



HOSPITAL ADMISSION AND POOR ADHERENCE TO ANTIHYPERTENSIVE THERAPY: IS THERE ANY RELATIONSHIP?

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ABSTRACT

Poor adherence to medication is a major problem among patients with hypertension, when patients do not follow the doctor's prescription, it is likely that their symptoms may worsen and lead to complications. This can further lead to increase using of hospital and emergency room (ER) services, office visits, and other medical resources. The objectives of this study were (i) to measure adherence to antihypertensive therapy of Malaysian population and (ii) to determine if there is a relationship between poor adherence to antihypertensive therapy by patients and hospital admission. A semi-standard survey interview method was conducted and distributed on a convenience sample of 518 patients with antihypertensive therapy at the clinic of Penang General Hospital, Malaysia. Adherence was assessed using the MORISKY Medication Adherence Scale (MMAS). An independent sample T-test with a response rate 73.36% was used to determine whether there is a significant difference between patients' who were hospitalized ($n = 12$) and who were not ($n = 368$), with poor adherence. Our results show that, the MORISKY scale items were summed that 195 (51.3%) patients had poor adherence to antihypertensive medication. The highly statistically significant result showed a much higher level of hospitalization for patients who have poor adherence ($M = 4.50$, $SD = 0.384$) compared to patients who have adherence ($M = 2.82$, $SD = 1.486$), which means less hospitalization admission is likely to be found in patients who have more adherences. Similar to what has been reported worldwide, poor adherence of the patient to medication has a significant relationship with hospital admission.

Keywords: Adherence; Antihypertensive therapy; hospital admission; MMAS; Malaysia

INTRODUCTION

Poor adherence to medications is a major public health problem and remains one of the main unresolved issues in the management of hypertension¹. Adherence to medication has been defined as the extent to which a person's behaviour coincides with medical or health advice². The seriousness of poor adherence to medical regimens in Malaysia was raised in 2006, after the publishing of the results of a study by Hassan which showed that 55.8% of drugs prescribed by physicians were not taken as directed³.

Unfortunately, patients with poor adherence to hypertension treatments are

at an increased risk of serious adverse outcomes, including kidney failure, blindness, stroke, and heart disease⁴. Many studies have documented low rates of adherence to antihypertensive medication among patients with hypertension⁵. Poor adherence to medication is also an important factor in hospital admissions^{6, 7}. More than 10% of patients admitted to hospitals are due to poor adherence in following medication regimens⁸. In 1990 a study done by Col and his colleagues, one-third of patients admitted to the hospital had a history of poor adherence⁹. This has been proved by studies which show that patients who take at least 80% of their medications have significantly better

control over their blood pressure levels compared with those who take less than 50% of their prescribed medications ¹⁰.

As far as hypertension is concerned, adhering to prescribed medication is critically important for controlling blood pressure and reducing the associated risk of cardiovascular complications such as stroke ¹¹. Thus, to combat poor medication adherence, clinicians must identify non-adherent patients.

Braam & Lenders (2007) found that patients were referred to hospital because of elevated hypertension; during the hospital stay drug intake was checked, the BP was lowered for both systolic and diastolic, in that time hospital was using same drugs patients used before ¹². When patients do not follow the doctor's prescription, it is likely that their symptoms may worsen and lead to complications. This can further lead to increased use of hospital and emergency room (ER) services, office visits, and other medical resources ^{13, 14}. In the USA it is estimated that non-adherence to medication results in 125,000 deaths annually ¹⁵. However, this study did not determine the direct relationship between cost and adherence.

Studies conducted by Sokol (2005) have found that patients who maintained an 80 to 100 percent medication adherence were significantly less likely to be hospitalized compared with patients with lower levels of

adherence¹⁶. These differences were statistically significant for most of the adherence levels tested ($p = 0.001 < 0.01$). For hypertension, through this we will be able to determine if there is a relationship between poor adherence to antihypertensive therapy by patients and hospital admission.

MATERIALS AND METHODS

The study design is a non experimental retrospective cohort study, which deals with adherence to anti-hypertensive medication. The plan for this study was to determine poor adherence to anti-hypertensive therapy in outpatient hypertension department at the Hospital Pulau Pinang (General Penang Hospital), the biggest government hospital in Penang, located at Jalan Residensi. The survey method is a quantitative design that uses structured questionnaires (Morisky Scale) as the primary method for data collection. In the mid-1980s, Morisky and colleagues developed a brief questionnaire four items' (see Table - 1) to aid practitioners in prospectively predicting adherence with antihypertensive medications². Subsequently, the instrument was validated in a number of studies and demonstrated to have good psychometric properties ¹⁷. The advantages of this over other methods of measurement include its simplicity, speed, cheap and viability of use. Several studies highlighted the usefulness of the self-report as an adherence measurement tool.

Table 1: Morisky simplified self-report measure of adherence scale

Morisky items	Never	Rarely	Sometime	Often	Always
1- Do you ever forget to take your medicine?	1	2	3	4	5
2- Are you careless at times about taking your medicine?	1	2	3	4	5
3- When you feel better do you sometimes stop taking your medicine?	1	2	3	4	5
4- Sometimes if you feel worse when you take the medicine, do you stop taking it?	1	2	3	4	5

Table 1 shows five-point Likert scale was used throughout the questionnaire for stating the required scaling to keep the mind of the respondents more focused on the statement. According to Shelly et al. (2005), patients are considered adherent to the treatment if they answered (1 = never or 2 = rarely) for all Morisky scale, except those patients who are considered poorly adherent¹⁷.

Because the study was conducted in Malaysia, the questionnaire required translation to Malay language (Bahasa). Back-translation was used to assure the accuracy of the translation. The final translated questionnaire was then pre-tested with a panel of ten Malaysian citizens who had obtained Master degrees in the United States. Members of this pre-test group were asked for any comments on the questionnaire, pertaining to ambiguity or awkwardness in the wording of the questions. In addition, pilot study was planed as a part of the scale development methodology to ensure a comprehensive analysis for a range of perspectives, to detect any possible problems associated with the format, wording, and measurement, and to make sure that the respondents comprehended the instructions, questions.

Due to the time constraint and impossible to treat our sample rigorously, that we have no clear details about the schedule list of the respondents (patients), it was decided to conduct convenience sampling technique for this research. In clinical practice, we used patients who are available to us as our sample, we sample simply by asking for volunteers, as the name implies, and sampling refers to the collection of information from member of the population who are conveniently available. As a secondary data method, we

used the formulation table (Clinical form) design for extracting data from patients' records on their clinical outcome during 2006 and 2007. Our research was identified if patient admitted to the hospital once at least whether from the emergency room or the outpatients clinic doctors, with consideration that all these admission only related to hypertension treatments as our sample included only essential hypertension patients.

With regard to the size of the sample, 518 questionnaires were distributed to the patients while they were waiting for their turn to meet the doctor at the waiting area of the clinic. Once the data were collected from patients, only useable medical records that met our sample frame were selected and matched with the questionnaire data. In addition, a number of other inclusion and exclusion criteria were used to define our sample frame. The period of data collection was from 15th June 2007 to 10th February 2008. The Clinical Research Center (CRC) at the General Hospital in Penang and Malaysian Ministry of Health granted approval for accessing the patients' medical records and distributing the questionnaire.

Inclusion Criteria

(Aged ≥ 18 and ≤ 60 years, diagnosed with essential hypertension, received at least one anti-hypertensive medication, duration of hypertension from 2 to 5 years).

Exclusion Criteria

Secondary hypertension states such as chronic renal disease, reno-vascular disease, Cushing's syndrome, patients diagnosed with other co-morbid diseases such as diabetes mellitus, dyslipidemia, heart failure, hepatic dysfunction,

psychiatric disorder, pregnant women, finally, cancer patients.

The data collected was analyzed using SPSS® Version 15.0¹⁸. Data distributions were normal and therefore parametric analysis was conducted. To identify the relationship of adherence level on hospital admission, an independent sample T-test is used to determine whether there is a significant difference between the average values of the adherence level made with two different conditions (yes or no) for hospital admission.

RESULTS

The final response rate from 518 patients was 73.36% ($n = 380$). From Table 2, we can infer the following. Overall, 218 (57.4%) of the respondents were male

and 162 (42.6%) were female. The respondents' ages are between 51 years and 60 years, 200 with 52.6%, and ages are between 40-50 years old, with 45.3% of the respondents. The highest number of the respondents were Malay ($n = 146$; 38.4%), followed by Chinese (33.9%) and Indian (27.6%). Most of the respondents had poor adherence ($n = 195$; 51.3%), whereas 48.7% ($n = 185$) had good adherence. The level of the education shows that the highest number of the respondents hold high school (330, 86.4%), which is approximately most of the sample. The result shows the highest income is more than 2000 Malaysian Ringgit (Malaysian currency) 69.6%. The respondents' ages are between 36 years old and 45 years, 271 with 70.9% of the respondents.

Table 2: Analyzing results of demographic data

Variables	Valid	Frequency	Percentage (%)
Gender	Male	218	57.4
	Female	162	42.6
Age	18 - 28	0	0
	29 - 39	8	2.1
	40 - 50	172	45.3
	51 - 60	200	52.6
Race	Malay	146	38.4
	Chinese	129	33.9
	Indian	105	27.6
Adherence	Good	185	48.7
	Poor	195	51.3
Hospital admission	Yes	13	3.2
	No	368	96.8
Income	Below 500 RM	9	2.6
	500-1000 RM	38	9.9
	1000-2000 RM	67	17.6
	More than 2000 RM	266	69.9
Education	High school	330	86.4
	Bachelor Degree	50	13.6
	Master Degree	0	0
	Doctoral Degree	0	0

*(RM) Malaysian currency

An independent sample *t*-test was conducted between participants who were hospitalized ($n = 12$) and who were not ($n = 368$), with poor adherence as the independent variable. The highly statistically significant result showed a much higher level of hospitalization for patients who have poor adherence ($M =$

4.50, $SD = 0.384$) compared to patients who have adherence ($M = 2.82$, $SD = 1.486$), which means less hospitalization admission is likely to be found in patients who have more adherences. Table 3 shows the difference in the mean of hospitalization groups.

Table 3: T-test hospitalization groups

Poor Adherence		<i>N</i>	Mean	Std. Deviation	Std. Error Mean
Hospitalization	YES	12	4.50	0.384	0.111
	NO	368	2.82	1.486	0.077

Table 4 shows the significant $P < 0.001$ relationship between the two groups and the level of the adherence. Hence, the

summary of the result states that poor adherence has a relationship with hospital admission.

Table 4: T-test independent samples (hospitalization)

Poor Adherence	Levene's Test for Equality of Variances		<i>t</i> -Test for Equality of Means				
	<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig.</i>	Mean Diff.	Std. Error Diff.
Equal variances assumed	128.5	0.000	3.904	378	0.000	1.67	0.430
Equal variances not assumed			12.40	24.168	0.000	1.67	0.135

DISCUSSION

(i) Identification of patients with poor adherence

In relation to the first objective, one of the main findings of this study was the identification of patients with poor adherence. The MORISKY scale items were summed, and the descriptive statistics presented in Table 1, showed that 195 patients had poor adherence to hypertensive medication. According to this result, 51.3% of our total sample was taking their medicines irregularly. This finding concurs with the finding by Hassan ³. The rate of adherence is low

compared with the rate that is prevalent in western population such as in Scotland where a 91% rate of adherence has been reported ¹⁹, and in Pakistan where a 77% rate of adherence has been reported ²⁰.

Poor adherence is related to the way in which a patient judges personal need for a medication against a variety of competing needs, wants, and concerns (adverse effects, stigma, cultural beliefs, cost, etc.). In fact, patients are not the only factor that affects adherence, with respect to the demographic variables, no statistically significant associations were found between the change in adherent patients' level and demographic variables

in this study. Healthcare providers, complex medication regimens, and accessing and navigating the healthcare delivery system can contribute to the problem of non-adherence.

There are many factors that effect adherence; it could be because of the disease itself, given that hypertension is a deadly condition that possesses no warning signs (asymptomatic) and is often dubbed as the 'silent killer'. In fact, while the questionnaire was distributed, it was noted that, most patients had not discovered that their blood pressure elevated until they had some degree of trouble. In 2008, Paul S. found that most chronic hypertensive patients have difficulty adhering to a prescribed regimen ²¹. In fact, the lack of awareness of hypertension and lack of adequate control with treatment could also be reasons for poor adherence to therapy ²². These findings may be used to identify the subset of population at risk of low adherence who should be targeted for interventions to achieve better blood pressure control and hence prevent complications.

(ii) Poor adherence and hospital admission

The results of our study demonstrate a significant relationship between poor adherence and hospitalizations among outpatients with hypertension. Our results showed that approximately 51.3% of patients had poor adherence, which was associated with 3.2% hospital admission. This is in accordance with previous research that shows that adherence to medication is a critical component to decreasing avoidable acute care hospitalizations.

Braam & Lenders (2007) found that during the patients hospital stay it can be

shown that BP is lowered with the drug already prescribed at the outpatient clinic ¹². Many patients were referred to hospital because of elevated blood pressure; during the hospital stay drug intake was checked, the BP was lowered for both systolic and diastolic, in that time hospital was using same drugs patients used before. Because further investigations, insufficient adherence to the antihypertensive drugs was suspected.

According to an article published in *The New England Journal of Medicine*, of all the medication-related hospital admissions in the United States, 33–69% is attributable to poor adherence to medication ²³. In addition, according to the Briggs National Quality Improvement/ Hospitalization Reduction Study (2006), focusing on medication adherence can indeed help to decrease avoidable acute care hospitalizations ²⁴. Caremark Proactive Pharmacy Care (2009) approach designed to help improve medication adherence to positively impact outcomes and manage costs found that nearly half of patients hospitalized for chronic disease such as hypertension and cardiovascular disease may not be adherent to recommended drug therapies, in an important manner, increasing their risk for subsequent hospitalization within 12 months. The study found that among those patients who were non-adherent to drug therapy, average subsequent hospitalizations per patient in a 12 month almost twice that of adherent patients ²⁵. Another study by Michael (2005) found that patients who maintained 80–100% adherence to antihypertensive therapy were significantly less likely to be hospitalized when compared with patients with lower levels of adherence ⁷. Poor adherence is also responsible for various medical

complications of disease, reduces the quality of life of the patients, and wastes health-care resources²⁶. This result showed support also for some previous research^{7,27}.

Malaysia is a growing nation, filled with dreams of becoming an industrialized country and reaching the status of a developed nation by 2020²⁸. Malaysia also hopes to become a respected and highly regarded country, on par with other developed nations in the eyes of the rest of the world. Nevertheless, there is a growing worry on the increasing prevalence of chronic diseases among its population; health-care professionals are pondering over the dreadful consequences of chronic ailments that the present generation faces and the future generation is destined to face, unless something is done on a war-footing basis.

The findings of this study suggest an important practical implication for the government. The effect of poor adherence on the economy was discussed by Coombs²⁹; Iskedjian³⁰; and Sullivan, Krelig & Hazlet³¹. When the rate of adherence improves, it would have an economic effect by reducing cardiovascular morbidity³²; it would also improve the outcome of hypertensive pharmacotherapy. Thus, it would be appropriate to suggest that government efforts should be focused on the types of interventions to improve adherence among patients in Malaysia. These interventions can help in closing the gap between the clinical efficacy of interventions and their effectiveness when used in the field. As government level, many strategies could help for improving adherence such as:

- Develop and implement programs for patient compliance support (e.g.,

group support programs, educational interventions, monitoring clinics, compliance packaging aids, and multiple medicine reviews). Keep health care providers informed about these programs so they can refer appropriate patients as part of an individualized compliance regimen.

- Develop and implement innovative programs that teach patients responsibility for and involvement in his/her health care.

This study had several limitations need to be acknowledged. Certain limitations relating to the relatively small sample occurred. This does not reflect the full range of Malaysian diversity, the scope of this study only targeted the outpatients diagnosed with essential hypertension and treated for hypertension in the General Hospital of Penang in Malaysia. The measure used for this study is based only on self-reports (Morisky Scale). Many other measures could also be applied to identify patients with poor adherence, such as refill, pill counts, and electronic monitoring. Additional studies can be carried out to investigate this area of the study further. Also as mentioned earlier, this study has been conducted only on outpatients diagnosed with essential hypertension and treated for hypertension in the General Hospital of Penang in Malaysia. Therefore, future studies can be conducted in other places in Malaysia. Finally, more research is required to study the effect of poor adherence to medication on end-organ damage, because this needs long period.

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