

Artikel Puji Lestari dkk

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MEDICATION ADHERENCE IN PATIENTS WITH DIABETES MELLITUS AND INFLUENCING FACTORS IN INDONESIA© Puji Lestari^{1*}, Liyanovitasari¹, Heri Prabowo²¹Department of Nursing, Faculty of Health, Universitas Ngudi Waluyo, Semarang, Indonesia²Departemen of Management, Faculty of Business and Economics, Universitas PGRI Semarang, Indonesia**BACKGROUND:** Diabetes Mellitus significantly impacts the quality of human resources and substantially increases health-care costs. Good adherence to diabetes treatment can control blood sugar levels and minimize hospitalization.**AIM:** To determine the medication adherence profile in patients with diabetes mellitus and the influencing factors.**MATERIALS AND METHODS:** A cross-sectional study was used in Kalinyamatan Primary Health Center, Central Java, Indonesia, involving 90 patients with type 2 diabetes mellitus. Primary data was collected using pretested questionnaires. This research used a total sampling technique to recruit participants. To determine the factors influencing medication adherence in patients with diabetes mellitus, we conducted a logistics regression analysis.**RESULTS:** The study showed that medication adherence indicated low in 22 individuals (24.4%) and high in 68 individuals (75.6%). Four factors were significantly influencing medication adherence in patients with diabetes mellitus: age (p-value 0.007), education (p-value 0.048), occupation (p-value 0.012), and family support (p-value 0.002). However, two factors, namely gender (p-value 0.259) and duration of illness (p-value 0.547), were found to have no significant impact on medication adherence.**CONCLUSION:** Healthcare professionals should have to motivate patients with Diabetes Mellitus to ensure adherence to their prescribed treatment regimen.**KEYWORDS:** diabetes mellitus; influencing factors; medication adherence.

ПРИВЕРЖЕННОСТЬ К МЕДИКАМЕНТОЗНОЙ ТЕРАПИИ У ПАЦИЕНТОВ С САХАРНЫМ ДИАБЕТОМ В ИНДОНЕЗИИ И ФАКТОРЫ, ВЛИЯЮЩИЕ НА НЕЕ

© Puji Lestari^{1*}, Liyanovitasari¹, Heri Prabowo²¹Кафедра сестринского дела, Факультет здравоохранения, Университет Нгуди Валуи, Семаранг, Индонезия²Кафедра менеджмента, факультет бизнеса и экономики, Университет PGRI Семаранг, Индонезия**ОБОСНОВАНИЕ.** Сахарный диабет существенно влияет на качество человеческих ресурсов и значительно увеличивает расходы на здравоохранение. Хорошая приверженность лечению помогает контролировать уровень сахара в крови и снижает риск госпитализаций.**ЦЕЛЬ.** Определить профиль приверженности к медикаментозной терапии у пациентов с сахарным диабетом и выявить влияющие на нее факторы.**МАТЕРИАЛЫ И МЕТОДЫ.** Была проведена поперечная (cross-sectional) выборка в амбулаторном центре Калиньяман, Центральная Ява, Индонезия, с участием 90 пациентов с сахарным диабетом 2 типа. Первичные данные собирались с помощью предварительно протестированных анкет. Для набора участников использовалась стратегия сплошной выборки. Для определения факторов, влияющих на приверженность к лечению, был проведен логистический регрессионный анализ.**РЕЗУЛЬТАТЫ.** Приверженность к лечению была низкой у 22 человек (24,4%) и высокой у 68 человек (75,6%). На приверженность достоверно влияли следующие четыре фактора: возраст ($p=0,007$), уровень образования ($p=0,048$), род занятий ($p=0,012$) и семейная поддержка ($p=0,002$). Пол ($p=0,259$) и длительность заболевания ($p=0,547$) не показали значимого влияния.**ЗАКЛЮЧЕНИЕ.** Медицинские работники должны мотивировать пациентов с сахарным диабетом соблюдать назначенное лечение.**КЛЮЧЕВЫЕ СЛОВА:** сахарный диабет; факторы влияния; приверженность к медикаментозному лечению.

BACKGROUND

Globally, the non-communicable disease prevalence, such as Diabetes mellitus (DM) and hypertension, is estimated to be 25-30% in low- and middle-income countries [1] and 3.3% in developing countries [2]. Indonesia as low- and

middle-income country, ranks seventh globally in diabetes mellitus (DM) prevalence, with around 10 million adults affected [3]. Complications from type 2 DM are a leading cause of death in the country [4]. Especially in Central Java, Indonesia, DM accounted for 18.33% of all reported non-communicable disease cases and ranked the second highest

percentage [5]. Experts project that non-communicable diseases will cause economic losses amounting to 4.47 trillion US\$ from 2012 to 2030, equivalent to 1.5 times Indonesia's 2012 Gross Domestic Product [6]. Furthermore, low public awareness about DM makes it challenging to manage blood glucose effectively, leading to various complications [7].

DM significantly impacts the quality of human resources and substantially increases healthcare costs [8]. Non-communicable diseases have common characteristics that make affected individuals more vulnerable to emergency conditions, such as a two to three times higher risk of heart attacks and strokes [1]. Therefore, all parties, including the community and the government, should actively participate in countering DM [8]. Research indicates that understanding the complexities of patient decision-making helps healthcare professionals engage better with individuals living with diabetes [7]. Good adherence to diabetes treatment can control blood sugar levels and minimize cardiovascular events [9]. For diabetic patients who are unaware of how to adhere to medication properly, unintentional factors such as irregular access to oral hypoglycemic agents and insulin can arise [10]. Patients with lower treatment adherence often exhibit poor glycemic control compared to those with higher adherence [11–13].

Factors influencing medication adherence include gender, education, employment status, duration of illness, health insurance coverage, knowledge about the disease, accessibility to healthcare services, healthcare provider's role, motivation for treatment, and family support [14–19]. Age, disease duration, treatment adherence, diet, and physical activity can affect blood glucose levels [20, 21]. A combined analysis of six studies on anti-diabetic medication practice determinants showed that age and place of residence are significant determinants of adherence to anti-diabetic medication in Ethiopia [22]. Meanwhile, intentional factors like lack of perceived benefits from medication, fear of side effects, and increasing regimen complexity contribute to reduced medication adherence [23, 24]. Therefore, the present study aimed to determine the medication adherence profile in patients with type 2 DM and the influencing factors in Kalinyamatan Primary Health Center, Central Java, Indonesia.

MATERIALS AND METHODS

Place and period of the research

Place of the research. The study was conducted at Kalinyamatan Community Health Center in Jepara in October 2022, involving patients with Diabetes Mellitus who visited the health center.

Populations under study

This research involved 90 respondents in Kalinyamatan Primary Health Center, Central Java, Indonesia. We included individuals diagnosed with type 2 DM, having the disease for more than a year, and visiting the health center, and excluded the patients with DM who did not live with their families.

Method of sampling from the studied population (or several studied populations)

This research used a total sampling technique, meaning that all members of the population who met the inclusion criteria were included in the study, ensuring that the sam-

ple fully represents the studied population. The researcher wants to capture the characteristics of every individual within the population, leading to more comprehensive and generalizable findings.

Study design

This study conducted a descriptive correlational design with a cross-sectional approach to determine the medication adherence profile in patients with type 2 DM and the influencing factors in Kalinyamatan Primary Health Center, Central Java, Indonesia. Primary data collection was from Diabetes Mellitus patients who visited Kalinyamatan Community Health Center. Respondents filled out questionnaires to gather information on gender, education, age, occupation, duration of illness, family support, and medication adherence. The Perceived Social Support-Family Questionnaire (PSS-Fa) [25] was used to measure the variable of family support while measuring medication adherence using the Morisky Adherence Scale (MMAS-8) questionnaire [26].

Statistical analysis

The collected data from the respondents underwent a thorough review for completeness of responses, scoring, and coding. Subsequently, the data were analyzed using statistical software, SPSS version 22. Descriptive analysis was utilized to describe the characteristics of the respondents, including gender, education, age, occupation, duration of illness, family support, and treatment adherence. Simple and multiple logistic regression analyses were employed to determine the factors influencing treatment adherence among diabetes mellitus patients.

Ethics review

This study was approved by the Ethics Committee of Universitas Ngudi Waluyo University on October 25, 2022, with approval number 103/KEP/EC/UNW/2022. Informed consent was provided to all respondents before participating in the study.

RESULTS

This study included 90 individuals with type 2 DM. The data analyzed covered the characteristics of the respondents, including gender, education, age, occupation, duration of illness, family support, and treatment adherence. Table 1 provides a complete breakdown of these characteristics.

Based on Table 1, the majority of the respondents were female (57.8%), below 60 years old (83.3%), had a low level of education (83.3%), were unemployed (52.2%), had a duration of illness of two years or more (64.4%), received good family support (61.1%), and demonstrated high medication adherence (75.6%). However, there was still a 24.4% non-adherence rate among DM patients.

Table 2 shows that the simple logistic regression analysis identified four factors significantly influencing medication adherence among DM patients ($p < 0.05$). Age was a significant predictor ($p = 0.007$, OR = 0.232, 95% CI = 0.80–0.67), indicating that younger patients were more likely to adhere to medication. Education level also played a significant role ($p = 0.048$, OR = 8.143, 95% CI = 1.02–64.84), suggesting

Table 1. Distribution of Respondents Characteristics, Duration of Illness, Family Support, and Medication Adherence

Variable	n (90)	%
Gender		
Male	38	42,2
Female	52	57.8
Age		
<60 years old	69	76.7
≥60 years old	21	23.3
Education		
Low level	70	77.8
High level	20	22.2
Occupation		
Employed	36	40
Unemployed	54	60
Duration of illness		
<2 years	32	35.6
≥2 years	58	64,4
Family support		
Adequate	35	38.9
Good	55	61.1
Adherence		
Low	22	24.4
High	68	75.6

Table 2. The Relationship Between Medication Adherence with Some Determinant

Variable	n (90)	Medication Adherence		OR	95% CI	p
		Low	High			
Sex						
Male	38	7	31	0.557	0.20-1.54	0.259
Female	52	15	37			
Age						
<60 years	69	12	57	0.232	0.80-0.67	0.007*
≥60 years	21	10	11			
Education						
Low level	70	21	49	8.143	1.02-64.84	0.048*
High level	20	1	19			
Occupation						
Employed	36	14	22	3.659	1.30-10.01	0.012*
Unemployed	54	8	46			
Duration of illness						
<2 years	32	9	23	1.355	0.51-3.64	0.547
≥2 years	58	13	45			
Family support						
Adequate	35	15	20	5.143	1.82-14.52	0.002*
Good	55	7	48			

*Significant.

Table 3. Multiple Regression Medication Adherence with Some Determinant

Variable	β	Adjusted OR	95% CI	p
Age	-21.582	0.000	0.00-0.01	0.998
Education	22.919	898	0.00-0.01	0.998
Occupation	1.675	5.338	1.39-20.56	0.015*
Family support	0.880	2.410	0.66-8.81	0.184
Constant	-4.733			

*Significant.

that patients with higher education levels were more likely to adhere to their treatment. Occupation was another influential factor ($p=0.012$, $OR=3.659$, $95\% CI=1.30-10.01$), with employed individuals showing higher adherence. Lastly, family support had a strong impact ($p=0.002$, $OR=5.143$, $95\% CI=1.82-14.52$), where patients with better family support were significantly more likely to follow their medication regimen. However, gender ($p=0.259$) and duration of illness ($p=0.547$) did not show a significant impact on medication adherence in this study ($p>0.05$), indicating that these factors were not strong predictors of adherence in the sample population.

Factors significantly influencing medication adherence were analyzed using multiple logistic regression to identify the most impactful factor. Table 3 shows that occupation emerged as the most influential factor in medication adherence ($p=0.015$, $95\% CI=1.39-20.56$). It indicates that employed individuals were significantly more likely to adhere to their medication regimen compared to unemployed. The wide confidence interval suggests a strong effect, although there may be some variability in the estimate.

DISCUSSION

The research results indicate that 24.4% of respondents have low adherence, 41.1% of diabetes mellitus patients have forgotten to take their medication at some point, 33.3% did not take their medication in the last two weeks, and 37.8% forgot to bring their medication when traveling. These findings align with other studies [27], which reported that nearly half of the respondents (44.9%) were non-adherent to their prescribed medication. Additionally, 22.5% had poor medication adherence, while the remainder fell into moderate and high adherence categories [28].

Four factors significantly influence medication adherence among diabetes mellitus patients, namely age, education, occupation, and family support, whereas gender and duration of illness do not. Multiple logistic regression analysis identified occupation as a significant factor influencing medication adherence, with a p -value of 0.015 ($95\% CI 1.39-20.56$). Age and education level were found to be associated with adherence, which is consistent with the previous findings [27]. However, this contrasts with another study that found no association between age, education level, and medication adherence in diabetes mellitus patients [28]. Among respondents aged over 60 years, 11 (52%) were classified as having high adherence. Higher adherence rates increase with age [29]. As individuals age, the risk of developing various chronic diseases increases. Comorbidity can influence adherence by increasing awareness of a particular illness [30].

Additionally, 19 (95%) of respondents with higher education levels had high adherence, indicating that higher education correlates with better information absorption and behavior. Behavior is influenced by predisposing factors such as knowledge; better knowledge leads to better behavior [17]. The occupation was associated with adherence, corroborating previous findings that reported a statistically significant relationship between socioeconomic class and adherence [31]. However, this is contrary to the findings [28, 32] that found no association between occupation and adherence levels. Employed individuals tend to have less time to visit healthcare facilities, while unemployed individuals are generally more adherent due to having more time for healthcare visits.

Family support, referring to verbal information, goals, tangible assistance, or actions provided by individuals familiar with the issue, plays a role in the social environment. The interconnectedness between family and the environment is known as family support [33]. Family support can impact the health of individuals with chronic diseases, as indicated by a study conducted in Klaten, Indonesia. Patients are more motivated to maintain their health if they have good communication and family coping mechanisms [34]. Family support is one of the reinforcing factors that contribute to adherence behavior. Individuals can manage their health better at home due to the family's ability to identify health problems, make decisions, offer care, maintain and improve household health, and locate necessary medical facilities [35]. Those receiving family support are more likely to follow medical advice compared to those without such support. Thus, family and social support are crucial for addressing health issues [36]. A study in Sukabumi found a significant relationship between family support and medication adherence among diabetes mellitus patients at the Internal Medicine Clinic of R. Syamsudin, S.H. Hospital, with a chi-square test p -value of 0.000 [37].

Addressing the issue of non-adherence among DM patients, healthcare providers should develop targeted educational programs, especially for older patients and those with lower education levels, emphasizing the importance of medication adherence. Involving family members in patient care is essential, as family support plays a crucial role. Workplaces should offer flexibility to help patients manage their treatment schedules. Regular monitoring and community-based interventions, such as medication reminders or visits by healthcare workers, can significantly improve adherence.

Limitations of the research

Researchers have been unable to control other factors that may affect medication adherence in this study, namely

participation in health insurance, disease knowledge, access affordability to health services, health worker's role, and motivation to look for treatment.

Directions for further research

Further research is needed to measure the various factors that influence medication adherence.

CONCLUSION

There is still a 24.4% non-adherence rate among DM patients in Central Java, Indonesia. Four factors may influence medication adherence among diabetes mellitus patients, namely age, education, occupation, and family support, while gender and duration of illness have no significant impact in this study.

OTHER INFORMATION

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Author's contribution. Puji Lestari – the concept or study design or to the obtaining, data analysis, or interpreting results, making significant changes to the manuscript; Liyanovitasari – the concept of study, writing an article, Heri Prabowo – the concept of study, writing an article. The authors approved the article's final version before publication. They consented to be responsible for all aspects of the work, which implies proper resolution and investigation of its accuracy and integrity issues.

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