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Analysis of Factors Affecting Non-Adherence to Treatment in Type 2 Diabetes Mellitus Patients at Jatilawang Community Health Center

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A B S T R A C T

Diabetes mellitus is a chronic metabolic condition characterised by high blood sugar. Noncompliance with type 2 diabetes therapy raises the risk of complications and failure to regulate blood sugar levels. This quantitative cross-sectional study employed spatial and network analysis to investigate the variables influencing non-adherence among 114 type 2 diabetes patients registered as prolanis participants at the Jatilawang Community Health Centre. Data collecting methods included surveys, interviews, and geographic mapping using Google Maps. SPSS was used for univariate, bivariate, and multivariate analyses, as well as QGIS for network mapping. The study found that access to health information substantially increased non-adherence (p-value=0.006, OR=5.170), although transportation availability (p-value=0.427, OR=0.609) and family support (p-value=0.076, OR=2.622) were confounding variables. Other factors, such as knowledge, attitude, motivation, distance to the community health centre, and health professionals' roles, were not significant. Network mapping revealed that the majority of respondents resided within 3 km of the community health centre. The findings indicate that patients should actively seek health information from healthcare professionals in order to improve treatment adherence.

INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder, characterized by increased blood sugar levels and triggering various complications (WHO 2024). Type 2 DM occurs when the body is unable to utilize insulin effectively (Nursucita & Handayani 2021). As many as 422 million people in the world live with diabetes (WHO 2024). Based on data from the 10th edition of the IDF Atlas, 10.6% of the total adult population in Indonesia suffers from DM with a death toll reaching 236,711 people (Kemenkes RI 2022). Based on data Dinas Kesehatan Provinsi Jawa Tengah (2023), the proportion of DM cases in Central Java reached 9.59%. DM cases in Banyumas Regency reached 22,766 people and Jatilawang Community Health Center became one of the areas with a high proportion of DM cases of 4.7% (Dinas Kesehatan Kabupaten Banyumas 2023).

Non-adherence with treatment is one of the factors that increases the risk of complications in type 2 DM patients (Firdiawan 2020). According to Lawrence Green (1980) in Pakpahan et al. (2021), individual behavior in taking action is driven by three main factors, namely predisposing factors, enabling factors, and reinforcing factors. Research Della et al. (2023) stated that adherence with DM treatment is influenced by motivational factors within oneself, family support, gender, age, and the role of health workers. Other results were presented by Araya et al. (2020), Edyawati et al. (2021), and Hutasuhut & Siregar (2024),

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where factors such as distance, availability of access to information, and adequate health facilities can increase patient motivation to be more adherent with their treatment.

Failure of blood sugar control in type 2 DM patients is caused by their non-adherence in undergoing treatment Standar Diagnosis Keperawatan Indonesia (2019) stated that non-adherence with treatment is an individual's behavior when they do not follow an agreed treatment plan and have an impact on the ineffectiveness of treatment results. This condition can result in low achievement of community health center results, increased incidence of complications, and decreased quality of life of patients (Firdiawan 2020). Non-adherence with type 2 DM medication includes behaviors such as delaying or not taking prescribed medication, reducing the frequency of medication use, and not adhering to the dosage of medication prescribed by the doctor (Sasmita 2021).

Based on DM prolanis data for August 2024, of the 172 active prolanis patients at the Jatilawang Community Health Center, there were still patients who were not adherent in undergoing treatment, such as delaying taking medication and not routinely checking their blood sugar (Puskesmas Jatilawang 2024). The emergence of side effects from conventional medicines and boredom in taking medicines encourages them to combine conventional medicines with herbal medicines or even switch to only taking herbal medicines during the healing process (Rahem et al. 2023). Identifying non-adherence with medication in DM patients through multiple logistic regression analysis and network analysis is important to ensure that therapy is effective and complications can be prevented. Therefore, researchers are interested in analyzing factors that influence non-adherence with medication in type 2 DM patients at the Jatilawang Community Health Center.

METHOD

This study is a quantitative analytical study with a cross-sectional design involving spatial analysis in the form of network analysis. The study was conducted in the Jatilawang Community Health Center working area in August - December 2024. The study population included patients diagnosed with type 2 DM and registered as active prolanis participants at the Jatilawang Community Health Center. The number of samples consisted of 114 respondents obtained through cluster random sampling techniques.

Inclusion criteria include respondents aged 20-70 years, communicative, and willing to be respondents, while exclusion criteria include respondents who are not at home when data collection, resign and are not willing to continue the study, and have died or moved house. The independent variables used include knowledge, attitudes, self-motivation, access to health information, distance from home to the community health center, availability of transportation, the role of health workers, and family support, while the dependent variable is non-adherence with treatment for type 2 DM patients. The data collection process

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was carried out using an interview method with a questionnaire and taking the coordinates of the respondent's house using Google Maps.

The research measuring instrument was a questionnaire that had previously undergone validity and reliability testing at the Ajibarang I Community Health Center. The results showed that each instrument was declared valid and reliable. Data were analyzed multivariately using SPSS 20 software through multiple logistic regression analysis with an α value of 5% to analyze the most influential factors. Data analysis was also carried out through network analysis with QGIS to produce a map of the shortest route from home to the community health center. This study has obtained ethical approval from the Ethics Commission of the Faculty of Health Sciences, Jenderal Soedirman University with the number 1627/EC/KEPK/X/2024.

RESULT

Univariate Analysis

Respondent Characteristics

Table 1. Distribution of Research Respondent Characteristics

Characteristics	Frequency (n)	Percentage (%)
Age		
19-59 Years	55	48.2
≥ 60 Years	59	51.8
Gender		
Man	15	13.2
Woman	99	86.8
Education		
higher education	22	19.3
Low Education	92	80.7

(Source: Processed Primary Data, 2024)

Table 1 shows that more respondents were aged ≥ 60 years, namely 59 respondents (51.8%), were female as many as 99 respondents (86.8%), and had low education (elementary-junior high school) as many as 92 respondents (80.7%).

Overview of Independent and Dependent Variables

Table 2. Description of Distribution of Independent and Dependent Variables

Variables	Frequency (n)	Percentage (%)
Knowledge		
Good	70	61.4
Not good	44	38.6
Attitude		
Positive	71	62.3
Negative	43	37.7
Self-Motivation		
Good	64	56.1
Not good	50	43.9
Access to Health Information		
Tall	70	61.4

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Variables	Frequency (n)	Percentage (%)
Low	44	38.6
Distance from Home to Community Health Center		
Near	82	71.9
Far	32	28.1
Transportation Availability		
Easy	58	50.9
Difficult	56	49.1
The Role of Health Workers		
Good	58	50.9
Not good	56	49.1
Family Support		
Good	61	53.5
Not good	53	46.5
DM Treatment Non-Adherence		
Adherent	71	62.3
Non-Adherent	43	37.7

(Source: Processed Primary Data, 2024)

Table 2 shows that more respondents have good knowledge, namely 70 respondents (61.4%), positive attitudes as many as 71 respondents (62.3%), good self-motivation as many as 64 respondents (56.1%), high access to health information as many as 70 respondents (61.4%), close distance from home to community health center as many as 82 respondents (71.9%), easy availability of transportation as many as 58 respondents (50.9%), good role of health workers as many as 58 respondents (50.9%), good family support as many as 61 respondents (53.5%), and adherence with type 2 DM treatment as many as 71 respondents (62.3%).

Bivariate Analysis

Table3. Relationship between Independent Variables and Dependent Variables

Variables	Non-Adherence with Type 2 DM Treatment						*P-Value*	Information
	Non-Adherent		Adherent		Total			
	n	%	n	%	n	%		
Knowledge								
Not good	14	31.8	30	68.2	44	100	0.405	No connection
Good	29	41.4	41	58.6	70	100		
Attitude								
Negative	21	48.8	22	51.2	43	100	0.088	No connection
Positive	22	31.0	49	69.0	71	100		
Self-Motivation								
Not good	21	42.0	29	58.0	50	100	0.523	No connection
Good	22	34.4	42	65.6	64	100		
Access to Health Information								
Low	28	63.6	16	36.4	44	100	0.0001	There is a Relationship
Tall	15	21.4	55	78.6	70	100		
Distance from Home to Community Health Center								
Far	13	40.6	19	59.4	32	100	0.853	No connection
Near	30	36.6	52	63.4	82	100		
Transportation Availability								
Difficult	28	50.0	28	50.0	56	100	0.014	There is a Relationship
Easy	15	25.9	43	74.1	58	100		
The Role of Health Workers								
Not good	29	51.8	27	48.2	56	100	0.004	There is a Relationship
Good	14	24.1	44	75.9	58	100		

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Variables	Non-Adherence with Type 2 DM Treatment						*P-Value*	Information
	Non-Adherent		Adherent		Total			
	n	%	n	%	n	%		
Family Support								
Not good	30	56.6	23	43.4	53	100	0.0001	There is a Relationship
Good	13	21.3	48	78.7	61	100		

(Source: Processed Primary Data, 2024)

Table 3 shows that 14 out of 44 respondents (31.8%) with poor knowledge were not adherent with type 2 DM treatment. Meanwhile, among respondents with good knowledge, there were 29 out of 70 respondents (41.4%) who were not adherent. The chi-square test produced a p-value of 0.405 (p-value > 0.05), which means there is no relationship between knowledge and non-adherence with type 2 DM treatment. In addition, 21 out of 43 respondents (48.8%) with negative attitudes were not adherent with type 2 DM treatment. Meanwhile, among respondents with positive attitudes, there were 22 out of 71 respondents (31.0%) who were not adherent. The chi-square test produced a p-value of 0.088 (p-value > 0.05), which means there is no relationship between attitude and non-adherence with type 2 DM treatment.

A total of 21 out of 50 respondents (42.0%) with poor self-motivation were non-adherent with type 2 DM treatment. Meanwhile, among respondents with good self-motivation, there were 22 out of 64 respondents (34.4%) who were non-adherent. The chi-square test produced a p-value of 0.523 (p-value > 0.05), which means there is no relationship between self-motivation and non-adherence with type 2 DM treatment. In addition, 28 out of 44 respondents (63.6%) with low access to health information were non-adherent with type 2 DM treatment. Meanwhile, among respondents with high access to health information, there were 15 out of 70 respondents (21.4%) who were non-adherent. The chi-square test produced a p-value of 0.0001 (p-value ≤ 0.05), which means there is a relationship between access to health information and non-adherence with type 2 DM treatment.

As many as 13 out of 32 respondents (40.6%) with a far distance from their home to the community health center were not adherent with type 2 DM treatment. Meanwhile, among respondents with a close distance from their home to the community health center, there were 30 out of 82 respondents (36.6%) who were not adherent. The chi-square test produced a p-value of 0.853 (p-value > 0.05), which means there is no relationship between the distance from home to the community health center and non-adherence with type 2 DM patient treatment. In addition, 28 out of 56 respondents (50.0%) with difficult transportation availability were not adherent with type 2 DM treatment. Meanwhile, among respondents with easy transportation availability, there were 15 out of 58 respondents (25.9%) who were not adherent. The chi-square test produced a p-value of 0.014 (p-value ≤ 0.05), which means there is a relationship between transportation availability and non-adherence with type 2 DM patient treatment.

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A total of 29 out of 56 respondents (51.8%) with poor health worker roles were non-adherent with type 2 DM treatment. Meanwhile, among respondents with good health worker roles, there were 14 out of 58 respondents (24.1%) who were non-adherent. The chi-square test produced a p-value of 0.004 (p-value ≤ 0.05), which means there is a relationship between the role of health workers and non-adherence with type 2 DM patient treatment. In addition, 30 out of 53 respondents (56.6%) with poor family support were non-adherent with type 2 DM treatment. Meanwhile, among respondents with good family support, there were 13 out of 61 respondents (21.3%) who were non-adherent. The chi-square test produced a p-value of 0.0001 (p-value ≤ 0.05), which means there is a relationship between family support and non-adherence with type 2 DM patient treatment.

Multivariate Analysis

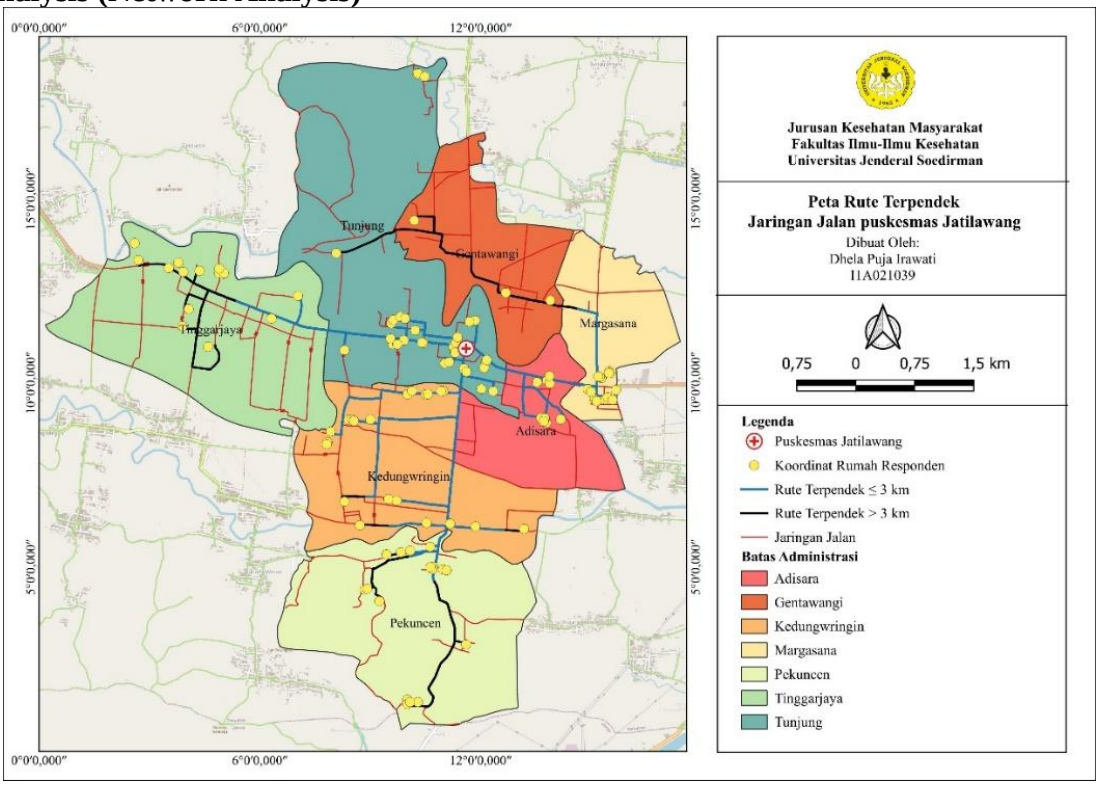
Table 4. Final Modeling of Multivariate Analysis

Variables	*P-Value*	OR	95%CI
Access to Health Information	0.006	5,170	1,595 - 16,765
Transportation Availability	0.427	0.609	0.179 - 2.069
Family Support	0.076	2,622	0.903 - 7.610

(Source: Processed Primary Data, 2024)

Table 4 shows that the factors influencing non-adherence with treatment of type 2 DM patients at the Jatilawang Community Health Center are access to health information (p-value = 0.006, OR = 5.170) with the availability of transportation and family support acting as confounding variables.

Spatial Analysis (Network Analysis)



Picture 1. Shortest Route Map of Jatilawang Community Health Center Road Network

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Based on Figure 1, it is known that the shortest route from home to the Community Health Center is ≤ 3 km (71.9%) marked with a blue road line, while the black road line shows the shortest route to the Jatilawang Community Health Center with a distance of > 3 km (28.1%).

DISCUSSION

The results showed that access to health information was a factor that influenced non-adherence with type 2 DM treatment in Jatilawang Community Health Center (p-value = 0.006, OR = 5.170) with the availability of transportation and family support acting as confounding variables. This means that patients with low access to health information will be at 5.170 times higher risk of non-adherence with type 2 DM treatment compared to patients with high access to health information after being controlled by the variables of transportation availability and family support. A total of 35 respondents (30.7%) stated that health workers did not provide enough education about the importance of blood sugar control. This phenomenon likely occurs because in every DM prolanis activity, health workers only provide medicine without any prior education, so respondents tend to come late or even leave their medicine with their closest neighbors which results in their absence during prolanis activities. As a result, they do not get any information about DM treatment, including the importance of regular blood sugar control.

Not only that, as many as 17 respondents (14.9%) felt that they had never received information about the risks of not complying with DM treatment. Patients who are not given information about the risks of non-adherence may more often miss doses of medication or even not follow the control schedules determined by the doctor. Without adequate information, patients tend to consider treatment as something optional and often do not understand how important routine treatment and self-management are, resulting in low treatment adherence (Edyawati, Asmaningrum & Nur 2021). The lack of efforts to search for health information related to DM treatment also results in low patient ability to manage the disease, making it difficult for them to determine what kind of treatment to choose as an effort to find treatment for their recovery (Pane, Derang & Mendrofa 2022).

The network analysis map shows that most areas of Tunjung Village have adequate shortest routes, except for respondents who live in RW 06. Kedungwringin Village has direct access to the community health center but has a narrow path, while Adisara and Margasana Villages overall have adequate shortest routes. Meanwhile, Pekuncen, Gentawangi, and Tinggarjaya Villages face the challenge of longer distances even though the main road access is adequate. The results of the network analysis of the road network can facilitate the determination of the distance traveled by a person by prioritizing the shortest route (Ni'mah et al., 2016).

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CONCLUSION

More respondents had good knowledge (61.4%), positive attitude (62.3%), good self-motivation (56.1%), high access to health information (61.4%), close distance from home to community health center (≤3 km) (71.9%), easy availability of transportation (50.9%), good role of health workers (50.9%), good family support (53.5%), and adherence with DM treatment (62.3%). There was an influence between access to health information on non-adherence with treatment of type 2 DM patients at Jatilawang Community Health Center.

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