

Determinants Of Adherence To Oral Antidiabetic Medication Among Type 2 Diabetes Melitus (T2DM) Patients

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ARTICLE INFO	ABSTRACT
Keywords: diabetes mellitus; adherence; medication.	The prevalence of diabetes is increasing rapidly and has become a major contributing factor to several other diseases. Patients' adherence to oral antidiabetic medication is a key determinant of successful diabetes management and therefore warrants specific attention. This study aimed to identify factors associated with adherence to oral antidiabetic medication. A cross-sectional design was employed involving 109 patients with type 2 diabetes mellitus at a Public Health Center in West Aceh Regency, covering 24 villages. Respondents were selected using stratified random sampling. Medication adherence was measured using the Morisky Medication Adherence Scale-8 (MMAS-8). The results showed that 78% of respondents were non-adherent to oral antidiabetic medication. Factors significantly associated with medication adherence included occupation ($p = 0.000$; $RR = 5.3$; 95% CI: 2.39–11.63), duration of diabetes ($p = 0.041$; $RR = 0.79$; 95% CI: 0.63–0.98), number of medications taken daily ($p = 0.006$; $RR = 1.37$; 95% CI: 1.09–1.72), and the use of herbal medicine ($p = 0.001$; $RR = 1.47$; 95% CI: 1.17–1.86). Regular monthly meetings involving community health cadres, diabetic patients, and their families are recommended as educational forums to improve medication adherence. Further research is needed to determine the most effective type of educational intervention to enhance adherence to oral antidiabetic therapy.

1. INTRODUCTION

Diabetes is a major health problem which reaches an alarming rate where almost half a billion (463 millions) people in the world live with it. Indonesia is on the seventh position on largest adult population (10.7 millions people) diagnosed with diabetes (International Diabetes Federation, 2019). The initial priority to assess a successful therapy for diabetes patients can be seen in the aspect of medication adherence, including in type 2 diabetes mellitus patients (American Diabetes Association, 2020)

Type 2 diabetes mellitus is the type of diabetes that is costly due to the high rates of morbidity and mortality (Dall et al., 2014). Diabetes patient is one of the patients with high level of medication non-adherence. Almost 50% of T2DM patients are unable to achieve glycemic control

of HbA1c < 7% due to diabetic medication non-adherence. It is the most contributing factor to poor glycemic control (Cowie, 2019).

Erpeldinger et al., (2016) in the meta-analysis of 1,632 research articles show the use of oral antidiabetic (OAD) medication significantly decreases the risk of hypoglycemia compared to the use of insulin. Therefore, diabetic patients usually take a single type of OAD. Patient adherence towards the recommended OAD can improve glycemic control, decreasing the possibility of macrovascular and microvascular complications, controlling morbidity rate and reduce the burden of the country's economy.

Systematic review study shows high level of medication adherence in diabetes patients can improve glycemic control. It can also decrease the rate of emergency visit, hospital admission and lower the medical expense (Capoccia et al., 2016). In accordance to the study, meta-analysis study conducted by Khunti et al., (2017) shows high adherence in taking antidiabetic medication is linked to reduced risks of mortality and hospital admission. A research indicates that in 13% case of T2DM with hospital visit, there is a change in the HbA1c level between the first and third visits, supported by adherence in OAD use (García Díaz et al., 2017).

Age, sex, education, employment status, cost of treatment, comorbidity, the duration of the diabetes and the frequency as well as the number of medication factors in several studies show the correlation with medication adherence (Abebaw et al., 2016). Non-adherence is also affected by medication tolerancy and efficacy, its cost, the number of the prescribed medication as well as the interaction between health care provider and patients (Blackburn, Swidrovich & Lemstra, 2017). Apart from those, the effect of complementary therapy factors towards OAD adherence also needs to be assessed. The result of a study by Alfian et al., (2018) shows 54.4% diabetes patients in Indonesia take herbal medicine. It correlates to non-adherence in taking the medication. Patients who use complementary therapy have higher possibility to stop or refuse conventional medication. Several studies state antidiabetic medication non-adherence in Indonesia is around 50-69% (Akrom et al., 2019).

Various studies indicating the relation between medication nonadherence and the higher rate of diabetes complication have been frequently conducted but there is limited reasearch in the primary level of health care service. Health facility in primary level is easily accessible to everyone to take care of their health problems, including diabetes. Medication adherence plays an important role in helping the patients achieve good glycemic control. Therefore, a study regarding medication adherence and the correlating factors need to be conducted, especially in primary level of health care service

2. METHODS

This cross sectional study is conducted for 2 months (April to May 2021) in Pasi Mali Woyla Barat Public Health Centre in West Aceh Regency. The regency is comprised of 24 villages. The data is collected using questionnaire and medical record (demography and prescribed medication). To asses the adherence, the researcher uses Morisky Medication Adherence Scale 8 Items (MMAS-8) which has been tested on its validation and reliability on diabetes patients in Indonesia (Riastienanda et al., 2017). MMAS-8 questionnaire is consisted of 8 questions. Questions 1-7 are Yes or No questions. Question 8 uses frequency scale 1-5 (always, often, sometimes, seldom, never). The categories of adherence in this study include: 1) Good adherence with total score of 8, 2) Moderate adherence with total score of 6-7 and 3) Poor adherence with total score of 0-5. Stratified

random sampling method is used to recruit respondents from 24 villages. They are chosen from each village randomly. They should meet the inclusive criteria: outpatient older than 18 years old, diagnosed with type 2 diabetes mellitus with or without complication, are not currently pregnant, have received at least one OAD in the past 3 months and are willing to participate in the study. Participation of respondent in this study is confidential and voluntary. The samples are counted using slovin formula with 5% confidence interval. The data is analysed using Chi square to find out the significant factors contributing to medication adherence. The analysis uses SPSS 25.0 for Windows.

3. RESULTS AND DISCUSSIONS

The result of this study includes respondents' demographic characteristics and related factors of the level of diabetes patient adherence in taking OAD.

3.1 Demographical Characteristic

There are 109 respondents who meet the inclusive criteria. Their characteristics are shown in Table 1. The majority of the respondents are 19-59 years old (55%), male (60.6%), had formal education for ≤ 9 years (75.2%), have unstable income (75.2%), have comorbidities (73.4%), have had diabetes for ≥ 5 years (57.8%). Most of the patients are prescribed combined type of OAD (53.2%), namely, metformin and sulfonylurea. The majority of antidiabetic medications prescribed by the doctors have to be taken twice a day (84.4%). Around 56% respondents take more than two medicines a day and 54.1% respondents have the habit of taking herbal medicine such as papaya or moringa leaves boiled in water, or buying herbal medicine from a medication store. A good number of the respondents (78%) are non-adherence to the OAD regimen. Only 22% of the respondents are adherence.

Table 1: Frequency Distribution of Respondents Based on Demographic Characteristics (n = 109).

Characteristics	f %
Age (years)	
19-59	60 (55)
>60	49 (45)
Sex	
Male	66 (60,6)
Female	43 (39,4)
Education	
Basic Level (< 9 year)	82 (75,2)
Higher Level (> 9 year)	27 (24,8)
Employment	
Employed	27 (24,8)
Unemployed	82 (75,2)
Duration Of Diabetes	
< 5 year	46 (42,2)
> 5 year	63 (57,8)
Used Of Herbal Product	
Yes	59 (54,1)
No	50 (45,9)
Comorbid	
Yes	80 (73,4)
No	29 (26,6)
Oral Antidiabetic	
Monotherapy	51 (46,8)
Combination therapy	58 (53,2)
Number Of Medicines	
>2 medicines	61 (56)
0-2 medicines	48 (44)

Table 2. Factors Influencing Antidiabetic Medication Adherence

Variable	Good Adherence	Poor Adherence	RR	CI	P-value
Total	24 (22)	85 (78)			
Age (years)			0,87	0,72-1,07	0,287
19-59	16 (66,7)	44 (51,8)			
>60	8 (33,3)	41 (48,2)			
Sex					1,000
Male	15 (62,5)	51 (60)	0,98	0,80-1,19	
Female	9 (37,5)	34 (40)			
Education			1,07	0,83-1,37	0,766
Basic Level (< 9 year)	17 (70,8)	65 (76,5)			
Higher Level (> 9 year)	7 (29,2)	20 (23,5)			
Employment			5,3	2,39-11,63	0,000*
Employed	2 (1)	80 (94)			
Unemployed	22 (99)	5 (6)			
Duration Of Diabetes			0,79	0,63-0,98	0,041*

< 5 year	15 (62)	31 (36)			
> 5 year	9 (38)	54 (64)			
Used Of Herbal Medicine			1,47	1,17-1,86	0,001*
Yes	5 (21)	54 (64)			
No	19 (79)	31 (36)			
Comorbid			0,96	0,76-1,21	0,952
Yes	17 (70,8)	63 (74,1)			
No	7 (29,2)	22 (25,9)			
Oral Antidiabetic			0,85	0,71-1,05	0,206
Monotherapy	8 (33,3)	43 (50,6)			
Combination therapy	16 (66,7)	42 (49,4)			
Number Of Medicines			1,37	1,09-1,72	0,006*
>2 medicines	7 (29)	54 (64)			
0-2 medicines	17 (71)	31 (36)			

(*) significance $p < 0.05$, Chi-square analysis

3.2 Factors Associated with Respondents Adherence

The result of the analysis of the correlation between patient characteristics and adherence can be seen in Table 2. Factors related to good adherence in this study are employment status ($p=0,000$; RR 5,3; CI 2,39-11,63), how long they have had diabetes mellitus ($p=0,041$; RR 0,79 ; CI 0,63-0,98), followed by the number of medication taken in a day ($p=0,006$; RR 1,37; CI 1,09-1,72), and herbal medicine ($p=0,001$; RR 1,47; CI 1,17-1,86). Non-working patients are more adherence by 5.3 times compared to working patients. Patients who have had diabetes for longer than 5 years are 0.79 times more adherence than patients who have had diabetes for less than 5 years. Patients who take 1-2 medication a day are 1.7 times more adherence than patients who take more than two medications a day. Patients who do not take herbal medicine are 1.47 times more adherence compared to patients who take herbal medicine.

According to the result of Chi-square analysis in Table 2, potential factors ($p<0.25$) correlated to patient adherence are age ($p=0,287$; RR 1,63; CI 0,76-3,49) and the type of OAD ($p=0,206$; RR 1,75; CI 0,82-3,76). Patients who are 19-59 years old are potentially more adherence than patients who are ≥ 60 years old. Respondents who take OAD combination are potentially more adherence by 1.75 times compared to respondents with a single type of OAD. This indicates that the factor potentially associated with adherence is age (respondents who are 19-59 years old) whilst using OAD combination is associated with poor adherence.

DISCUSSION

As many as 22% respondents are adherence to their OAD regimen while 78% respondents are not. The type of the non-adherence in this study is respondents stopping the regimen when they feel better. Their reason is they are bored of taking the medication regularly in a long term, even for their entire lives. They are also worried of the effect of medication dependence. (Lee et al., 2017) states that

medication adherence in diabetes patients is difficult to achieve, the rate rarely gets to 50%. This is supported by a study carried out by Mulyani (2016) who states that only 43% diabetes patients are adherence to their recommended medications. A study by Balkhi et al., (2019) also mentions the level of medication adherence is only 42%.

This research shows that socio-demography characteristics (age, sex, and education) are not correlated to respondent adherence in taking their medication. Similar result is stated by as well as Akrom et al., (2019) who affirm that age, sex, and education is not related to OAD adherence. However, a study by Abdul Salam & Farheen Siddiqui (2013) and a study by Abebaw et al. (2016) state that socio-demography characteristics (age, sex, and education) are related to OAD adherence. These varied results may be caused by different socio-demographic and cultural backgrounds.

This research finds that employment status is significantly related to medication adherence: non-working patients are more adherence than working patients. This finding is supported by research by Kavitha et al., (2017) and Bonger et al., (2018) which mention that patients who do not work are more adherence than those who do. The correlation between employment and adherence in patients with chronic disease can be due to stable personal finance to access health care and medication as well as due to their working routine to improve cognitive and functional status of the patients. The majority (55%) of the respondents are in their productive middle age. Abebaw et al., (2016) investigate the reason of their non-adherence. The most frequent reasons are because the patients are busy, forget to take the medicine, or because they often go out of town. A research by Akrom et al., (2019) also states a similar result: employment is the contributing factor on why the patients forget to take the medicine or why they take it less than prescribed. Strenuous work can affect patients' routine in taking the medication and in turn, it affects patient adherence (Alsolami, 2016).

The duration or how long the patients have had diabetes is significantly related to patient adherence. Respondents who have had diabetes for more than 5 years are 0.79 times more adherence compared to patients who have had diabetes for less than 5 years. This finding is in accordance with the result of a research conducted by Abebaw et al., (2016) which affirms that respondents who have had diabetes longer interact with health care providers more often. Therefore, it is possible that they are frequently informed about OAD and they would be more aware of diabetes complication. Apart from that, patients who have had diabetes longer want to extend their quality of life (Horvat et al., 2018)

Both single type and combination type of OAD do not contribute to patient adherence in this study. Rosdianah (2016) states that single or combination type of medication does not affect patient adherence. Similarly, comorbid factor in this study is not associated with OAD adherence. Lee et al. (2017) mentions that comorbid factor does not contribute to diabetic patient adherence.

Medication factor, that is, the number of medicine taken in a day, is significantly related to patient adherence in this study. Respondents who have 1-2 medicines prescribed are more adherence than those who have more than two medications prescribed to them (RR 1,37; CI 1,09-1,72). It means there is a correlation between adherence and the number of medication prescribed. Patel et al. (2019) mentioned fewer prescribed medication contributes to better adherence in patients with chronic disease.

In this study, complementary therapy such as herbal medicine for diabetic patients is related to medication adherence. Herbal medicine has been used by many Indonesians from generation to generation. A research conducted by Alfian et al. (2018) on 114 T2DM patients shows that herbal medicine makes it difficult for patients to continue their regimen and it causes medication non-

adherence. It is possible that patients skip taking prescribed antidiabetic medication because they have already taken the herbal medicine.

The role of health care workers, especially nurses, in improving patient adherence is important. Frequent education and its reinforcement should be given to patients with long term therapy such as type 2 DM patients Akrom et al. (2019). Nurses can actively participate to help improve patient adherence in taking medication by regularly educating them regarding OAD adherence; giving tools such as treatment calendar and reminder cards that patients can mark if they have taken the medicine; and giving support, motivating them, as well as providing convenience in patients' effort in their treatment (Alajmi et al., 2017; Cohen et al., 2013). The researcher observes that the cadres in primary level of health care service can cooperate in improving OAD adherence. The cadres are advised to meet diabetes patients with their families once every month to educate them in regards to OAD adherence. Cadre with T2DM patients can also make treatment cards to help remind them to take OAD.. It can be carried out in group meetings when patients come to outpatient unit so that they can manage their health problem well.

4. CONCLUSION

Based on the result of this study, it can be concluded that the factors which are significantly associated with medication adherence are employment, how long they have had diabetes, the number of medication prescribed in a day and herbal medicine they take. It needs a regular appointment once a month between the cadre and the diabetes patients as well as their families as a means to educate them to improve OAD adherence.

The result of this research can be used as the basis of further research related to OAD adherence in patients with type 2 diabetes mellitus (T2DM). The right type of education to improve OAD adherence needs to be researched further in order to improve the quality of life of diabetes patients.

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