

Measuring medication adherence of hypertensive patients with monotherapy treatment in a community health center by utilizing medication possession ratio

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Abstract

Adherence is a particular concern in treating hypertension, and non-adherence to antihypertensive drugs might cause uncontrolled hypertension. This study aimed to measure retrospectively the medication adherence of hypertensive patients with monotherapy treatment in a community health center (Puskesmas) in Bandung city, Indonesia. The retrospective patient data from 2011 to 2015 were obtained from an electronic prescription database. The patient data of those diagnosed with hypertension, >18 years old, and who received mono-antihypertensive therapy within a 12-month period were included in this study. To assess medication adherence, the medication possession ratio (MPR) was applied. Out of 780 patients, 93.6% of patients showed poor adherence, about 5.8% showed intermediate adherence, and 0.6% of patients had high adherence. Males and females showed different levels of adherence ($p < 0.05$). Efforts should be focused on obtaining optimum clinical benefits and strengthening the effectiveness of health systems in Indonesia.

Keywords

adherence, hypertension, monotherapy, MPR, community health center

Introduction

Hypertension is one of the risk factors for cardiovascular and renal diseases (Lacruz et al. 2015). Slightly elevated blood pressure (BP) levels might lead to an increased risk of cardiovascular disease (CVD) or stroke (Lacruz et al. 2015). Hypertension is a major health problem in both developing and developed countries (Kamran et al. 2014) and is estimated to cause more than 13% of deaths

annually (Marshall et al. 2012). Regardless of the national and universal guidelines for hypertension, studies based on population have discovered that most individuals with hypertension are either untreated, deficiently controlled, or remain undiagnosed (Marshall et al. 2012).

Healthcare facilities provide services including promotive, preventive, curative, and rehabilitative care; in this study, we focus on central or regional government- and/or community-run facilities (Government of

Republic of Indonesia 2016). In Indonesia, there are three levels of healthcare facilities. (Government of Republic of Indonesia 2016) Community health centers (Puskesmas) are part of the first level, which is instrumental in the national health system (Ministry of Health Republic of Indonesia 2014). The Indonesian government has established at least one Puskesmas in every district (Government of Republic of Indonesia 2016). The Puskesmas is the most visited healthcare facility by patients in Indonesia (Pradipta et al. 2015).

Medication adherence can be defined as the extent to which patients take their medications as prescribed (Vrijens et al. 2012); it is dynamic and changes over time (Vrijens et al. 2017). Medication adherence is measured by utilizing patients' self-reported data, electronic database, pharmacy refill, and claims data in research, routine practices, and epidemiological studies (Lam and Fresco 2015). Several studies using secondary database analysis utilize the medication possession ratio (MPR), which is assessed from the first to the last prescription record and utilizes a proportion of days covered (PDC). However, the PDC is used to assess patients' persistence to a medication therapy rather than adherence (Lam and Fresco 2015).

Adherence is a particular concern in hypertension, and non-adherence to antihypertensive drugs can cause uncontrolled hypertension (Kamran et al. 2014). Estimates of the rate of poor adherence or non-adherence to treatment range from 30% to 50% (Marshall et al. 2012). A longitudinal study of the electronically compiled the dosing histories of 4,783 patients and reported that about half of the patients prescribed with an antihypertensive drug stopped taking their medication within 1 year (Vrijens et al. 2008). The causes of poor adherence are complex and include complicated drug regimens, drugs costs, old age, poor social support, cognitive problems, and depression (Vrijens et al. 2017).

The World Health Organization has affirmed that adherence to therapies including hypertension therapy is an essential determinant of successful treatment (De Geest and Sabaté 2003). Poor adherence debilitates optimum clinical benefits and could reduce the overall effectiveness of health systems (De Geest and Sabaté 2003). According to the European Federation of Pharmaceutical Industries and Association, the lack of medication adherence is estimated to cost European governments €125 billion per year (Vrijens et al. 2017). In the United States, the association between non-adherence and costs has been illustrated as a continuous cycle, with poor medication adherence leading to poor health outcomes and increased service utilization and healthcare costs that are passed on to the patient and subsequently further affect adherence (Iuga and McGuire 2014; Vrijens et al. 2017). In Indonesia, research on assessing medication adherence to hypertension therapy remains insufficient, especially in terms of utilizing secondary data and the MPR. Given that Puskesmas are the most visited healthcare

facilities in Indonesia, (Pradipta et al. 2015) a study in a Puskesmas in Tarakan reported that 67.8% patients received antihypertensive monotherapy (Fadhilla and Permana 2020). Therefore, as a first step, this present study measured the medication adherence of hypertension patients who received antihypertensive monotherapy in a Puskesmas by utilizing secondary data and the MPR.

Methods

Study design and setting

This retrospective study utilized patient data obtained from an electronic prescription database of all hypertensive patients (International Classification of Diseases, ICD-10: I10) enrolled in a Puskesmas in Bandung city, Indonesia from January 2011 to December 2015.

The inclusion criteria for patients in this study were as follows: hypertension diagnosis, older than 18 years old, and having received monotherapy antihypertensive within a 12-month period. The exclusion criteria included patients who had >1 diagnosis and a referral status.

Insured patients were poor individuals who did not pay for treatment (paid by the government) and those who purchased national health insurance (most of them being government employees; thus, the government provided the insurance for them).

Ethics approval

Ethics approval was obtained from the Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia (639/UN6.C.10/PN/2017).

Medication adherence

Medication adherence was calculated individually for each patient and each medication by calculating the MPR. (Rolnick et al. 2013) The MPR was obtained from the sum of the days' supply for all fills of a given drug in a particular time period, divided by the number of days in that period (Crowe 2015).

$$MPR = \left(\frac{\text{Sum of days' supply for all fills in period}}{\text{Number of days in Period}} \right) \times 100\% \quad (\text{Crowe 2015})$$

The MPR calculation results were then categorized as poor (MPR < 50%), intermediate (50 ≤ MPR < 80%), and high (MPR ≥ 80%) (Lee et al. 2017).

Statistical analysis

The data were analyzed descriptively and statistically with either a Mann-Whitney or Kruskal-Wallis test. $P < 0.05$ was considered significant. All statistical analysis was performed using the statistical software SPSS Ver. 22 (IBM Corp., Armonk, NY, USA).

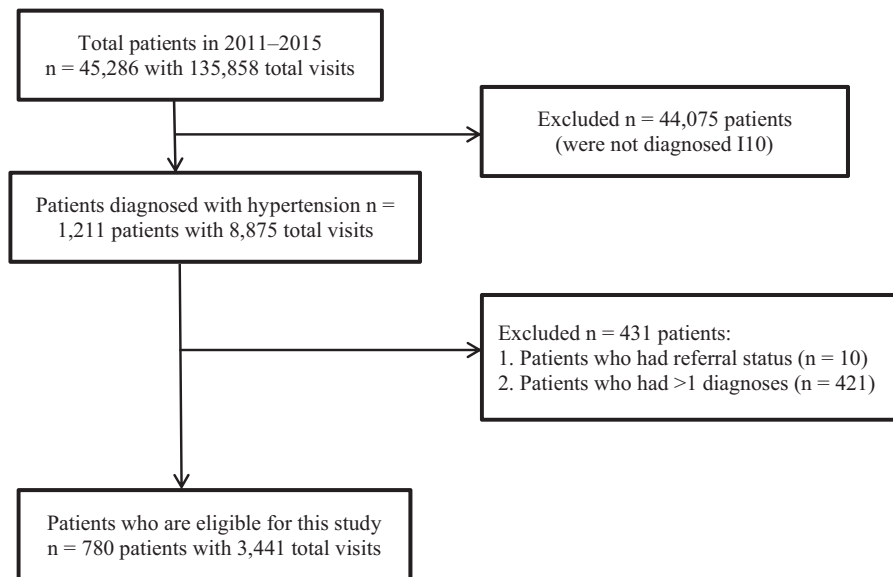


Figure 1. Flowchart of patient data selection.

Results

Data selection

Fig. 1 presents a flowchart of the patient data selection. Total patient data recorded in the electronic prescription database from 2011 to 2015 comprised those of 45,286 patients, having 135,858 total visits. A total of 2,079 patients were included with 8,857 visits. Overall, 780 patients met the criteria, totaling 3,441 visits.

Patient characteristics

Table 1 shows the hypertensive patient data characteristics included in this study. Most patients with hypertension were female (69.7%), were 55–64 years old (32.3%), and had insurance (71.4%). The mean patient age was 58-years-old. Most patients obtained Captopril (40.4%) monotherapy.

Medication adherence

Table 2 shows the medication adherence of hypertensive patients based on MPR calculation and patient characteristics. Most patients (93.6%) had poor adherence, 5.8% had intermediate adherence, and only 0.6% had high adherence. Male and female patients had significantly different adherence ($p = .00$). The male patients had slightly higher adherence than female patients did in the intermediate and high adherence categories. Other characteristics showed no difference in adherence.

Discussion

This study presents the poor medication adherence of hypertensive patients who received monotherapy in a Puskesmas in Bandung city, Indonesia. The causes for

Table 1. Patient characteristics.

Characteristics	Total (%)
Gender	
Male	236 (30.3)
Female	544(69.7)
	780 (100)
Age (Mean was 58-years-old)	
18–44	73(9.4)
45–54	236(30.3)
55–64	252(32.3)
>65	219(28.0)
	780(100)
Patient's category	
Insured	557(71.4)
Uninsured	223(28.6)
	780(100)
Medication	
Reserpine	268(34.4)
Captopril	315(40.4)
Hydrochlorothiazide	44(5.6)
Amlodipine	153(19.6)
	780(100)

patients' poor adherence to the treatment could be relate to the patients themselves, treatments, and/or healthcare providers (Hugtenburg et al. 2013). Because this study retrospectively measured medication adherence using a medical record database, one possible cause that may lead to low adherence to hypertensive treatment is the unavailability of a national integrated medical record system for patients who are treated in Puskesmas or other healthcare facilities. Thus, even if the patients take their medication from other healthcare facilities, the data may not have been recorded in the medical record database. Another possible cause of patients not taking their medication is the absence of symptoms. For example, Marshall et. al studied populations in Brazil, Denmark, the Netherlands, Thailand, the United Kingdom, and the

Table 2. Medication adherence.

Characteristic	Medication Adherence			Total n (%)	p-value
	Poor (MPR <50%)	Intermediate (50 ≤ MPR < 80%)	High (MPR ≥80%)		
Gender					
Male	209(26.8)	24(3.1)	3(0.4)	236(30.3)	.00 ^{*a}
Female	521(66.8)	21(2.7)	2(0.2)	544(69.7)	
	730(93.6)	45(5.8)	5(0.6)	780(100)	
Age (Mean = 58 years)					
Age ≤ 58 years	382(49)	25(3.2)	2(0.2)	409(52.4)	.83 ^a
Age > 58 years	348(44.6)	20(2.6)	3(0.4)	371(47.6)	
	730(93.6)	45(5.8)	5(0.6)	780(100)	
Insurance					
Insured	527(67.6)	28(3.6)	2(0.2)	557(71.4)	.62 ^a
Uninsured	203(26)	17(2.2)	3(0.4)	223(28.6)	
	730(93.6)	45(5.8)	5(0.6)	780(100)	
Medication					
Reserpine	251(32.2)	15(1.9)	2(0.2)	268(34.4)	.43 ^b
Captopril	299(38.3)	13(1.7)	3(0.4)	315(40.4)	
Hydrochlorothiazide	41(5.6)	3(0.4)	0	44(5.6)	
Amlodipine	139(17.8)	14(1.2)	0	153(19.6)	
	730(93.6)	45(5.8)	5(0.6)	780(100)	

*Significant; ^aMann–Whitney test; ^bKruskal–Wallis test.

United States and reported that people in these countries took medications exclusively only when symptoms were present (Marshall et al. 2012). However, the low adherence to hypertension treatment is still a major health-related problem and a significant risk factor for complications, disability, and hypertension-associated mortality (Ajayi et al. 2018). In addition, poor adherence leads to poor outcomes, which then increase healthcare service utilization and overall healthcare costs (Eaddy et al. 2012; Iuga and McGuire 2014).

This study was also in accordance with a previous study on a Puskesmas in Medan city that assessed medication adherence through a questionnaire and reported that 58% of patients had low level adherence (Wahyuni et al. 2019). Their poor adherence was associated with poor knowledge, bad attitude, negative action, and lack of communication by the doctor (Wahyuni et al. 2019). A study in primary health clinics in Malaysia also measured medication adherence through a Morisky Medication Adherence Scale questionnaire, yielding that the medication adherence rate was low among primary care hypertensive patients. Additionally, poor adherence rate was found to negatively affect BP control (Ramli et al. 2012). Both studies showed low adherence levels among hypertensive patients.

In this study, we observed that female patients have a higher prevalence of hypertension than male patients. This result aligns with Gudmundsdottirs' study, which reported that hypertension is a major risk factor for CVD and outcomes in women (Gudmundsdottir et al. 2012). The American Heart Association reported that heart disease was the leading cause of death in the United States in 2007, and CVD caused about one death per minute among women in the United States (Roger et al. 2011). Mosterd's study implied that hypertension is a contributing factor to heart failure in more women than

men (Mosterd et al. 1999). According to Gholizadeh and Davidson's study, (Gholizadeh and Davidson 2008) heart disease is the leading cause of death in women in every major developed country and most emerging economies (Gudmundsdottir et al. 2012). The percentages of men and women with hypertension aged 45–64 years are similar; a higher percentage of women also presented higher BP than men (Roger et al. 2011). A European study that utilized 24 h BP monitoring for the diagnosis of hypertension showed that after adjusting for age and body mass index, hypertension prevalence in postmenopausal women was more than twice that in premenopausal women. However, more women than men have been predicted to develop hypertension in the near future (Kearney et al. 2005). Globally, the prevalence of hypertension is predicted to increase by 9% in men and 13% in women between 2000 and 2025 (Pimenta 2012).

In this study, male patients indicated a slightly higher adherence to antihypertensive therapy than female patients. This higher adherence might be owing to Indonesian culture, in which men have to bear a greater level of family responsibilities than women; they should be healthy and be able to work and provide for their family. Chen (Chen et al. 2014) also reported that male patients adhere more effectively to medications than female patients, noting that the factors associated with adherence in male patients included less causal attribution to culture, more attribution to risk factors, fewer and unclear symptoms related to high BP among women, lower scores for timeline-cyclical, and higher scores for illness consequences and coherence. Meanwhile, other studies have found that women have higher adherence to antihypertensive medication than men. (Li et al. 2008; Kamran et al. 2014; Tilea et al. 2018) The differences indicate the need for personalized therapeutic management to improve clinical outcomes.

Captopril was the most frequently used drug in this study. It is one of the first-line drugs for hypertension based on guidelines for basic treatment in Puskesmas (Ministry of Health Republic of Indonesia 2007). Millions of patients with essential hypertension have received significant clinical benefits from Captopril (Bakhle 2020). Angiotensin-converting enzyme (ACE) inhibitors are effective treatments for all stages of hypertension (Materson 1984). Because Captopril was introduced in 1981, other ACE inhibitors have been widely synthesized (Materson 1984; Bakhle 2020).

In this study, we measured medication adherence by utilizing MPR. There are many ways to assess a patient's medication adherence. The most appropriate assessment method is the direct method. This biological method directly measures the concentration of drugs or metabolites in the patient's blood or urine (Boskovic et al. 2014). The patient adherence questionnaire and MPR are both indirect methods. The questionnaire has the advantage of being economical, easy to administer, non-intrusive, and able to provide information about attitudes and beliefs regarding treatment (Boskovic et al. 2014). The MPR is a simpler method than a questionnaire and is easier and more affordable to conduct because it uses pharmaceutical secondary data and does not require interviews (Boskovic et al. 2014).

This study is subject to a few limitations. First, the data were obtained from a single Puskesmas only, so the results cannot be generalized for other Puskesmas and healthcare facilities. Second, this research was based on retrospective data retrieval; we could not include the patient's BP, education, and occupation data owing to incomplete prescription data. Despite the limitations, we could measure and provide the medication

adherence overview of patients with hypertension in a community health center by utilizing secondary data and MPR.

Conclusion

The medication adherence of hypertensive patients with monotherapy in a Puskesmas in Bandung city was poor. Low adherence to hypertension treatment is still a major health-related problem. Further studies conducted in other regions or even nationwide to determine the factors that affect medication adherence are needed to confirm the findings of the present study.

Conflicts of interest

The authors report no conflict of interest.

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Authors' contributions

IMP, LNA, SDA, and RA were responsible for the study design. IMP, LNA, RKS, and SDA were responsible for data collections and analysis. All authors participated in the drafting and revising of the manuscript. All authors read and approved the final manuscript.

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