

Factors Associated With Poor Medication Adherence In Hypertensive Patients In Lusaka, Zambia

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ABSTRACT

Objectives: To determine the prevalence of drug adherence and factors associated with poor adherence to antihypertensive treatment among adults seen in the department of medicine at UTH. To investigate patient related and health care system related factors associated with poor adherence to antihypertensive Drugs.

Methods: 237 adult patients aged 18 and above with previous diagnosis of essential hypertension receiving out patient care in the University Teaching Hospital (UTH) were recruited from the first week of November to the second week of December 2010. Information was collected regarding health care system related factors and care giver related factors to patient non adherence using self report and modified Hill-Bone compliance scale.

Results: The prevalence of adherence was 83% by self report and 70% using modified Hill-Bone scale. The mean age was 57.8 ± 12.0 SD. Patients on three antihypertensive drugs were less likely to be non-adherent (OR 0.21; 95% CI 0.06-0.79) than patients taking only one drug. Majority (60%) of the patients were reviewed at least twice in the last 6 months at the time of the interview. 195 (83%) patients reported that drugs prescribed were not available at the hospital pharmacy, but 186 (79%) of

these were able to purchase the drugs elsewhere. Patients counseled by the nurse were more likely to be adherent than those not counseled by the nurse (OR 2.7; 95% CI 1.0-7.3). Those who were counseled for more than 5 minutes had three fold likelihood of less non-adherence as reported by both self report and modified Hill-Bone with OR 0.3; 95% CI 0.2-0.8 and 0.3; 95% CI 0.1-0.5, respectively.

Multivariable analysis showed that; participants were more likely to be non-adherent by self-report if they had attained a primary level of education, had missed appointments due to lack of transport, or had experienced the side effect of dizziness. Patients with heart failure were more likely to be non-adherent based on the modified Hill-Bone score.

Conclusion: The prevalence of adherence among hypertensive patients was found to be higher than anticipated. The factors associated with non-adherence included side effect of dizziness, missed appointment due to lack of transport, and living at a distance of more than 10 km from the hospital. Taking 3 BP drugs and receiving more than 5 minutes of counseling about how to take medications were both associated with decreased likelihood of non-adherence.

INTRODUCTION

Hypertension is the leading cause of morbidity and mortality among non-communicable diseases and has shown a rapid increase in prevalence affecting the urban more than the rural population in Sub-Saharan Africa.^{1,2} Available data shows an overall

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prevalence of 5-20%.³ Generally, antihypertensive therapy should be maintained indefinitely.⁴ However, findings in clinical practice have raised concerns about under treatment and nonadherence to antihypertensive treatment hampering the effectiveness of these medications.⁵

WHO defines adherence as "the extent to which a person's behavior—taking medication, following a diet, and/or executing lifestyle changes—corresponds with agreed recommendations from a health care provider".³ Variables influencing adherence can be classified into patient related factors, system related factors and caregiver related factors. This study was conducted to assess the prevalence and factors contributing to poor medication adherence in Zambian patients with hypertension.

METHODS

We conducted a questionnaire-based cross-sectional analysis at the University Teaching Hospital (UTH) in Lusaka, Zambia. Lusaka is the capital city of Zambia with a population of 1, 084, 703.⁶ UTH is the national public referral hospital and also provides primary care services to many residents of the surrounding urban communities. The study population were adult patients aged 18 and above with diagnosis of essential hypertension, seeking outpatient care. The questionnaire was developed from a similar Pakistani study by Saman et al and was pilot tested and refined to suit our setting.³ Hypertensive patients were defined as those with raised BP of more than or equal to 140/90 mmHg on three prior clinical visits. 237 patients were recruited from the first week of November to the second week of December 2010. Consecutive patients were enrolled from UTH outpatient clinic.

DATA COLLECTION

Data were collected from 237 patients regarding social demographic factors, medical history, level of education, monthly income and family history of hypertension. Cut offs for low, middle, and high income brackets were set as <1,335,000 Kwacha, 1,335,001-4,100,000 Kwacha, and > 4,100,000 Kwacha, respectively, as described by the Zambian Ministry of Finance and Planning⁷. Patients were also asked about details on their prescribed

medication regimen. Antihypertensive drugs were categorized by specific drugs, classes of drugs, number of drugs prescribed, along with the drug class frequency per day and total pill burden. Any side effects potentially associated with the drugs were also described.

In patients who were illiterate and those that did not know their medication regimens, prescriptions and information from the medical records were used to confirm reliable data. The following variables were classified as system related factors: duration taken to secure an appointment for review, spacing of reviews, number of appointments missed in last six months, reasons for missing appointment, number of prescribed drugs, number of drugs issued and how often patients bought drugs. In order to assess care-giver related factors, patients were asked, "Have any of the following (doctor, nurse, family member, other) ever explained to you how to take your medicines?" and "How much time do you think has been spent in explaining your medicines to you?" Patients' self-reports were used to measure adherence. Adherence rates were calculated as pills taken over a specific period of time (one week), divided by pills prescribed for that specific period of time.⁴ Adherence for self report was defined as an adherence rate greater than or equal to 80 percent.

An additional questionnaire with the modified Hill-Bone adherence scale was also administered. The Hill-Bone scale is a well-validated method for determining adherence to medications. The modified Hill-Bone has been validated in an urban South African setting similar to ours¹¹.

The maximum score on the scale is 40, with higher scores indicative of worse adherence. Adherence was defined on the modified Hill-Bone scale as a score of less than 16, while non adherence was scored as greater than or equal to 16.

STATISTICAL ANALYSES

All statistical analyses were performed using Epi info, v3.5.1. The questionnaire was pre-coded and all data entered and counter checked.

For continuous variables means and percentages were used to describe participants in the study. For categorical variables proportions and percentages were used. Adherence was analyzed as a dichotomous variable using patient self report and

the modified Hill-Bone cut-offs as described above.¹¹ Independent variables were checked for confounding and interactions. Odds ratios (with 95% confidence intervals, CI) were calculated from the tables. We performed multivariable stepwise logistic regression modeling, to identify factors independently associated with medication non-adherence. Categorical variables with 3 or more categories were analyzed as dummy variables. In a stepwise fashion we eliminated the variable with the highest p value, if $p > 0.5$. Dummy variables were eliminated only if $p > 0.5$ for all categories. A p-value of less than 0.05 was considered to be statistically significant for all analyses.

RESULTS

After pilot testing and refining the questionnaire with 50 individuals, we interviewed 237 patients. After excluding patients with missing data, 234 patients were included in the analysis.

Patient demographic and clinical characteristics

The mean age of the patients was 57.8 years \pm 12.0 (SD). 157 (67%) participants were women. The majority of the participants (71%) were in the low income bracket earning less than K 1,335,000 per month. The commonest co-morbid conditions included diabetes mellitus and heart failure making up 22% and 19%, respectively. It was encouraging to note that about 186 of the participants (68%) reported that they were able to buy drugs that were not available in the public pharmacy even though majority of the patients were in the low income bracket. The commonest side effects of drugs reported in the study were dizziness and excessive urination, affecting 35% and 31% of patients, respectively. Patient demographic details are shown in table 1.

Patient related factors to non adherence

By self report, 40 (17%) of 234 patients were non-adherent. Table 1 and table 2 show the patient related factors to non-adherence as measured by self report and modified Hill-Bone compliance scale, respectively. Odds ratio (OR) for non-adherence are reported at 95 percent confidence interval (CI).

By self report, patients on three antihypertensive drugs were 20% less likely to be non adherent (OR 0.21; 95% CI 0.06-0.79) than patients taking only one drug. Patients experiencing side effect of dizziness were more likely to be non adherent (OR 3.17; 95% CI 1.6-6.4). Those who missed their clinic appointments due to lack of transport were more likely to be non-adherent than those who kept their appointments (OR 2.9; 95% CI 1.9-5.9).

Modified Hill-Bone scale showed that those who were able to name drugs were less likely to be non-adherent to their treatment than those who couldn't (OR 0.3; 95% CI 0.14-0.5). Similarly as reported in self report those who experienced side effects of dizziness were more likely to be non-adherent to treatment.

Table 1: Patient Factors Associated With Medication Non-adherence As Measured By Patient Self-report†

	N	Adherent	Non - adherent	OR (95% CI)*
Total	234	194 (83)	40 (17)	--
Age, mean (SD)	--	58.1 (12.2)	56.3 (11.4)	8
Sex				
Male	77	65 (84)	12(26)	1
Female	157	129(82)	28(28)	1.2 (0.6 -2.5)
Income				
Low	166	140(84)	26(16)	1
Middle	59	47(80)	12(20)	1.4 (0. 7-2.9)
High	9	7(78)	2(22)	1.5(0.3 -7.7)
Family history of hypertension				
Yes	159	133(84)	26(16)	0.9(0.4 -1.7)
No	75	61(81)	14(19)	
Co - morbidities:				
DM				
Yes	51	42(83)	9(17)	1.1(0.5 -2.4)
No	183	151(83)	32(17)	
Heart Failure				
Yes	44	34(77)	10(23)	1.6(0.7 -3.6)
No	190	160(84)	30(16)	
Number of BP drugs				
1	52	39(75)	13(25)	1
2	127	103(81)	24(19)	0.7(0.3 -1.5)
3	46	43(94)	3(6)	0.21(0. 1-0. 8)
>4	9	9(100)	0	--
Able to name drugs				
Yes	159	133(84)	26(16)	0.9 (0.4 -1.7)
No	75	61(81)	14(19)	
Side effects:				
Cough				
Yes	19	17(82)	38(18)	0.6 (0.1 -2.5)
No	215			
Dizziness				
Yes	81	58(72)	23(28)	3.2 (1.6 -6.4)
No	153	136(89)	17(11)	
Diarrhea				
yes	6	6 (81)	0 (0)	--
No	228	188(83)	40(17)	
Excessive Urination				
Yes	73	60(82)	33(18)	1.1(0.5 -2.2)
No	161	134(83)	27(18)	
Missed Appointments				
Yes	75	46(71)	19(29)	2.9(1.4 -5.9)
No	169	48(88)	21(18)	

* Odds for non-adherence

† Adherence defined as self-report of >80% of prescribed pills taken in the past 7 days

? Patients who missed their clinic appointment due to lack of transport[∞] p=0.375

Table 2: Patient Factors Associated With Medication Non-adherence As Measured By Modified-hill-bone Scale

		N	Adherent	Non-Adherent	OR(95%CI)
Total		234	163 (70)	71(30)	
Age mean SD		---	57.7 (12.4)	58.3(11.3)	?
Sex	Male	77	53(69)	24 (31)	1.1(0.6-2.1)
	Female	157	110(70)	47(30)	
Income	Low				
	Middle	166	117(71)	49(29)	1
	High	59	40(68)	19(32)	1.1(0.3-5)
		9	6(67)	3(33)	1.1(0.6-2.1)
Family history of hypertension	Yes	159	107(67)	52(33)	1.4(0.8-2.7)
	No	75	56 (75)	19(25)	
Co-morbidities	Yes	51	31(61)	20(39)	1.7(0.8-3.2)
Diabetes mellitus	No	183	132(72)	51(28)	
Heart Failure	Yes	44	27(61)	17(39)	1.7(0.8-3.1)
		190	136(72)	54(28)	
Number of BP drugs					
	1	52	33(64)	19(36)	1
	2	127	87(69)	40(31)	0.8(0.4-1.6)
	3	46	36(78)	10(22)	0.5(0.2-1.3)
	>4	9	7(78)	2(22)	0.5(0.1-2.6)
Able to name drugs	Yes	186	141(76)	45(24)	0.3(0.1-0.5)
	No	48	22(46)	25(54)	
Side effects					
Cough	Yes	19	15(79)	4(21)	0.6(0.2-1.8)
	No	215	148(69)	67(31)	
Dizziness	Yes	81	38(47)	43(53)	5.1(2.8-9.7)
	No	153	125(82)	28(18)	
Diarrhea	Yes	6	6(100)	0	--
	No	228	157(69)	71(31)	
Excessive urination	Yes	73	49(67)	24(33)	1.2(0.7-2.2)
	No	161	114(71)	47(29)	
Missed appointments	Yes	65	46(71)	19(29)	7.7(0.7-14.2)
	No	169	148(88)	21(12)	
Missed appt due to lack of transport	Yes	169	139(82)	30(18)	3.2(1.1-9.5)
	No	65	24(37)	41(63)	

¥ Odds for non-adherence

†Adherence defined as modified Hill-Bone score < 16

? p=0.707

é Patients who missed their clinical appointment due to coming late

Health care system related factors to non adherence

Majority of the patients were reviewed at least twice in the last 6 months at the time of the interview making up 60 % (144) of the patients. These reviews were mostly over a period of every three months in about 54% of the participants.

Patients self reports showed that patients who missed appointments due to lack of transport were more likely to be non-adherent to their antihypertensive treatment (OR 3.2; 95% CI 1.1-9.5).

Living 10 km from the hospital was associated with missing appointments (P=0.02). There was increased likelihood of non-adherence in people who lived

more than 10 kilometers or more as reported by the modified Hill-Bone scale as shown in table 4. Patients who missed their clinical appointments due

to coming late were seven fold more likely to be non-adherent than those who kept their appointment (OR 7.6; 95% CI 2.9-20.4).

Table 3: Healthcare System Related Factors Associated With Medication Non-adherence As Measured By Self-report

		N 234	Adherence	Non adherence	OR (95% CI)
Number of reviews	0 or 1	36	29(81)	7(19)	1
	2	141	119(84)	22(16)	0.8(0.0-2.1)
	3	31	22(71)	9(29)	1.3(0.5-3.5)
	4	18	17(94)	1(6)	0.3(0.1-1.8)
	5 or more	8	7(88)	1(12)	0.6(0.3-6.7)
Spacing of Reviews (months)	1	22	14(84)	8(16)	1
	2	41	31(76)	10(24)	1.7(0.6-4.7)
	3	137	109(86)	18(14)	0.9(0.4-2.1)
	4 or more	17	13(72)	4(28)	1.3(0.3-5.6)
Unable to be seen due to late for appt	Yes	22	18(82)	4(18)	1.1(0.4-3.4)
	No	212	176(83)	36(17)	
Reported drugs not available in pharm.	Yes	195	163(84)	32(16)	0.8(0.3-1.7)
	No	39	31(80)	8(20)	
Distance from home to hospital					
	< 5 km	35	29(83)	6(17)	1
	5km-10km	140	121(86)	19(14)	0.8(0.3-2.1)
	> 10 km	74	59(80)	15(20)	1.6(0.6-4.8)

Table 4: Healthcare System Related Factors Associated With Medication Non-adherence As Measured By Modified Hill-bone Scale

		N 234	Adherence	Non adherence	OR (95% CI)
Number of reviews	0 or 1	36	25(69)	11(31)	1
	2	141	99(70)	42(30)	1.0 (0.4-2.7)
	3	31	20(64)	11(36)	1.3 (0.5-2.5)
	4	18	14(78)	4(22)	0.7 (0.2-2.4)
	5 or more	8	5(63)	3(37)	1.4(0.3-6.7)
Spacing of Reviews (months)	1	49	37(76)	12(25)	1
	2	41	23(56)	18(44)	1.7(0.6-4.7)
	3	127	93(73)	34(27)	0.9(0.3-2.1)
	4 or more	17	10(57)	7(44)	1.3(0.3-5.6)
Reported drugs not available in pharm.	Yes	195	134 (69)	61(31)	1.3(0.6-2.9)
	No	39	29(74)	10(26)	
Distance from home to hospital					
	< 5 km	35	28(80)	7(20)	1
	5-10km	140	103(74)	37(26)	1.4(0.6-3.6)

Care Giver related factors to non adherence

Table 5 and 6 shows the care-giver factors associated with non-adherence.

Patients counseled by the nurse as reported by self reports were more likely to be non-adherent, (OR 2.7; 95% CI 1.0-7.3). However, those who were counseled for more than 5 minute had a significant

increase in adherence as reported by Self report (OR 0.3; 95% CI 0.2-0.8)

Modified Hill-Bone scale on the other hand unlike self report showed that those who were counseled by the nurse were more adherent, (OR 0.4; 95% CI 0.2-0.7) including those counseled for more than five minutes on how to take their medicines. (OR 0.3; 95% CI 0.1-0.5)

Table 5: Caregiver Factors Associated With Medication Non-adherence As Measured By Self-report

		N	Adherence	Non adherence	OR (CI 95%)
Counseled by:∞					
Doctor	Yes	221	181(82)	40(18)	--
	No	13	13(100)	0	
Nurse	Yes	175	140(80)	35(20)	2.7(1.0-7.3)
	No	59	54(92)	5(8)	
Other/Family	Yes	20	18(90)	2(10)	1.9(0.4-8.7)
	No	214	176(82)	38(18)	
Total time spent ¥					
	---	144	112(78)	32(22)	1
	5min or more	90	82(91)	8(9)	0.3(0.2-0.8)

∞ Patients were asked "Have any of the following people ever explained to you how to take your medicines?"
 ¥Time spent to counsel patients on how to take antihypertensive drugs in minutes

Table 6: Caregiver Factors Associated With Medication Non-adherence As Measured By Modified Hill-bone Scale

		N	Adherence	Non adherence	OR (CI 95%)
Counseled by: ∞					
Doctor	Yes	221	155(70)	66(30)	0.7(0.2-2.2)
	No	13	8(62)	5(38)	
Nurse	Yes	175	131(75)	44(25)	0.4(0.2-0.7)
	No	59	32(54)	27(46)	
Other/Family	Yes	214	152(71)	62(29)	0.5(0.2-1.3)
	No	20	11(55)	9(45)	
Total time spent Explaining how					
	<5 minutes	144	86(60)	58(40)	1
	5 minutes or more	90	77(86)	13(14)	0.3(0.1-0.5)

∞ Patients were asked "Have any of the following people ever explained to you how to take your medicines?"
 ¥ Patients were asked on total time spent on explaining how to take medication

Multivariable logistic regression modeling was used to assess variables associated with non-adherence.

Table 7 shows the results of logistic regression modeling for non-adherence based on self report and modified Hill-Bone scale.

Table 7: Logistic Regression For Non Adherence: Self Report And Modified Hill-bone Scale

		Non adherence by Self Report	Non adherence by modified Hill Bone
		Odds Ratio (95% CI)	Odds Ratio (95% CI)
Age		1.05	--
Distance			
	<5 km	1	1
	5-10 km	1.9(0.5-7.0)	1.8(0.6-5.3)
	>10 km	3.9(1.0-16.2)	3.1(0.9-9.9)
Co-morbidities:	Heart failure	1.9(0.6-16.2)	1.5(0.7-3.5)
Number of BP drugs	1	1	1
	2	0.8(0.3-2.3)	0.6(0.2-1.5)
	3	0.2(0-1.6)	0.2(0.1-0.9)
	4 or more	--	0.3(0.1-2.7)
Level of Education	Non	1	1
	Primary	4.7(1.1-21.4)	1.3(0.5-3.8)
	Secondary	1.7(0.4-7.5)	0.5(0.2-1.5)
	Tertiary	1.6(0.3-8.7)	0.8(0.2-2.7)
Total number of pills per day	1	1	1
	2	2.4(0.5-11.3)	2.0(0.5-8.2)
	3	0.4(0.1-2.3)	0.8(0.2-3.6)
	4	0.3(0.1-2.3)	2.5(0.5-11.7)
	5 or more	0.3(0-1.9)	1.9(0.4-9.4)
	<5min	1	1
	>5min	0.5(0.2-1.3)	0.4(0.2-0.9)
Reasons for missing appt	Lack of transport	6.8(1.5-30.8)	3.8(1.9-7.6)
Side effects	Dizziness	3.1(1.3-7.6)	3.8(1.9-7.6)
Number of Reviews in last 6 months	0 or 1	1	1
	2	0.5(0.1-9.6)	0.7(0.3-1.8)
	3	3.0(0.7-12.7)	1.2(0.4-3.9)
	4	0.3(0-2.8)	0.6(0.1-2.9)
	5 or more	0.8(0.1-9.4)	1.1(0.2-6.7)

∞Patients were asked on the total time spent to explain how to take drugs

Factors independently associated with non adherence by self report

Patients who missed their clinical appointments due to lack of transport were more likely to be non-adherent than those who kept their appointments (OR 6.8; 95% CI 1.5-30.8). Patients who had attained primary level education were more non-adherent as reported by self report (OR 4.7; 95% CI 1.1-21.4). Those who lived more than 10 km from the hospital were more non-adherent to treatment, (OR 3.9; 95% CI 1.0-10.2).

Factors independently associated with non adherence by modified Hill Bone

Similar to the self report the modified Hill-Bone scale reported that those who missed their clinical visit due to lack of transport were more likely to be non-adherent (OR 3.3; 95% CI 1.0-11.3) and those who were experiencing side effects of dizziness as in the self report were also more likely to be non-adherent to their antihypertensive treatment (OR 3.8; 95% CI 1.9-7.6). On the other hand those taking 3 types of BP medicines and those counseled for more than 5 minutes were more adherent to their BP medication as shown in table 7.

There is only moderate correlation between modified Hill-Bone scale and self reported on adherence ($r = -.39$).

DISCUSSION

We conducted a study to determine the levels of adherence and factors associated with non-adherence to antihypertensive treatment. Our results showed that 83% of the patients were adherent to their prescribed medications by self report. Modified Hill-Bone scale reported 70% adherence. Adherence was comparable to studies from other parts of Africa, including Nigeria (69%) and Egypt (74%)^{11,12}. Age and sex of the patient had no bearing on adherence to treatment. The mean age was relatively comparable to studies done in Nigeria in which mean age was 62.2±12.19 and 52±12 in the Pakistan study^{3,11}. Other studies have shown increasing adherence with age^{3,9,13}.

Those who had attained primary education about 24% of patients were more likely to be non-adherent by self report compared to those who had no education. This was not a significant finding with modified Hill-Bone scale. Less educated people may more likely overestimate their adherence in trying to impress the care giver. This can also be explained by lack of time given to educate patients in a manner that will enable them understand the importance of adherence.

A family history of hypertension did not have a bearing on adherence. Patients with co-morbid medical conditions did not show any statistical bearing on adherence similar to other studies.^{3,14}

Our study also showed that patients taking 3 types of medications had better adherence. This finding could be due to the fact that those taking more drugs could perceive that their illness is more severe and hence become more compliant to their treatment. Another possible explanation is that physicians caring for chronically non-adherent patients may never get the opportunity to optimally escalate treatment.

Patients experiencing side effects of dizziness also showed high levels of non-adherence. Side effects commonly hinder adherence since a perception of dizziness is more unpleasant than the subtle symptoms of hypertension.

Patients who come late for clinic visits i.e. after patients' vitals signs have been taken and assigning of patients to a particular doctor was done were not seen that day and were given an appointment for a later date. Those who missed their clinical appointment due to lack of transport and coming late were found to be non-adherent. Patients who miss appointment will not have drugs and hence they won't be on any medication.

The health care system factors that significantly affected adherence were living at a distance of more than 10 km from the health institution. These could have been the same patients that were unable to come for reviews due to lack of transport. The number of clinical reviews and spacing of reviews did not statistically affect adherence.

Duration taken to counsel patients on adherence also showed a 3 fold likelihood of adherence in those who were counseled for five minutes or more. This highlights the importance of patient education to address adherence. Studies done in developed countries however, did not show any statistical significance in terms of knowledge and adherence to drugs³. This finding affirmed the hypothesis made in this study. These findings also highlight the need for comprehensive individualized patient education on disease management, including providing detailed explanation regarding side effects of prescribed medication and patients future options.¹⁴

The level of adherence in our study was comparable to studies in the region. This information was validated by the use of modified Hill-Bone scale that strengthens the findings in our study. The other important finding was the increase in adherence levels in patients that were counseled by nurses and those who received 5 minutes or more of counseling on how to take drugs. This could be important information that can be used to improve adherence by using specialized trained nurses to educate patients on knowledge of hypertension and the importance of adherence.

Care givers should also address the side effect of dizziness when prescribing a type of drug by avoiding such a drug. Those who live more than 10 kilometers or more can be encouraged to go to their nearest clinic after stabilizing their BP to avoid missing of appointments.

There were several limitations to our study. The primary measure of adherence to medication was self reporting, which may not provide a true picture of actual adherence. Recall bias could have under estimated or over estimated the level of adherence reported in the study. Both methods of adherence have limitations with self report having particularly influenced by recall bias and social desirability bias. Patients generally give overly optimistic reports about adherence so as not to disappoint their doctors or the researchers. This was supported by the discrepancy between self report and modified Hill-Bone score, with modified Hill-Bone score showing a lower, possibly more accurate, prevalence of adherence. However, patient self report is a simple and inexpensive way of assessing adherence and has been used extensively throughout the literature. The

use of the modified Hill-Bone scale a validated tool, however, helped to strengthen our findings. The cutoffs used for defining non-adherence both with self-report and modified Hill-Bone score were pre-determined, but there is no standard cutoff for these measures.

Patients who could not volunteer information on their own were also excluded and this further restricts the generalization of these findings.

Based on an association between increased counseling received and adherence we recommend that specialist nurses be trained and used in adherence counseling as is done for patients on anti-retroviral therapy. These can also be used to educate patients on the natural history and complications of hypertension. Physicians or care givers should pay special attention to patient education and counseling when reviewing these patients. This can also be complimented with print and audiovisual material to help patients have more information on the conditions and importance of adherence. Patient support groups can also be used to help those who are non adherent.

CONCLUSION

The prevalence of adherence among hypertensive patients was found to be higher than anticipated. The factors associated to poor adherence included: side effect of dizziness, missed appointment due to lack of transport, living at a distance of more than 10 km from the hospital. Patients taking 3 BP drugs and those counseled for more than five minutes by a nurse on how to take medications were less likely to be non adherent. The modified Hill-Bone score was a reliable tool used to measure adherence and was moderately correlated to the self report. This information provides baseline data to help improve and address the issues of adherence in hypertensive patients seen in our health institutions.

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