

Medication Adherence in Diabetes Mellitus Patients Based on the Health Belief Model Perception

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ABSTRACT: Diabetes Mellitus (DM) is a chronic disease that requires long-term treatment. Treatment adherence is an important factor in controlling blood glucose levels and preventing complications. Patient perception based on the Health Belief Model (HBM) is thought to play a role in shaping treatment adherence behavior. This study aims to analyze the influence of HBM perceptions on treatment adherence in DM patients at the Gadingrejo community health center, Pringsewu, Lampung province, Indonesia. This study used an observational analytical design with a case-control approach conducted in April–June 2026. A sample of 206 respondents consisting of 103 case groups and 103 control groups, selected using a stratified random sampling technique. Data were collected using the HBM and MMAS-8 questionnaires, then analyzed using the Chi-Square test with $\alpha = 0.05$. There was a significant influence between perceived susceptibility ($p < 0.001$; OR=3.051; 95%CI=1.730–5.383), perceived severity ($p = 0.002$; OR=2.482; 95%CI=1.417–4.347), perceived benefit ($p < 0.001$; OR=2.927; 95%CI=1.662–5.156), perceived barriers ($p = 0.012$; OR=2.120; 95%CI=1.213–3.702), self-efficacy ($p = 0.005$; OR=2.290; 95%CI=1.310–4.003), and cues to action ($p < 0.001$; OR=4.531; 95%CI=2.492–8.239) on medication adherence. All constructs of the HBM influence medication adherence in DM patients. Increasing positive perceptions and reducing barriers can support better medication adherence.

KEYWORDS: Diabetes mellitus, Health belief model, Medication adherence, Patient perception, Self-efficacy.

INTRODUCTION

Diabetes Mellitus (DM) is a chronic metabolic disease characterized by high blood glucose levels due to impaired insulin production, insulin action, or both. This disease is a growing global health problem and requires long-term management. The success of DM treatment is greatly influenced by patient adherence to therapy. Good adherence can help achieve optimal glycemic control, prevent complications, improve quality of life, and reduce morbidity, mortality, and healthcare costs. Conversely, non-adherence can lead to therapy failure and worsen the patient's condition (Highton et al., 2025). Globally, the International Diabetes Federation reports that in 2024, there will be approximately 589 million adults aged 20–79 years living with DM, and this number is projected to increase to 853 million by 2050. As many as four out of five people with DM live in low- and middle-income countries, with approximately 3.4 million deaths annually from this disease (Schwardz et al., 2025). WHO also reported that the prevalence of DM in the adult population increased from 7% in 1990 to 14% in 2022, especially in developing countries that still face limited access to health services and early detection (Zhou et al., 2024).

Southeast Asia is one of the regions with a high burden of diabetes. The WHO notes that more than 70% of people with diabetes in this region are undiagnosed or have not received adequate treatment. Urbanization, lifestyle changes, and demographic transition are the main factors driving the increase in diabetes cases (Schwardz et al., 2025). In Indonesia, the prevalence of diabetes in adults reached 11.3% with approximately 20.4 million people in 2024, placing Indonesia fifth in the world in the number of adult diabetes sufferers (Schwardz et al., 2025). Data from the 2023 Indonesian Health Survey also showed a prevalence of diabetes in those aged ≥ 15 years at 11.7% (Jabbar et al., 2025). At the regional level, the number of diabetes cases also continues to increase. In Lampung province, diabetes cases increased from approximately 132,800 cases in 2023 to 141,600 cases in 2024 (Lampung Provincial Health Office, 2025). In Pringsewu regency, DM cases increased from 6,742 cases in 2023 to 7,518 cases in 2024



(Pringsewu Regency Health Office, 2025). A sharper increase occurred in the Gadingrejo community health center (*Puskesmas*) area, from 680 cases in 2022 to 771 cases in 2023 and to 1,897 cases in 2024 (UPT Puskesmas Gadingrejo, 2025).

Despite the increasing number of cases, DM control remains suboptimal. Research in primary healthcare services shows that only 35.2% of type 2 DM patients successfully achieve the HbA1c target of <7% (Setiawan et al., 2025). Data from the Pringsewu Regency *Prolanis* (National Health and Social Welfare Program) shows that the number of DM patients with controlled blood sugar increased from 256 patients in 2023 to 515 patients in 2024 and 692 patients in 2025. However, the Gadingrejo community health center only recorded 25 patients with controlled blood sugar in 2024 (Pringsewu Regency Health Office, 2025). This condition indicates that DM management still faces obstacles, one of which is patient compliance with treatment. Treatment compliance is a critical factor in the success of DM management. Highton et al. (2025) reported that approximately 38% of DM patients do not take medication as prescribed by healthcare professionals. Low compliance can lead to poor glycemic control, increase the risk of complications, and reduce the patient's quality of life. Treatment adherence is influenced by sociodemographic, clinical, and psychosocial factors, such as knowledge, family support, interactions with health workers, and patient beliefs about the disease and treatment being undertaken (Chantzaras et al., 2025).

One theory that can be used to explain adherence behavior is the Health Belief Model (HBM). This model explains that a person's health behavior is influenced by perceptions of disease threats and the benefits of health measures (Iskandar et al., 2025). In the context of DM, the HBM explains medication adherence through four main constructs: perceived susceptibility, perceived severity, perceived benefit, and perceived barrier. Patients who are aware of the risks and impacts of DM and believe in the benefits of treatment tend to be more adherent. Conversely, the greater the perceived barriers, the lower the patient's adherence level (Ismayadi, Adawiyah, and Aji, 2021). Based on this description, research to analyze the factors influencing adherence to diabetes mellitus medication at the Gadingrejo community health center is important as a basis for developing more effective interventions to improve medication adherence and the success of diabetes mellitus management.

METHODS

This research is a quantitative analytical study with a case-control design that aims to analyze the relationship between Health Belief Model (HBM) perceptions and medication adherence in DM patients. The study was conducted in April–June 2026 in the working area of Gadingrejo community health center, Pringsewu, Lampung province, Indonesia. The study population was all DM patients undergoing treatment at Gadingrejo community health center in 2026. The study sample consisted of 206 respondents consisting of 103 non-adherent patients (case group) and 103 compliant patients (control group). Sampling was carried out using a stratified random sampling technique. The dependent variable in this study was medication adherence in DM patients as measured using the Morisky Medication Adherence Scale-8 (MMAS-8).

The independent variable was patient perception based on the Health Belief Model constructs which include perceived susceptibility, perceived severity, perceived benefit, perceived barriers, self-efficacy, and cues to action. Primary data were collected through interviews using a structured questionnaire based on the Health Belief Model with a four-point Likert scale. Data analysis was carried out in stages, including univariate analysis to describe the distribution of each variable and bivariate analysis using the Chi-Square test to determine the relationship between each HBM construct and medication adherence with a significance level of $\alpha = 0.05$. This study has obtained ethical approval from the Research Ethics Committee of Tanjung Karang Health Polytechnic Number 236/KEPK-TJK/IV/2026. All respondents have provided written informed consent before participating in the study.

RESULTS

Based on the results of data collection, the results of the study were obtained in the form of respondent characteristics in table 1. Based on Table 1, the majority of respondents were in the productive age group (<59 years) as many as 127 respondents (61.7%), which shows that most DM patients are still at an active age so that medication compliance is important in maintaining health. Based on gender, most respondents were men as many as 113 respondents (54.9%), which shows male dominance in this study.



Table 1. Respondent Characteristics (n=206)

Variable	Frequency (n)	Percentage (%)
Age		
Productive age <59 y.o	127	61.7
Non Productive age >59 y.o	79	38.3
Gender		
Female	93	45.1
Male	113	54.9

The influence of HBM perception on DM medication adherence

The results of the analysis of the influence of the HBM treatment on compliance with diabetes mellitus treatment at the Gadingrejo health center, Pringsewu, Lampung province, Indonesia, are presented in Table 2.

Table 2. The effect of HBM treatment on DM medication adherence (n=206)

	Medication adherence				<i>p-value</i>	OR (95% CI)
	Adhere		Not adhere			
	n	%	n	%		
Perceived Susceptibility						
High	66	64.1	38	36.9	<0.001	3.051 (1.730-5.383)
Lower	37	35.9	65	63.1		
Perceived Severity						
High	64	62.1	41	39.8	0.002	2.482 (1.417-4.347)
Lower	39	37.9	62	60.2		
Perceived Benefit						
High	66	64.1	39	37.9	<0.001	2.927 (1.662-5.156)
Lower	37	35.9	64	62.1		
Perceived Barriers						
Lower	65	63.1	46	44.7	0.012	2.120 (1.213-3.702)
High	38	36.9	57	55.3		
Self-Efficacy						
High	64	62.1	43	41.7	0.005	2.290 (1.310-4.003)
Lower	39	37.9	60	58.3		
Cues to Action						
High	78	75.7	42	40.8	<0.001	4.531 (2.492-8.239)
Lower	25	24.3	61	59.2		
Total	103	100	103	100		



The results of the analysis showed that respondents with high perceived vulnerability (perceived vulnerability) had more good adherence to treatment, namely 66 respondents (64.1%), while respondents with low perceived vulnerability were more non-adherent to treatment, namely 65 respondents (63.1%). The results of the statistical test showed that there was a significant influence between perceived vulnerability and attendance of treatment in DM patients (p -value < 0.001). The OR value of 3.051 (95% CI: 1.730–5.383) indicated that respondents with low perceived vulnerability had a 3.051 times greater risk of non-adherence to treatment than respondents with high perceived vulnerability. The results of the analysis showed that respondents with high perceived severity (perceived severity) were more compliant with treatment, namely 64 respondents (62.1%), while respondents with low perceived severity were more non-compliant with treatment, namely 62 respondents (60.2%). The results of statistical tests showed a significant influence between perceived severity and medication adherence in DM patients (p -value = 0.002). The Odds Ratio (OR) value of 2.482 (95% CI: 1.417–4.347) indicated that respondents with a low perceived severity level had a 2.482 times greater risk of non-adherence to medication compared to respondents with a high perceived severity level.

The analysis results showed that respondents with high perceived benefits were more compliant with treatment, namely 66 respondents (64.1%), while respondents with low perceived benefits were more non-compliant with treatment, namely 64 respondents (62.1%). The statistical test results showed a significant influence between perceived benefits and treatment compliance in DM patients (p -value < 0.001). The OR value of 2.927 (95% CI: 1.662–5.156) indicated that respondents with low perceived benefits had a 2.927 times greater risk of non-compliance with treatment compared to respondents with high perceived benefits. The analysis results showed that respondents with low perceived barriers were more compliant with treatment, namely 65 respondents (63.1%), while respondents with high perceived barriers were more non-compliant with treatment, namely 57 respondents (55.3%). The results of statistical tests showed a significant influence between perceived barriers and medication adherence in DM patients (p -value = 0.012). The OR value of 2.120 (95% CI: 1.213–3.702) indicated that respondents with high perceived barriers had a 2.120 times greater risk of non-adherence to medication compared to respondents with low perceived barriers.

The results of the analysis showed that respondents with high self-efficacy were more likely to comply with treatment, namely 64 respondents (62.1%), while respondents with low self-efficacy were more likely to be non-compliant with treatment, namely 60 respondents (58.3%). The results of statistical tests show that there is a significant influence between self-efficacy and treatment compliance in DM patients (p -value = 0.005). The OR value of 2.290 (95% CI: 1.310–4.003) indicates that respondents with low self-confidence have a 2.290 times greater risk of non-adherence to treatment than respondents with high self-confidence. The results of the analysis based on cues to action showed that respondents with a high level of encouragement, 78 respondents (75.7%) were more likely to comply with treatment, while respondents with low encouragement, 61 respondents (59.2%) were more likely to be non-compliant with treatment. The results of statistical tests show that there is a significant influence between cues to action and treatment compliance in diabetes mellitus patients, with a p -value < 0.001 ($p < 0.05$). In addition, the Odds Ratio (OR) value of 4.531 (95% CI: 2.492–8.239) indicates that respondents with low encouragement have a 4.531 times greater risk of non-adherence to treatment compared to respondents who have high encouragement. These findings confirm that the lower the encouragement or trigger for action that the patient receives, the greater the possibility of non-adherence in undergoing treatment.

DISCUSSION

The results of this study indicate that perceived susceptibility has an influence on medication adherence in DM patients. This finding is in line with Harun's (2025) research which showed a significant relationship between perceived susceptibility and medication adherence in Diabetes Mellitus patients at the Galala Community Health Center (p -value = 0.000), as well as Fitriani, Pristianty, and Hermansyah's (2019) research which found that increased perceived susceptibility is associated with increased adherence to insulin therapy in type 2 DM patients (p -value = 0.006). The results of this study are in accordance with the concept of the HBM which states that individuals tend to take health actions when they feel vulnerable to disease. The higher the perceived susceptibility, the greater the urge to comply with treatment. According to Rosenstock (1974), perceived susceptibility is an individual's belief about the possibility of experiencing a disease or health problem, which is influenced by knowledge, personal experience, and information from the surrounding environment. These perceptions play a crucial role in shaping health behaviors, including medication adherence (Notoatmodjo, 2004; Alamer, 2024). Therefore, improving health education regarding the risks and



complications of diabetes mellitus can strengthen patients' perceptions of vulnerability, thus encouraging better medication adherence.

The results of this study indicate that perceived severity has an influence on medication adherence in DM patients. This finding is supported by Harun's (2025) research which found a significant relationship between perceived severity and medication adherence in DM patients at the Galala community health center (p-value = 0.000). Similar results were also reported by Fitriani, Pristianty, and Hermansyah (2019) (p-value = 0.047) and Shabrina (2023) (p-value = 0.000), which showed that perceived severity is related to patient adherence in undergoing diabetes therapy. The results of this study are in line with the concept of the HBM which states that individuals who view their disease as a serious condition tend to be more motivated to undergo regular treatment. According to Rosenstock (1974), perceived severity is an individual's belief regarding the seriousness of the disease and its impact on life, both from medical, psychological, social, and economic aspects (Alamer, 2024). This perception is influenced by experience, knowledge, and concerns about the consequences of the disease (Rosenstock, 2016). Therefore, increasing patient understanding of the impact and complications of diabetes mellitus can strengthen perceptions of severity, thus encouraging better treatment adherence.

The results of this study indicate that perceived benefit has an influence on medication adherence in DM patients. This finding is in line with Harun's (2025) study which found a significant relationship between perceived benefit and medication adherence in DM patients (p-value = 0.000). Similar results were also reported by Fitriani, Pristianty, and Hermansyah (2019) which showed that perceived benefit influences insulin adherence (p-value = 0.026). According to Pramono (2018), patients who feel real benefits from treatment tend to be more compliant because they see a positive impact on their health condition. Almira et al. (2019) also explained that the experience of improving health conditions can strengthen patients' beliefs about the benefits of therapy, while Vazini and Barati (2014) stated that the higher the perceived benefit, the greater the patient's willingness to undergo treatment consistently. In the HBM, perceived benefit is an individual's belief that a health action will provide benefits for their health. Rosenstock (1974) emphasized that even if a person is aware of the risks and severity of a disease, health measures will not be taken if they do not believe in the benefits of those measures (Rosenstock, 2016). Therefore, increasing patient understanding of the benefits of treatment and preventing complications of Diabetes Mellitus is an important factor in improving treatment compliance.

The results of this study indicate that perceived barriers have an influence on medication adherence in DM patients. This finding is in line with Harun's (2025) research which showed a significant relationship between perceived barriers and medication adherence in Diabetes Mellitus patients (p-value = 0.000). Similar results were also found by Shabrina (2023) (p-value = 0.018), Pramono (2018), and Vazini and Barati (2014) (p-value = 0.042), which showed that various barriers, such as drug side effects, fear of therapy, treatment costs, and limited access to health services can reduce patient adherence. In the Health Belief Model, perceived barriers are individual beliefs about various obstacles that can hinder the implementation of health behaviors. These barriers can be physical, psychological, social, or economic factors that affect the patient's ability to undergo therapy regularly (Rosenstock, 1974; Fitriani et al., 2019). Therefore, the greater the perceived barriers a patient face, the greater the likelihood of non-adherence to treatment. Conversely, efforts to reduce perceived barriers can improve adherence to diabetes mellitus management.

The results of this study indicate that perceived efficacy has an influence on medication adherence in DM patients. This finding is in line with Harun's (2025) research which showed a significant relationship between self-efficacy and medication adherence in DM patients (p-value = 0.000). Similar results were also reported by Fitriani, Pristianty, and Hermansyah (2019) (p-value = 0.042) and Ulum et al. (2015), who found that self-efficacy is related to medication adherence in type 2 DM patients. Self-efficacy is an individual's belief in their ability to carry out health behaviors successfully. According to Limbu et al. (2023), individuals who have high self-confidence tend to be more able to motivate themselves, overcome obstacles, and maintain recommended health behaviors. Within the HBM framework, self-efficacy is an important factor influencing long-term adherence because patients who are confident in their abilities will be more consistent in undergoing therapy than patients with low self-confidence. Therefore, increasing education, mentoring, and support from health workers and families is needed to strengthen self-efficacy so that medication adherence in Diabetes Mellitus patients can increase. The results of this study indicate that Cues to Action has an influence on medication adherence in DM patients. The results of this study are in line with Harun's (2025) study which showed a significant relationship between cues to action and medication adherence in diabetes mellitus patients at the Galala Community Health Center with a p-value = 0.000. Pramono's (2018) study also reported similar results with a p-value = 0.028, where patients who received regular reminders and encouragement from health workers and families tended to be more compliant



with medication. In addition, research related to family support in managing diabetes mellitus showed a significant relationship with medication adherence with a p-value = 0.007, which illustrates that family attention and supervision play an important role in increasing patient adherence (Pusmarani, 2025). Research by Diani et al. also strengthens this finding with a p-value = 0.001, which shows that health worker support is closely related to increased patient compliance in undergoing therapy.

Cues to action are triggers that encourage individuals to initiate or maintain certain health behaviors. In the context of diabetes mellitus, these triggers can include reminders from healthcare professionals, family support, health information, and direct experiences with disease symptoms. Although individuals already have perceptions of risks, severity, benefits, and barriers, health actions often fail to occur without adequate encouragement. Limbu et al. (2023) explain that the strength of the trigger is crucial in determining whether individuals will move from simply understanding the risks to actually taking health actions. Conceptually, cues to action in the HBM serve as drivers that bridge the gap between intention and actual action. Without strong triggers, individuals tend to delay or even neglect treatment despite understanding the risks of the disease. Therefore, regular reminders, ongoing education, and social support are crucial elements in improving medication adherence in diabetes mellitus patients.

CONCLUSION

This study shows that all constructs of the HBM, namely perceived susceptibility, perceived severity, perceived benefit, perceived barriers, self-efficacy, and cues to action, have a significant effect on medication adherence in DM patients at our study area. Patients with high perceived susceptibility, perceived severity, perceived benefit, self-confidence, and urge to act tend to be more adherent to treatment, while patients with high perceived barriers tend to be less adherent.

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