

## Original Research Article

# Compliance to antihypertensive therapy and associated factors among adults' hypertensive patients attending medical clinics in Kilifi County Kenya

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**Received:** 17 July 2021

**Revised:** 23 August 2021

**Accepted:** 25 August 2021

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## ABSTRACT

**Background:** Hypertension is both public health and medical problem worldwide. Compliance to antihypertensive therapy is key in avoiding hypertension complications. The purpose of this study was to establish compliance to antihypertensive therapy and associated factors among adults' hypertensive patients in Kilifi county Kenya.

**Methods:** A facility-based cross-sectional was undertaken in four public health facilities in Kilifi County Kenya. Two hundred and thirteen hypertensive patients were recruited in the study. Data was collected using a pretested questionnaire and analyzed using Statistical package for social sciences (SPSS) version 23 software. Chi-square test was utilized in establishing the relations, while logistic regression was adopted to determine independent risk factors for compliance.

**Results:** Compliance to antihypertensive therapy was recorded in 31 (14.6%) of the patients. A statistically significant association was established between compliance to antihypertensive therapy and patients knowledge ( $p < 0.001$ ); age ( $p = 0.024$ ); education ( $p = 0.04$ ); income ( $p = 0.013$ ); duration on treatment ( $p = 0.005$ ); cost ( $p = 0.029$ ); health care provider advice ( $p = 0.009$ ); consistency of therapy ( $p = 0.002$ ); medicines availability ( $p = 0.021$ ); and health facility distance ( $p = 0.013$ ). Independent risk factors for compliance to antihypertensive therapy were the duration on treatment of (OR=0.383; 95%CI 0.151-0.972); Knowledge on hypertension (OR=2.715; 95%CI 1.598-4.615); Health care worker follow-ups (OR=0.452; 95%CI 0.282-0.726); and cost of medication (OR=2.682; 95%CI 1.134-6.345).

**Conclusions:** Anti-hypertensive therapy compliance among patients was low. This could be attributed to factors that are socio-demographic, patient, and health service-related in nature. Prompt public health interventions that are patient-community centred are necessary to improve compliance to antihypertensive therapy.

**Keywords:** Hypertension, Compliance, Antihypertensive, Therapy

## INTRODUCTION

Hypertension (HTN) also called high blood pressure (HBP) is a medical condition characterized by persistent and elevated arterial systolic and diastolic BP of 140/90mmHg and more or using antihypertensive as reported.<sup>1</sup> It is the main significant reason, for coronary

artery diseases, ischemic stroke, Kidney failure, and retinopathies whose consequences are significant infirmity and death globally.<sup>2</sup>

Approximately 1.5 billion people are affected by HTN worldwide and more so about 9.4 million HTN associated mortalities occur annually.<sup>3</sup> Of these mortalities, 50%,

55%, and 55% are because of ischemic stroke, ischemic heart condition, and other CVDs respectively.<sup>4</sup>

Hypertension burden is highest in Sub Sahara Africa (SSA), with a prevalence of about 27% compared to other World Health Organization (WHO) regions in the world.<sup>5</sup> While in advanced countries burden of hypertension has dropped, in SSA studies show escalating rates.<sup>6</sup> This has been ascribed to the rise in urbanization, elderly population, westernization, dietary modifications plus a slothful lifestyle.<sup>7</sup>

In Kenya, national Stepwise survey established hypertension prevalence of about 24%.<sup>8</sup> Various studies have established that early diagnosis, creating awareness, appropriate management, and control of HTN, lessen disease and death due to HTN associated complications.<sup>9</sup> However, the benefits of antihypertensive therapy are not achieved because a large section of patients don't conform to the prescription. Poor compliance to antihypertensive therapy has contributed to the deterioration of disease states, high medical costs, morbidity and mortality.<sup>10</sup> WHO reports that, compliance with long-term medications for chronic conditions such as HTN is approximately 50% and is lesser in LMIC such as Kenya.

Consequently, good compliance to antihypertensive therapy is vital in attaining optimal BP and hence averts complications. According to District Health Information System (2019) report, it revealed escalating hypertension cases in Kilifi county. In the year 2019, 57,942 cases were reported, while in 2018 and 2017, 44,127 cases and 26,458 cases were reported respectively. Understanding the predictors of compliance to antihypertensive therapy among the adult high BP patients in Kilifi County is critical in guiding policymakers to develop effective interventions early. Nonetheless, in a view of the effects of poor compliance to antihypertensive therapy and paucity of local literature in this area, this study, therefore, seeks out to address the knowledge gap on burden and associated factors, of compliance to antihypertensive therapy, amongst adult hypertensive patients in Kilifi County. The objectives of the study were: to determine the proportion of compliance to antihypertensive therapy, to establish socio-demographic factors that influence compliance to antihypertensive therapy, to assess the level of knowledge on hypertension and to determine health service-related factors that influence compliance to antihypertensive therapy.

## METHODS

### Study design

The facility -based cross-sectional study was conducted in four selected public health facilities in Kilifi county namely Malindi Sub county Hospital (level 4 hospital), Muyeye, Gongoni, and Marereni Health Centers, Kilifi County between the months March and May 2020.

### The study population

#### Inclusion criteria

This study targeted adult hypertensive patients who were 18 years old and above, with a confirmed diagnosis of hypertension and on follow-up for treatment in medical clinics for more than six months.

#### Exclusion

Critically ill, patients who could not comprehend, pregnant hypertensive patients, and patients who declined to consent.

### Sample size and sampling procedure

Cochran's (1977) formula:

$$n = Z^2 p(1 - p) \div d^2$$

was used to estimate sample size.

Where:

n=denotes the expected sample size (since the target population is above 10,000),

Z=Standard normal deviate at a 95% confidence interval that corresponds to a 1.96 confidence level.

P=denotes the proportion of the compliance to antihypertensive therapy (In this case p= 50%, because the prevalence of compliance with antihypertensive therapy in Malindi Sub County was unknown.

$$q=(1-p), 1-0.5=0.5$$

d=desired level of precision (acceptable degree of error). It was assumed at 5%.

Therefore, the calculated sample size was 384.

Since the estimated total population (N) was below 10,000, the formula

$$nf = n \div (1 + (n - 1) \div N$$

was employed to correct sample size.

The required final sample size was 216 after adding 10% non-responsive proportion. Ten medical workers were interviewed from the four selected public health facilities.

### Sampling

Purposive sampling was deployed in the selection of Kilifi County one of the counties that has recorded increased hypertension cases and related complications recently

according to district Health Information System 2 of 2019. Simple random sampling was used to select Malindi Sub-county and the three health centers in the sub-county. The total sample of 216 was proportionally allocated to the four health facilities. Study participants were chosen by the systematic random sampling with every 4th patient interviewed based on his/her arrival.

This design was also adopted in the selection of medical staff based on their knowledge and experience in managing hypertensive patients

### Research instruments

Structured pretested questionnaires were used for data collection. The tool comprised of four parts. Part 1 consisted of 13 questions associated with social-demographics characteristics and general clinical information of the patients, while part 2 comprised of 8 questions (MMAS-8) associated with medication adherence behavior which assessed compliance status and 5 Likert scale questions on recommended healthy lifestyle modification. Part 3 comprised 30 questions related to knowledge on hypertension and part 4 comprised of 12 questions that dealt with respondents' health service-related factors.

BP was measured by use of digital BP machine. Two BP readings were taken at an interval of 5 minutes apart while the patient was seated. The average was calculated and entered into the tool.

### Pre-testing of instruments

The pretesting of data tools was carried out in Ngao sub-county Hospital. This involved approximately 10 % (22) of study sample patients and health care providers to test significance, completeness, and simplicity of data collection. Establishing validity and reliability of the tool formed an integral part of the process.

### Data collection

Data collection was based on exit interviews. The process was preceded by recruitment and training of 4 research assistants on the objectives of the research and data collection tools. Training took one week including pretesting of the tools followed by actual data collection.

### Data analysis

At the end of the field work quantitative data was cleaned, edited; coded, and processed using the Statistical Package for Social Sciences (SPSS) software version 23. Descriptive statistics were used to summarize data, chi-square test, tested the relationships among variables and logistic regression was used to predict outcome variables. Qualitative data were organized and analyzed thematically based on the objective of the study.

### Logistical and ethical considerations

Prior to data collection, Kenyatta University Ethics and Review Committee (KUERC) approved this study and National Commission for Science Technology and Innovation (NACOSTI) authorized it. Kilifi County Government gave clearance to collect data from selected public health facilities. Study participants were briefed on the objectives and procedures. Participation was through informed consent, while adhering to the principles of confidentiality and anonymity throughout the entire period.

## RESULTS

Overall, the findings show that the majority 98 (46%) of the patients, were 59 years old and above, with a high proportion being women 137 (64.3%).

**Table 1: Social demographic features of the hypertensive patients (n=213).**

| Variable                   | Categories                        | N   | %    |
|----------------------------|-----------------------------------|-----|------|
| Age groups (in years)      | 18-28                             | 9   | 4.2  |
|                            | 29-38                             | 13  | 6.1  |
|                            | 39-48                             | 28  | 13.1 |
|                            | 49-58                             | 65  | 30.5 |
|                            | >59                               | 98  | 46.0 |
| Gender                     | Male                              | 76  | 35.7 |
|                            | Female                            | 137 | 64.3 |
| Marital status             | Married                           | 139 | 65.3 |
|                            | Single                            | 12  | 5.6  |
|                            | Separated/Divorced                | 14  | 6.6  |
|                            | Widowed                           | 48  | 22.5 |
| Religion                   | Muslim                            | 28  | 13.1 |
|                            | Christian                         | 179 | 84.0 |
|                            | Others                            | 6   | 2.8  |
| Highest level of education | No formal education               | 89  | 41.8 |
|                            | Primary                           | 85  | 39.9 |
|                            | Secondary                         | 31  | 14.6 |
|                            | Tertiary                          | 8   | 3.8  |
| Occupation                 | Student                           | 2   | 0.9  |
|                            | Employed                          | 45  | 21.1 |
|                            | Self Employed                     | 92  | 43.2 |
|                            | Unemployed                        | 74  | 34.7 |
| Income (Kshs)              | Low income (<5000 Ksh)            | 139 | 65.3 |
|                            | Lower middle income (5000-10000)  | 35  | 16.4 |
|                            | Upper middle income (11000-20000) | 28  | 13.1 |
|                            | High income (≥20,000Kshs)         | 11  | 5.2  |

Kshs=Kenya shillings

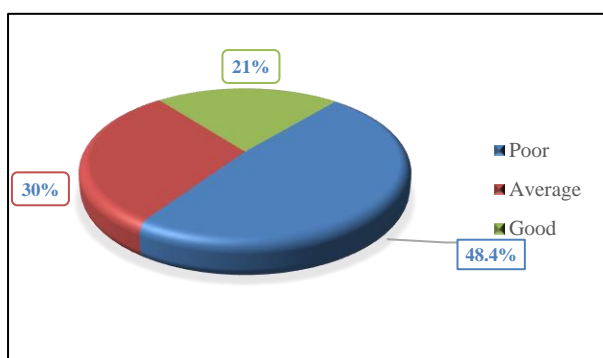
Similarly, the married 139 (65.3%) and Christians 179 (84.0%) constituted the majority and slightly over a half 124 (58.2%) had formal education and self-employed 92 (43.2%). More than half 139 (65%) were low-income earners with an estimated monthly income of less than Kshs 5,000. Details are presented in Table 1.

**Table 2: General clinical features of the hypertensive patients (n=213).**

| Variable                           | Categories        | Frequency | %    |
|------------------------------------|-------------------|-----------|------|
| BP categories                      | Controlled        | 62        | 29.1 |
|                                    | Uncontrolled      | 151       | 70.9 |
| Duration of hypertension Treatment | 6 months -1 year  | 40        | 18.8 |
|                                    | More than 1year   | 173       | 81.2 |
| BP medication                      | One (monotherapy) | 5         | 2.3  |
|                                    | Two (duo therapy) | 138       | 64.8 |
|                                    | More than two     | 70        | 32.9 |
| Comorbidities                      | Yes               | 46        | 21.6 |
|                                    | No                | 161       | 78.4 |
| Alternative medicine               | Yes               | 20        | 9    |
|                                    | No                | 193       | 91   |

**Table 3: Distribution of hypertensive patients' compliance to medication, healthy lifestyle modification and antihypertensive therapy (n=213).**

| Variables                   | Non compliance | Compliance |
|-----------------------------|----------------|------------|
|                             | N (%)          | N (%)      |
| Antihypertensive therapy    | 182 (85.4)     | 31 (14.6)  |
| Medications                 | 146 (68.5)     | 67 (31.5)  |
| Healthy lifestyle behaviour | 170 (79.8)     | 43 (20.2)  |



**Figure 1: Hypertension knowledge level scale (N=213).**

#### General clinical characteristics

As illustrated in table 2, the majority 151 (70.9%) of the patients had uncontrolled blood pressure (>140/90 mmHg)

with most 173 (81.2%) being on treatment for period exceeding one year. Among those on treatment, over half 138 (64.8%) were on two (duo) therapy with small proportion 20 (9%) reporting additional use of alternative treatment.

**Table 4: Distribution of health service-related factors among the respondents (n=213).**

| Variable   | Categories      | Frequency | %    |
|--|-----------------|-----------|------|
| High BP clinic appointments                      | Never           | 112       | 52.6 |
|  | Sometime missed | 101       | 47.4 |
| Advice on the importance of hypertension therapy | Very clearly    | 116       | 54.5 |
|  | Not clearly     | 82        | 38.5 |
|  | Never           | 15        | 7.0  |
| Healthcare follows up on consistency therapy     | Yes             | 193       | 90.6 |
|  | No              | 20        | 9.4  |
| Refill of High BP drugs                          | Yes             | 75        | 35.2 |
|  | No              | 138       | 64.8 |
| Availability of high BP drugs                    | Sometime        | 158       | 74   |
|  | Never           | 55        | 26   |
| Cost of High BP medicines                        | Yes             | 124       | 58   |
|  | No              | 89        | 42   |
| Drugs side effects                               | Yes             | 41        | 19.2 |
|  | No              | 172       | 80.8 |
| Distance from home to health facility            | Yes             | 89        | 46   |
|  | No              | 115       | 54   |

#### Compliance to medication, recommended healthy lifestyle modification and antihypertensive therapy

As illustrated in table 3, the results show that a small proportion 31 (14.6%) complied with antihypertensive therapy (both medications and lifestyle behaviors, while a quarter of them 43 (20.2%) complied with healthy lifestyle behaviors and majority 146 (68.5%) of the patients were non-compliant to antihypertensive medications.

#### Respondents level of knowledge on hypertension

The respondents' level of knowledge was assessed by Hypertension knowledge level scale (HKLS) questionnaire which had 30 questions describing HTN, risk factors, signs and symptoms, drug treatment and compliance, drug side effects, recommended healthy behaviors, and hypertension complications. A score of 1 was awarded to each correct answer. According to this scale the maximum score was 30 points (100%).

In this study the scores changed into percentages according to modified bloom's cut-off point (80-100%- good), (60-79%- average) and less than 60% poor knowledge.

Thus, good knowledge had a Those who scored 24-30 points (80%-100%) average knowledge 18-23 points (60-79%), and poor knowledge  $\leq 17$  points (60% and below).

From the results only small proportion 46 (21.6%) of patients had good knowledge on hypertension. (Figure 4).

### Health service –related factors

In this section, a series of questions were designed so as to enlist multiple responses on care as depicted in table 4.

**Table 5: Social demographics characteristics and compliance to antihypertensive therapy.**

| Variables                                    | Compliance status    |                  | Total (N) | $\chi^2$ | P value |
|--|----------------------|------------------|-----------|----------|---------|
|  | Non-compliance N (%) | Compliance N (%) |           |          |         |
| <b>Age (Years)</b>                           |                      |                  |           | 11.229   | 0.024*  |
| 18-28  | 5 (55.6)             | 4 (44.4)         | 9         |          |         |
| 29-38  | 11 (84.6)            | 2 (15.4)         | 13        |          |         |
| 39-48  | 21 (75.0)            | 7 (25.0)         | 28        |          |         |
| 49-58  | 56 (86.2)            | 9 (13.8)         | 65        |          |         |
| > 59   | 89 (90.8)            | 9 (9.2)          | 98        |          |         |
| <b>Gender</b>                                |                      |                  |           | 0.618    | 0.277   |
| Male   | 63 (82.9)            | 13 (17.1)        | 76        |          |         |
| Female                                       | 119 (86.9)           | 18 (13.1)        | 137       |          |         |
| <b>Marital status</b>                        |                      |                  |           |          |         |
| Married                                      | 114 (82.0)           | 25 (18.0)        | 139       |          |         |
| Single                                       | 11 (91.7)            | 1 (8.3)          | 12        |          |         |
| Separated/Divorced                           | 14 (100)             | 0 (0.00)         | 14        | 4.735    | 0.192   |
| Widowed                                      | 43 (89.6)            | 5 (10.4)         | 48        |          |         |
| <b>Religion</b>                              |                      |                  |           |          |         |
| Muslim                                       | 24 (85.7)            | 4 (14.3)         | 28        |          |         |
| Christian                                    | 152 (84.9)           | 27 (15.1)        | 179       | 1.064    | 0.587   |
| Others                                       | 6 (100)              | 0 (0.0)          | 6         |          |         |
| <b>Education level</b>                       |                      |                  |           | 7.672    | 0.04*   |
| No formal education                          | 83 (93.3)            | 6 (6.7)          | 89        |          |         |
| Primary                                      | 68 (80.0)            | 17 (20.0)        | 85        |          |         |
| Secondary                                    | 25 (2.1)             | 6 (7.8)          | 31        |          |         |
| Tertiary                                     | 6 (85.4)             | 2 (14.6)         | 8         |          |         |
| <b>Occupation</b>                            |                      |                  |           | 3.478    | 0.324   |
| Student                                      | 2 (100.0)            | 0 (0.0)          | 2         |          |         |
| Employed                                     | 35 (77.8)            | 10 (22.2)        | 45        |          |         |
| Self-Employed                                | 82 (89.1)            | 10 (10.9)        | 92        |          |         |
| Unemployed                                   | 63 (85.1)            | 11 (14.9)        | 74        |          |         |
| <b>Income (Kshs)</b>                         |                      |                  |           | 10.820   | 0.013*  |
| Low income (<5,000)                          | 123 (88.5)           | 16 (11.5)        | 139       |          |         |
| Low middle income (5,000-10,000)             | 31 (88.6)            | 4 (11.4)         | 35        |          |         |
| Upper middle income (11,000-20000)           | 22 (78.6)            | 6 (21.4)         | 28        |          |         |
| High income (>20000)                         | 6 (54.5)             | 5 (45.5)         | 11        |          |         |
| *p<0.05 is significant; $\chi^2$ =chi-square |                      |                  |           |          |         |



**Table 6: General clinical characteristics and compliance to antihypertensive therapy.**

| Variables                        | Compliance status       |                     | Totals (N=213) | X <sup>2</sup> | P value |
|----------------------------------|-------------------------|---------------------|----------------|----------------|---------|
|                                  | Non-compliance<br>N (%) | Compliance<br>N (%) |                |                |         |
| BP control                       |                         |                     |                |                |         |
| Controlled <140/90 mmHg          | 53 (85.5)               | 9 (14.5)            | 62             | 0.00           | 1.000   |
| Uncontrolled>140/90 mmHg         | 129(85.4)               | 22(14.6)            | 151            |                |         |
| Duration of hypertension         |                         |                     |                |                |         |
| 6 months- 1 year                 | 28(70.0)                | 12(30.0)            | 40             | 9.448          | 0.005*  |
| More than 1 year                 | 154(89.0)               | 19(11.0)            | 173            |                |         |
| Class(es) of HBP drugs           |                         |                     |                |                |         |
| One                              | 5(100)                  | 0(0.0)              | 5              | 2.103          | 0.365   |
| Two                              | 120(87.0)               | 18(13.0)            | 138            |                |         |
| More than two                    | 57(81.4)                | 13(18.6)            | 70             |                |         |
| Other chronic medical conditions |                         |                     |                |                |         |
| Yes                              | 38(82.6)                | 8(17.4)             | 46             | 5.275          | 0.627   |
| No                               | 144(86.3)               | 23(13.7)            | 167            |                |         |
| Alternative medicine             |                         |                     |                |                |         |
| Yes                              | 17                      | 2                   | 19             | 0.272          | 1       |
| No                               | 165                     | 29                  | 194            |                |         |
| * p<0.05 is significant          |                         |                     |                |                |         |

\* p&lt;0.05 is significant

**Table 7: Association between level of knowledge on hypertension and compliance to antihypertensive therapy.**

| Level of knowledge | Compliance status       |                     | Totals (N) | $\chi^2$ | P value  |
|--------------------|-------------------------|---------------------|------------|----------|----------|
|                    | Non-compliance<br>N (%) | Compliance<br>N (%) |            |          |          |
| Poor knowledge     | 95 (92.2)               | 8 (7.8)             | 103        | 16.090   | <0.0001* |
| Average knowledge  | 56 (87.5)               | 8 (12.5)            | 64         |          |          |
| Good knowledge     | 31 (64.7)               | 15 (32.6)           | 46         |          |          |

\*p<0.05 is significant,  $\chi^2$ =chi-square**Table 8: Association of health service-related factors with compliance to antihypertensive therapy (N=213).**

| Variables                                       | Compliance              |                     | Totals<br>N | X <sup>2</sup> | P value |
|---|-------------------------|---------------------|-------------|----------------|---------|
|   | Non-compliance<br>N (%) | Compliance<br>N (%) |             |                |         |
| High BP clinic appointments                     |                         |                     |             |                |         |
| Never missed                                    | 91 (81.3)               | 21 (18.8)           | 112         | 4.955          | 0.175   |
| Missed  | 91 (90.1)               | 10 (9.9)            | 101         |                |         |
| Advice on the importance of therapy by HCW      |                         |                     |             |                |         |
| Very clearly                                    | 99 (85.3)               | 17 (14.7)           | 116         | 9.329          | 0.009*  |
| Not clearly                                     | 74 (90.2)               | 8 (9.8)             | 82          |                |         |
| Never   | 9 (60.0)                | 6 (40.0)            | 15          |                |         |
| Health care follow up on consistency of therapy |                         |                     |             |                |         |
| No  | 15 (75)                 | 5 (25)              | 20          | 14.414         | 0.002*  |
| Yes   | 167 (86.5)              | 26 (13.5)           | 193         |                |         |
| Leaving the hospital with drugs (Refill)        |                         |                     |             |                |         |
| No  | 125 (90.6)              | 13 (9.4)            | 138         | 9.753          | 0.021*  |
| Yes   | 57 (76)                 | 18 (24)             | 75          |                |         |
| Availability of drugs                           |                         |                     |             |                |         |
| No  | 45 (80.4)               | 11 (19.6)           | 56          |                |         |

Continued.

| Variables  | Compliance              |                     | Totals<br>N | X <sup>2</sup> | P value |
|--|-------------------------|---------------------|-------------|----------------|---------|
|  | Non-compliance<br>N (%) | Compliance<br>N (%) |             |                |         |
| Yes  | 137 (87.3)              | 20 (20.7)           | 157         | 1.582          | 0.208   |
| The cost of medication                             |                         |                     |             |                |         |
| Yes  | 111 (90.2)              | 12 (9.8)            | 123         | 5.389          | 0.029*  |
| No   | 71 (78.9)               | 19 (21.1)           | 90          |                |         |
| Side effects of HBP drugs                          |                         |                     |             |                |         |
| Yes  | 34 (82.9)               | 7 (17.1)            | 41          | 0.259          | 0.611   |
| No   | 148 (86.0)              | 24 (14.0)           | 172         |                |         |
| Health facility distance                           |                         |                     |             |                |         |
| Yes  | 91 (91.9)               | 8 (8.1)             | 99          | 6.233          | 0.013*  |
| No   | 91 (79.8)               | 23 (20.2)           | 114         |                |         |
| *p<0.05 is significant: X <sup>2</sup> =chi-square |                         |                     |             |                |         |

Table 9: Multiple logistic regression analysis for independent factors for antihypertensive therapy compliance.

| Variables   | B (coefficients) | p-value | OR    | 95% CI |       |
|---|------------------|---------|-------|--------|-------|
|   |                  |         |       | Lower  | Upper |
| <b>Duration on treatment of High BP</b>               | -0.960           | 0.043   | 0.383 | 0.151  | 0.972 |
| <b>Knowledge of High blood pressure</b>               | 0.999            | <0.0001 | 2.715 | 1.598  | 4.615 |
| <b>Healthcare follow up on consistency of therapy</b> | -0.794           | 0.001   | 0.452 | 0.282  | 0.726 |
| <b>Cost of medication</b>                             | 0.986            | 0.025   | 2.682 | 1.134  | 6.345 |
| CI =Confidence Interval; OR=Odds Ratio                |                  |         |       |        |       |

Whereas slightly over a half never missed their clinic appointments 112 (52.6%) as well as received clear advice on lifestyle changes 116 (54.5%), an equally significant proportion 158 (74%) sometimes failed to take hypertension drugs owing to stock outs or cost 124 (58%).

#### Determinants of compliance to antihypertensive therapy

As shown in table 3, only 14.6% of the respondents complied with the recommended antihypertensive therapy. This study went further to establish factors that independently and collectively accounted for the difference between the two groups.

#### Social-demographic characteristics

Table 5; illustrate the potential influence of social demographics characteristics, on compliance to antihypertensive therapy. A significant association was

observed between compliance to antihypertensive therapy and age ( $x^2=11.229$ ,  $p=0.024$ ), education level ( $x^2=7.672$ ,  $p=0.05$ ) and income ( $x^2=10.820$ ,  $p=0.013$ ). Optimum compliance to antihypertensive therapy was observed among the younger age group 18-28 years old, those with formal education, and those with high income (>Khs. 20,000) (Table 5).

#### Clinical characteristics

Table 6. Shows association between general clinical characteristics and compliance to antihypertensive therapy. A significant association was found between compliance to antihypertensive therapy and duration of treatment of hypertension ( $X^2=9.448$ ,  $p=0.005$ ). Optimum compliance to antihypertensive therapy was observed among patients who were on treatment for hypertension for 6months to 1 year.

### Knowledge level

The study found a significant association between level of knowledge ( $X^2=16.090$ ,  $p<0.0001$ ) and compliance to antihypertensive therapy. Optimal compliance was observed among patients who had good knowledge on hypertension. Table 7 presents the details.

### Health-service related aspects

A significant association was observed between compliance to antihypertensive therapy and advice from healthcare worker on importance of antihypertensive therapy ( $X^2=9.329$ ,  $p=0.009$ ); Health care follow up on consistency of taking therapy ( $X^2=14.414$ ,  $p=0.002$ ); Refill of high BP medications ( $X^2=79.753$ ,  $p=0.021$ ); Cost of high BP medication ( $X^2=5.38$ ,  $p=0.029$ ) and distance from home and health facility ( $X^2=6.233$ ,  $p=0.018$ ).

Optimal compliance to antihypertensive therapy was observed among all groups except those who failed to take medications as recommended.

### Independent predictors of compliance

Variables found to be statistically significant, were subjected to multiple logistic regressions. Among the variables, duration of treatment (OR=0.383; 95% CI :0.151-0.972;  $p<0.043$ ); knowledge on high BP (OR=2.715;95%CI: 1.598-4.615;  $p<0.001$ ), Healthcare provider follows up on consistency of therapy (OR= 0.452 ;95%CI: 0.282-0.726;  $p<0.001$ ) and cost of medications (OR=2.682;95%CI: 1.134-6.345;  $p=0.025$ ) were independent risk factors for antihypertensive therapy compliance. Details as presented in Table 9.

## DISCUSSION

Hypertension management and control is a major challenge that necessitates attention to pharmacological and lifestyle modification. WHO rates poor compliance to therapy, as the main reason for uncontrolled BP. Good compliance to HTN therapy has proved to control and reduce related risk of complications.<sup>11</sup>

This study established a compliance rate of 14.6% to both hypertensive medications and healthy lifestyle behaviors. This result is comparable to a local study done in Kerugoya (15.4%).<sup>20</sup> However, the compliance rates in this current study were below what other studies reported in advanced countries, LMIC, and china.<sup>21,22</sup> In these studies, compliance rate ranged between 53.4-91%. This dissimilarity in compliance rates could be attributed to diverse social, economic, cultural characteristics, and better health care services in these countries.

This current study revealed that 67 (31.5%) of the respondents were found to conform to hypertension medications. The rate is lower than studies done in Ethiopia (66.8%) South Africa (54.6%) and Nigeria

(67.2%).<sup>12-14</sup> This might be because of variation in social-demographic characteristics, sample size differences, and challenges in the health sector in Africa. Comparatively this prevalence is similar to a study done in Cameroon which revealed a medication compliance rate of 33.3%.<sup>15</sup>

Similarly, compliance to healthy lifestyle modification practice was 20.2%. This is comparable with another study which established a rate of 23%.<sup>16</sup> In this study, among the healthy lifestyle modifications, 14.6% of patients practiced consistent exercise of 30min per day for three days in a week, which is below 16.1% and 89% physically active patients in previous findings in Ethiopia and India.<sup>17,18</sup> This low compliance rate might be attributed to poor patient-health care provider relationships, lack of family and friend assistance.<sup>19</sup>

This study showed a positive association between compliance to antihypertensive therapy and age ( $p=0.024$ ). Young patients between the ages of 18-28 years demonstrated optimal compliance to therapy than their counterparts. It was noted that as age increases, compliance to antihypertensive therapy decreases. These results are parallel to a study done in Mumbai India.<sup>23</sup> This is because younger people can pay for their health services often. After all, they are working. In contrast, some studies reported better compliance among older hypertensive patients.<sup>24</sup>

A significant association was demonstrated between patient's education and compliance to antihypertensive therapy ( $p=0.005$ ). This study confirms the findings of previous studies in South Africa which established medication compliance is associated with a patient's level of education.<sup>25</sup> This is because formal education promotes patient awareness and more so understanding hypertension instructions.<sup>26</sup> A contrary study revealed noncompliance was higher for the educated. This means that hypertension management needs teamwork of all health personnel in educating the public.

A significant association was established between patients' monthly income and compliance to antihypertensive therapy ( $p=0.013$ ). High-income earners demonstrated optimal compliance to antihypertensive therapy. An increase in patient income would somehow improve compliance to the therapy. A parallel study in Iraq reported that an average social-economic status was related to good compliance to medications.<sup>27</sup>

Also established was poor knowledge (48.4%) on hypertension condition. Insufficient knowledge or low awareness and the symptomless nature of hypertension are the main patient associated problem.<sup>28</sup> These current study findings are alike to knowledge levels found in previous studies in Cameroon which reported that 32.6 % had poor, 53.4% had average and 14.0% had adequate knowledge.<sup>29</sup>

A statistically significant affiliation between knowledge about high BP treatment and compliance to



antihypertensive therapy ( $p < 0.001$ ) was noted. Knowledge on hypertension increases antihypertensive therapy compliance by 2.715 times and is very essential for proper high BP control. The finding is similar to a study which was done in Ethiopia, Debre Tabor, Gondar, China, and Malaysia that patients with sufficient knowledge of their diseases and management had improved compliance compared to those who didn't.<sup>30,31</sup> The probable description is that knowledgeable hypertensive patients would understand well the significance of controlling high BP and hence would be more compliant to the therapy. Knowledge increases antihypertensive therapy compliance by 2.715 times.

This current study found a substantial relationship between compliance to antihypertensive therapy and health care follow-up on the consistency of therapy ( $p = 0.002$ ). A similar study by Rahmatulla et al revealed that patients who get extensive counseling from HCW regarding their condition management showed improved compliance to medications.<sup>32</sup> Healthcare follows up on consistency of therapy increases antihypertensive therapy compliance by 0.45 times.

This study established a significant relationship between distance from health facilities ( $p = 0.003$ ). A similar study in Ethiopia found improved compliance as the distance to health facilities decreased. This displays that access to health institutions is a significant factor affecting compliance to therapy.

In this study, a significant association between compliance to antihypertensive therapy and the cost of hypertensive medicine ( $p = 0.025$ ) was noted. This is consistent with a study by Baker (2019) which showed that poor compliance was among those who paid for health service out of pocket. Cost increases antihypertensive therapy compliance by 2.68 times. This is equivalent with a study done in Shanghai. In this study, it was argued that patients may take their medications often if its cost is reasonable or free and therefore this might improve compliance to therapy.

The study was limited to selected public health facilities in medical outpatient clinics in Kilifi County. Therefore, the scope was partial and therefore the general representation of the study was affected. However, the study took place in a major referral hospital (level 4) and health centers where a large number of patients are treated hence good representation. The information by the respondents was not precise because of recall bias, the investigators were trained on the filling of a questionnaire, and participants were sufficiently informed on the relevance of the study.

## CONCLUSION

This study makes the following conclusions that the rate of compliance to antihypertensive therapy was low (14.6%) among the adult hypertensive patients in Kilifi County. Several reasons for poor compliance were observed such as social-demographic factors, patient's

knowledge, and healthcare service-related issues. Specifically age, education, income and knowledge highly influenced compliance. Similarly advice from healthcare providers, Cost of medication, and distance from health facility highly influenced compliance. Duration of treatment, knowledge, cost of medicines, and healthcare provider follow ups were independent risk factors for compliance to antihypertensive therapy.

## Recommendations

To combat barriers to optimum compliance, public health interventions that aim to increase knowledge on HTN and catalyze access to health services should be instituted as a matter of priority. More specifically County government should ensure consistent supply of antihypertensive and also consider waiving medical cost of these patients especially in level four and above hospitals. Health care providers ought to ensure that they regularly advise hypertensive patients on the significance of compliance to therapy.

## ACKNOWLEDGMENTS

Our sincere appreciation goes to the Department of Community Health and Epidemiology, Kenyatta University and study participants for their voluntary participation.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Ministry of Health. Kenya national guidelines for cardiovascular disease management. 2018. Available at: <http://www.health.go.ke> › 2018/06 › Cardiovascular-guidelines-2018\_A4\_Final. Accessed on 10 May 2021.
2. Agbor N, Takah F, Aminde N. Prevalence and factors associated with medication adherence among patients with hypertension in sub-Saharan Africa: protocol for a systematic review and meta-analysis. *BMJ Open*. 2018;8(3).
3. Mohamed SF, Mutua MK, Wamai R. Prevalence, awareness, treatment and control of hypertension and their determinants: results from a national survey in Kenya. *BMC Public Health*. 2018;18:1219.
4. Van Kleef E, Spiering W. Hypertension is overly important but under-controlled. *European Journal of Preventive Cardiology*. 2017;24(3):36-43.
5. WHO. Geneva hypertension fact sheet. 2019. Available at: <https://www.who.int/health-topics/hypertension/>. Accessed on 4 August 2020.
6. Cappuccio P, Miller A. Cardiovascular disease and hypertension in sub-Saharan Africa: burden, risk, and interventions. *Internal and emergency medicine*. 2016;11(3):299-305.

7. Sheppard-Law S, Zablotska-Manos I, Kermeen M, Holdaway S, Lee A, George J et al. Factors associated with non-adherence to HBV antiviral therapy. *Antiviral Therapy*. 2018.
8. Ministry of Health. Kenya Stepwise survey for Non-Communicable Diseases. 2015. Available at: <http://www.health.go.ke> > Steps-Report-NCD-2015. Accessed on 4 August 2021.
9. Sodovsuren N, Unurjargal T, Sanjaa N. A2030 Non-adherence to medication and risk factors of non-compliance among Mongolian people with arterial hypertension. *Journal of Hypertension*. 2018;36:e130.
10. Kazaure Z, Abubakar A, Ibrahim S, Gidado S, Sabitu K, Nguku P. Factors for nonadherence to antihypertensive drugs among Federal Civil Servants attending health facilities—Abuja, FCT. *Sub-Saharan African Journal of Medicine*. 2017;4(1):20.
11. Asgedom SW, Atey TM, Desse TA. Antihypertensive medication adherence and associated factors among adult hypertensive patients at Jimma University Specialized Hospital, southwest Ethiopia. *BMC Res Notes*. 2018;11:27.
12. Tibebe A, Mengistu D, Bulto N. Adherence to prescribed antihypertensive medications and associated factors for hypertensive patients attending chronic follow-up units of selected public hospitals in Addis Ababa, Ethiopia. *International journal of health sciences*. 2017;11(4):47-52.
13. Rampamba M, Meyer C, Godman B, Kurdi A, Helberg E. Evaluation of antihypertensive adherence and its determinants at primary healthcare facilities in rural South Africa. *Journal of comparative effectiveness research*. 2018;7(7):661-72.
14. Mekonnen H, Gebrie H, Eyasu H, Gelagay A. Drug adherence for antihypertensive medications and its determinants among adult hypertensive patients attending in chronic clinics of referral hospitals in Northwest Ethiopia. *BMC Pharmacology and Toxicology*. 2017;18(1):27.
15. Adidja M, Valirie A, Aminde A, Ngwasiri A, Blackett N, Leopold A. Non-adherence to antihypertensive pharmacotherapy in Buea, Cameroon: A cross-sectional community-based study. *BMC Cardiovascular Disorders*. 2018;18(1):150.
16. Alefan Q, Huwari D, Alshogran OY, Jarrah MI. Factors affecting hypertensive patients' compliance with a healthy lifestyle. *Patient preference and adherence*. 2019;13:577-85.
17. Buda S, Hanfore K, Fite O, Buda S. Lifestyle modification practice and associated factors among diagnosed hypertensive patients in selected hospitals, South Ethiopia. *Clinical hypertension*. 2017;23(1):1-9.
18. Durai V, Muthuthandavan AR. Knowledge and practice on lifestyle modifications among males with hypertension. *Indian Journal of Community Health*. 2015;27(1):143-9.
19. Alefan Q, Huwari D, Alshogran OY, Jarrah MI. Factors affecting hypertensive patients' compliance with a healthy lifestyle. *Patient preference and adherence*. 2019;13:577-85.
20. Gichobi BW. Determinants of adherence to antihypertension therapy, Descriptive study in patients at Kerugoya Hospital [master's dissertation, UON]. Research direct. 2018. Available at: <http://hdl.handle.net/11295/105040>. Accessed on 4 August 2021.
21. Schulz M, Krueger K, Schuessel K. Medication adherence and persistence according to different antihypertensive drug classes: a retrospective cohort study of 255,500 patients. *Int J Cardiol*. 2016;220:668-76.
22. Pan J, Wu L, Wang H, Lei T, Hu B, Xue X et al. Determinants of hypertension treatment adherence among a Chinese population using the therapeutic adherence scale for hypertensive patients. *Medicine*. 2019;98(27).
23. Shah J, Singh V, Patil P, Gadkari R, Ramchandani V, Doshi J. Factors affecting compliance to antihypertensive treatment among adults in a tertiary care hospital in Mumbai. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*. 2018;43(1):53.
24. Khayyat M, Khayyat S, Alhazmi R. Predictors of medication adherence and blood pressure control among Saudi hypertensive patients attending primary care clinics: a cross-sectional study. *PloS One*. 2017;12.
25. Nielsen J, Shrestha D, Neupane D, Kallestrup, P. Non-adherence to antihypertensive medication in low-and middle-income countries: a systematic review and meta-analysis of 92443 subjects. *Journal of human hypertension*. 2017;31(1):14-21.
26. Boima V, Ademola AD, Odusola AO, Agyekum F, Nwafor CE, Cole H et al. Factors Associated with Medication Nonadherence among Hypertensives in Ghana and Nigeria. *International Journal of Hypertension*. 2015.
27. Vedanthan R, Tuikong N, Kofler C, Blank E, Kamano JH, Naanyu V et al. Barriers and Facilitators to Nurse Management of Hypertension: A Qualitative Analysis from Western Kenya. *Ethnicity & disease*. 2016;26(3):315-22.
28. Akoko BM, Fon PN, Ngu RC, Ngu KB. Knowledge of Hypertension and compliance with therapy among Hypertensive patients in the Bamenda Health District of Cameroon. *Across-sectional Study*. *Cardiol Ther*. 2017;6:53-67.
29. Getenet A, Tesfa M, Ferede A, Molla Y. Determinants of adherence to antihypertensive medications among adult hypertensive patients on follow-up in Hawassa Referral Hospital: A case-control study. *JRSM Cardiovascular Disease*. 2019;8.
30. Teshome, DF, Bekele, KB, Habitu YA. Medication adherence and its associated factors among hypertensive patients attending the Debre Tabor

General Hospital, northwest Ethiopia. *Integra Blood Pressure Control*. 2017;10:1.

31. Yue Z, Bin W, Weilin Q, Aifang Y. Effect of medication adherence on blood pressure control and risk factors for antihypertensive medication adherence. *Journal of evaluation in clinical practice*. 2015;21(1):166-72.
32. Rahmathulla V, Srinivasan A, Kannan S, Shareef A. Impact of hospital pharmacist education on adherence, knowledge, attitude, and practice of

hypertensive patients in a private multispecialty hospital. *Int J Pharm Sci Rev Res*. 2014;3(10):14-25.

**Cite this article as:** Moss JT, Kimani H, Mwanzo I. Compliance to antihypertensive therapy and associated factors among adults' hypertensive patients attending medical clinics in Kilifi County Kenya. *Int J Community Med Public Health* 2021;8:4655-65.