



The Effectiveness of Social Support Management of Diabetes on Glucose Control of Type 2 Diabetes Mellitus Patients: Quasi-Experiments

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Abstract

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BACKGROUND: Family plays a role in managing risk factors for diabetes mellitus (DM) in family members. The family can use diet and activity management as a form of prevention of risk factors and care for family members diagnosed with type 2 DM to keep it from getting to the level of severity.

AIM: The study aims to analyze Social Support Management of Diabetes (SoSMed) for glucose control of type 2 DM patients.

METHODS: The study used a quasi-experiment pre-post-test with a control group design. The SoSMed intervention was conducted for 3 months. The samples were taken by a random sampling technique of 50 respondents in each group. The measurement tool checks for glucose during the GDA-test 3 times, analyzed using a paired t-test.

RESULTS: The results show significant differences between the intervention and control groups after being given SoSMed in carrying out glucose control for patients with type 2 DM ($p = 0.001$).

CONCLUSION: SoSMed interventions provide type 2 DM sufferers with glucose control. Based on the findings, it is recommended that nurses should provide proper nursing interventions by involving families in diabetes management.

Introduction

Diabetes mellitus (DM) – has increased from 1.7 to 2.2 million due to risk factors such as smoking, unhealthy diets, lack of physical activity, and alcohol use, especially in Indonesia as a low- and middle-income country [1]. In Indonesia, the prevalence of diabetes has nearly doubled since 1980 [2]. The country also contributed a significant incidence related to the number of diabetics from 2007, 2013, and 2018, as stated by Basic Health Research (Riskesdas) data. The total was 5.7% in 2007, 6.9% in 2013, and in 2018 it increased to 8.5% [3]. International Diabetes Federation (IDF) has estimated that the number of Indonesian diabetic patients was 11.3% in 2020 and it was ranked on 7 in the world [4]

DM will become a severe problem if the patient has an unhealthy lifestyle [5], [6], [7]. However, it can be prevented and controlled by controlling risk factors [8]. The results of previous studies showed that

primary outcome analyses indicate that the adapted Diabetes Self-Management Education and Support (DSMES) was more effective than standard care at improving self-care and quality of life and decreasing diabetic foot ulcers [9]. The management of DM risk factors can involve families because they have a role in caring for the patient, such as controlling the healthy diet. Furthermore, family activities can be a form of prevention of risk factors and care for family members diagnosed with type 2 DM to maintain the sickness, so it is not getting worse [10], [11].

Efforts made by health services emphasize the overall management of DM through the Social Support Management of Diabetes (SoSMed) approach. Community and family-based approaches, namely, Community as Partner, Family-Centered Nursing, Maglaya, Health Promotion Model toward increasing self-awareness, self efficacy, and behavior change that look at the biological factors of type 2 diabetes patients, interpersonal health factors, health threats, and service provider factors, such as non-communicable

disease services [12]. Families should support those who experience DM to maintain optimal health status and independence [13], [14]. Families who do not understand how to care for people with DM will feel the burden of caring, so training is needed to fulfill basic needs in people with DM at home. Besides, families must increase the motivation of people with DM to routinely take medical check-ups in the nearest service [12].

SoSMeD concept is the development of the Health Promotion Model, similar to the health belief model, which explains disease prevention behavior [15], [16]. The recent findings in a study show that education, nutrition management, physical activity, and stress management interventions that draw on the concept of diabetes management influence the knowledge, attitudes, and skills of adults with type 2 DM [12]. Similar studies using social-cognitive theory find that diabetic women with diabetes self-efficacy will increase with physical activity interventions [17]. SoSMeD is an intervention developed based on the Health Promotion Model theory and previous research that emphasizes the health-care system in providing services related to DM. This study aims to identify the glucose value of DM patients and analyzes the effectiveness of SoSMeD on glucose control in patients with type 2 DM in Mojokerto.

Methods

This research was a quasi-experiment pre-post-test with a control group design. It was conducted in Mojokerto Regency for 3 months with three measurements and used a simple random sampling method of 50 respondents in each group [18]. The sample in this study had inclusion criteria, including; (1) type 2 DM medical diagnosis obtained from the Public Health Center (Puskesmas) registration book; (2) adult diabetics (28–59 years); and (3) diabetics who could read and write. The sample exclusion criteria in this study were clients with complications of diabetic foot and bed rest. The parametric statistical test was done using SPSS IBM-21 with paired t-test analysis [19]. The research ethics committee approved by the Indonesian National Nurses Association (PPNI) Mojokerto College of Health Sciences number IV.a/258/STIKes.KS/III/2020.

The researchers then collected pre-test data on March 1, 2020, in the intervention and control groups. The intervention group divided respondents into six groups: Given education, nutrition management, physical activity, and stress management. The treatment was carried out in the control group using the lecture method. The intervention was conducted for 2 months starting from March 1, to May 1, 2020, consisting of

eight sessions, and each session was ± 30 min. After the intervention is given, a GDS measurement is taken as a control phase, followed by a 2-week facilitation phase needed for people with diabetes to study independently with a 4-times follow-up and 1-week internalization phase. After that, on May 1, 2020, intervention and control groups were carried out post-test. On May 2–5, 2020, the same intervention was carried out in the control group. The implementation of the SoSMeD intervention for the intervention group is as follows (Table 1):

Table 1: Social support management diabetes (SoSMeD) schedule

Activity	Topics	Methods
Session 1	Diabetes mellitus education	Watching educational videos and discussions
Session 2	Educate risk factors for DM	Supporting groups by cadres
Session 3	Educate on healthy and unhealthy foods	Game: with family
Session 4	Calculate calorie requirements	Tutorial: with family
Session 5	Arrange a day's meal menu	Tutorials, demonstrations, and re-demonstrations
Session 6	Foot gymnastics+marbles therapy	Tutorial and independent with family
Session 7	SMART Gymnastics	With cadres
Session 8	Progressive muscle relaxation and music therapy	Accompaniment

Results

The characteristics of respondents include gender, education, sources of information about DM, income, and the age of type 2 diabetes patients. Based on Table 2, most of the respondents' characteristics were women who graduated from elementary school and got the information from the health workers. The intervention group's mean age was 50.66 years old and 48.16 of control groups (Table 2).

Table 2: Distribution of Respondents' Characteristics

Characteristics of respondents	Intervention (n = 50)		Control (n = 50)	
	f	%	f	%
Age (Mean \pm SD)	50.66 \pm 5.457		48.16 \pm 5.426	
Salary (Mean \pm SD)	Rp 1.880.650 \pm Rp 1.133.027		Rp 1.764.000 \pm Rp 942.805	
Glucose (Mean \pm SD)				
Pre-test	308.26 \pm 120.534		315.24 \pm 115.975	
Control phase	298.16 \pm 116.772		315.34 \pm 116.026	
Post-test	282.32 \pm 111.722		315.84 \pm 116.342	
Gender				
Man	12	24.0	15	30.0
Woman	38	76.0	35	70.0
Education				
Not school	1	2.0	4	8.0
Elementary school	19	38.0	20	40.0
Junior high school	15	30.0	12	24.0
Senior high school	12	24.0	10	20.0
College	3	6.0	4	8.0
Sources of information about DM				
Health workers	41	82.0	30	60.0
Family/friends	3	6.0	10	20.0
Media (TV, internet, and posters)	4	8.0	7	14.0
Not getting information from anyone	2	4.0	3	6.0

The results of the study show that p-value of $0.001 < 0.05$. According to the basis of decision making in the test, it can be concluded that H_0 is rejected, which means that there is a significant effect of SoSMeD on

Table 3: Diabetic glucose control before and after the intervention

Group	Mean	SD	p-value
Intervention			
Before	308.26	22.956	0.001*
After	282.32		
Control			
Before	315.24	4.243	0.322*
After	315.84		

glucose control of type 2 DM patients (Table 3).

Discussion

Diabetes self-management refers to the concept that everyone must be systematically involved in their medical and non-medical management conditions. The challenge is whether scientific evidence supports the self-management education strategy in DM appropriate to the patients' needs [20], [21]. Some researchers have previously shown that self-management education is a valuable technique for glycemic control. DSME is a DM self-management education intervention related to diet regulation and physical activity aimed at glucose control [22], [23]. A similar study found significant differences in the knowledge and attitudes of people with DM before and after being given health education for 3 months [24].

Promotive and preventive activities to spread information and practical education through nursing intervention strategies to deal with DM need to be conducted [25], [26] – for example, SoSMed action to support people with diabetes in glucose control under normal conditions. SoSMed implementation is by involving the families as the closest caring sources. Family is the most effective place to implement healthy behavior as an essential health promotion strategy [27]. Family members should manage risk factors for DM experienced by their family [28]. The application of interventions in the management of DM to prevent more severe complications is conducted by improving good self-management behavior. Dietary management, treatment adherence, physical activity, blood glucose control, and foot care are critical components of diabetes self-care. However, this action has gone unnoticed, even though it is a significant element of awareness [9], [29]

The SoSMed was conducted for 3 months, with significant results on diabetes sugar control by comprehensive health education. Education to promote a healthy life needs to be undertaken to prevent and control DM [30]. The activities provided to people with diabetes by involving their families are researchers' innovations in dealing with DM, it requires support from families and government programs, a – Ministry of Health program related to non-communicable diseases. Integrated coaching posts are activities that involve the

community's participation in carrying out early detection and monitoring of risk factors for non-communicable illnesses whose movements can be carried out in an integrated, routine, and periodic manner [31]. Integrated Coaching Post of Non-communicable Disease (Posbindu PTM) activities could not be conducted according to schedule, because there was a lockdown system due to the corona-virus disease outbreak. Therefore, the researchers continued using the network method [32].

The use of network methods in providing interventions makes respondents more cooperative in giving their questions and opinions. Researchers also continued to offer learning media in learning modules, workbooks, leaflets, and educational videos [33]. It is in line with the previous research conducted by utilizing media of module development for health workers. The results show that there is a positive reaction to module development. Besides, post-training tests show that the level of knowledge, attitudes, monitoring, and evaluation is higher than the pre-test [34]. This study still has limitations, namely, in the intervention activities through the internet network, so some respondents are not timely in following the activities and difficulties in evaluating respondents' non-verbal responses.

Conclusion

The results show that the glucose of people with diabetes is controlled at 22.956 mg/dl after being given the SoSMed intervention. The administration of responses must be tailored to the management of the disease and the patient's needs. Several programs related to promotive and preventive efforts need to be reviewed with more attention to aspects of patient characteristics using comprehensive methods and utilizing a variety of more interactive and applicable media. Public health nursing services need to be established to improve health services to determine that the interventions are appropriate to the community problems.

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References

1. Kemenkes. Info Datin: Waspada Diabetes [Datin Info: Beware of Diabetes], Kemenkes RI; 2019. Available from: <https://www.pusdatin.kemkes.go.id/folder/view/01/structure-publikasi-pusdatin-info-datin.html>. [Last accessed on 2019 May 20].
2. Gostin LO, Abou-taleb H, Roache SA, Alwan A. Legal priorities for prevention of non-communicable diseases: Innovations from WHO's Eastern Mediterranean region. *Public Health*. 2016;144:4-12. <https://doi.org/10.1016/j.puhe.2016.11.001> PMID:28274382
3. Andriyanto A, Rekawati E, Rahmadiyah DC. Pemberdayaan pada penderita diabetes tipe 2 dan kader kesehatan dalam pelaksanaan program pos binaan terpadu penyakit tidak menular (Posbindu PTM) [Empowerment of people with type 2 diabetes and health cadres in the implementation of the integrated non-communicable disease guided post program]. *Engagem J Pengabdian Kpd Masy*. 2020;4:201-11. <https://doi.org/10.29062/engagement.v4i1.81>
4. Kemenkes. Pusat Data dan Informasi Kementerian Kesehatan RI [Center for Data and Information Ministry of Health RI], Jakarta; 2020.
5. Jiang L, Chang J, Beals J, Bullock A, Manson SM. Neighborhood characteristics and lifestyle intervention outcomes: Results from the special diabetes program for Indians. *Prev Med*. 2018;111:216-24. <https://doi.org/10.1016/j.ypmed.2018.03.009> PMID:29534990
6. Joseph JJ, Echouffo-Tcheugui JB, Talegawkar SA, Effoe VS, Okhomina V, Carnethon MR, *et al*. Modifiable lifestyle risk factors and incident diabetes in African Americans. *Am J Prev Med*. 2017;53:e165-74. <https://doi.org/10.1016/j.amepre.2017.06.018> PMID:28818415
7. Joiner KL, Nam S, Whittemore R. Lifestyle interventions based on the diabetes prevention program delivered via eHealth: A systematic review and meta-analysis. *Prev Med* 2017;100:194-207. <https://doi.org/10.1016/j.ypmed.2017.04.033> PMID:28456513
8. Vural S, Bostanci S, Koçyigit P, Çaliskan D, Baskal N, Aydin N. Risk factors and frequency of ingrown nails in adult diabetic patients. *J Foot Ankle Surg* 2018;(2):289-95. <https://doi.org/10.1053/j.jfas.2017.10.006> PMID:29329712
9. Damhudi D, Kertia N, Effendy C. The effect of modified diabetes self-management education and support on self-care and quality of life among patients with diabetic foot ulcers in rural area of Indonesia. *Open Access Maced J Med Sci*. 2021;9:81-7. <https://doi.org/10.3889/oamjms.2021.6614>
10. Kav S, Yilmaz AA, Bulut Y, Dogan N. Self-efficacy, depression and self-care activities of people with Type 2 diabetes in Turkey. *Collegian*. 2017;24(1):27-35. <https://doi.org/10.1016/j.colegn.2015.09.005> PMID:29218959
11. Zamani-alavijeh F, Araban M, Mohammadi V, Goodarzi F. Development and psychometric evaluation of a new instrument to assess nutritional perceptions and behaviors of diabetic men. *Diabetes Metab Syndr Clin Res Rev*. 2017;11 Suppl 2:S949-55. <https://doi.org/10.1016/j.dsx.2017.07.021> PMID:28709854
12. Andriyanto A, Rekawati E, Rahmadiyah DC. Increasing knowledge, attitudes, skills, and glucose control in Type-2 diabetic patients through EMAS interventions. *Nurse Media J Nurs*. 2019;9:141-50. <https://doi.org/10.14710/nmjn.v9i2.22989>
13. Alghafri TS, Alharthi SM, Al-balushi S, Al-Farsi Y, Al-busaidi Z, Bannerman E, *et al*. Health professionals' perceptions about physical activity promotion in diabetes care within primary health care settings in Oman. *Heliyon*. 2017;3(12):e00495. <https://doi.org/10.1016/j.heliyon.2017.e00495> PMID:29387824
14. Ishak NH, Yusoff SS, Rahman RA, Kadir AA. Diabetes self-care and its associated factors among elderly diabetes in primary care. *J Taibah Univ Med Sci*. 2017;12(6):504-11. <https://doi.org/10.1016/j.jtumed.2017.03.008> PMID:31435286
15. Alligood MR. *Pakar Teori Keperawatan dan Karya Mereka [Nursing Theory Experts and Their Work]*. Indonesia, Singapore: Elsevier Ltd.; 2017.
16. Pender N, Murdaugh C, Parsons MA. *Health Promotion in Nursing Practice*. 7th ed. United States of America: Julie Levin Alexander; 2015.
17. Ahdzadeh M, Peymam N, Taghipour A, Esmaily H, Mahdizade S. Effect of health education program on promoting physical activity among diabetic women in Mashhad, Iran: Applying social cognitive theory. *J Res Health Sci*. 2013;13(1):90-7.
18. Polit DF, Beck CT. *Essentials of Nursing Research Appraising Evidence for Nursing Practice*. 7th ed. China: Library of Congress Cataloging in Publication Data; 2010.
19. Dahlan MS. *Statistik Untuk Kedokteran dan Kesehatan [Statistics for Medicine and Health]*. 5th ed. Jakarta: Salemba Medika; 2013.
20. Farrés J, Pujol A, Coma M, Ruiz J, Naval J, Mas J, *et al*. Revealing the molecular relationship between Type 2 diabetes and the metabolic changes induced by a very-low-carbohydrate low-fat ketogenic diet. *Nutr Metab (Lond)*. 2010;7:88. <https://doi.org/10.1186/1743-7075-7-88> PMID:21143928
21. Masood I, Saleem A, Hassan A, Umm-E-Kalsoom, Zia A, Khan AT. Evaluation of diabetes awareness among general population of Bahawalpur, Pakistan. *Prim Care Diabetes*. 2016;10(1):3-9. <https://doi.org/10.1016/j.pcd.2015.06.004> PMID:26137919
22. Fan L, Sidani S. Factors influencing preferences of adults with Type 2 diabetes for diabetes self-management education interventions. *Can J Diabetes*. 2018;42(6):1-7. <https://doi.org/10.1016/j.jcjd.2018.04.003> PMID:30054235
23. Abdulah DM, Hassan AB, Saadi FS, Mohammed AH. Impacts of self-management education on glycaemic control in patients with Type 2 diabetes mellitus. *Diabetes Metab Syndr Clin Res Rev*. 2018;12(6):969-75. <https://doi.org/10.1016/j.dsx.2018.06.007> PMID:29903525
24. Adam L, O'Connor C, Garcia AC. Evaluating the impact of diabetes self-management education methods on knowledge, attitudes and behaviours of adult patients with Type 2 diabetes mellitus. *Can J Diabetes*. 2018;42(5):470-7.e2. <https://doi.org/10.1016/j.jcjd.2017.11.003> PMID:29449096
25. Stanhope M, Lancaster J. *Foundations of Nursing in The Community: Community-Oriented Practice*. United States: Mosby Inc., Elsevier Inc.; 2016.
26. Avogaro A, Fadini GP. Microvascular complications in diabetes: A growing concern for cardiologists. *Int J Cardiol*. 2019;291:29-35. <https://doi.org/10.1016/j.ijcard.2019.02.030> PMID:30833106
27. Nies MA, McEwen M. *Keperawatan Kesehatan Komunitas dan Keluarga [Community and Family Health Nursing]*. Indonesia, Singapore: Elsevier Ltd.; 2019.
28. Luthfa I, Ardian I. Effects of family empowerment on increasing family support in patients with Type-2 diabetes mellitus. *Nurse*

- Media J Nurs. 2019;9:58-68. <https://doi.org/10.14710/nmjn.v9i1.22501>
29. Mustika IW, Sudiantara K, Lestari AS. Health education with audiovisual media and relaxation massage in lowering blood pressure and improved sleep quality for the elderly. *Open Access Maced J Med Sci*. 2021;9:118-23. <https://doi.org/10.3889/oamjms.2021.6781>
30. Lari H, Tahmasebi R, Noroozi A. Diabetes and metabolic syndrome: Clinical research and reviews effect of electronic education based on health promotion model on physical activity in diabetic patients. *Diabetes Metab Syndr Clin Res Rev*. 2017;3(10):6-11. <https://doi.org/10.1016/j.dsx.2017.08.013>
31. Rahajeng E. Petunjuk teknis pos pembinaan terpadu penyakit tidak menular (POSBINDU PTM) [Technical guidance for integrated non-communicable disease development post (POSBINDU PTM)]. *Minist Health Repub Indones Dir Gen Dis Con*. 2012;11(2):39. <https://doi.org/ISSN 2088-270X>
32. Andriyanto A, Hidayati RN. Literature review: Pemanfaatan media promosi kesehatan (smartphone) dalam mencegah dan mengendalikan kadar gula diabetes Tipe 2 [Literature Review: Utilization of health promotion media (smartphones) in preventing and controlling Type 2 diabetes sugar lev]. *J Ners Dan Kebidanan*. 2018;5:172-7. <https://doi.org/10.26699/jnk.v5i2.ART.p172>
33. Bailey L, Curington R, Brown B, Hegener M, Espel M. Motivational interviewing education: Creation and assessment of a learning module implemented among advanced pharmacy practice students. *Curr Pharm Teach Learn*. 2017;9(5):786-93. <https://doi.org/10.1016/j.cptl.2017.06.007>
PMid:29233305
34. Khaikleng P, Wongwanich S, Sriklauk K, Ajpru H. A training module for evaluation capacity building of a health support organisation in Thailand. *Proc Soc Behav Sci*. 2015;171:1395-9. <https://doi.org/10.1016/j.sbspro.2015.01.259>