The effectiveness of booklets on family knowledge of diabetes mellitus patients about the management of hypoglycaemia

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Abstract

The three main acute complications of diabetes mellitus related to an imbalance in glucose levels that lasted in the short term were hypoglycemia, diabetic ketoacidosis (DKA), and hyperglycemic hyperosmolar nonketotic syndrome. The family, as the people closest to and always interacting with the patient, played a significant role in preventing complications. A booklet served as one medium to increase knowledge for families. This study aimed to determine the effectiveness of the booklet on the knowledge of families of DM patients regarding the management of hypoglycemia. A quantitative method with a quasi-experimental design approach involving pre-test and post-test designs was employed. The population in this study comprised families of Diabetes Mellitus patients who were at Puskesmas (Public Health Centre) Batu X and Puskesmas Mekarbaru, Indonesia. The research sample consisted of 70 respondents selected through purposive sampling. The research variables included demographic factors, family knowledge before and after the intervention in the intervention and control groups, and bivariate analysis. The research instrument employed a questionnaire and a booklet regarding the management of hypoglycemia. Independent t-test analysis was conducted (α=0.05). The booklet proved effective in improving the knowledge of families of diabetes mellitus patients regarding the management of hypoglycemia, with a p-value of 0.028. The booklet can enhance family knowledge about the management of hypoglycemia. Therefore, every internal medicine clinic or health centre should provide booklets as an educational medium.

Introduction

Data from the International Diabetes Federation (IDF) indicates that 463 million people had diabetes (DM) in 2019, which rose to 573 million people in 2021. It is estimated that this figure will reach 700 million people by 2045. DM is often referred to as a silent killer because it can affect other organs, including the heart, kidneys, nerves, blood vessels, and eyes.[1] Based on the blood test, the percentage of people aged greater than or equal to 15 years with diabetes (DM) was 6.9% in 2013 and increased to 10.9% in 2018.[2] Based on data from the Tanjungpinang City Health Office, in 2019, there were 6,419 cases of Diabetes Mellitus patients. In 2020, the number decreased to 4,690 cases, and from January to November 2021, there were 3,089 cases of DM. The three major acute complications of diabetes mellitus related to short-term imbalances in glucose levels are hypoglycemia, diabetic ketoacidosis (DKA), and hyperglycemic hyperosmolar nonketotic syndrome. Hypoglycemia has a serious impact on morbidity, mortality, and quality of life. The Diabetes Control and Complications Trial (DCCT) reported a threefold increase in severe hypoglycemia and coma in intensively managed patients compared to conventionally treated patients.[3,4] Hypoglycemia can lead to brain disorders and, in some cases, even patient fatalities. Approximately 66.7% of Diabetes Mellitus patients who visited the emergency room had hypoglycemia.[5] The previous study

found that poor glycemic control was associated with being female, being younger in age, receiving a combination of oral hypoglycemic agents and insulin, not taking biguanides, and having the presence of hyperglycemia and comorbid diseases.[6]

According to research, out of 109 Diabetes Mellitus patients, 33.9% experienced hypoglycemia.[7] Another study found that there are several risk factors for hospitalization among hypoglycemia patients, namely epidemiology, pathophysiology, impact, and prevention strategies.[8] Families are expected to participate in the treatment from the beginning as they play an important role in the recovery program.[9] Meanwhile, additional research indicates that family knowledge about hypoglycemia in patients with diabetes mellitus is categorized as follows: poor knowledge (60%), good knowledge (10%), and sufficient knowledge (30%). In another study, it was found that nurses' roles were classified as "good" in 54.90% of cases.[10] Next, it indicates that family involvement is suboptimal, especially among younger family members. Meanwhile, an alternative solution to address this issue is through home visits, but this presents a challenge for health workers at the Puskesmas due to the numerous routine tasks that they must perform.[11] Moreover, continuous education for families through WeChat can enhance the health of patients with type 2 diabetes.[12]

Recognizing this issue calls for a health education program designed for patients and the families of those affected by hypoglycemia. According to research, there is a need to develop an evidence-based education program focused on hypoglycemia prevention for patients and their families.[13] The subsequent study discovered that patient and family education through the use of booklets led to improvements in diabetes mellitus self-care knowledge.[14] From this description, it is evident that effective education is necessary to enhance family knowledge about hypoglycemia management as an effort to prevent hypoglycemia and associated fatalities. Therefore, the aim of this study was to assess the effectiveness of booklets in improving the knowledge of families with DM patients regarding hypoglycemia management.

Materials and Methods

Research design

This study uses a quantitative method with a quasi-experimental design approach with a pre test and post test design.

Study participants

The population for this study consisted of 82 people (based on the number of visits in the last 3 months). The sample for this study included the families of Diabetes Mellitus patients in the working areas of Puskesmas Batu X and Puskesmas Mekarbaru, totaling 70 respondents (determined using the Slovin formula) – 35 in the intervention group and 35 in the control group. The sampling method employed was purposive sampling. The criteria for selecting participants for the study were as follows: adults, capable of reading and writing, participation in the entire study, and having a family member with DM. During the study, two respondents refused to complete the questionnaire at the end of the intervention, so they were replaced.

Variable, instrument and data collection

The independent variables include demographic factors such as age, gender, education, ethnicity, occupation, relationship with the patient, and the duration of suffering from DM. The dependent variable is the family's knowledge about Hypoglycemia Management. The research instrument employed a questionnaire that had been previously tested for validity and reliability, and it was confirmed to be valid and reliable. The instruments used in this study included questionnaires and booklets on hypoglycemia management. The questionnaire consists of questions related to demographic data and 12 statements about hypoglycemia and hypoglycemia management, which were modified from previous research by Sunaryo.[15]

Data analysis

The analysis was conducted using SPSS. For bivariate analysis, the unpaired t-test was employed with a significance level set at p=0.05, and for univariate analysis, central tendency measures were utilized.

Ethical clearance

The research has received ethical approval from STIKes Bani Saleh, under ethical approval number EC.237/KEPK/STKBS/VI/2023 issued on June 1, 2023. Throughout the research, the researcher adheres to ethical principles including informed consent, respect for human rights, beneficence, and non-maleficence.

Results

Respondent characteristics

The characteristics of respondents in the intervention group were as follows (Table 1): 24 people (69%) were elderly, with 25 people (71%) being female. The highest level of education among the respondents was high school, which accounted for 18 people (52%). The majority of the respondents belonged to the Javanese ethnic group, totaling 13 people (37%). Most respondents worked as housewives, with 19 people (54%), and 24 people (69%) had a relationship with DM patients as wives. The majority of patients had been suffering from DM for more than 5 years, amounting to 23 people (66%). As for the characteristics of respondents in the control group: 18 people (51%) were elderly, with 24 people (69%) being female. The highest level of education that respondents had attained was high school, which was the case for 23 people (65%). The most common ethnic group among the respondents was Malay, with 14 people (40%). Most respondents worked in the private sector, which applied to 14 people (40%), and they had a relationship with the patient as a child in 16 cases (46%). The majority of patients had been suffering from DM for more than 5 years, totaling 26 people (74%).

Family knowledge

The results regarding knowledge about hypoglycemia in the control group and intervention group were different, but both groups showed an improvement (Table 2). In the intervention

group, the average increased from 58.8 at pretest to 77.2, while in the control group, the average increased from 57.46 to 83.46.

Bivariate analysis

The bivariate test results in Table 3 demonstrate the effectiveness of the booklet in improving the knowledge of families with diabetes mellitus patients regarding hypoglycemia management, with a p-value of 0.028

Discussion

Hypoglycemia is an emergency condition that requires immediate treatment because its complications can lead to reduced consciousness, seizures, and permanent brain damage. Both type 1 and type 2 diabetes mellitus patients can experience hypoglycemia. Therefore, knowledge about hypoglycemia, including prevention, treatment, and monitoring, is essential.[16] Based on the results of the research conducted by the researchers, it is evident that booklets

Table 1. Distribution of respondents in the intervention group (n=35).

Intervention group				Control group		
No	**Age**	**Amount**	**Percentage (%)**	**Age**	**Amount**	**Percentage (%)**
1	Mature	11	31	Mature	17	49
2	Elderly	24	69	Elderly	18	51
No	**Gender**	**Amount**	**Percentage (%)**	**Gender**	**Amount**	**Percentage (%)**
1	Man	10	29	Man	11	31
2	Woman	25	71	Woman	24	69
No	**Education**	**Amount**	**Percentage (%)**	**Education**	**Amount**	**Percentage (%)**
1	Not attending school	3	9	Not attending school	0	0
2	Elementary School	4	11	Elementary school	3	9
3	Junior high school	4	11	Junior high school	3	9
4	Senior high school	18	52	Senior high school	23	65
5	PT	6	17	PT	6	17
No	**Ethnic group**	**Amount**	**Percentage (%)**	**Ethnic group**	**Amount**	**Percentage (%)**
1	Java	13	37	Java	11	31
2	Malay	10	28	Malay	14	40
3	Batak	3	9	Batak	5	14
4	Buton	1	3	Buton	0	0
5	Minang	5	14	Minang	3	9
6	Sunda	2	6	Sunda	0	0
7	Chinese	1	3	Chinese	2	6
No	**Work**	**Amount**	**Percentage (%)**	**Work**	**Amount**	**Percentage (%)**
1	Doesn't work	4	11	Doesn't work	2	6
2	Housewife	19	54	Housewife	9	26
3	Household assistant	1	3	State civil apparatus	3	8
4	State civil apparatus	3	9	Private	14	40
5	Laborer	3	9	Student	4	11
6	Private	4	11	Retired	3	9
7	Financial staff	1	3	Financial staff	0	0
No	**Relationship with patients**	**Amount**	**Percentage (%)**	**Relationship with patients**	**Amount**	**Percentage (%)**
1	Wife	24	69	Wife	14	40
2	Husband	2	6	Child	16	46
3	Father	3	8	Father	2	6
4	Mother	4	11	Husband	2	6
5	Grandma	1	3	Mother	1	2
6	Older brother	1	3	Older brother	0	0
No	**Suffering from DM for a long time**	**Amount**	**Percentage (%)**	**Suffering from DM for a long time**	**Amount**	**Percentage (%)**
1	<5 years	12	34	<5 years	9	26
2	≥5 years	23	66	≥5 years	26	74

have proven to be effective in improving the knowledge of families with diabetes mellitus patients about hypoglycemia management. Several studies have shown a correlation between age, education, and occupation with the level of knowledge, where age is the dominant factor influencing knowledge[17] Other studies have shown that age, education level, and knowledge are positively correlated with hypertension self-management. As age increases, the ability to self-manage hypertension decreases, while higher education and better knowledge enhance hypertension self-management.[18] Additional studies have indicated that the quality of type 2 diabetes self-management is influenced by factors such as age, gender, level of education, duration of type 2 diabetes, knowledge, self-efficacy, stress, and family support.[19] Good adherence to a medication regimen is a crucial aspect of healthcare quality.[20] Knowledge about diabetes helped the patient to control the disease and to reduce the risk of disability.[21] Additional evidence suggests that a relationship exists between the duration of illness and the knowledge of foot and skin care in patients with type 2 diabetes mellitus at the Mamplam Room of RSUD dr. Zaenoel Abidin Banda Aceh. Booklets and leaflets have an impact on increasing knowledge, but booklet media is more effective than leaflet media in enhancing adolescents' understanding of the consequences of teenage pregnancy, as observed at Pertiwi High School in Jambi City[22] Another study reported a difference in the average knowledge level before and after maternal parenting education through booklet media. Booklet media is an effective tool for health education as it can improve the knowledge and attitudes of mothers with stunted toddlers. Furthermore, booklet media is practical, allowing for easy portability and on-the-go reading.[23] The results indicated that self-care supportive education with booklets had a positive effect on the ability to detect early hypoglycemia and hyperglycemia. This was characterized by a better ability to detect early hypoglycemia and hyperglycemia in the treatment group compared to the control group.[24] The study demonstrated a significant difference in knowledge and compliance levels before and after providing booklets to the intervention group. However, there was no significant difference in

knowledge and compliance levels in the control group. Therefore, it can be concluded that booklet media can enhance knowledge and compliance in patients with diabetes mellitus[25] Research also underscores the importance of patient and family education through booklets, which leads to improvements in diabetes mellitus self-care knowledge. This emphasizes the significant role of the family in recognizing the health status and changes experienced by their family members.[14]

Conclusions

Booklets and flipcharts are educational media that can enhance knowledge, but booklets have been proven to be more effective in increasing the knowledge of families with diabetes mellitus patients regarding hypoglycemia management. The implication of this research for nursing services is to provide information and insights to nursing practitioners about managing hypoglycemia. Hypoglycemia management booklets should be made readily available in hospital and health center clinics.

References

1. Badan Pusat Statistik. Kajian Indikator Sustainable Development Goals (SDGs). Kajian Indikator Lintas Sektor. 2014.
2. Bestari IL. Characteristics of patients with type 2 diabetes mellitus at Surabaya haji general hospital. Indon J Public Health 2020;15:286-94.
3. Perhimpunan Dokter Spesialis Penyakit Dalam Indonesia. EIMED PAPDI : Kegawatdaruratan Penyakit Dalam Buku I. Vol. 1. Jakarta Pusat : Interna Publishing; 2016.
4. Dinas Kesehatan Kota Tanjungpinang. Data Diabetes Melitus Tipe II Tahun 2019-2021. Tanjungpinang; 2020.
5. Bakar A, Qomariah SN, Santoso CH, et al. Factors the incidence of hypoglycemia in diabetes mellitus patients: A pilot study in the emergency room. Enferm Clin 2020;30:46-9.
6. Suprapti B, Izzah Z, Giriayu A, et al. Prevalence of medication adherence and glycemic control among patients with type 2 diabetes and influencing factors : A cross-sectional study. Glob Epidemiol 2023;5:100113.
7. Shufyani F, Wahyuni FS, Armal K. Evaluasi faktor-faktor yang mempengaruhi kejadian hipoglikemia pada pasien diabetes mellitus tipe 2 yang menggunakan insulin. Scientia: Jurnal Farmasi dan Kesehatan 2017;7(1).
8. Pratiwi C, Mokoagow MI, Made Kshanti IA, Soewondo P. The risk factors of inpatient hypoglycemia: A systematic review. Vol. 6, Heliyon. Elsevier Ltd; 2020.
9. Setyoadi S, Yusuf A, Kristianingrum ND, Hayati YS, Noviyanti LW, Syafiky NF. The correlation between family support and health status in patients with diabetes mellitus. Healthc Low-resour S 2023;11:11212
10. Indrayati S, Pranata L. Prosiding Seminar Nasional & Diseminasi Hasil Penelitian Update Evidence-Based Practice in Cardiovascular Nursing. 2019.
11. Zhang M, Wang W, Millar R, et al. Coping and compromise: A qualitative study of how primary health care providers respond

Table 2. Distribution of family knowledge.

No	Group	Pretest	Post test
1	Intervention	Mean = 58.8 Median = 58 Highest score= 83 Lowest score 42	Mean = 77.2 Median = 75 Highest score= 100 Lowest value = 50
2	Control	Mean = 57.46 Median = 58 Highest score= 83 Lowest value = 33	Mean = 83.46 Median = 83 Highest score= 100 Lowest value = 42

Table 3. Unpaired t test results.

	N	Mean ±sb	Mean difference (CI 95%)	p
Control	35	3,232	0.688-11.826	0.028
Intervention	35	3,232	0.688-11.826	0.028

to health reform in China. Hum Resour Health 2017;15:50.

12. Mao L, Lu J, Zhang Q, et al. Family-based intervention for patients with type 2 diabetes via WeChat in China: protocol for a randomized controlled trial. BMC Public Health 2019;19:381.

13. Whittemore R, Watts SA, Meulstee M. Development of an Educational Program on Prevention of Hypoglycemic Events Among Elderly Veterans With Type 2 Diabetes. Diabetes Educ 2015;41:690   -7.

14. Pranata L, Indaryati S, Daeli NE. Perangkat Edukasi Pasien dan Keluarga dengan Media Booklet (Studi Kasus Self-Care Diabetes Melitus). Jurnal Keperawatan Silampari 2020;4:102-11.

15. Sunaryo T. Faktor-faktor yang berhubungan dengan kemampuan pasien diabetes mellitus dalam melakukan deteksi episode hipoglikemia dalam konteks asuhan keperawatan di RSUD Karanganyar. [Jakarta]: FIK UI; 2008.

16. Rusdi MS. Hipoglikemia pada pasien Diabetes Mellitus [Internet]. 2020. Available from: http://ejurnal.ung.ac.id/index.php/jsscr

17. Suwaryo PAW, Yuwono P. Faktor-Faktor Yang Mempengaruhi Tingkat Pengetahuan Masyarakat dalam Mitigasi Bencana Alam Tanah Longsor. The 6th University Research Colloquium 2017 Universitas Muhammadiyah Magelang, 2017.

18. Sakinah S, Ratu JM, Weraman P. Hubungan antara Karakteristik Demografi dan Pengetahuan dengan Self Management Hipertensi Pada Masyarakat Suku Timor: Penelitian Cross sectional. Jurnal Penelitian Kesehatan 'SUARA FORIKES' (Journal of Health Research 'Forikes Voice') 2020;11:245.

19. Samudera WS, Efendi F, Indarwati R. Effect of community and peer support based healthy lifestyle program (CP-HELP) on self care behavior and fasting blood glucose in patient with type 2 Diabetes Mellitus. J Diabetes Metab Disord 2021; 20:193-9.

20. Zairina E, Nugraheni G, Sulistyarini A, et al. Factors related to barriers and medication adherence in patients with type 2 diabetes mellitus: a cross-sectional study. J Diabetes Metab Disord 2022;21:219-28.

21. Rondhianto, Kusnanto, Melaniani S. The effect of diabetes self-management education, based on the health belief model, on the psychosocial outcome of type 2 diabetic patients in Indonesia. Indian J Public Health Res Dev 2018;9:1718-23.

22. Sidiq R, Nurleli N. Relationship with Knowledge of Older Suffering Disease and Feet On Skin Care Patients Type 2 Diabetes Mellitus in Mamplam Room General Hospital of dr. Zaenoel Abidin Banda Aceh. Idea Nursing Journal 2015;VI(2).

23. Sari LA. Efektivitas Media Booklet Dan Leaflet Terhadap Pengetahuan Remaja Putri Tentang Dampak Kehamilan Remaja. Jambura J Health Sci Res 2019;1(2).

24. Inung Sylvia E, Azizah I, Manuntung A, Datak G. Peningkatan Pengetahuan Pasien Diabetes Melitus Melalui Edukasi Tentang Katarak Dengan Media Booklet. Jurnal Ilmiah Permas: Jurnal Ilmiah STIKES Kendal 2019;9:353-8.

25. Raodah, Sitti Nur Djannah, Lina Hadayani. Efektivitas Media Edukasi Booklet terhadap Pengetahuan dan Sikap Ibu Balita Stunting Aceh. Media Publikasi Promosi Kesehatan Indonesia (MPPKI). 2023;6(5).

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