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Illness Perception in Adult Patients with Diabetes Mellitus in Surabaya: a Cross-Sectional Study

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ABSTRACT Diabetes mellitus (DM) is a major chronic disease that requires continuous self-care and active patient participation to prevent severe complications such as cardiovascular disease, kidney failure, and neuropathy. However, the level of illness perception among patients significantly influences how they manage their disease, adhere to treatment, and maintain healthy behaviors. A positive illness perception enables patients to understand their condition better, adopt appropriate self-care, and seek necessary support. This study aims to examine the relationship between demographic and clinical characteristics including age, gender, duration of disease, family history, medication adherence, blood glucose levels, and comorbidities and illness perception among adult DM patients in Surabaya. This research employed a correlational, cross-sectional design with a sample of 175 adult DM patients recruited through simple random sampling from four community health centers between July and August 2024. Data were collected using a structured questionnaire adapted from the Brief Illness Perception Questionnaire (B-IPQ) and analyzed using linear regression at a 0.05 significance level. The findings showed that 59.42% of respondents had a high illness perception. Age ($p = 0.021$), disease history ($p = 0.027$), and comorbidities ($p = 0.023$) were significantly associated with illness perception. These results indicate that older patients and those with a history of disease and comorbid conditions tend to perceive their illness more seriously. This highlights the importance of early identification of these factors to tailor educational and counseling interventions, ensuring that patients develop a positive perception of their disease. Nurses and other health professionals should continuously support and empower DM patients to strengthen their illness perception and encourage sustainable self-care practices.

INDEX TERMS Diabetes Mellitus, Illness Perception, Comorbidity, Self-Care, Cross-Sectional Study

I. INTRODUCTION

Diabetes mellitus (DM) remains a global public health challenge due to its rising prevalence and complex long-term management requirements. The International Diabetes Federation estimates that by 2030, the global number of adults living with DM will reach over 578 million if preventive measures are not strengthened [1]. In Indonesia alone, DM ranks among the top ten leading causes of death, with a steady increase in cases reported annually [2], [3]. Patients with DM face a high risk of severe complications such as cardiovascular disease, kidney failure, neuropathy, and lower limb amputation if the disease is poorly managed [4], [5]. Therefore, patient engagement in self-care, regular monitoring, and treatment adherence is critical in reducing complications and improving quality of life [6].

A crucial factor influencing self-management behavior among DM patients is their illness perception how patients interpret, understand, and emotionally respond to their disease [7]. Positive illness perception motivates patients to adhere to medical recommendations, adopt healthy lifestyles, and seek timely medical assistance [8], [9]. Various studies have demonstrated that patients with a higher level of illness perception tend to have better glycemic control and lower rates of complications [10], [11].

Current interventions to enhance illness perception include patient education programs, family support, and counseling, often delivered through structured nursing care models [12], [13]. Several innovative approaches, such as digital health education, motivational interviewing, and the integration of mobile applications for self-care monitoring, have also emerged to strengthen patients' understanding of their condition [14]-[16]. Despite these advances, recent findings indicate that many patients still underestimate the severity of DM and its long-term impacts [17].

Prior studies have primarily focused on the impact of interventions or illness perception measurement tools, but relatively few have examined how demographic and clinical factors such as age, gender, duration of illness, family history, medication adherence, and comorbidities are associated with illness perception in Indonesian DM patients [18]. Understanding these associations is essential to designing tailored interventions that address specific patient profiles and needs.

Therefore, this study aims to investigate the relationship between demographic and clinical characteristics and illness

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perception among adult DM patients in Surabaya. By analyzing how factors such as age, disease duration, family history, adherence, and comorbid conditions relate to illness perception, this research seeks to provide evidence-based insights that can inform patient-centered care strategies [19].

This study offers three significant contributions: First, it provides updated empirical evidence on illness perception among Indonesian DM patients, filling the gap in local data and expanding knowledge beyond quantitative prevalence. Second, it identifies key demographic and clinical factors that may influence how patients perceive their disease, supporting healthcare professionals in developing personalized education and counseling plans. Third, it encourages nurses and health policymakers to integrate targeted strategies into community health services, promoting better disease understanding and self-care practices among DM patients.

II. METHODS

This research applied a correlational, cross-sectional design to determine the relationship between demographic and clinical characteristics and illness perception among adult diabetes mellitus (DM) patients. The study was conducted between July and August 2024 in four community health centers (Puskesmas) located in Surabaya, Indonesia. This design was selected due to its appropriateness for identifying relationships at a single point in time without manipulating variables, which is suitable for observational health studies [21].

A. STUDY POPULATION AND SAMPLING

The target population comprised all adult DM patients registered in the chronic disease management program (Prolanis) at the selected community health centers. Inclusion criteria were: (1) patients diagnosed with type 2 DM by a physician for at least six months, (2) aged ≥ 18 years, (3) able to communicate verbally, (4) willing to participate, and (5) not diagnosed with severe mental disorders. Patients with acute complications requiring hospitalization or who were absent during data collection were excluded [22].

A simple random sampling technique was used to ensure equal chance of selection for all eligible patients. The minimum sample size was calculated using the Slovin formula with a 5% margin of error, yielding 175 respondents. Sampling frames were developed based on patient lists provided by each health center, and random numbers were generated to select participants proportionally from each site.

B. RESEARCH INSTRUMENTS AND VARIABLES

Data were collected using a structured questionnaire divided into three sections: (1) demographic characteristics (age, gender, education, occupation), (2) clinical characteristics (duration of illness, family history, blood glucose levels, medication adherence, and comorbidities), and (3) illness perception. Illness perception was measured using the Brief Illness Perception Questionnaire (B-IPQ)**,** a standardized tool validated and adapted for the Indonesian context [23]. The B-IPQ includes nine items covering cognitive and emotional representations of illness. Responses were scored using a Likert scale, and total scores categorized illness perception as low or high [24]. To ensure content validity, the questionnaire was reviewed by three experts in nursing and public health. A pilot test was conducted on 20 patients at a non-study health center with similar characteristics to check readability and clarity. The instrument's reliability was confirmed with a Cronbach's alpha value of 0.84, indicating good internal consistency [25].

C. DATA COLLECTION PROCEDURE

Data collection was conducted by a trained research team consisting of the principal investigator and two enumerators. Prior to data collection, the team underwent standardized training on ethical research conduct, consent procedures, and data recording techniques. Respondents were approached during their routine check-up days. Written informed consent was obtained from each participant before completing the questionnaire.

The questionnaire was administered through face-to-face interviews to minimize misinterpretation due to varying literacy levels. Each interview lasted approximately 20–30 minutes and was conducted in a designated counseling room at the health center to ensure privacy and comfort. To complement self-reported data, medical records were reviewed to verify clinical data such as duration of diagnosis, latest fasting blood glucose levels, and comorbidity status. Medication adherence was self-reported but cross-checked with prescription refill records when available.

D. ETHICAL CONSIDERATIONS

Ethical clearance for this study was granted by the Health Research Ethics Committee of Politeknik Kesehatan Kemenkes Surabaya under approval number No. EA/3187/KEPK-Poltekkes_Sby/V/2024, dated June 2024. The study adhered to the ethical principles of autonomy, confidentiality, beneficence, and non-maleficence [26]. Participation was voluntary, and respondents were informed of their right to withdraw at any time without consequences.

E. DATA MANAGEMENT AND ANALYSIS

Completed questionnaires were checked for completeness and consistency daily. Data were entered into Microsoft Excel and analyzed using SPSS version 26. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to describe demographic and clinical characteristics. The normality of the data was assessed using the Shapiro-Wilk test.

To examine the relationship between demographic and clinical variables and illness perception, simple linear regression and multiple linear regression analyses were conducted. Variables with a p-value < 0.25 in bivariate analysis were included in the multivariate model [27]. A p-value < 0.05 was considered statistically significant. Multicollinearity was checked using Variance Inflation Factor (VIF) values. The strength of association was presented using standardized beta coefficients.

F. STUDY STRENGTHS AND LIMITATIONS

To enhance rigor, triangulation was applied by verifying clinical data with medical records. Data collectors were external to the health centers to minimize interviewer bias. However, self-reported adherence and perception scores

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could be influenced by social desirability bias. This limitation was addressed through privacy assurance and the use of neutral, non-judgmental questioning [28].

G. REPLICABILITY

This method is designed for easy replication in other settings. Essential parameters include: recruitment from registered DM patient lists, proportional random sampling, use of a validated B-IPQ, face-to-face administration by trained enumerators, and cross-checking with medical records for key clinical data. Ethical approval and informed consent are mandatory requirements for similar community-based studies [29], [30].

III. RESULTS

A. DESCRIPTION OF ILLNESS PERCEPTION

The number of successfully recruited respondents was 175 adult patients with DM. The description of illness perception in this study shows that the indicators that show that more than the majority (> 60%) of patients have a high perception are Consequence (70.86%), Identity (62.86%), Concern (64.57%), and Emotional Response (69.71%). Meanwhile, the indicators of the timeline (45.71%), personal control (40.57%), treatment control (41.71%), and coherence (44%) show values that must be watched out for interfering with self-care because almost all of them have low perception values (TABLE 1).

TABLE 1
Description of Illness Perception

Indicator	Category	Frequency	Percentage
Consequence	High	124	70.86
	Low	51	29.14
Timeline	High	95	54.29
	Low	80	45.71
Personal Control	High	104	59.43
	Low	71	40.57
Treatment Control	High	102	58.29
	Low	73	41.71
Identity	High	110	62.86
	Low	65	37.14
Concern	High	113	64.57
	Low	62	35.43
Coherence	High	98	56.00
	Low	77	44.00
Emotional Response	High	122	69.71
	Low	53	30.29

B. CHARACTERISTICS OF DIABETES MELLITUS PATIENTS AND ILLNESS PERCEPTIONS

The characteristic data that can be described are the age of the participants in this study, most (54.29%) ≥ 60 years, and 73.14% are female. Duration of suffering from DM 43.43% ≥ 6 years, 37.14% have a family history, 76% routinely take medication, 72% have random glucose levels ≥ 200 mg / dL, and 58.86% have comorbidities. Cross-tabulation between characteristics and illness perception shows that almost all patients (40.57%) have low illness perception. The highest percentage of low illness perception (30.86%) is owned by patients who do not have a history of heredity. Furthermore, in sequence, patients who have low illness perception are patients who have blood sugar levels > 200 mg / dL (29.14%), patients who are on regular medication (29.14%), patients who are > 60 years old (26.86%), and women (26.86%) (TABLE 2).

TABLE 2
Cross-Tabulation of Characteristics of Diabetes Mellitus Patients with Illness Perceptions

Characteristics	Illness Perception				Total	
	Low		High			
	f	%	f	%	f	%
Age (years)						
< 60	24	13.71	56	32.00	80	45.71
≥ 60	47	26.86	48	27.43	95	54.29
Gender						
Male	24	13.71	23	13.14	47	26.86
Female	47	26.86	81	46.29	128	73.14
Duration of DM (years)						
<6	42	24.00	57	32.57	99	56.57
≥ 6	29	16.57	47	26.86	76	43.43
History of heredity						
Yes	17	9.71	48	27.43	65	37.14
No	54	30.86	56	32.00	110	62.86
Taking medication						
Regular	51	29.14	82	46.86	133	76.00
Irregular	20	11.43	22	12.57	42	24.00
Random blood glucose (mg/dL)						
≤200	20	11.43	28	16.00	48	27.43
>200	51	29.14	76	43.43	127	72.57
Comorbid						
Yes	35	20.00	68	38.86	103	58.86
No	36	20.57	36	20.57	72	41.14

C. ANALYSIS OF FACTORS RELATED TO ILLNESS PERCEPTION

The analysis showed that age factors, a family history of diseases, and comorbidities were related to illness perception. This is indicated by the significance value of > 0.5, which is 0.021, 0.027, and 0.023, respectively (TABLE 3).

TABLE 3
Analysis of Factors Related to Illness Perception

Characteristic	Exp(B)	95% Confidence Interval	Wald (t)	Sig.
Age	0.440	0.219-0.883	5.333	0.021
Gender	1.491	0.726-3.062	1.185	0.276
Duration of DM	1.320	0.667-2.613	0.637	0.425
History of heredity	0.447	0.219-0.914	4.863	0.027
Taking medication	0.626	0.297-1.319	1.518	0.218
Random blood glucose	0.991	0.474-2.072	0.001	0.981
Comorbid	2.163	1.114-4.197	5.199	0.023

IV. DISCUSSION

A. INTERPRETATION OF THE RESULT

This study was conducted to analyze the relationship between demographic and clinical characteristics specifically age, gender, duration of disease, family history, medication adherence, blood glucose levels, and comorbidities and the level of illness perception among adult DM patients. The results demonstrate that age, disease history, and the presence of comorbidities have significant associations with illness perception. These findings suggest

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that patients with advanced age tend to possess a higher awareness of their disease's seriousness. This pattern can be attributed to cumulative experiences over time, increased exposure to complications, and greater engagement with healthcare services [31].

Additionally, the positive association between having a family history of DM and a higher illness perception implies that patients who have witnessed the disease's progression in family members are more likely to perceive its severity and recognize the importance of adhering to treatment and self-care. Similarly, the presence of comorbidities such as hypertension or hyperlipidemia intensifies patients' perception of their illness because they experience more frequent health disruptions and the need for regular medical care [32].

The results underscore that understanding a disease is not solely determined by information from health workers but also by lived experiences and observation of others' health conditions. Illness perception is shaped by cognitive and emotional representations, which affect the patient's motivation to adhere to treatment and to adopt a healthier lifestyle [33]. Consequently, patients with multiple risk factors and comorbid conditions generally have more frequent interactions with healthcare providers, which may positively reinforce their understanding and perception of the disease [34].

Conversely, other variables gender, education, and adherence levels did not show statistically significant associations in this study. Although some previous research indicated that women tend to have a higher illness perception due to their proactive health-seeking behavior [35], the current study did not find gender to be a significant factor. This suggests that in the study setting, awareness-building efforts might be reaching male and female patients equally. Similarly, the lack of significance for medication adherence as a predictor of illness perception indicates that, in this sample, perception may precede or co-occur with behavior rather than directly resulting from it.

These insights emphasize that demographic factors alone are insufficient to predict how patients perceive their illness. A patient's personal context, disease progression, and social support systems collectively contribute to shaping their illness perception [36]. Hence, nursing interventions should consider these contextual factors and not rely solely on generic educational messages.

B. COMPARISON WITH OTHER STUDIES

The significant association between age and illness perception is in line with findings by Abdullah *et al.* [37], who reported that older patients often perceive chronic conditions more seriously due to accumulated experience with symptoms and complications. Similarly, Suryanto [38] found that elderly patients were more aware of the risk of long-term complications and thus demonstrated better self-care practices than younger counterparts.

The influence of family history on illness perception aligns with the work of Dewanti [39], who found that individuals with first-degree relatives diagnosed with DM are more aware of the disease's genetic and lifestyle risk factors, making them more vigilant about their condition. Comparable results were observed by Yulianti [40], who noted that patients from families with a strong history of chronic illness were more receptive to educational interventions.

Regarding comorbidities, our findings are consistent with a recent study by Wicaksono [41], which highlighted that DM patients with co-existing hypertension were more likely to perceive their illness as severe, motivating greater compliance with medication and diet modifications. These findings reinforce the notion that the co-occurrence of multiple chronic diseases compounds a patient's perceived health burden and reinforces the seriousness of disease management.

In contrast, the lack of association between gender and illness perception found in this study differs from the results of Sari and Rohmah [42], who documented that women often have higher levels of illness perception, partly due to their role as caregivers, which fosters greater health consciousness. This discrepancy may stem from sociocultural differences in the study settings or the effectiveness of health promotion campaigns that have targeted both genders equally in Surabaya's urban context.

Additionally, previous research by Prasetyo and Anjarwati [43] emphasized that digital health interventions could significantly improve patient illness perception, especially in younger populations. This suggests that while age and comorbidities are significant predictors for older adults, younger patients may require tailored digital tools to enhance their understanding and perception of DM.

The current findings enrich the global discourse on illness perception by confirming that socio-demographic and clinical factors interact in complex ways. They also highlight the need for integrated nursing interventions that go beyond one-size-fits-all education and instead adapt content and delivery to patients' specific backgrounds and disease experiences.

C. LIMITATIONS, WEAKNESSES, AND IMPLICATIONS

Although the present study provides valuable insights, several limitations must be addressed to interpret the results with caution. Firstly, the cross-sectional design restricts the ability to establish causality between variables. Longitudinal studies are needed to determine whether changes in illness perception lead to better adherence and improved clinical outcomes over time [44].

Secondly, the reliance on self-reported data may have introduced response bias. Some respondents might have provided socially desirable answers regarding their understanding and disease management behaviors. Although triangulation with medical records was employed for clinical variables, perception and adherence data relied heavily on participants' honesty [45].

Thirdly, the study was limited to four community health centers in Surabaya, which may not reflect the situation in other regions, particularly rural areas with different socio-economic contexts and health service access. Therefore, the generalizability of the findings is somewhat constrained.

Despite these limitations, this research has significant implications for nursing practice and community health interventions. The clear relationship between age, disease history, and comorbidities with illness perception highlights the need for more personalized patient education. Nurses

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should identify patients with low perception scores particularly younger patients or those newly diagnosed who may underestimate the seriousness of DM and therefore require additional counseling and motivational support [46].

Moreover, family involvement should be prioritized in health education sessions to leverage the influence of family history as a positive reinforcement for building awareness. Community nurses can facilitate family-based counseling or peer support groups to share experiences and best practices in disease management.

Integrating digital tools, such as mobile applications and interactive educational videos, may further enhance illness perception, especially among younger and tech-savvy patients who might not relate as strongly to traditional lecture-based counseling [47]. Such innovations should be adapted to local languages and contexts to maximize reach and effectiveness. From a policy perspective, health authorities should allocate resources to strengthen nurse training in motivational interviewing and counseling techniques that emphasize the cognitive and emotional aspects of illness perception. Developing standard operating procedures (SOPs) that include regular screening for illness perception can help healthcare teams identify patients at risk of low adherence and provide timely interventions [48].

Future studies should expand the sample to include multiple cities and rural areas to better represent Indonesia's diverse population. Combining quantitative approaches with qualitative methods, such as in-depth interviews or focus group discussions, could yield deeper insights into the emotional and cultural dimensions that shape illness perception [49]. In conclusion, this study contributes evidence that demographic and clinical characteristics specifically age, disease history, and comorbidities significantly influence illness perception among adult DM patients. These findings support the development of more tailored and culturally sensitive education strategies that can empower patients to better understand their illness and maintain sustainable self-care behaviors [50].

V. CONCLUSION

In conclusion, this study was designed to analyze the relationship between demographic and clinical characteristics specifically age, gender, duration of illness, family history, medication adherence, blood glucose levels, and the presence of comorbidities and illness perception among adult patients with diabetes mellitus in Surabaya. The main objective was to generate empirical evidence on how these factors influence patients' understanding and interpretation of their chronic condition, which is vital for planning appropriate self-management interventions. The findings revealed that age, family history of diabetes, and comorbid conditions showed significant associations with illness perception levels among the 175 respondents surveyed. Statistical analysis confirmed that older patients, those with a positive family history, and patients experiencing comorbidities such as hypertension or hyperlipidemia were more likely to perceive their illness as serious and demanding of proactive self-care. Specifically, 59.42% of the respondents were categorized as having a high level of illness perception, with age ($p = 0.021$), disease history ($p = 0.027$), and comorbidities ($p = 0.023$) emerging as significant predictors. These results emphasize that illness perception does not occur in isolation but is influenced by a patient's demographic and health profile, accumulated life experiences, and exposure to health services. While this research adds to existing evidence, it also highlights the need for more tailored health education programs that consider patients' backgrounds to strengthen their understanding and self-care motivation. Future studies should adopt a longitudinal or mixed-methods approach to explore how illness perception evolves over time and to verify its impact on adherence and clinical outcomes.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

All authors contributed substantially to this research. Nadifa Salsa Andriyani conceptualized and designed the study, coordinated data collection, and drafted the manuscript. Siti Nur Kholifah was responsible for instrument development, field supervision, and initial data analysis. Sari Luthfiyah reviewed statistical outputs, verified results, and provided critical input on the discussion. Dwi Adji Norontoko provided overall supervision, methodological guidance, and final approval of the manuscript for submission. All authors read and approved the final version.

DECLARATIONS

ETHICAL APPROVAL

The authors declare that there is no conflict of interest regarding the publication of this article. This research did not receive any external funding and was carried out independently. Ethical approval was obtained from the Health Research Ethics Committee of Politeknik Kesehatan Kemenkes Surabaya, and all participants provided written informed consent. The authors affirm that all findings are original and have not been previously published elsewhere.

CONSENT FOR PUBLICATION PARTICIPANTS

Consent for publication was given by all participants

COMPETING INTERESTS

The authors declare no competing interests.

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