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Educational Characteristics in Medication Compliance Diabetes Mellitus in Indonesia

Faza Khilwan Amna*, Widya Hary Cahyati

Universitas Negeri Semarang, Indonesia

*Corresponding Author: fazakhilwan@gmail.com

Abstract
Background: Diabetes Mellitus (DM) is a chronic disease with a prevalence rate that continues to increase in Indonesia. Compliance with taking medication is a key factor in managing DM to prevent serious complications. However, the level of patient compliance with treatment is still a challenge. One factor that can increase compliance is education about the importance of DM therapy. Objective: This study aims to explore the characteristics of education about DM treatment that influence patient compliance in taking medication based on factors such as age, gender, education level, occupation, economic status, and place of residence in Indonesia. Method: This study used a descriptive analytical design with secondary data from the 2023 Indonesian Health Survey (SKI). The study sample included DM patients who were diagnosed and received drug therapy. The main variables analyzed were the proportion of patients who received education and their level of compliance in taking medication, which were categorized by age group, gender, education, occupation, economic status, and place of residence. Data analysis was carried out descriptively to identify the proportion of education in compliance with taking DM medication in Indonesia. Results: A study from the Indonesian Health Survey (SKI) showed that 81.4% of patients received education about the importance of taking medication regularly, and of that number, 90% showed high compliance in taking medication. Meanwhile, only 81% of patients who did not receive education remained compliant with their treatment. Conclusion: Education has been shown to have a significant relationship with adherence to taking DM medication in Indonesia. Patients who receive education have a higher level of adherence than those who do not receive education. Age, education, occupation, and economic status factors play a role in determining the level of patient adherence. The results of this study can be the basis for designing education-based interventions to improve adherence to DM therapy in Indonesia.

Keywords: education, medication compliance, diabetes mellitus, Indonesian Health Survey

INTRODUCTION

Diabetes Mellitus (DM) is one of the non-communicable diseases (NCDs) with an increasing prevalence in Indonesia. Based on the 2023 Indonesian Health Survey (SKI), the prevalence of diabetes in Indonesia is higher than the results of previous surveys, indicating the urgency of increasing patient awareness and compliance with treatment (SKI, 2023). WHO states that compliance with long-term therapy for chronic diseases, including DM, only reaches 50% in developed countries, while in developing countries such as Indonesia, this figure is lower (WHO, 2003). Low compliance with taking medication can increase the risk of complications such as nephropathy, retinopathy, and cardiovascular disease , which have an impact on the quality of life of patients and the national economic burden (Gusnanda, 2023; SKI, 2023).

One of the main factors that influences medication adherence is the patient's level of education about the disease and the importance of consistent therapy. Studies show that patients with good knowledge about DM have higher adherence to treatment than those with low knowledge (Marito & Lestari, 2021). Effective education can help patients understand the consequences of non-adherence to treatment, so that they are more disciplined in undergoing therapy (Almira et al., 2019). However, previous studies have shown that there are still gaps in access to health education, especially in rural areas and low-income groups, which results in lower levels of compliance compared to urban communities (SKI, 2023; Siraj et al., 2021).

Various demographic factors also affect the level of education and patient compliance in taking medication. Patients with higher levels of education find it easier to understand the importance of treatment, so they have better compliance than those with lower education.(Zainafree et al., 2025). In addition, support from health workers and personal motivation of patients also contribute to medication compliance (Almira et al., 2019). Occupational factors also have an influence, where patients with office jobs have more access to health information than physical workers such as laborers and fishermen (SKI, 2023). Studies also show that family and health worker support can improve patient compliance in taking medication. Families who actively provide support in the form of reminders and assistance in undergoing therapy tend to help patients to be more compliant with treatment (Dehdari & Dehdari, 2019). Given the importance of education in improving medication adherence in DM patients, this study aims to analyze the characteristics of education that contribute to medication adherence in Indonesia. Using data from the 2023 Indonesian Health Survey (SKI), this study will explore the relationship between education and adherence based on age, gender, education level, occupation, economic status, and place of residence. The results of this study are expected to provide deeper insights for the formulation of more effective health policies in improving DM management in Indonesia.

METHOD

This study used a quantitative descriptive study design to analyze the characteristics of education in medication adherence in patients with Diabetes Mellitus (DM) in Indonesia. The data used came from the 2023 Indonesian Health Survey (SKI), which includes information on patient education status, medication adherence, and sociodemographic factors such as age, gender, education level, occupation, economic status, and location of residence. This study used secondary data that had been collected through the 2023 SKI and had gone through health research ethics procedures. The results of this study are expected to provide in-depth insight into the role of education in improving medication adherence in DM patients, as well as being the basis for formulating more effective health policies in managing chronic diseases in Indonesia.

RESULT & DISCUSSION

Table 1. Proportion of Educational Characteristics in Medication Compliance in Indonesia

Characteristics	Getting Education (%)	DM Medication Compliance (%)
Age Group (years)		
15-24	67.6	88.1
25-34	79.4	92.9
35-44	78.5	89.3
45-54	80.7	87.8
55-64	82.6	90.5
65-74	81.5	89.9
75+	83.2	89.9
Gender		
Man	79.6	88.8
Woman	82.7	90.0
Level of education		
Not yet in school	79.1	87.6
Did not graduate from elementary school	80.3	87.2
Graduated from elementary school	78.0	89.4
Graduated from junior high school/Islamic junior high school	80.8	89.9
Graduated from high school/vocational school	83.9	89.0
Graduated D1/D2/D3/PT	87.6	93.0
Type of work		
Doesn't work	81.9	90.5
School	89.2	89.4
Civil Servants/TNI/Polri/BUMN	84.6	91.1
Private employees	87.6	90.3
Self-employed	78.9	87.1
Farmer/Farm Laborer	77.7	89.3
Fisherman	80.7	85.2

Laborer/Driver/Domestic Helper	78.1	84.5
Residence		
Urban	82.9	89.6
Rural	77.6	89.3
Economic Status		
Bottom	77.2	87.1
Lower Middle	77.0	87.5
Intermediate	78.5	88.6
Upper Middle School	80.9	89.8
Top	86.2	91.3

Source: Indonesian Health Survey, 2023

Based on Table 1 on the proportion of educational characteristics in medication adherence in Indonesia, it is known that age characteristics: The highest compliance is in the 25-34 year age group (92.9%) and the lowest in the 45-54 year group (87.8%), Gender: Women receive more education (82.7%) than men (79.6%), and have a higher level of compliance (90% vs. 88.8%), Education Level: Patients with higher education (D1 and above) have better compliance (93%) than those who have not graduated from elementary school (87.2%), Occupation: Office workers (civil servants/BUMN) have a higher level of compliance (91.1%) than physical workers (laborers/drivers 84.5%), Economic Status: Patients from the upper economic group are more compliant (91.3%) than the lower economic group (87.1%), Place of Residence: Patients in urban areas have higher access to education (82.9%) than in rural areas (77.6%), with slightly higher compliance (89.6% vs. 89.3%).

Table 2. Proportion of Non-Compliance in Taking Medication Based on Education Status in Indonesia

Reason for Non-Compliance	Patients Who Receive Education (%)	Patients Who Did Not Receive Education (%)
Feeling healthy	42.5	55.2
Bored/lazy/forgetful	18.0	22.3
Drug side effects	6.5	9.1
Medicine not available	1.8	3.6
Using traditional medicine	19.5	27.1

Source: Indonesian Health Survey (SKI) 2023

Based on the data in Table 2, it is known that the main reasons for non-compliance of patients who did not receive education include feeling healthy (55.2 %), boredom/forgetfulness (22.3%), and use of traditional medicine (27.1%). Based on data from the 2023 Indonesian Health Survey (SKI), there are differences in the level of compliance in taking medication based on age group, which is also related to the level of acceptance of health education. The 25-34 age group showed the highest compliance (92.9 %) compared to other age groups, while the 45-54 age group had lower compliance (87.8%). This finding is in line with research by Gusnanda et al. (2023) which shows that young individuals are more receptive to health information and are more familiar with health education technology such as social media and health applications (Gusnanda, 2023; Aloudah et al., 2018).

Although the 55-64 and 65-74 age groups have relatively high adherence rates (90.5 % and 89.9%), other factors such as memory loss, drug side effects, and physical limitations can be barriers for elderly patients in maintaining long-term adherence. A study by Marito & Lestari (2021) found that elderly DM patients often face challenges in remembering medication schedules and are more dependent on family and health worker support. Therefore, the elderly group requires a more personalized educational approach, such as family assistance and community-based health services (Marito & Lestari, 2021; Trayvilla et al., 2024). On the other hand, patients aged 15-24 years had a lower compliance rate (88.1 %) compared to older age groups. This is likely due to low perception of the risk of DM complications, considering that the symptoms of this disease are often not directly visible at a young age. A study by confirmed that young DM patients are more likely to ignore treatment if they do not experience serious symptoms. Therefore, education that emphasizes the prevention of long-term complications and the importance of early compliance is needed for this age group (Afaya et al., 2020).

The results of the 2023 SKI also showed that the proportion of patients who received education increased with age. The 25-34 age group had an education acceptance rate of 79.4%, while the elderly group aged 75+ years had the highest figure of 83.2%. However, compliance in the elderly remained slightly lower than in the productive age group, indicating that education alone is not enough without additional support strategies, such as routine consultation services and medication reminder programs. Almira et al. (2019) emphasized that technology-based educational approaches, such as

medication reminder applications and educational videos, can help improve compliance across age groups (Almira et al., 2019; Mirahmadizadeh et al., 2020). Medication adherence in Diabetes Mellitus (DM) patients differs between men and women, which is influenced by the level of acceptance of education and health behavior. Based on data from the 2023 Indonesian Health Survey (SKI), women have a higher level of compliance (90.0 %) than men (88.8%), and receive more health education related to drug consumption (82.7% vs. 79.6%). A study found that women are more active in seeking health information and interact more often with medical personnel. This may explain why women's compliance is better, because they are more aware of the consequences of not taking medication regularly. In contrast, men tend to ignore symptoms of the disease and consult health workers less often , which contributes to lower levels of compliance (Mannan et al., 2021).

In addition, access to education and social support also play a role in differences in adherence between genders. Women are more likely to receive encouragement from family and community, which helps them remain disciplined in taking their medication. Marito & Lestari (2021) explained that social support, especially from family, has a major influence on adherence in DM patients. Meanwhile, men rely more on independent decisions in managing their disease, which can lead to non-adherence if they feel healthy or do not experience acute symptoms. The study by Gusnanda et al. (2024) also showed that women more often use digital media and health applications as sources of education, while men use these sources of information less often. Therefore, technology-based and community-based educational approaches need to be adjusted to gender characteristics to be more effective (Marito & Lestari, 2021; Gusnanda, 2023).

Although women have higher adherence, some challenges remain, especially in the elderly group of women who may have difficulty remembering medication schedules or face economic constraints in purchasing medication regularly. Meanwhile, men, especially those working in the informal sector such as laborers and fishermen, often have limited time to consult with health workers, so the education they receive is more limited. To improve adherence in both groups, education programs must be more adaptive and gender-based, with strategies such as community counseling for men and optimization of digital education and family assistance for women. With a more inclusive approach, adherence to taking DM medication in Indonesia can be further improved overall (Efriani, 2022; Shahabi et al., 2023).

Education level plays an important role in determining the compliance of Diabetes Mellitus (DM) patients with taking medication. Based on data from the 2023 Indonesian Health Survey (SKI), patients with higher education have better compliance levels, where college graduates have the highest compliance (93.0 %), while patients who have not graduated from elementary school have lower compliance (87.2%). This is in line with research by Almira et al. (2019) which shows that individuals with higher education levels find it easier to understand the concept of long-term treatment and the risk of complications due to non-compliance. Patients with lower education tend to have a limited understanding of the importance of treatment, making them more susceptible to misperceptions , such as the assumption that medication only needs to be taken if you feel sick (Almira et al., 2019; Wibowo et al., 2022).

In addition, access to education is also influenced by education level. SKI 2023 data shows that patients with higher education more often receive education from various sources, such as medical personnel, digital media, and health communities, compared to those with lower education. A study by Marito & Lestari (2021) stated that patients with lower education tend to rely on information from their family or social environment, which is sometimes not necessarily based on correct medical information. On the other hand, patients with higher education are more proactive in seeking health information from more credible sources, such as doctors or online health platforms, so they better understand the importance of ongoing DM treatment (Marito & Lestari, 2021; Najafpour et al., 2021). The type of work has a significant influence on medication adherence in patients with Diabetes Mellitus (DM), especially due to differences in access to health education and daily activity patterns. Based on the 2023 Indonesian Health Survey (SKI), patients working in the formal sector, such as civil servants/TNI/Polri/BUMN, had the highest level of compliance (91.1%), while workers in the informal sector, such as laborers and fishermen, had lower compliance (84.5%). This is supported research which shows that formal workers have more access to health services, both through company facilities and health insurance, making it easier to get education and carry out routine checks. On the other hand, informal workers often have difficulty allocating time for treatment , so their compliance is lower (Zainafree et al., 2025; Araya et al., 2020).

In addition, the type of work also affects how patients receive education about DM treatment.

Office workers more often get health information from medical personnel, health seminars in the workplace, and access to digital media. A study by Gusnanda et al. (2024) stated that formal workers more often use technology such as health applications and telemedicine to consult with doctors, which has an impact on increasing their understanding and compliance. In contrast, physical workers such as laborers, farmers, and fishermen tend to be less exposed to health information due to limited access and time, so many of them rely on information from friends, family, or traditional practices that have not been proven effective (Marito & Lestari, 2021; Gusnanda, 2023). To improve medication adherence in various worker groups, an education strategy tailored to the characteristics of the work is essential. For formal workers, a technology-based approach, such as the use of medication reminder applications and online consultations, can be further optimized. Meanwhile, for informal workers, community-based education and counseling in the workplace are more effective, because they have limited time to access conventional health services. The study by Almira et al. (2019) also suggests that companies and worker organizations provide health education programs and regular check-ups to help increase awareness and adherence in DM treatment. With a more adaptive education approach, it is hoped that medication adherence can increase across all worker groups in Indonesia (Almira et al., 2019; Doya et al., 2024).

Place of residence plays an important role in determining access to health education and medication adherence in patients with Diabetes Mellitus (DM). Based on data from the 2023 Indonesian Health Survey (SKI), patients living in urban areas have a higher level of adherence (89.6 %) than those living in rural areas (89.3%), although the difference is not too significant. This is in line with research by Gusnanda et al. (2024) which states that patients in urban areas have better access to medical personnel, health facilities, and digital-based education programs, making it easier to understand the importance of routine treatment. Conversely, patients in rural areas often experience limitations in obtaining accurate health information, which can lead to a lack of understanding of the importance of medication adherence (Gusnanda, 2023; Febrinasari et al., 2022).

In addition to limited access, differences in education patterns also affect medication adherence based on where you live. Patients in urban areas receive more education through doctors, social media, health applications, and health seminars, while patients in rural areas rely more on health cadres, family, and traditional practices as their main sources of information. A study by Marito & Lestari (2021) showed that patients in rural areas are more vulnerable to inaccurate information, because many still rely on alternative treatment methods without consulting health workers. In addition, the frequency of visits to health facilities is also lower in rural areas due to limited infrastructure and long distances, which causes more patients to not receive continuous education (Marito & Lestari, 2021; Toyi et al., 2024). To improve medication adherence in rural areas, community-based education approaches need to be strengthened. The study by Almira et al. (2019) suggested that direct counseling by medical personnel and village health cadres can improve patient understanding of the importance of DM therapy. In addition, the government and health organizations need to develop education programs based on radio, local television, and mobile health services to reach patients living in remote areas. Meanwhile, in urban areas, optimizing technology such as the use of medication reminder applications and telemedicine can further improve patient adherence in taking medication. With an education approach that is tailored to geographical conditions and health infrastructure, DM medication adherence can be improved in various regions in Indonesia (Almira et al., 2019; Butt et al., 2023).

Economic status plays a major role in the compliance of Diabetes Mellitus (DM) patients in taking medication, especially due to limited access to health education and medical facilities. Based on data from the 2023 Indonesian Health Survey (SKI), patients from the upper economic group have a higher level of compliance (91.3 %) than the lower economic group (87.1%). This is in line with research by Gusnanda et al. (2024) which shows that patients with higher incomes tend to have better access to medical personnel, more accurate health information, and pharmaceutical facilities that support regular treatment. Conversely, patients from lower economic groups more often face financial barriers in purchasing drugs and paying for health services , which has an impact on their non-compliance in taking medication regularly (Gusnanda, 2023; Bairy et al., 2016). In addition to economic limitations, differences in education patterns are also an important factor in medication adherence. Patients from upper economic groups receive more education from specialist doctors, health seminars, and digital media, while lower economic patients rely more on information from health cadres, family, or personal experience. Research by Marito & Lestari (2021) states that patients from lower economic groups often do not understand the importance of long-term therapy, especially if they do not get enough education

from health workers. In addition, many patients from lower economic groups believe more in alternative treatments that have not been proven effective, thus worsening their level of adherence (Marito & Lestari, 2021; Abdullah et al., 2019).

To improve patient compliance from low-income groups, a more inclusive and community-based education strategy is needed. The study by Almira et al. (2019) showed that community-based counseling and drug subsidies can help improve compliance in low-income patients. In addition, the use of technology such as SMS drug reminders, free telemedicine, and education services at health centers can help reach patients who have limited access to conventional health services. Therefore, a more equitable policy in providing education and treatment subsidies is needed so that all DM patients, regardless of their economic status, can undergo optimal therapy (Almira et al., 2019). Non-compliance in taking Diabetes Mellitus (DM) medication is often associated with the level of education received by patients. Based on data from the 2023 Indonesian Health Survey (SKI), patients who did not receive education had a lower level of compliance (81%) than those who received education (90%). This shows that the lack of information about the importance of long-term treatment can cause patients to ignore taking their medication regularly. Study found that patients who have limited understanding of DM often stop treatment when they feel healthy, without realizing that this disease is progressive and requires long-term therapy (Baedlawi et al., 2023; Legese et al., 2023).

In addition, the source of education received by patients also affects their compliance in taking medication. Patients who only get information from family or friends are more likely to have an inaccurate understanding of treatment, compared to those who receive education from health workers or medical counseling programs. Research by Marito & Lestari (2021) shows that patients who do not receive formal education about DM are more susceptible to misinformation, such as the assumption that treatment can be stopped after blood sugar levels improve, which ultimately increases the risk of complications. Therefore, access to quality, medically based education is very important in improving patient compliance (Marito & Lestari, 2021; Singla et al., 2022). To overcome non-compliance due to lack of education, a more inclusive and sustainable approach is needed. The study suggests that community-based education programs, regular consultations with health workers, and the use of digital media can help increase patient awareness of the importance of medication adherence. In addition, the use of technology such as medication reminder applications and telemedicine services can help patients who have limited access to medical personnel. With a more equitable and sustainable education strategy, it is hoped that the level of patient compliance in undergoing DM therapy can increase significantly (Almira et al., 2019; Huang et al., 2021).

CONCLUSION

Based on data from the 2023 Indonesian Health Survey (SKI), education plays a significant role in increasing medication adherence in patients with Diabetes Mellitus (DM). Patients who receive education are more likely to be compliant in taking medication (90%) compared to those who do not receive education (81%). Factors such as age, gender, education level, occupation, place of residence, and economic status also affect the level of adherence. Patients with higher education, formal employment, and better economic status have easier access to health information and have higher adherence than vulnerable groups, such as informal sector workers and low-income communities. In addition, there are still challenges in providing effective education, especially for patients in rural areas and those with low levels of health literacy. Therefore, a more inclusive and community-based education strategy is needed to improve patient understanding of the importance of long-term treatment. Further research is expected to explore the effectiveness of various educational methods, such as social media, teleconsultation, and community-based counseling, in improving patient compliance across demographic groups. With more adaptive and evidence-based educational strategies, it is hoped that patient compliance with DM treatment can be increased, so that the risk of long-term complications can be minimized.

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