tahun* [Health Pocket Book]. Semarang: Public Health Office.
21. Rane, K., Wajngot, A., & Wandell, P.E. (2011). Psychososial problems in patients with newly diagnosed diabetes: Number and characeristics. *Diabetes Research and Clinical Practice, 54*(1), 44-51.
22. Roghieh, M., Mansour, H., & Lavasani, G. (2017). The reduction of anxiety and blood sugar level with group cognitive-behavior therapy in men and women with type II diabetes: An experimental study. *Caspian Journal of Neurological Sciences*, *3*(9), 95-105.
23. Turner, R. & Swearer, S.M. (2010). Cognitive behavioral therapy (CBT). *Educational Psychology Papers and Publications*, *147*, 226-229.
24. Welschen, L.M.C., Oppen, P., Dekker, J.M., Bouter, L.M., Stalman, W.A.B., & Nijpels, G. (2007). The effectiveness of adding cognitive behavioural therapy aimed at changing lifestyle to managed diabetes care for patients with type 2 diabetes: design of a randomised controlled trial. *BMC Public Health*, *7*, 74.
25. World Health Organization. (2016). *Diabetes Mellitus* [Online]. available from https://www.who.int. [Cited 2019 Jan 10].
26. Rohani, A., Akbari, V., Homayoon, K.Infective endocarditis presents as isolated splenomegaly(2011) Journal of Cardiovascular Disease Research, 2 (1), pp. 71-73.
DOI: 10.4103/0975-3583.78601
27. Lincy, G., Ponnavaikko, M., Anselm, L. Review of optimal siting and sizing techniques for distributed generation in the distribution system (2018) International Journal of Pharmaceutical Research, 10 (4), pp. 80-83.
28. Bhatia S, Namdeo AG, Nanda S. "Factors Effecting the Gelling and Emulsifying Properties of a Natural Polymer." Systematic Reviews in Pharmacy 1.1 (2010), 86-92. Print. doi:10.4103/0975-8453.59517

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