Research Article

Non-adherence to Antihypertensive Medication and Its Associated Factors Among Cardiac Patients at Alshaab Referred Clinic, November 2017

Fatima Abd Alraheem Osman¹, Huda Hassan Mohamed²,³, and Nazik Ahmed Alhaj⁴

¹Faculty of Medicine, University of Khartoum, Khartoum, Sudan
²Department of Community Medicine, University of Khartoum, Sudan
³Faculty of Public Health, Andrews Place, London, UK
⁴Alshaab Teaching hospital, Khartoum, Sudan

Abstract

Background: Non-adherence to antihypertensive drugs is identified to have negative impact on cardiovascular outcome. Various studies have been conducted on this issue worldwide but data about medications adherence and its associated factors in Sudan are limited.

Objectives: The objectives of this study are to identify the prevalence and factors associated with non-adherence to antihypertensive medications among cardiac patients in Sudan.

Methods: A descriptive cross-sectional study was conducted on 202 patients by total coverage of all diagnosed hypertensive patients with cardiac disease who attended the referred clinic at Alshaab teaching hospital during the study period from November 5th to December 7th, 2017.

Data were collected by direct interview of the patients using structured questionnaire, clinical characteristics of the patients were obtained from the medical records, WISEWOMAN medications adherence questionnaire for hypertension was used to assess the level of medication adherence. Descriptive and multivariate logistic regression was used for data analysis, using SPSS version 20.

Results: Out of 202 participants, 140 (69.3%) were female, the mean age of the participants was 60.7 ± 13.6. The study revealed that 41.6% of the patients were non-adherent to their antihypertensive medications, the level of non-adherence was found to be significantly associated with young age (p-value < 0.012), high level of education (p-value < 0.05), and using more than one pharmacy to get the medications (p-value < 0.00); after logistic regression analysis, non-adherence was found to be significantly associated with using more than one pharmacy to get the medications (p-value < 0.00). The level of non-adherence in our study is found to be corresponding to the findings of other similar local, regional, and international studies, which have reported that non-adherence of medication ranged between 39.5% and 55.9%. Other factors in different studies were found to be significantly associated with non-adherence such as gender, duration of hypertension, duration between follow-up visits to physician and number of drugs.
Conclusion: The study results show high prevalence of non-adherence; this is associated more with using more than one pharmacy to get the medications, young age, and higher level of education. In order to improve the adherence to antihypertensive medications in our country, we recommend the use of medications adherence scale as routine tool in the outpatient clinic to identify the non-adherent patients. Doctors must make sure that the drugs are available in the pharmacies around their area before prescription, and to conduct more studies to identify the barriers to adherence specially in young and educated patients.

Keywords: non-adherence, antihypertensive medications, cardiac patients, associated factors

1. Introduction

Hypertension is defined as “a systolic blood pressure equal to or above 140 mm Hg and/or diastolic blood pressure equal to or above 90 mm Hg” [19].

The practical definition of hypertension is “the level of BP at which the benefit of treatment out-weight the cost and hazards” [1].

Hypertension have adverse effect on many organs including blood vessels, heart, kidney, CNS, and retina [1]. And it contributes to the premature mortality and disability. The main objective of antihypertensive therapy is to reduce the incidence of cardiovascular complications [1].

Randomized controlled trials have demonstrated that antihypertensive therapy can reduce the incidence of stroke and to lesser extent coronary artery diseases [1].

Options of treatment include:

Non-drug therapy: lifestyle modification

Antihypertensive drugs

The adherence to medications is defined as “the extent to which a patient behavior with respect to taking medications corresponds with agreed recommendations from healthcare provider [2, 5].”

Only 29% of hypertensive patients in the USA have good control, and overall adherence rate of medication were about 50% [2]. In the USA, 33.69% of avoidable cases of hospital admissions were due to poor adherence [2].
There is limited published literature about adherence to antihypertensive medications in Sudan; a hospital-based study was conducted during 1997 in Kassala; compliance was measured using the pill count method, and it was found to be about 59.6%.

Many factors contribute to the medication non-adherence, and WHO categorized those factors into five groups including: patients, therapy, conditions, socioeconomic and health-system-related factors [2, 4]. As seen in sub-Saharan Africa countries, there are many social and economic barriers, inequalities in the distribution of services, staff shortage in healthcare facilities, limited supply of medications, and limited capacity to conduct clinical investigations [2].

This study aims to measure the prevalence of medication non-adherence among hypertensive patients with cardiovascular diseases and identify the factors that are associated with non-adherence.

2. Methodology

This study was an observational descriptive hospital-based cross-sectional study that was conducted between November 5 and December 7, 2017, at Al-shaab referred clinic, Khartoum, Sudan. Al-shaab teaching hospital is the largest public cardiac center in Sudan, patients with cardiac or chest diseases from all parts of Sudan are referred to Al-shaab hospital, and they get a monthly follow-up care at the referred clinic after discharge; there are six cardiac clinics in the week.

All diagnosed hypertensive patients with cardiac disease who attend the referred clinic during the study period were included, while patients with cardiac problem not known to be hypertensive were excluded.

Data were collected through direct interview of the patients using structured questionnaire; clinical characteristics of the patients were obtained from the medical records; WISEWOMEN medications adherence questionnaire for hypertension which is adapted from Morisky medication adherence scale was used to assess the level of medication adherence. Five medical students participated in data collection and interviewing the patients.

The data obtained through the questionnaire include: socio-demographic information, duration of hypertension, duration of treatment, classes and doses of antihypertensive medications, co-morbidities, and level of medication adherence.

The dependent variable of this study was the level of adherence to antihypertensive medication and the independent variables were age, gender, level of education, residence, occupation, age at diagnosis, regular follow-up, duration of treatment, number
of medication classes and doses, health insurance, side effects of the antihypertensive drugs, availability of the medications in pharmacies, and the presence of other chronic illnesses.

The adherence was measured using three items scale from medication adherence questionnaire for hypertension by WISEWOMAN which is adapted from Morisky Medication adherence Scale (Figure 2). The items were: “Do you sometimes forget to take your high blood pressure pills?” “Do you ever cut back or stop taking your BP medicine?” Taking medication every day can be inconvenient for some people. Do you ever feel hassled about sticking to your blood pressure treatment plan?”; each item had two responses (yes = 1, no = 0) and the items were summed, patients were considered as adherent to their medications when they have score < 2 and non-adherent when score ≥ 2.

Ethical approval was obtained from the University of Khartoum, Faculty of Medicine, Department of Community Medicine, State Ministry of Health, Research Committee at Al-shaab teaching hospital, and the head nurse at the referred clinic, the permission to use the medication adherence scale was obtained from the authors, and verbal consent was taken from the patients.

Data was entered and analyzed using SPSS software version 20, chi-square was used to determine the association between each independent variable and the level of adherence, then multiple logistic regression was used to identify the factors that significantly affected non-adherence to medications, p-value of ≤ 0.05 was considered as statistically significant.

3. Results

A sample of 211 patients were selected for the study, 202 of them participated in the study, 9 patients were excluded because some were very ill and could not complete the interview, and others denied that they had hypertension.

Table 1 shows the socio-demographic characteristics of the participants, 69.3% of the participants were female, 48.5% were above 60 years of age, and 43.6% belonged to the age group 41–60 years with mean age 60.7 (SD 13.6), 67.8% were married, 63.4% lived in urban areas, 40.6% were not educated (illiterate), 60.4% were unemployed, and 76.7% had health insurance.

Table 2 shows diseases and treatments-related factors, 69.8% were above 40 years of age when diagnosed with hypertension, 76.7% were visiting doctors for regular follow-up and measurement of blood pressure, 43.6% were using antihypertensive medications...
for < 5 years, 65.8% were using only one class of antihypertensive medications, 65.8% had only one dose of antihypertensive drug per day, 80.2% did not have side effects from their antihypertensive medications, 61.4% were using more than one pharmacy to get their medications, and 96.5% were taking medications for another chronic illnesses.

Regarding the medication adherence scale, the responses of the participants were as follow: 63.9% reported that they never forget taking their high blood pressure medications, 58.9% do not ever cut back or stop taking their medications, and 61.4% do not feel hassled sticking to their medications and treatment plan, as shown in Table 3. A total of 84 participants (41.6%) out of 202 were found to be non-adherent to their antihypertensive medications (with score ≥ 2; Figure 1).

Table 4 shows the association between socio-demographic characteristics and the level of adherence to antihypertensive medications, patients who were above 60 years of age were found to be more adherent, illiterate patients also show high level of adherence, other factors including gender, marital status, residence, occupation, and having health insurance don't show significance difference.

Regarding the medications and diseases-related factors and its relation to the level of adherence, those who use more than one pharmacy to get the medications were more non-adherent than those who got their medications from one pharmacy; other factors showed no significant difference (Table 5).
TABLE 1: Socio-demographic characteristics of the participants.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number(n)</th>
<th>Frequency(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–40 years</td>
<td>16</td>
<td>7.6%</td>
</tr>
<tr>
<td>41–60 years</td>
<td>88</td>
<td>43.6%</td>
</tr>
<tr>
<td>Above 60 years</td>
<td>98</td>
<td>48.5%</td>
</tr>
<tr>
<td>2. Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>62</td>
<td>30.7%</td>
</tr>
<tr>
<td>Female</td>
<td>140</td>
<td>69.3%</td>
</tr>
<tr>
<td>3. Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>6</td>
<td>3.0%</td>
</tr>
<tr>
<td>Married</td>
<td>137</td>
<td>67.8%</td>
</tr>
<tr>
<td>Divorced</td>
<td>6</td>
<td>3.0%</td>
</tr>
<tr>
<td>Widow</td>
<td>53</td>
<td>26.2%</td>
</tr>
<tr>
<td>4. Educational level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>82</td>
<td>40.6%</td>
</tr>
<tr>
<td>Khalwa</td>
<td>31</td>
<td>15.3%</td>
</tr>
<tr>
<td>Primary school</td>
<td>45</td>
<td>22.3%</td>
</tr>
<tr>
<td>Secondary school</td>
<td>34</td>
<td>16.8%</td>
</tr>
<tr>
<td>University</td>
<td>8</td>
<td>4.0%</td>
</tr>
<tr>
<td>Above university</td>
<td>2</td>
<td>1.0%</td>
</tr>
<tr>
<td>5. Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>74</td>
<td>36.6%</td>
</tr>
<tr>
<td>Urban</td>
<td>128</td>
<td>63.4%</td>
</tr>
<tr>
<td>6. Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>122</td>
<td>60.4%</td>
</tr>
<tr>
<td>Employee</td>
<td>32</td>
<td>15.8%</td>
</tr>
<tr>
<td>Trader</td>
<td>8</td>
<td>4.0%</td>
</tr>
<tr>
<td>Farmer</td>
<td>6</td>
<td>3.0%</td>
</tr>
<tr>
<td>Others</td>
<td>34</td>
<td>16.8%</td>
</tr>
<tr>
<td>7. Health insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>155</td>
<td>76.7%</td>
</tr>
<tr>
<td>No</td>
<td>47</td>
<td>23.3%</td>
</tr>
</tbody>
</table>
### Table 2: Diseases and medications related factors.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number(n)</th>
<th>Frequency(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The patients age when diagnosed with HTN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20 years</td>
<td>3</td>
<td>1.5%</td>
</tr>
<tr>
<td>20–40 years</td>
<td>57</td>
<td>28.2%</td>
</tr>
<tr>
<td>≥ 40 years</td>
<td>141</td>
<td>69.8%</td>
</tr>
<tr>
<td>2. Visiting doctors regularly for follow-up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>155</td>
<td>76.7%</td>
</tr>
<tr>
<td>No</td>
<td>47</td>
<td>23.3%</td>
</tr>
<tr>
<td>3. Duration of antihypertensive treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5 years</td>
<td>88</td>
<td>43.6%</td>
</tr>
<tr>
<td>5–9 years</td>
<td>44</td>
<td>21.8%</td>
</tr>
<tr>
<td>≥ 10 years</td>
<td>70</td>
<td>34.7%</td>
</tr>
<tr>
<td>4. Number of antihypertensive classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One class</td>
<td>133</td>
<td>65.8%</td>
</tr>
<tr>
<td>Two or more classes</td>
<td>69</td>
<td>34.2%</td>
</tr>
<tr>
<td>5. Number of doses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once per day</td>
<td>133</td>
<td>65.8%</td>
</tr>
<tr>
<td>Twice or more</td>
<td>69</td>
<td>34.2%</td>
</tr>
<tr>
<td>6. Side effects from medications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>39</td>
<td>19.3%</td>
</tr>
<tr>
<td>No</td>
<td>162</td>
<td>80.2%</td>
</tr>
<tr>
<td>Missed</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>7. Use more than one pharmacy to get medications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>124</td>
<td>61.4%</td>
</tr>
<tr>
<td>No</td>
<td>77</td>
<td>38.1%</td>
</tr>
<tr>
<td>Missed</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>8. Presence of other chronic diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>195</td>
<td>96.5%</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>3.5%</td>
</tr>
<tr>
<td>9. Types of chronic diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiac Diseases</td>
<td>185</td>
<td>66.8%</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>12</td>
<td>4.3%</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>64</td>
<td>23.1%</td>
</tr>
<tr>
<td>Other comorbidities</td>
<td>16</td>
<td>5.8%</td>
</tr>
</tbody>
</table>
Multiple logistic regression analysis revealed that the only variable that has significant effect on non-adherence is using more than one pharmacy to get the medications ($p$-value 0.000), other factors were excluded (Table 6).

4. Discussion

In this study, we found that about 41.6% of the participants were non-adherent to their antihypertensive medications, which corresponds to the findings of other similar local, regional, and international studies that have reported medication non-adherence ranging between 39.5% and 55.9%, despite the difference in the social and economic status of the patients in these countries, and the difference in health system, the prevalence of non-adherence to medications is still high, more studies need to be conducted to identify the barriers to adherence in order to develop the strategies to overcome these barriers [10, 13, 15, 17, 20, 21].

Regarding the socio-demographic factors and its relation to non-adherence, our study revealed that age has significant association with the level of adherence and this contradicts the finding of two other studies that reported that age has no significant effect on non-adherence [15, 17]; regarding the gender, we found that there is no difference between male and female patients in the adherence level, while a study in UAE found that male are more non-adherent than females [15]. Other two studies in Almadina Almunawara and Pakistan found the opposite, which may be due to the difference in the social and cultural beliefs regarding the gender in these areas [14, 16]. In our study, we found that non-adherence is less prevalent among patients with no formal education (illiterate), while a study which was conducted in Finland showed that non-adherence was less prevalent among highly educated patients [7], and these findings may be explained by the difference in the literacy rates between Sudan and Finland; in developed countries, the literacy is about 99.2%, while in sub-Saharan Africa, it is about 64.0% as reported by UNESCO in 2015; and another study in Saudi Arabia found that highly educated patients were more non-adherent to their medications, other socio-demographic factors including marital status, residence, occupation; having health insurance showed no significant difference and this is in agreement with the two similar studies in the UAE and Iran [15, 17].

Diseases- and medications-related factors that include age at diagnosis with hypertension, regular follow-up, duration of treatment, number of medication’s classes and doses, side effects of medications, using more than one pharmacy to get the medications and the presence of other comorbidities, all were found to be not significantly
associated with non-adherence except for using more than one pharmacy to get the medications, which is similar to the findings of a study that is conducted in three cardiac centers in Khartoum and found that one of the major reasons for poor medication adherence among the study participants to be poly-pharmacy; on the other hand, a study conducted in the UAE found that patients who use \( \geq 2 \) medications were more non-adherent than those who use only one drug [15], and another study in Finland showed that patients who experienced side effects of the drugs were significantly more likely to be non-adherent [7].

The literature about medication adherence in Sudan is limited and this makes direct comparison with local studies to be not feasible.

**Table 3:** Responses to medication adherence questionnaire.

<table>
<thead>
<tr>
<th>Items</th>
<th>Number (n)</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you sometimes forget to take your high BP medications?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>71</td>
<td>35.1%</td>
</tr>
<tr>
<td>No</td>
<td>129</td>
<td>63.9%</td>
</tr>
<tr>
<td>Missed</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>2. Do you ever cut back or stop taking your medications?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>83</td>
<td>41.1%</td>
</tr>
<tr>
<td>No</td>
<td>119</td>
<td>58.9%</td>
</tr>
<tr>
<td>3. Do you ever feel hassled sticking to your treatment plan?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>78</td>
<td>38.6%</td>
</tr>
<tr>
<td>No</td>
<td>124</td>
<td>61.4%</td>
</tr>
</tbody>
</table>

**5. Conclusion**

The study showed that 41.6% of cardiac patients were non-adherent to their antihypertensive medications, using more than one pharmacy to get the medications was the factor that is significantly associated with non-adherence.

In order to improve the adherence to antihypertensive medications in our country, we recommend the use of medications-adherence scale as routine tool in the out-patient clinic to identify the non-adherent patients. Doctors must make sure that the drugs are available in the pharmacies around their area before prescription and to conduct more studies to identify the barriers to adherence specially in young and literate patients.
### TABLE 4: Association between socio-demographic characteristics and level of adherence to antihypertensive medications.

<table>
<thead>
<tr>
<th>The factor</th>
<th>Non-adherence N %</th>
<th>Adherence N %</th>
<th>X²</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–40 years</td>
<td>10 5%</td>
<td>6 3%</td>
<td>8.796</td>
<td>0.012</td>
</tr>
<tr>
<td>41–60 years</td>
<td>43 21.3%</td>
<td>45 22.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 60 years</td>
<td>31 15.3%</td>
<td>67 33.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>24 11.9%</td>
<td>38 18.8%</td>
<td>0.304</td>
<td>0.0581</td>
</tr>
<tr>
<td>Female</td>
<td>60 29.7%</td>
<td>80 39.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>24 11.9%</td>
<td>41 20.3%</td>
<td>0.857</td>
<td>0.355</td>
</tr>
<tr>
<td>Married</td>
<td>60 29.7%</td>
<td>77 38.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Educational level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>26 12.9%</td>
<td>56 27.7%</td>
<td>11.05</td>
<td>0.050</td>
</tr>
<tr>
<td>Khalwa</td>
<td>12 5.9%</td>
<td>19 9.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>22 10.9%</td>
<td>23 11.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary school</td>
<td>21 10.4%</td>
<td>13 6.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>2 1%</td>
<td>6 3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above university</td>
<td>1 0.5%</td>
<td>1 0.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>34 16.8%</td>
<td>40 19.8%</td>
<td>0.915</td>
<td>0.339</td>
</tr>
<tr>
<td>Urban</td>
<td>50 24.8%</td>
<td>78 38.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>47 23.3%</td>
<td>75 37.1%</td>
<td>1.187</td>
<td>0.276</td>
</tr>
<tr>
<td>Employed</td>
<td>37 18.3%</td>
<td>43 21.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Health insurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>61 30.2%</td>
<td>94 46.5%</td>
<td>1.363</td>
<td>0.243</td>
</tr>
<tr>
<td>No</td>
<td>23 11.4%</td>
<td>24 11.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The factor</td>
<td>Non-adherence N %</td>
<td>Adherence N %</td>
<td>$X^2$</td>
<td>P-value</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>---------------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>1. The patient’s age when diagnosed with HTN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20 years</td>
<td>1 0.5%</td>
<td>2 1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20–40 years</td>
<td>32 15.8%</td>
<td>25 12.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 40 years</td>
<td>51 25.2%</td>
<td>90 44.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Visiting doctors regularly for follow-up</td>
<td></td>
<td></td>
<td>0.024</td>
<td>0.878</td>
</tr>
<tr>
<td>Yes</td>
<td>64 31.7%</td>
<td>91 45%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>20 9.9%</td>
<td>27 13.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Duration of antihypertensive treatment</td>
<td></td>
<td></td>
<td>1.260</td>
<td>0.533</td>
</tr>
<tr>
<td>&lt; 5 years</td>
<td>37 18.3%</td>
<td>51 25.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5–9 years</td>
<td>21 10.4%</td>
<td>23 11.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 10 years</td>
<td>26 12.9%</td>
<td>44 21.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Number of classes</td>
<td></td>
<td></td>
<td>0.991</td>
<td>0.320</td>
</tr>
<tr>
<td>One class</td>
<td>52 25.7%</td>
<td>81 40.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two or more classes</td>
<td>32 15.8%</td>
<td>37 18.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Number of doses</td>
<td></td>
<td></td>
<td>0.482</td>
<td>0.487</td>
</tr>
<tr>
<td>Once per day</td>
<td>53 26.2%</td>
<td>80 39.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twice or more</td>
<td>31 15.3%</td>
<td>38 18.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Side effects of medications</td>
<td></td>
<td></td>
<td>1.992</td>
<td>0.369</td>
</tr>
<tr>
<td>Yes</td>
<td>14 6.9%</td>
<td>25 12.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>69 34.2%</td>
<td>93 46%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missed</td>
<td>1 0.5%</td>
<td>0 0.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Use more than one pharmacy to get medications</td>
<td></td>
<td></td>
<td>15.767</td>
<td>0.000</td>
</tr>
<tr>
<td>Yes</td>
<td>65 32.2%</td>
<td>59 29.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>19 9.4%</td>
<td>58 28.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missed</td>
<td>0 0.0%</td>
<td>1 0.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Presence of another chronic disease</td>
<td></td>
<td></td>
<td>0.723</td>
<td>0.395</td>
</tr>
<tr>
<td>Yes</td>
<td>80 39.6%</td>
<td>115 56.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>4 2%</td>
<td>3 1.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6: Factors associated with non-adherence, logistic regression analysis.

<table>
<thead>
<tr>
<th>The factor</th>
<th>Significance</th>
<th>Exp(B)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Using more than one pharmacy to get the medications</td>
<td>0.000</td>
<td>0.183</td>
<td>(0.083–0.401)</td>
</tr>
</tbody>
</table>

Date
Adapted from Morisky Medication-Taking Adherence Scale
4/2014

Last Name First Name Middle Initial MBCIS ID (Office Use Only)

1. Do you sometimes forget to take your high blood pressure pills?
   - Yes [ ] No [ ]
   1a. If yes, how often?
   - Rarely [ ] Once in a while [ ] Sometimes [ ] Usually [ ] All the Time
   1b. If yes, explain why?

2. Do you ever cut back or stop taking your BP medicine?
   - Yes [ ] No [ ]
   If yes, do you cut back or stop taking your BP medicine because you (check all that apply):
   2a. Feel better?
   2b. Feel like your blood pressure is under control?
   2c. Feel worse when you take it?
   2d. Are having trouble paying for it?
   2e. Are having trouble getting to the pharmacy?
   2f. Are not sure why it is important?

3. Are you having any side effects from your medication?
   - Yes [ ] No [ ]

4. Do you use more than one pharmacy to get your medications?
   - Yes [ ] No [ ]

5. Taking medication every day can be inconvenient for some people. Do you ever feel hassled about sticking to your blood pressure treatment plan?
   - Yes [ ] No [ ]

Figure 2: Medication adherence questionnaire for hypertension.

References


