PATIENT RELATED-BELIEFS AND ADHERENCE TOWARDS THEIR MEDICATIONS AMONG THE ADULT HYPERTENSIVE OUTPATIENTS IN TANZANIA.

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Abstract

Introduction: Hypertension is a leading global health problem requiring lifelong treatment. However, adherence to antihypertensive medicines is a problem, higher among developing countries. Consequently, there is a need to determine current adherence rates and their associations among developing countries to plan future initiatives. Methods: Cross-sectional study among adult outpatients with essential hypertension in Tanzania. Pre-designed questionnaires were used to gather information on adherence rates and patient-related beliefs. The main outcome measure was adherence. Results: 180 participants were included, with females making up 65%. High adherence rates in 54% of patients. Patients’ belief about their medication and its necessity were higher in the high adherent group and concerns about their medicines and their necessity higher in the low adherent group. Conclusion: Adherence rates were low compared to a suggested level ≥ 80 %.
Educational initiatives are needed to address knowledge and concerns with hypertension to improve outcomes.

**Key words:** Adherence, antihypertensives, beliefs, hypertension, Tanzania

**Introduction**

High blood pressure (BP) is a leading cause of adult mortality across the world, estimated to cause more than 13% of deaths annually [1,2]. Overall, high BP is associated with at least 7.6 million to 9.4 deaths annually [3-5], and envisaged to cost globally nearly US$1 trillion over the next decade unless adequately addressed [4]. Currently, 3 out of 4 patients with hypertension live in low and middle income (LMIC) countries, with the highest prevalence in the African Region [3,5]. Uncontrolled hypertension is a concern with the WHO estimating that the prevalence of hypertension in adults over the age of 25 years in the African Region is as high as 46% [5].

Hypertension is a key driver of the cardiovascular disease (CVD) epidemic in Africa, and a major independent risk factor for heart failure, stroke and kidney failure [6,7]. A recent study conducted in Zimbabwe showed that the prevalence of uncontrolled hypertension was still high despite patients being treated with medication [8]. However, a recent study conducted in Nigeria showed that hypertension could be controlled in approximately two thirds of patients through initiatives to enhance adherence [9].

High income countries have begun to reduce the prevalence of hypertension through a number of initiatives including prudent diagnosis and treatment [5]. However, progress is much slower in sub-Saharan African countries [9]. Hypertension is usually controlled through both pharmacological methods and non-pharmacological methods. Pharmacological methods include antihypertensive medications daily [9-11]. This is increasingly coupled with measures to enhance adherence to the medicines prescribed given current concerns, coupled with other measures to reduce morbidity and mortality [1,12,13]. Non-pharmacological methods include restricting sodium intake to 80-100 mmol/day, weight loss, exercise and dietary changes [8,14] as well as stress reduction through relaxation methods such as yoga [15,16].

Adherence is typically defined as “the extent to which a person’s behaviour such as taking medications, following a diet, and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider” [17]. Studies have suggested that across both developed and LMIC countries there are considerable problems with adherence to antihypertensive medicines [18-23]. Overall, only approximately 14 to 25 % of treated patients achieve optimal blood pressure control, with 50 % of patients appearing to stop taking their antihypertensive treatments within the first year [24, 25]. Problems with adherence are believed to be higher in developing countries [9,26]. For instance among former Soviet Union Republics, only 26 % of patients prescribed treatments for hypertension took them daily [27]. This is important as adherence significantly reduces cardiovascular events or death among hypertensive patients [25].
Important factors affecting adherence include patient-related factors, patient-health care provider related factors, social and economic factors, condition and treatment related factors as well as health system related factors [2,9,24,25,28]. Patient-related factors include medication characteristics, cognitive function, demographics, co-existing illness and illness representation factors including health beliefs, beliefs about medications and knowledge about illness [2,17]. Co-payments can also have a negative influence on adherence to medicines for CV diseases including hypertension [11,27,29]. These factors have resulted in concerns with the current state of managing patients with hypertension across countries, with substantial room for improvement in its management [9,25,30,31].

Currently, there is limited knowledge concerning adherence rates to medicines among patients with hypertension in Africa as well as their beliefs and perceptions about their antihypertensive medications. The latter is important as this will impact on adherence rates in practice [24]. This is a critical issue given the prevalence of hypertension in the African Region and its impact on morbidity and mortality [5]. For instance, a previous study in Tanzania suggested that hypertension is currently controlled in only 13% of patients attending a leading referral hospital [15].

Consequently, the aim of this study was to ascertain adherence rates and beliefs among adult patients with hypertension in Tanzania. Subsequently, use the findings to suggest future strategies to improve adherence rates to anti-hypertensive medicines if this is a problem in Tanzania. Suggestions and experiences may also be of interest to other African countries as well as other LMIC countries.

**Material and Methods**

**Study area**
The study was conducted at the cardiovascular clinic in Bugando Medical Centre (BMC), which is a referral and teaching hospital for the Lake and western zones of the United Republic of Tanzania. It is a referral hospital for six regions, namely, Mwanza, Shinyanga, Kagera, Tabora, Mara and Kagera.

**Study design and Study population**
Descriptive cross-sectional study enrolling all adults aged 18 years and above, diagnosed with essential hypertension attending the outpatient cardiovascular clinic at BMC who consented to participate in the study.

**Inclusion criteria**
- All patients attending the outpatient cardiovascular clinic
- Patients diagnosed with essential hypertension
- Patients above the age of 18 years

**Exclusion criteria**
Patients who do not consent to be included
Patients who were newly diagnosed with hypertension
Patients who had secondary complications
Patients who presented with co-morbidities

**Sample size**
In order to obtain sufficient and good quality information on patient-related beliefs about their medications and their relation to adherence, a sample size was estimated using Fischer’s formula [32] based on published levels of control in the referral centre [15].

Fischer’s formula is:

\[ n = \frac{Z^2 p(1-p)}{d^2} \]

\( n \) = sample size.

\( Z \) = is the z-value corresponding to significance level of 5 % (0.05)

\( p \) = proportion of controlled hypertension in Tanzania, Proportion of controlled hypertension in Tanzania being 13 % shown by one of the studies done at BMC by John Maginga in 2013 [15].

\( d \) = tolerable error set at 5 %.

\[ n = \frac{1.96^2 \times 0.13(1-0.13)}{0.05^2} \]

This means \( n = 173 \).

This formula resulted in a sample size of 180 participants being recruited for the study.

**Sampling procedure**

Subjects were recruited using nonprobability convenient sampling,

**Data collection procedure**

A semi-structured questionnaire was used to collect information from patients about social demographics characteristics and adherence as well as their beliefs towards their medications using the Morisky Medication Adherence Scale 8 (MAS8). Overall, the questionnaire consisted of beliefs about medication necessity and concerns, adherence and adherence-related factors including the demographic information, education levels, length of treatment, number of drugs and number of doses per day, and socio-economic information (Appendix). In order to clarify any ambiguity, the questionnaire was pre-tested before the study was performed.

The Morisky Medication Adherence Scale (MMAS), 8-item medication adherence questionnaire was used to measure patient adherence to their medication as it remains one of the most widely used methods to assess adherence [24, 33]. In the MMAS-8, patients who were adherent were given a score of “0” while non-adherent were given a score of “1”. This tool defines high adherence as score of “0”, medium adherence as score of “1-2”, and low adherence as score of “3-8” [24].

The section on ‘Belief about medication’ focused on necessity and concerns with antihypertensive medicines and not on other medicines patients may be taking in
order not to dilute the findings [34]. This tool assesses patients’ beliefs about their pharmacological treatment based on two categories; namely (a) belief about the medicines in general and (b) belief about the disease-specific medications.

Patients’ beliefs about the necessity and concerns with antihypertensive medicines were rated using a 5-point Likert scale. The Likert scale is a well-accepted scale for qualitative research [34]. Each domain on beliefs about medications as well as concerns had 5 questions each. Each question could have a score from 0-5, with a combined total of 5-25 for all five questions in each domain. The ratings were such that a patient who scored greater or equal to 15 points was said to have a high belief towards medication necessity; alternatively, a score of less than 15 was associated with a low belief about medication necessity or had concerns [34].

Confirmation of the diagnosis of hypertension and the medicines the patients were prescribed were obtained from the patient’s file.

The potential impact of patient co-payments was not assessed in our study since an appreciable number of patients attending BMC are 60 years and older. Medicines for this group of patients, as well as consultation and diagnostic fees, are covered by the National Health Insurance Fund (NHIF), with the monthly instalments covered by the Pension Funds to which patients contribute whilst they are in employment.

Data analysis procedure
The raw data was captured onto Microsoft Excel 7, and transferred into the Stata version 13 for statistical analysis. Double entry was undertaken to minimize errors. Adherence was initially divided into 3 groups – low, medium and high. Patients with medium or high adherence groups were subsequently merged into one group, i.e. high adherence, to simplify the analysis.

All data were subjected to descriptive statistics and reported as means for continuous variables and percentages for categorical variables. Comparisons for categorical data were undertaken using the chi-square test. The level of statistical significance was taken as P≤0.05. Continuous variables were analyzed using the t-test. Cramer’s V statistic test (defined as a level of at least 0.5) was used for associations between two categorical variables. An independent two-sample t-test was used to assess the statistical significance of differences in means. Cohen's d-value was used to evaluate mean differences between groups (with significance defined as a level of at least 0.8).

All the completed questionnaires, including the consent forms, were kept in a locked cupboard by the investigators to ensure confidentiality.

Ethical consideration
Ethical clearance was granted by the joint Catholic University of Health and Allied Sciences (CUHAS)/ Bugando Medical Centre (BMC) research and ethical committee. Permission to carry out the study was granted by the Director General of Bugando Medical Centre (BMC) and the Head of Internal Medicine Department.

Participants meeting the inclusion criteria were required to understand and voluntarily sign a consent form before enrolling into the study. To ensure confidentiality of the
study participants, all data were coded and held in safe custody. The participants could also leave the study any time if they decided to do so.

Results

Demographics of the study group participants
Overall, a total of 180 patients were enrolled into the study. Females accounted for 117 (65 %). The mean age of the study population was 58.4 years (+/- 11.57 years). Other characteristics of the patients including their education level, employment status, marital status, and length of time on antihypertensive medicines are shown in Table 1.

Nearly half the patients 81 (45 %) were unemployed, with the remainder split between self-employed and employed (Table 1). The majority of patients had attended school, with 84 (46.7 %) attending at least primary level of education. Fifty five (30.6 %) had attained secondary education and 15 (8.3 %) a tertiary level of education, with 6 (14.4 %) of the studied population having informal education.

Table 1: Participants baseline characteristics by adherence group

<table>
<thead>
<tr>
<th>Demographic variables</th>
<th>Total n = 180</th>
<th>low adherence n = 83</th>
<th>High adherence n = 97</th>
<th>p-value</th>
<th>Cramer's V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>58.4 (11.57)</td>
<td>59.08 (12.41)</td>
<td>57.81 (10.83)</td>
<td>0.053</td>
<td></td>
</tr>
<tr>
<td>Female, n(%)</td>
<td>117 (65)</td>
<td>55 (47.01)</td>
<td>62 (52.99)</td>
<td>0.742</td>
<td>0.0245</td>
</tr>
<tr>
<td>Education Level n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal education</td>
<td>26 (14.4)</td>
<td>13 (50)</td>
<td>13 (50)</td>
<td>0.746</td>
<td>0.0827</td>
</tr>
<tr>
<td>primary</td>
<td>84 (46.67)</td>
<td>40 (47.61)</td>
<td>44 (52.38)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>secondary</td>
<td>55 (30.56)</td>
<td>25 (45.45)</td>
<td>30 (54.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tertiary</td>
<td>15 (8.33)</td>
<td>5 (33.33)</td>
<td>10 (66.66)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment status</td>
<td></td>
<td></td>
<td></td>
<td>0.683</td>
<td>0.0651</td>
</tr>
<tr>
<td>Employed</td>
<td>48 (26.67)</td>
<td>22 (45.83)</td>
<td>26 (54.16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unemployed</td>
<td>81 (45)</td>
<td>35 (43.21)</td>
<td>46 (56.79)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>self employed</td>
<td>51 (28.33)</td>
<td>26 (50.98)</td>
<td>25 (49.02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of use of anti HTN medications</td>
<td></td>
<td></td>
<td></td>
<td>0.433</td>
<td>0.0584</td>
</tr>
<tr>
<td>&lt; 6 months</td>
<td>21 (11.67)</td>
<td>8 (38.10)</td>
<td>13 (61.90)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 6 months</td>
<td>159 (88.33)</td>
<td>75 (47.17)</td>
<td>84 (52.83)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of administration of anti HTN meds</td>
<td></td>
<td></td>
<td></td>
<td>0.805</td>
<td>0.0491</td>
</tr>
<tr>
<td>once daily</td>
<td>98 (54.44)</td>
<td>43 (43.88)</td>
<td>55 (56.12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>twice daily</td>
<td>78 (43.33)</td>
<td>38 (48.72)</td>
<td>40 (51.28)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thrice daily</td>
<td>4 (2.22)</td>
<td>2 (50)</td>
<td>2 (50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>marital status</td>
<td></td>
<td></td>
<td></td>
<td>0.691</td>
<td>0.0901</td>
</tr>
<tr>
<td>single</td>
<td>12 (6.66)</td>
<td>6 (50)</td>
<td>6 (50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>married</td>
<td>125 (69.44)</td>
<td>54 (43.20)</td>
<td>71 (56.80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>divorced</td>
<td>4 (2.22)</td>
<td>2 (50)</td>
<td>2 (50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>widow</td>
<td>39 (21.66)</td>
<td>21 (53.84)</td>
<td>18 (46.15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>number of medications used</td>
<td></td>
<td></td>
<td></td>
<td>0.997</td>
<td>0.0002</td>
</tr>
<tr>
<td>1-2 medications</td>
<td>167 (92.78)</td>
<td>77 (46.11)</td>
<td>90 (53.89)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 or more medications</td>
<td>13 (7.22)</td>
<td>6 (46.15)</td>
<td>7 (53.85)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Levels of adherence to antihypertensive medications
Thirty four patients had high adherence (19%), with the remainder medium and low adherence rates. On merging in accordance with our methodology, 54% of patients subsequently had high adherence and 46% low adherence.

Prevalence of the use of medications and the type of medications used
The majority of the hypertensive patients were on 1-2 medications while a minority (7.2 %) were on three or more medications (Table 1).

The majority of patients (52 %) were on angiotensin receptor blockers (ARBs), whilst 79 (44%) were taking calcium channel blockers, 50 (27.8%) angiotensin converting enzyme inhibitors (ACEIs), 37 (21%) on a β-blocker, 27 (15%) on diuretics and only 5 (2.8% of patients) were prescribed a direct vasodilator, hydralazine.

Participant’s baseline characteristics by adherence
As mentioned, 54% of the studied population had high adherence with 46% low adherence. There was no statistical difference between males and females (Table 1). However, two thirds of the patients with tertiary level of education were found to have high adherence (Table 1).

Higher adherence (61.9%) was found in patients who were on hypertensive medications for less than six month compared with 52.8% of patients who were on antihypertensive medication for more than six months (Table 1). However, the association between the length of use of anti-hypertensive medications and adherence status was not statistically different (p=0.433). Patients who were on anti-hypertensives medicines and had high adherence had higher adherence if the treatment regime was once daily (56.1%) versus twice (51.3%) or three times daily (50%) (Table 1). However overall, the association between dosing regimens and adherence rates was not statistically significant (p=0.805). There was also no statistical difference in adherence rates between patients taking 1 – 2 medicines per day versus those taking 3 or more, e.g. high adherence (53.9%) was observed in patients taking 1-2 medications per day which was similar to those taking 3 or more (53.9%) in the high adherence group (Table 1). Similar but lower rates were seen in the low adherence group (Table 1). There was also no statistical significant association between the levels of adherence among high and low adherence groups with respect to marital or employment status (Table 1).

Beliefs about medication
Beliefs about medication necessity scores were higher at 19.9 ± 2.4 in the high adherent group compared to those in low adherent group at 18.1 ± 2.5 (Table 2). This was statistically significant as shown by a p-value of 0.026 and Cohen’s d- value of 0.7 demonstrating a medium to large difference. The patients with high adherence scored lower on concerns about their medication at 12.2 ± 2.9 compared to those in low adherent group at 14.5 ± 2.9 (Table 2). This was also statistically significant (p=0.003; Cohen’s d= 0.8). Patients in the low adherence group scored significantly higher in their concerns about taking medicines and other factors, which were all statistically significant apart from ‘My medicines are a mystery to me’ (Table 2).
The question regarding belief about their medication, “My health currently depends on my medication”, had the highest or second highest scores in both groups. This was statistically significantly higher (4.3 ±0.6) in the high adherence group versus those low adherence group (3.8 ± 0.5), with a (p-value <0.01 and Cohen’s d=0.8) (Table 2). There were also high scores on the question regarding beliefs about medication concern, i.e. “I sometimes worry about being too dependent on my medicines”. In this case, the low adherence group scored higher at 3.3 ±1.03 compared to high adherence group at 2.8 ± 1.4. This was again statistically significant with a p-value <0.01. In the low adherence group, there were also greater concerns that the medicines prescribed would disrupt daily life, impacting on subsequent adherence. This again was again statistically significant with a p-value <0.01 (Table 2).

Table 2: Beliefs about medications questionnaire scores by adherence groups

<table>
<thead>
<tr>
<th></th>
<th>Low adherence (mean ± SD)</th>
<th>High adherence (mean ± SD)</th>
<th>p-value</th>
<th>Cohen’s d-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NECESSITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My health currently depends on my medication</td>
<td>3.8 ± 0.50</td>
<td>4.30 ±0.60</td>
<td>&lt;0.01</td>
<td>0.8</td>
</tr>
<tr>
<td>Without medication, my life would be impossible</td>
<td>3.3 ± 0.90</td>
<td>3.9 ±0.9</td>
<td>&lt;0.010</td>
<td>0.7</td>
</tr>
<tr>
<td>Without medication, I would be very ill.</td>
<td>3.7 ± 0.80</td>
<td>3.9 ±0.7</td>
<td>0.001</td>
<td>0.3</td>
</tr>
<tr>
<td>My health in future will depend on my medication</td>
<td>3.4 ± 0.80</td>
<td>3.6 ±0.8</td>
<td>0.042</td>
<td>0.3</td>
</tr>
<tr>
<td>My medication prevents my condition from worsening</td>
<td>3.9 ± 0.30</td>
<td>4.1 ±0.4</td>
<td>0.028</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>CONCERN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having to take medicines worries me</td>
<td>2.3 ± 0.90</td>
<td>1.8 ±0.6</td>
<td>&lt;0.010</td>
<td>0.6</td>
</tr>
<tr>
<td>I sometimes worry long term effects of my medicines</td>
<td>3.1 ± 1.10</td>
<td>2.6 ±1.0</td>
<td>0.004</td>
<td>0.5</td>
</tr>
<tr>
<td>My medicines are a mystery to me</td>
<td>2.9 ± 0.90</td>
<td>2.7 ±0.9</td>
<td>0.125</td>
<td>0.2</td>
</tr>
<tr>
<td>My medication disrupts my life</td>
<td>2.8 ± 0.90</td>
<td>2.2 ±0.8</td>
<td>&lt;0.010</td>
<td>0.7</td>
</tr>
<tr>
<td>I sometimes worry about being too dependent on my medicines</td>
<td>3.3 ±1.03</td>
<td>2.8 ±1.4</td>
<td>0.008</td>
<td>0.4</td>
</tr>
</tbody>
</table>

**Discussion**

There was limited use of ACEIs and diuretics in the patient population due to concerns with side-effects including a dry cough with ACEIs compared to ARBs.

Overall, the study reported a relatively high level of adherence to anti-hypertensives at 54% of the patients studied among hypertensive patients in the United Republic of Tanzania. These rates were similar to a compliance rate of 56% among hypertensive patients attending clinics in Dar es Salaam as well as rates of 60% to 70% among patients with Type 2 diabetes treated at a national hospital in Dar es Salaam [35].
However, they were higher than seen for instance in recent studies in Brazil (51.4%), Peru (33.6%) and Kenya at 31.8% [24,36] but lower than seen in China (69.2%) and Canada (77%) [24,37,38]. This difference could be due to differences in patient-related factors, patient-health care provider related factors, social and economic factors, as well as health system related factors [2, 24, 25]. The differences could also be due to the different tools used to measure adherence as well as differences in access to the medicines. For instance, the study in Kenya used the Hill-Bone compliance methodology whilst we used the Morisky scale methodology to measure adherence [36]. It is difficult to explore differences further within the current scope of our study. In any event, the suggested treatment goal should be a level of adherence to antihypertensive medication of $\geq 80\%$.

There were no statistical significant association between adherence levels and the length of treatment, frequency of administration or the number of medication used in our study (Table 1). This was contrary to the findings in Peru where patients’ only taking 1-2 medications had a higher compliance than those who used two to three medicines [24]. In Columbia, adherence to antihypertensive medicines was also significantly associated with the extent of combinations prescribed [39]. Similarly in Zimbabwe, patients taking only one medicine per day were more compliant [8]. In a study conducted in Burkina Faso, compliance was also associated with the length of treatment and frequency of medication taking, being highest in those patients taking their medications once daily [40]. Some of these differences might be because in our study there were only few patients who were on three or more medications (7.22%) (Table 1); whilst for instance in Peru, 39.1% of hypertensive patients were on three or more medications [24]. There were also only a small number of patients with regimens that required three times daily dosing in our study (Table 1). Further research is needed to explore some of these differences in more detail.

There is also a need to understand better how patients view their medication in order to enhance adherence rates in the future. Marshall and colleagues systematically reviewed 53 qualitative studies of lay perspectives on hypertension and adherence to treatment from 16 countries including Israel [2]. They found a widespread belief that hypertension was mainly due to stress and was manifested by symptoms such as headache, dizziness or sweating. Many people also believed that when such symptoms abated, their hypertension was resolved and they could discontinue treatment without consulting their physician. Many patients also experienced side-effects that they found unpleasant and some feared addiction to treatment, affecting adherence rates. In addition to factors related to their understanding of hypertension and the importance of treatment, there were also a number of external factors affecting adherence. These included the time and cost involved in consulting physicians or obtaining medicines as well as simple forgetfulness. Research among older Israelis specifically identified adherence problems that can arise from multiple medications and where there is lack of trust in the primary caregiver [41]. A number of these factors may also be causes of non-adherence in our study population; however, we didn’t explore these. This included co-payments for the reasons stated earlier.

On a positive note, our study showed a positive association between patients’ concerns about their medication and adherence level, which was also shown in for instance in the study undertaken in Peru [24]. This can be addressed through
educational initiatives. Furthermore, a positive association was found between patient’s belief about medication necessity and their adherence (Table 2). This though was not seen in the study undertaken in Peru [24]. However, Rajpura et al linked higher necessity levels and lower concern levels about medicines in hypertensive patients with better adherence levels [42], which is line with our findings (Table 2).

**Study limitations**

We acknowledge that this study was conducted in only one centre. However, this was a referral centre for a representational region in Tanzania. Consequently, we believe our findings are generalizable. We also acknowledge that we used questionnaires to elicit adherence rates rather than other methods. However, low adherence rates have been seen among LMIC countries suggesting widespread concern with adherence rates to antihypertensive medicines in countries such as Tanzania.

We are also aware that this study did not evaluate patients’ compliance and adherence to specific antihypertensive medicines and that we did not evaluate adverse drug effects and compliance. This is because the study was aimed principally at adherence levels among antihypertensives as a whole as well as attitudes towards antihypertensive medicines rather than singling out specific antihypertensive medicines. We will address this in future studies.

In addition, most patients regularly attend the clinic; however some do miss their scheduled appoints due to the nature of the disease its’ chronic condition. As a result, the sample patient population may have more patients who are on treatment for a longer duration of time and so probably more aware of the benefits of regularly attending the sessions. However, we believe the sample size was large enough to overcome this potential bias.

Overall despite these limitations, we believe the study does provide robust guidance for improving compliance rates with antihypertensive medicines in Tanzania and other African countries in the future.

**Conclusion and recommendations**

The level of adherence to antihypertensive medicines in our study at 54 % was similar or higher than studies in other countries. However, relatively low compared to the required level of adherence to antihypertensive medicines at ≥ 80 %. Consequently this needs to be addressed. In view of our findings, hypertensive patients need to be educated regarding the disease, the consequences associated with uncontrolled hypertension and the importance of adhering to their medications. Furthermore, they should be assured that these medications are safe and not toxic at the prescribed dose to reduce potential fears and increase adherence rates.

Education initiatives could be undertaken when patients attend the clinics through multidisciplinary teams as well as by pharmacists in the hospital when patients received their hypertensive medications. This will be the subject of future research projects.
Executive summary
- High blood pressure is associated with at least 7.6 million to 9.4 deaths annually, envisaged to cost globally nearly US$1 trillion over the next decade. Currently, 3 out of 4 patients with hypertension live in low and middle income countries, with the highest prevalence in the African Region.
- Adherence to antihypertensive medication is a concern. Consequently, there is a need to ascertain current rates and the rationale behind these.
- High adherence rates was seen among 54% of patients attending a cardiovascular clinic at a leading referral and teaching hospital in Tanzania.
- Patients with high adherence scored lower on concerns about their medication with patients in the low adherence group scoring significantly higher in their concerns about taking medicines and other factors. There were also higher scores in the high adherence group regarding beliefs about their medication.
- Overall, adherence rates were low compared to the required level of $\geq 80\%$.

Educational initiatives are needed to address knowledge and concerns with hypertension to improve future rates.

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References

** – of considerable interest


* Good paper discussing some of the concerns.


** Good paper discussing some of the issues regarding hypertension especially among LMIC countries.


** Key paper discussing some of the issues regarding hypertension especially among African countries.


** Good paper discussing key issues surrounding the management of hypertension and the consequences with poor control.


*Interesting paper highlighting the risks of poor compliance with antihypertensive medicines.


35. Rwegerera GM. Adherence to anti-diabetic drugs among patients with Type 2 diabetes mellitus at Muhimbili National Hospital, Dar es Salaam, Tanzania- A cross-sectional study. The Pan African medical journal. 2014;17:252
*Good paper discussing issues relating to adherence to NCD medicines among Africa countries.

*Good paper reviewing the control and adherence to antihypertensive patients in an African country


*Good study assessing the association between perception and adherence to antihypertensive medicines providing guidance for the future.