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Diabetes Mellitus Preventive Behaviour in the Sibela Community Health Center; Determinant Factor

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ABSTRACT

Introduction: Diabetes Mellitus (DM) is a severe problem in the world and Indonesia. The prevalence of DM at Sibela Community Health Center in Surakarta City in 2021 was 3.37%, the highest in Surakarta City. Efforts are needed to prevent DM through behavioral interventions. Several factors influence DM prevention behavior, such as family history, family support, knowledge, and attitudes.
Methods: The independent variables in this study include family history, family support, knowledge, and attitude. This study is an analytic observational study with a cross-sectional approach. The population of this study were people who lived in the Sibela Health Center Working Area and did not suffer from DM. The sample in this study was 167 respondents, with a sampling technique using purposive sampling. The research instrument used a questionnaire with data collection techniques in the form of interviews. Data analysis used logistic regression with a confidence level of 95% and a significance level of $\alpha = 0.05$.
Results: The results showed that there was a relationship between attitude and DM prevention behavior (p-value = 0.016), and there was no relationship between family history (p-value = 0.719), family support (p-value = 0.131), and knowledge (p-value = 0.815) with DM prevention behavior.
Conclusion: Attitude is one of the determinant factors related to DM preventive behavior, it is hoped that the POSBINDU PTM can be implemented more broadly and comprehensively through the program, such as developing a physical agenda, training to improve skills such as meal planning, exercise, and stress management, training cadres on skills, and providing remote health access.

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INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycemia (high blood glucose levels) due to insulin deficiency, insulin resistance, or both (1,2). DM is one of the major non-communicable diseases (NCDs), and the prevalence and mortality of DM are serious problems in the world. In 2019, the prevalence rate of DM was 5.943 per 100.000 population worldwide, and the mortality rate was 20.5% per 100.000 population (3). In Indonesia, the prevalence of DM adults was as high as 6.9% in 2013 and increased in 2018 to 8.5% (4,5). The incidence of DM needs to be minimized because if a person has been diagnosed with DM and cannot control it properly, it will cause several complications such as retinopathy, neuropathy, and nephropathy (microvascular), as well as peripheral vascular and coronary artery disease (microvascular) (6).

Therefore, DM prevention behaviors should be implemented to prevent or delay a person from developing DM (7,8). DM prevention behavior consists of several things, such as diet, physical activity, not smoking, and maintaining the ideal body weight (9–11). DM preventive behavior should also be based on the knowledge and attitude that underlie a person in an attempt to prevent DM. Knowledge and attitude of a person tend to generate awareness for DM preventive behavior. DM preventive behaviors that are based on sound knowledge, awareness, and positive attitude will be lasting compared to DM preventive behaviors that are not based on knowledge (12). In addition, individuals with a family history of DM often possess a heightened awareness of their risk, which can motivate them to adopt DM-preventive behavior (13). External support, such as family support, is also needed to obtain better health outcomes, including better eating habits, physical activity, glycemic control, and psychological status as a manifestation of DM preventive behavior (14).

On the other hand, previous research conducted at Taman District, Madiun City, East Java, showed no relationship between knowledge and DM preventive behavior (p-value: 0.499), and there was a relationship between family history and DM preventive behavior (p-value: 0.048) (15). Another research conducted at the Faculty of Public Health, Universitas Airlangga, showed there is no relationship between knowledge (p-value: 1.114) and attitude (p-value: 0.597) with exclusive DM preventive measures (16). While related to attitude, a study in Malang City shows a relationship between family support and DM prevention behavior (p-value: 0.000) (17). In addition, several studies have also shown a positive relationship between family history, family support, knowledge, and attitude with DM preventive behavior (18–20). Some previous studies show the inconsistency of the results, and there is no research that explicitly analyzes family history, family support, knowledge, and attitude toward DM preventive behavior, especially in Surakarta City, Central Java. This makes the researcher interested in choosing a research location in Surakarta City, especially at Sibela Community Health Center, which has the highest prevalence of DM cases in Surakarta City, at as many as 3.37% (21).

METHOD

Research Type

This type of research is a quantitative study with an analytical observational design and a cross-sectional method.

Population and Sample/Informants

The population of this study consisted of individuals residing in the Working Area Sibela Community Health Center of Surakarta City, totaling 25,506 people aged 15–44 years. This study has secondary data by name and address from Sibela Community Health Center, so that DM patients seeking treatment at Sibela Community Health Center and living in the Sibela Community Health Center Working Area have been excluded from the total population.

Sample calculation using Lemeshow with Confident Interval (CI 95% = 1.96), proportion 0.1 (22), and absolute precision value (5% = 0.05) with 138 respondents as a minimal sample. Then, anticipate for non-response affect 10% and use the infinite formula q = 1 / (1 – 0,1) with the total calculation of 153 respondents. The sample in this study is 167 respondents. The sampling technique used purposive sampling, with inclusion criteria such as people aged 15 – 45 years, not suffering from DM, living in the Sibela Health Center Working Area of Surakarta City, and willing to become respondents. The exclusion criteria are people who have DM diagnosed and are psychologically and cognitively limited.

Research Location

The study was conducted at the Working Area Sibela Community Health Center.

Instrumentation or Tools

The instrument used to measure the knowledge level is the Diabetes Knowledge Questionnaire (DKQ-24), which consists of 24 question items. Validity and reliability tests show that the value of Crobach's Alpha is 0.757 > 0.7, so the DKQ-24 questionnaire is valid and reliable (23). DKQ-24 is divided into three categories: poor knowledge (< 55), fair knowledge (55 - 75), and good knowledge (76 - 100).

Meanwhile, attitudes were measured using the Diabetes Attitude Scale-3 (DAS-3) questionnaire, which consisted of 33 question items. The results of the tests' validity 0.448 > and reliability 0.909 > 0.6, so the DAS-3 questionnaire is valid and reliable (24).

The questionnaire on preventive behavior by the researcher contains 4 main dimensions: eating habits, physical activity, obesity status, and consumption of DM-inducing medications, with 27 questions. Validity and reliability tests were carried out on June 20, 2023, at Penumping Health Center, with 25 respondents. Questions 1 – 21 are valid, and numbers 22 - 27 are invalid because < 0.361, but considering that the question was essential to include, the question was used in this study. The reliability test is Cronbach's Alpha 0.761, which is declared reliable.

Data Collection Procedures

Quantitative data was collected through an *interview questionnaire from September 2023 to January 2024.*

Data Analysis

Data analysis used statistical software, where univariate analysis was performed to see the frequency distribution of respondents' characteristics and multivariate analysis was used to analyze the relationship between independent variables (family history, family support, knowledge, and attitude) with DM prevention behavior using a logistic regression test and 95% confidence level.

Ethical Approval

The Health Research Ethics Committee Hospital TK approved this study—II 04.05.01 dr. Soedjono Magelang with Number: 510/EC/VIII/2023.

RESULTS

The characteristics of the respondents are shown in Table 1. The number of respondents obtained in this study was 167 at Sibela Community Health Center. Table 1 below shows that the majority of respondents aged 26 - 45 years are in the adult category, as many as 89 respondents (53.3%). Based on gender, the majority of respondents were female as many as 124 respondents (74.3%), the majority of respondents had a high school education level as many as 91 respondents (54.5%), and the majority of respondents had job status as civil servant as many as 71 respondents (42.5%).

Table 1. Participant Demographic

Demographic Variable	Category	Frequency (%)
Age	Young Adulthood (17 – 25 years)	76 (46.7)
	Adult (26 – 45 years)	89 (53.3)
Gender	Male	43 (25.7
	Female	124 (74.3)
Level of Education	Elementary School	4 (2.4)
	Junior High School	19 (11.4)
	Senior High School	91 (54.5)
	Bachelor Degree	53 (31.7)
Job Status	Unemployment	4 (2.4)
	Housewife	38 (22.8)
	Farmer	2 (1.2)

	Trader	9 (5.4)
	Entrepreneur	71 (42.5)
	Civil Servant	2 (1.2)
	Other	41 (24.6)
Total		167 (100)

Table 2. below shows that there is a relationship between attitude and DM prevention behavior (p-value = 0.016), and there is no relationship between family history (p-value = 0.612), family support (p-value = 0.323), and knowledge (p-value = 0.360) with DM prevention behavior.

Table 2. Bivariate Analysis of Determinant Factors for DM Preventive Behaviour

Variable	Category	Preventive Behavior of DM				Total		P-value
		Low		High				
		n	%	n	%	n	%	
Attitude	Positive	31	39.2	48	60.8	79	100	0.016
	Negative	51	58.0	37	42.0	88	100	
Family History	No	47	47.5	52	52.5	99	100	0.612
	Yes	35	51.5	33	48.5	68	100	
Family Support	Low	40	53.3	35	46.7	75	100	0.323
	High	42	45.7	50	54.3	92	100	
Knowledge	Low	30	44.8	37	55.2	67	100	0.360
	High	52	52.0	48	48.0	100	100	

And the final analysis used multivariate analysis that illustrates, based on Table 3. below that there was no association between family history (p-value = 0.719), family support (p-value = 0.131), and knowledge (p-value = 0.815).

Table 3. Multivariate Analysis of Determinant Factors for DM Preventive Behaviour

Variabel	B	S.E.	Exp.B	(95% CI)	P-value
Atittude	-0.027	0.343	0.437	(0.223 – 0.857)	0.016
Family History	-0.119	0.330	0.888	(0.465 – 1.695)	0.719
Family Support	0.499	0.330	1.648	(0.862 – 3.148)	0.131
Knowledge	-0.079	0.338	0.924	(0.477 – 1.791)	0.815

DISCUSSION

This study found that the results of multivariate analysis showed that there was no association between family history (p-value = 0.719), family support (p-value = 0.131), and knowledge (p-value = 0.815). The assertion that there is no relationship between family history and diabetes mellitus (DM) preventive behavior contradicts existing research findings (25–27). The inconsistency of previous studies could be due to various barriers, including individual physiological factors such as self-efficacy. Self-efficacy plays an important role; individuals who lack confidence in making changes are less likely to adhere to recommendations. In addition, the stress associated with implementing lifestyle changes can overwhelm individuals, making it difficult to maintain consistency in performing DM prevention behaviors (28,29). Meanwhile, if it is found that family history and DM prevention behavior have a relationship, it is due to shared lifestyle patterns; family members often share similar lifestyles, affecting dietary habits and physical activity levels. This shared environment contributes to DM risk and preventive behavior (30,31). This effort can be considered one of the family support efforts, and it was in line with previous studies that show a relationship between family support and DM prevention behavior (32,33). However, this study did not find an association between family support and DM prevention behavior, and this may be because, in some people, external factors have little effect on self-change (34–36). For example, a person needs a fundamental reason to perform a behavior, such as self-motivation.

Self-motivation refers to the desire to pursue health goals within oneself (37). A previous study mentioned that research had shown the importance of the relationship between motivation type and physical activity/exercise behavior in individuals as a DM-prevention behavior (38). In addition, a study also shows that self-motivation makes

it easier for a person to adopt a healthy diet (39,40). Based on another study, low self-motivation led to a significantly higher risk of uncontrolled blood sugar levels than those with high self-motivation, suggesting that enhancing motivation could lead to better health outcomes (41,42). Efforts to increase self-motivation so that someone wants to do DM preventive behavior, such as understanding what drives a person personally, are critical, as is recognizing intrinsic values and aligning DM prevention behavior goals with those values to foster a deeper commitment to behavior change and using visualization can significantly improve by imagining the positive outcomes of adhering to DM preventive behaviors (43,44).

Besides self-motivation, knowledge is needed to achieve better health outcomes. Previous studies show the relationship between knowledge and DM preventive behavior (45,46). Individuals who are educated about DM are more likely to engage in preventive practices like regular health screenings and maintaining a healthy weight (47). However, this study is not in line with the previous study because this study found that there is no relationship between knowledge and DM preventive behavior. This may be because most respondents are adults and tend to procrastinate preventive behavior health-related, believing they can address issues later (48). In addition to the tendency to procrastinate, lifestyle can also affect disease prevention behavior. Adults often choose fast food despite its high sugar and fat content, primarily due to the perceived benefits of convenience and time-saving (49,50). Even though they have good knowledge and understand that fast food is not good for their health, they still consume it because they feel the benefit, so it can be concluded that knowledge can affect behavior, not a simple and linear relationship. This also applies to the relationship between a person's attitude (51,52).

Attitude is the degree of positive or negative affect towards a psychological object (53). Positive attitudes in this study, such as indicating a strong willingness to incorporate physical activity into their routines and often preferring low-sugar foods, maintaining regular meal times, and being conscious of calorie intake then negative attitudes, such as disagreeing with the idea of dietary restrictions and exercise, can foster a negative outlook on DM prevention behavior. Based on Table 3. This study found a relationship between attitude and preventive behavior with a p-value of 0.016. This is in line with research conducted at 25 Puskesmas in Bantul, Yogyakarta Special Region, Indonesia, which shows that attitude has a positive relationship with DM prevention behavior ($p < 0.001$) (54). Another study also showed a relationship between attitude and DM preventive behavior (55). Even though this study found the relationship, it is interesting that most respondents, as many as 88 (52.7%). It may be because of psychological aspects in carrying out DM prevention behavior, such as anxiety disorders, post-traumatic stress disorder, and personality and conduct disorders (56–58). Previous studies show that interventions such as psychotherapeutic approaches, particularly cognitive behavioral therapy (CBT), motivational interviewing, and mindfulness-based therapies, have effectively enhanced self-efficacy, mental health, and implementation of DM preventive behavior (59,60).

Socioeconomic factors, such as income and employment status, can also be influenced, significantly influencing preventive attitudes and behaviors. Lower income levels are associated with lower health outcomes and lacking active health-related attitudes (61). For example, unhealthy dietary patterns due to limited access to affordable, nutritious food and cooking facilities, higher rates of smoking, alcohol consumption, and physical inactivity linked to stress, and limited recreational resources (62,63). Those negative attitudes that are carried out continuously can be a concern because they have a higher chance of developing DM (64).

Efforts can be made to minimize the incidence of DM by conducting population-based screening and lifestyle change programs that are very important by implementing DM prevention behaviors (65,66). Previous research shows that enhancing the role of POSBINDU PTM, especially for DM preventive behavior, can be in the form of early detection, monitoring, and early follow-up of risk factors (67). Interventions that POSBINDU PTM can provide to improve DM prevention behavior can be done in various ways, such as: 1) Organize regular walking groups, gymnastics, or cycling events at POSBINDU PTM; 2) Behavioral skill training like the use of demonstrations and practice sessions for meal planning, exercise routines, and stress management(68); 3) Train POSBINDU PTM cadres to deliver consistent counseling on DM preventive behavior (69); 4) Provide remote access to healthcare providers for personalized feedback, reducing barriers to sustained engagement (70). However, support is also needed to enhance the role of POSBINDU PTM, which can be done in several ways, such as collaborating with community leaders and influencers to increase participation, thereby significantly increasing trust and encouraging community members to engage in activities and ensuring adequate funding and resources ending with conducting ongoing evaluation and feedback to assess its impact on community health outcomes (71–73).

This study has several limitations, including its cross-sectional design, which prevents establishing causation, and its reliance on self-reported data, which may introduce recall or social desirability bias. Additionally, the findings are limited in generalizability as the study was conducted solely at the Sibela Community Health Center. The research also excluded variables such as socioeconomic status and access to healthcare, which could influence DM preventive behavior. Furthermore, the study found no significant relationship between family history, family support, and knowledge of DM preventive behavior. This contradicts prior research, potentially due to sample-specific effects or measurement limitations.

CONCLUSION

One of the factors proven to be associated with DM prevention behavior in this study is attitude. Other factors, such as family history, family support, and knowledge, were not shown to have a relationship with DM prevention behavior. The self-efficacy, self-motivation, and lifestyle of the respondents can cause this. This study also found that most respondents had a low level of attitude.

Therefore, efforts are needed to improve and control DM prevention behavior in the community. Efforts that can be made can be made through the POSBINDU PTM program such as developing a physical agenda, training to improve skills such as meal planning, exercise, and stress management, training cadres of skills, and providing remote health access. Support from community leaders, funding, evaluation, and feedback is also needed to improve the role of the POSBINDU PTM. The study concluded that there are several factors, such as family history, family support, and knowledge, but there is no relationship with DM preventive behavior. One factor influencing DM preventive behavior in this study is attitude.

AUTHOR'S CONTRIBUTION STATEMENT

This research was conducted by the research team with the specific contribution as follows: 1) Data collection, analysis, and an explanation of discussion; Anisa Catur Wijayanti; 2) An analysis and an explanation of discussion; Kusuma Estu Werdani; 3,4) Enumerator; Nida Dwi Arifa and Avifah Ainun Hidayah; 5) An explanation of discussion and editing; Widya Galih Puspita.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

I declare that generative AI and AI-assisted technologies were used only to support language refinement and improve clarity in the writing process. All ideas, analyses, and conclusions in this thesis are entirely my own, and no AI tools were used to generate research data or substantive academic content.

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