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Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory on Health Locus of Control and Blood Sugar Levels of Diabetes Mellitus Patients

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Abstract

Introduction: People with diabetes mellitus need to have a good health locus of control to be compliant in carrying out self-management so that they can maintain blood sugar levels to avoid complications. Aim: The purpose of this study was to analyze Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory on health locus of control and blood sugar levels. Method: The research design used was a quasi-experimental study with a sampling technique using a simple random sampling technique with sample determination according to inclusion and exclusion criteria, with a sample size of 120 respondents divided into 60 respondents in the intervention and control groups. The instruments used in this study were a Multidimensional Health Locus Of Control (MHLC) and a glucometer. Statistical analysis used the t-test with $p < 0.5$. Results: The results showed that in the intervention group, the average health locus of control before and after the intervention was 87.82, while the average blood sugar level before and after the intervention was 220.10. In the control group, the average health locus of control before and after the intervention was 61.02, while the average blood sugar level before and after the intervention was 310.35. Data analysis showed that psychoeducation and interactive nursing reminders based on the health belief model theory on health locus of control and blood sugar levels had a p-value of 0.000. Conclusion: Psychoeducation and Interactive Nursing reminders based on the Health Belief Model Theory can be used in diabetes mellitus management to improve health locus of control and blood sugar level control.

Keywords: Diabetes Mellitus; Health Belief Model; Health Locus of Control; Blood Sugar Level;

Psychoeducation and Interactive Nursing Reminder

1. Introduction

Diabetes mellitus is often referred to as a silent killer because this diabetes disease is most often discovered when further complications have occurred and become a serious threat, this is because diabetes sufferers pay less attention to lifestyle, lack of knowledge, lack of follow-up treatment and lack of support from family for family members who suffer from diabetes in getting post-diagnosis care (Cho & Kim, 2023; Green et al., 2020; Sari et al., 2023). Diabetes mellitus has become a global epidemic and its prevalence continues to increase. According to the International Diabetes Federation Diabetes Atlas (2021) report, adults in the age category of 20 to 79 years have suffered from diabetes mellitus as many as 537 million people. This figure is predicted to increase by 46% between 2021 and 2045. It is also projected that the prevalence of adults with DM worldwide in 2030 will be 640 million people and in 2045 it will be 783 million people (Lin et al., 2020). The results of observations and interviews with 40 DM patients in the Wonokromo Health Center Area, Surabaya, 84% have a low health locus of control category and 86% have uncontrolled blood sugar levels. The high prevalence of Diabetes Mellitus is feared to increase comorbidities. This risk can occur due to a lack of information related to the disease and management of diabetes mellitus which ultimately forms an inaccurate perception of diabetes [5],[6].

The patient's lack of understanding of their disease causes a decrease in health locus of control and causes uncertainty in the ability to carry out diabetes management, which affects blood sugar control (Okafor et al., 2023; Shiferaw et al., 2021). So education to promote healthy living needs to always be carried out as part of prevention efforts and is a very important part of holistic DM management (Cho & Kim, 2023; Kusuma et al., 2022; Yoshida et al., 2018). One of the DM patient education is psychoeducation, Psychoeducation is an education or education with a psychological concept approach that can be given individually or in groups (Okafor et al., 2023)(Kumar et al., 2022). One of the most important points in long-term care for diabetes mellitus patients is the belief in health locus of control in the patient's ability to care for and manage themselves (Luque et al., 2023; Zhu et al., 2022). Psychoeducation and Interactive Nursing Reminders Based on the Health Belief Model Theory are centred on providing education that involves psychological aspects plus reminders or monitoring by health workers which are useful in facilitating knowledge, skills, and abilities and handling psychological problems of DM patients so that it will change the behaviour of sufferers which includes six aspects, namely perceived susceptibility, perceived severity, perceived barriers, perceived benefits, self-efficacy and cues to action so that it has an impact on increasing health locus of control to be able to control blood sugar levels and maintain health status at a good level (Alagili & Bamashmous, 2021; Jiang et al., 2021; Sari et al., 2023).

The purpose of this study was to determine the effect of Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory on Health Locus of Control and Blood Sugar Levels in Diabetes Mellitus Patients. The urgency of this study is psychoeducation and interactive nursing reminders based on health belief model theory in diabetes mellitus patients. Providing education by considering psychological aspects accompanied by monitoring in the implementation of diabetes mellitus management can increase the patient's health locus of control in carrying out diabetes management independently so that it will support positive behaviour and also have an impact on biological responses with controlled blood sugar levels that can reduce complications and worsen their condition. Research on psychoeducation and interactive nursing reminders based on health belief model theory on health locus of control and blood sugar levels in diabetes mellitus patients has never been studied, so it needs to be studied.

2. Materials and methods

2.1 Design and Sample

The research design used in this study was a quasi-experiment with the untreated control group design with dependent pre-test and post-test samples. This study involved two groups of subjects, namely the intervention group and the control group with a target population of all Diabetes Mellitus patients in the Wonokromo Health Center Work Area, Surabaya. The planned sample size was 116 participants. Furthermore, the samples that had been collected were divided into two with 58 respondents in the treatment group and 58 respondents in the control group. The sampling technique will be carried out using a purposive sampling technique with sample determination according to the inclusion and exclusion criteria. Inclusion criteria: DM patients undergoing a treatment program with fasting blood sugar levels (FBS)> 126 mg/dl and random blood sugar/post prandial blood sugar (FBS)> 200 mg/dl, DM patients aged 26-65 years, able to communicate verbally well, able to read and write, suffering from DM ≥ 1 year, patients receiving rapid action insulin therapy (regular insulin) or oral hyperglycemic drugs. As for the exclusion criteria: DM patients with physical, mental or cognitive limitations (blind, deaf, mentally disabled), DM patients who have complications (chronic kidney failure, heart failure, visual impairment), and patients involved in complementary therapy or other research. Dropout criteria: patients undergoing hospitalization or patients who died.

2.2 Data collection procedures

The independent variables in this study are Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory. The dependent variables in this study are Health Locus Of Control and Blood Sugar Levels. The instrument used in this study Health Locus Of Control will be measured by Multidimensional Health Locus Of Control (MHLC) from Wallston (Wallston et al., 1978). Blood sugar levels are measured using an easy touch brand Glucometer which has a meter dimension of H x W x D (mm): 88 X 64 X 22 with a sugar measurement range of 20-600 mg/dl (1.1-33.3 mmol/L) which has a measurement time duration of 10 seconds, using a 3 V battery type (CR2032) with a battery life that can be used for ± 1000 x examinations accompanied by electrode-based biosensor technology.

Psychoeducation and Interactive Nursing Reminder Interventions Based on Health Belief Model Theory will be carried out for 2 months with an intervention duration of ± 30 minutes per meeting, consisting of two meetings a week with reminders or monitoring carried out once a day using social media or WhatsApp mobile phone applications with the stages of the first week; assessing knowledge and identifying problems experienced by patients, Second week; management of diabetes mellitus knowledge related to education, pharmacological and non-pharmacologic treatment, physical exercise, diet and blood sugar level checks. Assessment of the third and fourth weeks; establishing a joint action plan to achieve the goals that have been set, then assessing the patient's beliefs, motivation, level of trust, and ability. The fifth and sixth weeks; helping patients achieve a self-management plan for diabetes mellitus care. The seventh and eighth weeks; helping patients to use community resources, and providing professional support through peer groups.

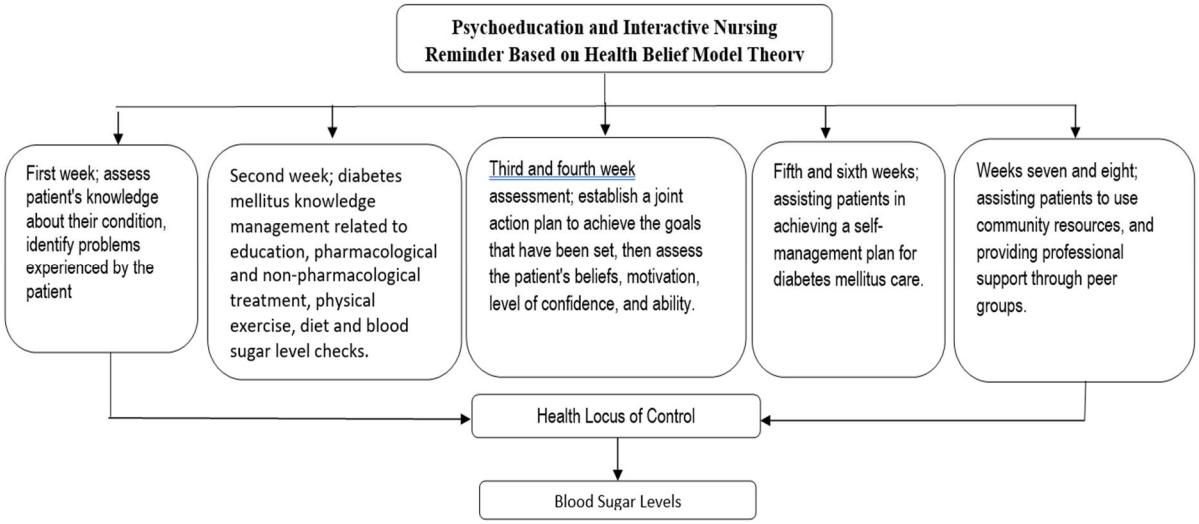

Figure 1. Psychoeducation Framework and Interactive Nursing Reminder Based on Health Belief Model Theory on Health Locus of Control and Blood Sugar Levels

2.3 Ethical Consideration

This research has been approved by the Chakra Brahmanda Lentera Institute Research Ethics Committee in May with the number 044/028/V/EC/KEP/LCBL/2024

2.4 Data analysis

Data analysis was tested using Paired sample t-Test and Independent sample t-Test with $p<0.005$

3. Results and discussion

3.1 Results

Tabel 1. Subjects' Characteristics

Characteristic	Intervention Group (n=60)		Control Group (n=60)		p-value
	f	%	f	%	
Age (Years)					
Early adulthood (26-35)	4	6.7	5	8.3	
Late adulthood (36-45)	14	23.3	23	38.3	0.928
Early old age (46-55)	31	51.7	23	38.3	
Late old age (56-65)	11	18.3	9	15	
Sex					
Male	12	20	17	28.3	0.200
Female	48	80	43	71.7	
Education					
Basic	25	41.6	24	40	0.484
Intermediate	30	50	33	55	
High	5	8.3	3	5	
Profession					

Civil servants	7	10	6	10	
Entrepreneur	18	30	26	43.3	0.610
House Wife	28	46.7	23	38.3	
Does not work	8	13.3	5	8.3	
Long DM					
1-3 years	11	18.3	7	11.7	
4-5 years	31	51.7	34	56.7	0.710
>5 years	18	30	19	31.7	
Comorbidities					
No	11	18.3	20	33,3	0.120
Yes	49	81.7	40	66,7	

The homogeneity test of the characteristics of respondents in the intervention group and the control group was used Lavene's test. It showed a p-value of age (0.928), sex (0.200), education (0.484), profession (0.610), long DM (0.710) and comorbidities (0.120)

Tabel 2. Health Locus Of Control dan Kadar Gula Darah pre and post intervention and control group

ɔle	)			ıe
		± SD	± SD	
ı Locus Of	ention	± 13.83	± 14.40	;9
Control	ɔl	± 13.83	± 14.11	
Blood Sugar	ention	2 ± 49.84	) ± 31.91	3
Levels	ɔl	2 ± 50.01	5± 49.78	

Table 2. The average Health Locus of Control in the intervention group before the action was 61.05 and after the action, the average Health Locus of Control was 87.82. In the blood sugar levels of the intervention group, before the intervention, the average was 312.72 and after the intervention, the average value was 220.10, with a p-value of 0.000. which can be interpreted that there was a significant increase in Health Locus of Control and a decrease in blood sugar levels after being given a psychoeducation program and interactive nursing reminder based on the health belief model theory. While in the control group, the average Health Locus of Control was 61.05 and after the intervention, the average value was 61.02 with a p-value of 0.829. While blood sugar levels showed an average value before the intervention of 312.32 and after it was 310.15 with a p-value of 1.173, which means there was no significant increase in Health Locus of Control and blood sugar levels in the control group.

Tabel 3. Nilai perbedaan Health Locus of Control dan Kadar Gula Darah pre and post in the intervention group and the control group

ɔle	)	± SD	e	
			·e	
ı Locus Of Control	ention	± 14.40	1.000	0.000
	ɔl	± 14.11		

Sugar Levels	ention	) ± 31.91	)	0.965	0.000
	ol	5 ± 49.78			

Table 3. Shows that from the results of data analysis obtained p-value = 0.000 on health locus of control and blood sugar levels after intervention. in the intervention group before and after the action it was found that health locus of control obtained an average value of 87.82 and blood sugar levels with an average value of 220.10. In the control group it was found that before and after the action it was found that health locus of control obtained an average value of 61.02 and blood sugar levels with an average value of 310.35.

3.2 Discussion

Diabetes mellitus is a long-term disease caused by external and internal factors. The main key to stabilizing diabetes control is self-management, because of its lifelong characteristics. However, in reality, poor self-management and blood sugar control are the main problems of diabetes mellitus sufferers (Aga et al., 2020; Sun et al., 2022). Psychoeducation is an important non-pharmacological method to improve self-management and stabilize blood sugar control in diabetes mellitus patients. Psychosocial factors have progressively played an important role in diabetes education and management. Where in particular, current health education often ignores psychosocial factors in disease management. Health locus of control (HLC) is a psychosocial variable that can predict self-management behavior in diabetes mellitus patients (Klinovszky et al., 2019; Mohamed et al., 2019). This is in line with the results of the study where patients with diabetes mellitus in the intervention group who were given Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory experienced an increase in health locus of control and stable blood sugar levels compared to the control group who only received standard care from primary health services. Where respondents stated that during the intervention they felt an increase in locus of control which was reflected in the existence of confidence, self-confidence in making decisions and being able to control themselves during the management of diabetes mellitus so that they were more compliant with the therapy regimen and had an impact on stable blood sugar levels. Psychoeducation combined with Interactive Nursing Reminder on Health Belief Model Theory which contains education, relaxation and effective support in improving the results of the care provided, provides positive effects and emotional support that can improve a person's health locus of control. Health locus of control is closely related to self-management, where those with high health locus of control tend to take proactive actions that are beneficial to health (Javanmardifard et al., 2020; Klinovszky et al., 2019; Mohamed et al., 2019; Sari et al., 2021). This is also supported by the results of research from (Zhu et al., 2022) which states that an increase in health locus of control in a positive direction will make people with diabetes mellitus more likely to be responsible for themselves to control their health, so that the individual is responsible for the implementation of diabetes mellitus management and adheres to self-management recommendations to stabilize blood sugar levels.

Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory is a psychoeducational intervention combined with Interactive Nursing Reminder which emphasizes six aspects, namely perceived susceptibility, perceived severity, perceived barriers, perceived benefits, self-efficacy and cues to action so that health locus of control also increases in deciding on self-care actions and changing self-care behavior towards positive to maintain their health which is supported by using WhatsApp group media in its implementation for reminders or monitoring which is useful in facilitating knowledge, skills, abilities and handling psychological problems of DM patients with the goal of being able to control blood sugar levels and being able to maintain health status at a good level(Alagili & Bamashmous, 2021; Jiang et al., 2021; Sari et al.,

2023). This is also supported by the results of observations and interviews, almost all respondents in the intervention group stated that there was assistance when running the diabetes self-management program, they felt that there was support and guidance that helped in deciding on the right self-management, reminding and even monitoring and feeling effective and efficient through social media so as to increase health locus of control which makes them more obedient so that blood sugar levels blood in stable condition. The existence of a cellphone also supports the effectiveness and efficiency of communication facilities in obtaining various information needed by someone who is not limited by space and time. The increase in behavior in this intervention group occurred due to routine interactions between researchers and respondents (Johnson et al., 2023; Rahbar et al., 2024). In line with the statement (Leong et al., 2022) which explains that attitudes are influenced by a person's personal experience, can be formed from social interactions experienced by individuals, mutually influencing relationships occur in interactions which affect the behavior patterns of each individual.

Factors that can support the success of Psychoeducation and Interactive Nursing reminders based on the Health Belief Model Theory in patients with diabetes mellitus cannot be separated from the education factor. This is in line with the results of the study where half of them have a secondary education background. Where during the intervention the respondents were very open and easily understood the educator's directions regarding the direction and selection of the right diabetes management so that they were obedient in implementing it. This is in line with the research of Health, (2020); Zajacova & Lawrence, (2018) which explains that educational background, economy, cultural values and lifestyle, social values, technology, and spirituality are related to a person's health-related to life expectancy, morbidity and health behaviour. This is also supported by the research of Mekonnen & Hussien, (2021) which states that a person's level of education will help individuals absorb knowledge more quickly, understand, respond to and practice what is obtained regarding self-care for patients with diabetes mellitus to achieve the desired treatment targets and contribute significantly to disease management so that they can control their blood sugar levels to maintain their health and reduce or prevent complications due to their illness.

The success of the Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory innovation intervention in patients with diabetes mellitus is reflected as follows: First, Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory enhances the strength of a person's health locus of control to maximize the educational effect. Second, during personalized communication, we apply targeted instructions according to the characteristics of the individual's health locus of control to help individuals identify their strengths in carrying out and choosing the right diabetes management, stimulating and stabilizing their perception of the internal health locus of control which has an impact on increasing individual readiness. Third, providing respondents with knowledge and skills for self-management practices so that they can control stable blood sugar levels to reduce or avoid complications. Finally, the intervention serves to deepen respondents' memories through continuous repetition of knowledge and positive feedback.

4. Conclusion

Psychoeducation and Interactive Nursing Reminder Based on Health Belief Model Theory affect increasing Health Locus Of Control and Blood Sugar Levels of Diabetes Mellitus Patients. This program can provide an empirical basis for innovation in primary care. In further research, researchers include a Psychoeducation and Interactive Nursing Reminder program Based on the Health Belief Model Theory that is personalized for Diabetes Mellitus patients to be included in telenursing planning as educators, monitors and evaluations of patients undergoing home care.

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Conflict of interest

The authors declare there is no conflict of interest in this paper.

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