Evaluating Compliance with Traditional Herbal Treatments in Type 2 Diabetes Mellitus Patients

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ABSTRACT

Background: The management of diabetes mellitus is often faced with the challenge of adherence to antidiabetic herbs. Poor adherence to diabetes medication increases the risk of complications and death. This study aims to analyze the determinants related to treatment adherence in Type 2 DM patients.

Subjects and Method: The cross-sectional *study* was carried out at UPF Yankestrad Dr. Sardjito Tawangmangu Hospital. A total of 201 adult patients with Type 2 DM were selected in this study. The *dependent* variable is treatment adherence in Type 2 DM patients. The *independent* variables were education, knowledge, access to health services, family support, income, and side effects of treatment. Data was collected using questionnaires. Data were analyzed by double linear regression.

Results: There was a statistically significant positive association between knowledge and medication adherence (b = 0.19; 95% CI = 0.12 to 0.26; p<0.001); access to healthcare (b = 0.37; 95% CI = 0.26 to 0.47 p<0.001); family support (b= 0.29; 95% CI= 0.20 to 0.39; p<0.001); income (b = 0.15; 95% CI = 0.01 to 0.29; p= 0.030); and there was a negative and statistically significant association between adverse events and medication adherence (b= -0.33; 95% CI= -0.49 to -0.18; p<0.001). The model fit between the independent variables included in the linear multiple regression analysis model together was able to explain the variation in treatment adherence by 67.12% (Adj R-squared= 67.12%).

Conclusion: Treatment adherence in Type 2 DM patients is positively related to knowledge, access to services, family support, and income.

Keywords: treatment compliance, knowledge, side effects, type 2 diabetes mellitus

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BACKGROUND

The trend of back to nature in herbal or traditional medicine is increasing due to concerns about the side effects of synthetic drugs, drug resistance, and high costs. Indonesia, with its vast biodiversity, has about 8,000 types of medicinal plants, but only 1,200 are traditionally used. The use of local medicinal plants can improve public health and regional income (Hanifa et al., 2020). Traditional medicine is still important especially in developing countries,

where 75-80% of the population relies on plant-based medicines. Traditional medicine is often considered safer and culturally acceptable. More than 400 plant species have the potential as natural antidiabetic drugs (Tran et al., 2020).

The herbal medicine scientific program in Indonesia supports the use of herbal medicine that has been scientifically proven to be effective in primary health facilities, such as UPF Yankestrad Dr. Sardjito Tawangmangu Hospital, which also supports wellness tourism (Hartono and Kusumastuti, 2019). The prevalence of global diabetes mellitus is increasing rapidly. In 2019, about 463 million adults were reported to have diabetes, with a projection of reaching 700 million by 2045. Indonesia is among the top 10 countries in diabetes cases, reaching 10.7 million cases in 2019 (IDF, 2019; Ministry of Health of the Republic of Indonesia, 2020). Herbal plants such as sambiloto, legi wood, salam, brotowali, temulawak, turmeric, and meniran are used to lower blood sugar levels (UPF Yankestrad Dr. Sardjito Tawangmangu, 2024).

Long-term therapy adherence in developing countries is often less than 50%, associated with poor outcomes and additional burden on health systems. Factors affecting treatment adherence include education, knowledge, access to health services, family support, socio-economic conditions (income), and medication side effects (Settineri et al., 2019). Poor adherence can increase the risk of complications and death (Khunti et al., 2019). Understanding the barriers to compliance is important to reduce the prevalence of Type 2 DM at UPF Yankestrad Dr. Sardjito Tawangmangu Hospital.

SUBJECTS AND METHOD

1. Research Design
This study was conducted using an observational analytical method, with cross-sectional studies. This research was conducted at the Yankestrad Functional Service Unit (UPF) of Dr. Sardjito Tawangmangu Hospital, which was carried out from May to June 2024.

2. Population and Sample
The study population was adult patients with Type 2 DM who visit UPF Yankestrad Dr. Sardjito Tawangmangu Hospital. A total sample of 201 subjects, by sampling, namely by simple random sampling .

3. Research Variables
The dependent variable is treatment adherence in Type 2 DM patients. The independent variables in this study were education, knowledge, access to health services, family support, income, and medication side effects.

4. Operational Definition
Education: The level of formal education completed by the subject.

Knowledge: The subject's understanding of preventive measures, the treatment of Type 2 DM, and the possible impact of non-adherence to treatment.

Access to health services: The ability of the subject to obtain the necessary health services, which is assessed based on affordability, availability of treatment, ease of access to information, and ease of obtaining health services.

Family support: Support that includes emotional, rewarding, informational, and instrumental support provided by family members to support the patient's compliance with treatment. Measured using a questionnaire measuring tool.

Income: The total amount of income earned by a family in one month, which is measured based on the Provincial Minimum Wage Value (UMP).

Side effects of treatment: When the subject reports any side effects experienced during the treatment period.

Medication compliance: The level of compliance of people with Type 2 diabetes in carrying out treatment regularly and carrying out a lifestyle according to the recommendations given by the doctor.

5. Data Collection Techniques

Data collection was carried out by direct interview method using questionnaire tools.

6. Data Analysis

Complete data will be analyzed univariately, as well as multivariately. Multivariate analysis using multiple linear regression.

7. Research Ethics

Research ethics such as informed consent, anonymity, and confidentiality, have been carefully handled throughout the research process. The research ethics letter was obtained from the Research Ethics Committee of Dr. Moewardi Hospital Surakarta, Indonesia, with number 1.201/V/HREC/-2024, on May 13, 2024.

RESULTS

1. Univariate Analysis

Based on Table 1, mean of knowledge score was 2.11 (SD= 2.19). Mean of health service access score was (Mean= 1.68; SD= 1.47). Mean of family support score was 3.38 (SD= 1.35). Mean of income perception was 0.79 (SD= 0.91). Mean of side effect was 2.51 (SD= 0.80). Mean of treatment adherence score was 1.12 (SD= 1.44). Mean of age was 55 years old (Mean= 55.14; SD= 9.88). The average income was Rp 3,598,508 (SD= 915121.7).

Table 1. Univariate Analysis (Continuous Data)

Variable	N	Mean	SD	Min	Max
Knowledge	01	2.11	2.19	0	6
Access to healthcare	01	1.68	1.47	0	3
Family support	01	3.38	1.35	1	8
Income	01	0.79	0.91	0	3
Side effects	201	2.51	0.80	0	3
Medication compliance	201	1.12	1.44	0	6
Age	201	55.14	9.88	21	80
Income	201	3,598,508	915,121.7	1,000,000	5,700,000

Table 2 shows the characteristics of the research subjects obtained by 201 participants based on gender, 107 males (53.23%) and 94 females (46.77%). Furthermore, for research subjects who did not work, there were 29 people (14.43%) and working subjects as many as 172 people (85.57%). Based on the level of education with subjects at the elementary level as many as 5 people (2.49%), junior high school level as many as 31 people (15.42%), high school level as many as 75 people (37.31%), and higher education as many as 90 people (44.78%).

Table 2. Univariate Analysis (Categorical Data)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	107	53.23
	Female	94	46.77
Occupation	Not working	29	14.43
	Working	172	85.57
Education	Not attend school	0	0
	Elementary school	5	2.49

Variable	Category	Frequency (n)	Percentage (%)
	Junior high school	31	15.42
	Senior high school	75	37.31
	College	90	44.78

2. Multivariate Analysis

Table 3, shows the results of linear double regression analysis on a number of predictors of treatment adherence in patients with Type 2 Diabetes Mellitus. There was a positive and statistically significant association between treatment knowledge and adherence (b= 0.19; 95% CI= 0.12 to 0.26; p <0.001). There was a positive and statistically significant association between healthcare access and medication adherence (b= 0.37; 95% CI= 0.26 to 0.47 p<0.001). There was a positive and statistically significant association between family support and medication adherence (b= 0.29; 95% CI= 0.20 to 0.39; p<0.001). There was a positive and statistically significant association between income and medication adherence (b= 0.15; 95% CI= 0.01 to 0.29; p= 0.030). There was a negative and statistically significant association between adverse events and treatment adherence (b= -0.33; 95% CI= -0.49 to -0.18; p<0.001).

Table 3 also shows that the model compatibility between the independent variables included in the linear multiple regression analysis model together is able to explain the variation of treatment adherence by 67.12% (Adj R-squared = 67.12%).

Table 3. Results of linear double regression analysis of a number of predictors of treatment adherence in patients with Type 2 Diabetes Mellitus

Independent Variables	Regression coefficient (b)	95% CI		p
		Lower Limit	Upper Limit	
Knowledge	0.19	0.12	0.26	<0.001
Access to health services	0.37	0.26	0.47	<0.001
Family support	0.29	0.20	0.39	<0.001
Income	0.15	0.01	0.29	0.030
Side effects	-0.33	-0.49	-0.18	<0.001
N observations	201			
Adjusted R²= 67.12%				
p<0.001				

DISCUSSION

1. Medication Knowledge and Compliance

Mature age and secondary education are sufficient to access health information. People who are more educated tend to be obedient in treatment because they have better knowledge and understand how to manage diseases. However, formal education does not always affect compliance. People with basic education can gain knowledge from various sources (Yulianita & Kasma, 2023). The results of this study showed that there was a positive and statistically significant relationship between knowledge and adherence to treatment. Every 1 unit increase in knowledge score will be followed by an increase in compliance score of 0.19 units (b= 0.19; 95% CI = 0.12 to 0.26; p<0.001).

The level of education is important in improving medication adherence. Higher education is associated with better knowledge and obedience (Chauke et al.,

2022). A good understanding of the principles of treatment is associated with high adherence (Swiatoniowska et al., 2019). Increasing knowledge about diabetes reduces negative views and improves T2DM treatment adherence. Research by Alsaidan et al, (2023) showed a positive correlation between diabetes knowledge and medication adherence (rho spearman = 0.425; p<0.001). Good knowledge about diabetes is associated with better glycemic control. Islamoglu et al. (2021) found significantly higher education in patients who adhered to treatment (p = 0.005).

2. Healthcare Access and Medication Compliance

There is a positive and significant relationship between access to health care and medication adherence. An increase in access to health services by 1 unit increased treatment adherence by 0.37 units (b=0.37; 95% CI=0.26-0.47; p<0.001). Access to health services includes facilities such as hospitals, clinics, health centers, medical personnel, and medicines (Muhlis & Prameswari, 2020). DM sufferers visit health facilities more often, which helps them follow medical instructions (Hagdoost et al., 2019). However, high medical costs can lower compliance.

Access to health services is measured based on distance, travel time, and ease of transportation. Patients with a positive view of their illness and actively managing their health tend to be more compliant (Bilondi et al., 2021). Affordable access improves medication adherence (Makatindu et al., 2021). Easy and convenient access also affects medication adherence (Maghsoudi et al., 2023).

3. Family Support and Medication Compliance

Patients with limited social support tend to have low levels of adherence. Support from family, doctors, and the community are the three main sources that influence patient compliance (Dehdari, 2019). The results of this study showed that there was a positive and statistically significant relationship between family support and treatment adherence. Each 1-unit increase in family support score will be followed by an increase in adherence score of 0.29 units (b= 0.29; 95% CI = 0.20 to 0.39; p<0.001).

Family support is divided into four dimensions: empathy, encouragement, facilitation, and participation. In herbal treatment for Type 2 DM, family support includes herbal use permits, schedule reminders, delivery to health facilities, and herbal preparation (Joeliantina et al., 2019). In line with previous research by Islam et al, (2021), patients with a family history of diabetes tend to be more obedient because they get greater information and support from their families. Research by Olagbemide et al, (2021), family support was also reported as the strongest factor in treatment adherence in Type 2 DM patients. The emotional atmosphere of the family plays a role in the decision to use herbal medicine. Monitor-ing and follow-up by families improves medication adherence (Maghsoudi et al., 2023).

4. Revenue and Medication Compliance

Socioeconomic factors such as unstable economic conditions, low education, and unemployment status affect medication adherence. Education and income play an important role in patients' perception of disease (Faridah et al., 2022). The results of this study showed that there was a positive and statistically significant relationship between income and medication adherence. Each 1-unit increase in revenue score will be followed by an increase in compliance score of 0.15 units (b= 0.15; 95% CI = 0.01 to 0.29; p= 0.030). High-income groups tend to have a positive view of the disease

and are more involved in treatment than low-income groups (Yulianita & Kasma, 2023).

Income affects health expenses, individuals with low incomes often have difficulty getting optimal treatment, which can worsen the patient's condition (Perwitasari, 2017). Previous research by Ngari et al, (2020), financial limitations and lack of health insurance are the main obstacles to treatment adherence. In contrast, patients with high incomes showed better adherence. Previous research by Julaiha (2019), showed that DM patients who have an income of < Rp. 2,100,000, have a 2,981 times higher risk of non-compliance compared to outpatient DM patients who have an income of ≥ Rp. 2,100,000/month.

5. Side Effects and Treatment Compliance

The results of this study showed that there was a negative and statistically significant relationship between side effects and treatment adherence. Each 1-unit increase in side effect score will be followed by a decrease in compliance score by 0.33 units (b= -0.33; 95% CI = -0.49 to -0.18; p<0.001). Low adherence to Type 2 DM treatment can result in poor glycemic control, increased use of health resources, higher medical costs, and a greater risk of death. Patients tend to be more compliant if they believe the prescribed medication provides real and immediate benefits. Concerns about the side effects of conventional treatment can lead to non-compliance, as well as reluctance to start new treatments.

Some patients choose herbal medicine because they are considered safer and have fewer side effects than synthetic drugs (Utomo et al., 2022). Previous research supports these findings, suggesting that patients are satisfied with herbal medicines (jamu) due to minimal side effects (Lestari et al., 2020). In addition, other studies

revealed that one of the reasons patients prefer herbal treatment is concern about kidney problems that can arise from long-term drug use (Nanda et al., 2018).

AUTHOR CONTRIBUTIONS

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CONFLICTS OF INTEREST

There is no conflict of interest in this study.

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