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# Assessment of patients' adherence to antihypertensive therapy in a teaching hospital in Ogun state, Nigeria

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## ABSTRACT

Adherence is important in reducing morbidity and mortality associated with uncontrolled hypertension. The aim of the study was to assess adherence of hypertensive patients to therapy. A cross sectional study was carried out on 325 patients on antihypertensive therapy. Data collection tools were modified Hill Bone medication adherence subscale and Health Belief Model scale. Descriptive statistics, Pearson correlation and Multiple Regression Analysis were employed for data analysis at 5% level of significance. Most respondents were female, (56.3%), ≤ 60 years (63.7%), and married (62.2%). Patients differed significantly in their adherence based on age (p=0.032) and gender (p=0.025), severity (p=0.021) susceptibility (p=0.001), benefits (0.031), barriers (p=0.015) and cue to action (p=0.010). Adherence rate of 59.1% was reported among the respondents in the study. The study outcomes highlight the need for interventions by pharmacists that promote adherence to antihypertensive medications.

**Keywords**: hypertension, adherence, antihypertensive medication, modified Hill-Bone adherence subscale, health belief model

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## INTRODUCTION

Hypertension is a chronic, non-communicable disease that affects individuals of various age groups, sex and socio-economic status[1]. Despite the advances made in prevention, detection, management and control of hypertension over the years, the disease remains a global public health concern[2]. It is a major risk factor for stroke, ischaemic heart disease, other cardiovascular diseases and chronic kidney disease. It is a major cause of mortality, causing more than 10 million deaths globally every year[3,4]. In 2021 an estimated 1.28 billion adults aged 30-79 years had hypertension globally with about two-thirds living in low- and middle-income countries (LMICs)[5]. The burden of hypertension has been on the rise over the past few decades in sub-Saharan Africa. In West Africa, hypertension prevalence ranges from 12%-68%, while prevalence of hypertension is between 12%-36.8% in Nigeria[6-9]. Medication adherence, which is 'the degree to which a person's behavior corresponds with the agreed recommendations from a healthcare provider is important, especially in management of chronic illnesses[10]. There have been documented cases of individuals who do not, however adhere to their medication regimen[11-14]. World Health Organization also reported that in developed countries, up to 50% of patients with chronic illnesses do not adhere to their medications, while the adherence rate is even lower in developing countries[10]. Hypertension is associated with one of the highest risks of premature mortality[15]. Poor adherence to antihypertensive therapy has been associated with various issues such as poor blood pressure control, re-hospitalization and increase healthcare costs[16,17]. Reports also show that blood pressure control is associated with marked reductions in cardiovascular events and reduced mortality[18]. Thus, it is important to improve patient adherence to antihypertensive therapy so as to achieve desirable blood pressure control[12]. The Health Belief Model (HBM) has been used to explain and predict the health behaviours of individuals for preventing and/or controlling diseases (such as hypertension) and their complications. It has shown efficacy in predicting health behaviors in individuals with or at risk of developing cardiovascular disease[19]. It was introduced in the 1950s by social psychologists Godfrey Hochbaum, Irwin Rosenstock and Stephen Kegels and is used to explain a wide range of health behaviour[20]. The Health Belief Model constructs can be used to study non-adherence to hypertension and other chronic diseases. It predicts health-related behaviour with six constructs, which are: perceived susceptibility to a health problem, perceived severity of the health problem, benefits of taking action, barriers to taking action, cues to action and self-efficacy[21]. The Health Belief Model postulates that for a person to avoid a disease, the individual should believe that he/she is susceptible to the disease and that

having the disease will cause a degree of severity of the disease on some aspect of the person's life. Also, undertaking a particular action would be favourable to health and the action would have to overcome barriers such as convenience, cost, discipline and time. Cues to action is the trigger for protective health behavior and can be internal (such as the appearance of the signs and symptoms of a disease) or external (such as the impact of mass media-radio, television, or advice from relatives, friends and health providers)[22]. The HBM has been used to assess people's behavior to diagnosed illnesses, especially with regards to adherence to medication regimens. The Hill Bone medication adherence subscale assesses hypertensive patient's behavior with regard to medication adherence[23]. Several countries have carried out studies on adherence to antihypertensive medication using the health belief model and Hill Bone medication adherence subscale[22-25]. Limited studies have, however been carried out on adherence in hypertensive patients in Nigeria using the Hill Bone medication adherence subscale and the health belief model[19]. The aim of this study was to assess adherence of hypertensive patients to therapy using the Hill Bone medication adherence subscale and evaluate the influence of the health belief model on adherence at the Medical Out-Patient Department of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun state, Nigeria.

## METHODOLOGY

### Study setting

The study was conducted at the Medical Outpatient Department (MOPD) of Olabisi Onabanjo University Teaching Hospital, Sagamu**.** Olabisi Onabanjo University Teaching Hospital is a tertiary care facility located in Sagamu, a suburban town with a population of 253.412[26].

### Study design

The study was a descriptive cross-sectional design which was conducted by pharmacists for 12 weeks from July to October, 2018.

### Study population

All patients with hypertension, who were receiving antihypertensive therapy and met the following criteria:

### Inclusion criteria

Hypertensive patients who were 18 years and above at the time of the study, had been on antihypertensive therapy for at least 6 months and who consented to participate in the study.

**Exclusion criteria**

Hypertensive patients less than 18 years of age, yet to be placed on therapy, those too sick to participate and those who did not consent to participate in the study.

**Sample size determination**

A sample size of 333 was calculated for this study using Kirkwood[27] sample size determination formula:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where:

**n**= sample size

**p**=expected proportion in population based on previous studies or pilot studies (31.8%)

**d**= margin of sampling error acceptable (0.05)

**Z= S**tandard normal deviate corresponding to 95% confidence level=1.96.

**Sampling procedure**

Hypertensive patients attending clinics between 8 am and 2 pm from Monday to Friday, who met the inclusion criteria, were randomly sampled for the study.

**Ethical approval**

Ethical approval was obtained from the Human Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital with reference number OOUHREC/PHARM/B/000123.

**Data collection tool**

The data collection tool was a pre-tested, self-report questionnaire which comprised of seven sections- A, B, C, D, E, F and G. Section A contained 10 items on demographic variables of participants. Section B contained 8 items on adherence to anti-hypertensive therapy adapted from the Hill-Bone medication adherence subscale. Section C contained 6 items on perceived severity of hypertension in patients. Section D contained 6 items on patients' perception on susceptibility. Section E contained 6 items on perceived benefits of adherence to anti-hypertensive therapy. Section F contained 5 items on perceived barriers of non-adherence to anti-hypertensive therapy. Section G contained 7 items on patients' perception on cue to action.

The items in section B (the Hill-Bone medication adherence subscale) were on a four-point Likert scale of daily (1), frequently (2), rarely (3) and never (4) with total score ranging from 8 (minimum) to 32 (maximum). Sections C, D, E, F and G (the Health Belief Model) were on a four-point Likert scale which were: strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD). The scores attached to these scales were: SA = 4; A = 3; D = 2; SD = 1.

**Validity**

The questionnaire was translated from English to Yoruba language which is the language spoken predominantly in the area. After translation it was back-translated and compared to the original questionnaire to check for differences and make necessary revisions in order to ensure that the meaning of the original questionnaire is retained.

For content validity, the questionnaire was examined by two cardiologists working at Cardiac unit at General Hospital, Ikorodu, Lagos State. The researcher held discussions with the cardiologists to look into issues of clarity, specificity of variables to be measured and relevance of the contents of the questionnaire in Nigerian context. The study instrument was pretested using 10 patients on antihypertensive therapy at another hospital not used in the main study (General Hospital in Ikorodu, Lagos State).

**Reliability**

The Cronbach Alpha values obtained were 0.840, 0.729, 0.710, 0.682, 0.675 and 0.680 for adherence, perceived severity, perceived susceptibility, perceived benefit, perceived barriers and perceived cue to action respectively of which adherence, perceived severity, perceived susceptibility are above the reference value of 0.7[28].

**Data collection**

Data were collected by the researcher and two trained assistants. The questionnaire consisted of closed ended questions and was written in English language that is understood and well-spoken by most Nigerians. The Yoruba version of the questionnaire was given to those who didn't understand English. The time used to complete one form was about 15 minutes. Data was collected within a period of 12 weeks.

**Outcome measure**

The main outcome measure was the percentage of patients with adherence levels to antihypertensive medication ≥80% using the modified Hill Bone medication adherence subscale[24]. Secondary outcome measures were predictors of adherence to antihypertensive therapy.

### Data analysis

Data were entered into the computer using SPSS version 17.0. Data were summarized using frequency tables and cross tabulations. Descriptive statistics such as mean, standard deviation and simple percentage analysis were employed to compare rate of adherence. Pearson correlation analysis was done to determine the relationship between the independent variables and the dependent variable in the study. Multiple regression analysis was adopted to determine the combined effect of psycho-social variables suggested by Health Belief Model on adherence to antihypertensive therapy. The test was conducted at 5% level of significance.

## RESULTS and DISCUSSION

### Socio-demographic data of respondents

Out of 333 questionnaires distributed, a total of 325 (97.6% response rate) were retrieved. Most of the respondents (63.7%) were 60 years and below, female (56.3%) and married (62.2%). Sixty-nine respondents (21.2%) had no formal education, while only forty two (12.9%) had tertiary education as shown in Table 1.

**Table 1.** Socio-demographic variables of Respondents

| Variable | Frequency | % |
|---|---|---|
| **Age** | | |
| ≤60 years | 207 | 63.7 |
| > 60 years | 118 | 36.3 |
| **Gender** | | |
| Male | 142 | 43.7 |
| Female | 183 | 56.3 |
| **Marital Status** | | |
| Married | 202 | 62.2 |
| Separated | 51 | 15.7 |
| Widowed | 72 | 22.1 |
| **Highest Educational Qualification** | | |

| | | |
|---|---|---|
| None | 69 | 21.2 |
| Primary Education | 85 | 26.2 |
| Secondary Education | 129 | 39.7 |
| Tertiary education | 42 | 12.9 |
| Occupation: | | |
| Unemployed | 166 | 51.1 |
| Employed | 159 | 48.9 |

**Adherence to therapy based on socio-demographic variables**

Most respondents (75.8%) who were 60 years and below were adherent to their medications. The adherence rates of male and female patients were 46.5% and 68.8% respectively. The adherence rate was higher among married patients (69.8%) than separated and widowed patients (45.1% and 38.9% respectively). Adherence rate was also higher among patients with tertiary education (76.2%) than those with primary, secondary or no education. Patients who were employed had higher adherence rate (78.0%) than those who were not employed (40.1%).

Age and gender were significantly associated with adherence (p=0.032 and p=0.025 respectively) as shown in Table 2.

**Table 2.** Adherence to therapy based on socio-demographic variables

| Variables | Therapy Adherence | | | | p-value |
|---|---|---|---|---|---|
| | Non-Adherent | % | Adherent | | |
| | Frequency | | Frequency | % | |
| **Age** | | | | | |
| ≤60 years | 50 | 24.2 | 157 | 75.8 | 0.032* |
| >60 years | 83 | 70.3 | 35 | 29.7 | |
| **Gender** | | | | | |
| Male | 76 | 53.5 | 66 | 46.5 | 0.025* |
| Female | 57 | 31.1 | 126 | 68.8 | |
| **Marital Status** | | | | | |
| Married | 61 | 30.2 | 141 | 69.8 | 0.071 |
| Separated | 28 | 54.9 | 23 | 45.1 | |
| Widowed | 44 | 61.1 | 28 | 38.9 | |
| **Educational Background** | | | | | |
| None | 24 | 41.7 | 35 | 58.3 | 0.068 |
| Primary Education | 41 | 48.2 | 44 | 51.8 | |
| Secondary Education | 57 | 44.2 | 72 | 55.8 | |
| Tertiary Education | 10 | 23.8 | 32 | 76.2 | |
| **Occupation** | | | | | |
| Unemployed | 98 | 59 | 68 | 40.1 | 0.081 |
| Employed | 35 | 22 | 124 | 78 | |

*p<0.05 is significant

### Patients' adherence to antihypertensive medications

One hundred and ninety-two patients (59.1%) were adherent to their antihypertensive medications as shown in Figure 1.

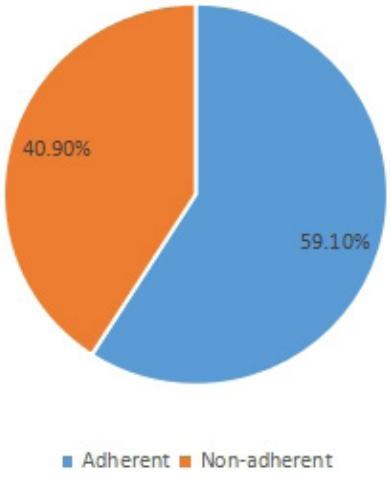


**Figure 1.** Patient adherence to antihypertensive medications

### Adherence to therapy based on psycho-social variables

Patients with high perception of severity of their health condition had higher adherence rate of 79.7% compared to patients with low perceived severity. Adherence rates of hypertensive patients with low and high perceptions of susceptibility of having hypertension were 47.7% and 72.2% respectively. The adherence rates of hypertensive patients with low and high perceptions on the benefits of using antihypertensive medications were 39.2% and 78.1% respectively. Patients with low perception of barriers to treatment had higher adherence rate to antihypertensive therapy of 70.2% compared to those with high perception of barrier of 49.4%. Hypertensive patients with high perceived cues to action had higher adherence rate (71.0%) than patients with low perceived cues to action.

Adherence to therapy was significantly associated with patients' perception on severity, susceptibility, benefits, barriers and cue to action as shown in Table 3 ($p=0.021$, $p=0.001$, $p=0.031$, $p=0.0015$ and $p=0.010$ respectively).

**Table 3.** Adherence to therapy based on psycho-social variables

| Patients Perceptions on | Therapy Adherence | | |
|---|---|---|---|
| | Non-Adherence | Adherence | |
| | Frequency(%) | Frequency(%) | p-Value |
| **Severity** | | | |
| Low | 109(52.7) | 98(47.3) | 0.021* |
| High | 24(20.3) | 94(79.7) | |
| **Susceptibility** | | | |
| Low | 91(52.3) | 83(47.7) | 0.001* |
| High | 42(27.8) | 109(72.2) | |
| **Benefits** | | | |
| Low | 96(60.8) | 62(39.2) | 0.031* |
| High | 37(21.9) | 132(78.1) | |
| **Barriers** | | | |
| Low | 45(29.8) | 106(70.2) | 0.015* |
| High | 88(50.6) | 86(49.4) | |
| **Cue to Action** | | | |
| Low | 88(51.8) | 82(48.2) | 0.010* |
| High | 45(29.0) | 110(71.0) | |

*$p<0.05$ is significant

### Patients' reasons for non-adherence to therapy

Reasons for non-adherence among the patients included forgetting to take medications, sense of feeling better, perceived deteriorating health despite the use of therapy, perceived ineffectiveness of the medication and cost of medications as shown in Figure 2.

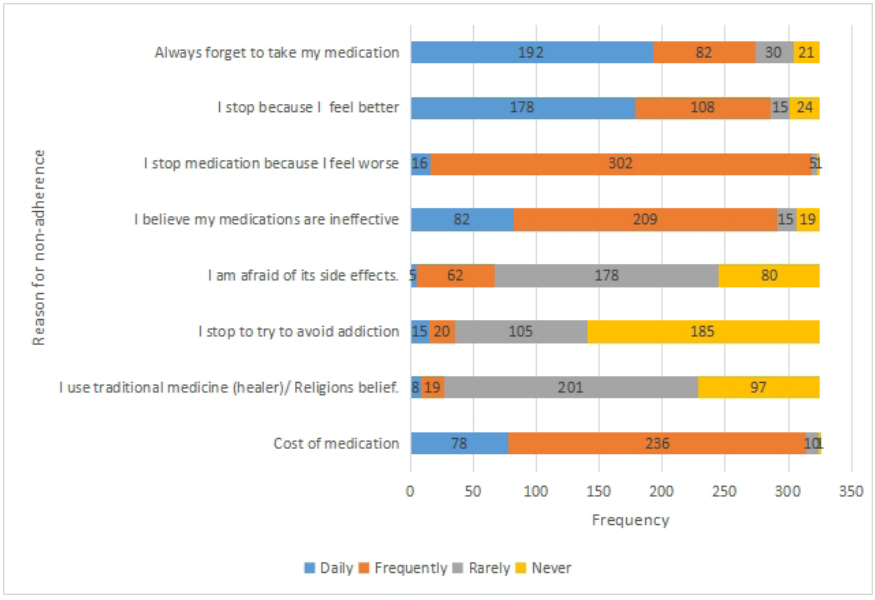


**Figure 2.** Patients' reasons for non-adherence to therapy

### Relationship between psycho-social variables of health belief model and adherence to therapy by hypertensive patients

There was significant (positive but low) relationship between therapy adherence and perceived severity ($r= 0.104$; $p<0.05$). Furthermore, the result revealed that there was no significant relationship between adherence to therapy and perceived susceptibility ($r= 0.141$; $p>0.05$).

Likewise, there was significant (positive but low) relationship between perceived benefits and adherence to therapy ($r= 0.274$; $p<0.05$) However, perceived barriers had significant (negative but moderate) relationship with adherence to therapy ($r= -0.528$; $p<0.05$). Perceived cue to action had significant (positive but low) relationship with adherence to therapy ($r= 0.197$; $p<0.05$). More so, there was significant (positive but low) relationship between perceived severity of hypertension and perceived susceptibility ($r = 0.285$; $p<0.05$). Also, perceived severity had significant (positive but low) relationship with cues to action ($r = 0.202$; $p<0.05$). Perceived benefit of using medication showed significant negative, moderate relationship with perceived barriers ($r = -0.45$; $p<0.000$). Also perceived benefits of using medication showed moderate positive relationship with cues to action ($r = 0.323$; $p<0.05$).

**Table 4.** Relationship between psycho-social variables suggested by HBM and adherence to therapy (n=325)

| Variables | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Adherence to therapy (1) | 1.000 | | | | | |
| Perceived Severity (2) | .104* | 1.000 | | | | |
| Perceived Susceptibility (3) | .141 | .285** | 1.000 | | | |
| Perceived Benefits (4) | .274** | .090 | -.062 | 1.000 | | |
| Perceived Barriers (5) | -.528** | -.090 | .061 | -.449** | 1.000 | |
| Perceived Cue to Action (6) | .197* | .202* | .180* | .323* | .323 | 1.000 |

* Correlation is significant at the 0.05 level (2-tailed).

** Correlations is significant at 0.01 level (2-tailed).

## The composite effect of psycho-social variables on adherence to therapy

The predictor variables were perceived severity, perceived susceptibility, perceived benefit, perceived barriers and cues to action. The result indicated significant model fit for the data ($F = 12.911$; $p<0.05$). The amount of variance in therapy adherence which is accounted for by the predictors is 32.8% ($R^2 = 0.328$) while other variables accounted for 67.2%. Perceived barrier being the strongest predictor of adherence to therapy by patients suffering from hypertensive ($\beta = -0.477$; $p=0.000$). A negative beta coefficient indicates a negative association between perceived barriers and adherence to therapy. Other predictor variables such as perceived severity, perceived susceptibility, perceived benefit and cues to action were not statistically associated with adherence of patients to antihypertensive therapy.

Reported adherence rate to antihypertensive therapy among the patients in this study was 59.1%. There was a significant association between age, gender of patients and adherence to antihypertensive medications while marital status, educational level and occupation of patients had no significant association with adherence. Also, there was significant association in adherence to therapy by patients according to their perceptions on severity, susceptibility, benefits, barriers and cue to action. Reasons for non-adherence to therapy reported in the study included forgetting to take medication, sense of feeling better, deteriorating

health despite the use of therapy, ineffectiveness of the therapy and cost of medications. Furthermore, the result revealed that psycho-social variables had significant combined effect on adherence rate to therapy and that perceived barrier was the only psycho-social variables potently predicting adherence to therapy.

The rate of adherence in this study is similar to that reported by Takahashi et al.[29] who conducted a study in 3 district hospitals in South-Eastern Asia and reported that half of the hypertensive patients (50%) adhered to antihypertensive medication. Ambaw et al.[30] reported a higher adherence rate of 64.6% in a hospital in Ethiopia while Algabbani and Algabbani[3], and Hussein et al.[12] reported lower adherence to antihypertensive therapy by patients of 42.2% and 46.12 respectively.

The study found that more hypertensive patients 60 years and below adhered to their antihypertensive medication compared to older hypertensive patients. Similarly, Joho[31] who conducted a cross-sectional study of hypertensive patients in 3 district hospitals in Dar es Salaam Tanzania reported that hypertensive patients who were less than 64 years had higher adherence rate than those who were 65 years and above. However, Hussein et al.[12] reported that younger age (<40 years) was a significant predictor of adherence compared to older patients. In contrast, Lee et al.[32] conducted a study in South Korea and found that older people adhered more to antihypertensive therapy compared to younger people. Probable reason could be perceived susceptibility and severity. However, in a cross-sectional study in Saudi Arabia conducted among hypertensive patients at primary health clinics in Prince Sultan Medical City there was no relationship between age and medication adherence[3]. There was a higher rate of adherence reported by female patients compared to male patients in the study which was significant. This finding was similar to reports by Joho,[31] who reported that females had higher adherence to antihypertensive therapy compared to males. The low rate of adherence to antihypertensive therapy by male patients may be due to fear of the side effect of antihypertensive drugs, one of which is erectile dysfunction[33]. Algabbani and Algabbani[3] reported no significant relationship between gender and adherence.

Hypertensive patients with tertiary education in the study had higher adherence rate compared to those with little or no educational background, which is similar to the studies by Hussein et al.[12] and Joho[31], in which patients with higher education were more adherent to their medication. The probable reason could be because education plays an important part in comprehension, retention, recollection and application of health information and knowledge and patients with higher level of education may have a better understanding of the importance of controlling their blood pressure and the consequences of

poor drug adherence[25]. Married hypertensive patients in the study reported higher adherence rate than separated and widowed patients. The help, care and support patients received from spouses could be a reason why there was higher rate of adherence among married patients compared to those who were not. This result supported the findings of Joho[31] who reported that married participants were more adherent to treatment than non-married participants. A study by Najjuma et al.[34] of Southwest Ugandan patients also reported that patient's family support contributed to medication adherence. A meta-analysis by Abegaz et al.[35] showed that interventions adapted to family engagement can improve antihypertensive adherence.

Reasons reported for non-adherence to antihypertensive therapy reported in the study included forgetfulness, cost of the medications, feeling better, fear of the side effects, avoiding addiction to drugs and use of traditional medicine. Similar reasons were reported by Takahashi et al.[29] in an observational study of hypertensive patients for not adhering to their medication regimen.

The study reported significant relationship between drug therapy adherence and perceived severity. This implies that the higher the perceived severity of hypertension the greater the adherence to therapy. There was however no significant relationship between adherence to therapy and perceived susceptibility. There was a significant relationship between perceived benefits and adherence to therapy. This implies that the higher the perceived benefit of therapy, the higher the adherence to treatment. Perceived barriers had significant negative relationship with adherence to therapy, meaning the higher the perceived barrier, the less the adherence. Perceived cue to action was significantly related with adherence to therapy meaning that when individuals receive more reminders of the importance of treatment adherence, they are more likely to adhere to medication. More so, there was significant relationship between perceived severity of hypertension and perceived susceptibility. This implies that the higher the perceived severity of hypertension the higher the perception of being vulnerable to the complications of hypertension. Also, perceived severity had significant relationship with cues to action implying that the higher the perceived severity of hypertension the higher the inclination to follow the cues to action (reminders). Perceived benefit of using medication showed significant negative relationship with perceived barrier, this meant that the higher the perception of benefit the lower the perception of barriers. Also perceived benefit of using medication showed positive association with cues to action, meaning that the higher the perception of benefit, the higher the inclination to heed reminders**.** Similarly**,** Joho[31] reported significant relationship between perceived susceptibility, perceived benefits of therapy, perceived barriers to

treatment, cues to action and adherence to antihypertensive therapy by hypertensive patients. In contrast, in the study reported by Osamor and Ojelabi[19], only perceived susceptibility, perceived benefit of medication and perceived barriers to treatment had significant relationship with adherence.

The study reported that out of all the five HBM variables, only perceived barriers to adherence significantly predicted the adherence rate of hypertensive patients to antihypertensive medication. In contrast, Osamor and Ojelabi[19] reported that only perceived susceptibility was a significant predictor of adherence.

A limitation of the study was that the sample size used was less than the calculated sample size. This can be improved in subsequent studies by making allowance for attrition. Also, test-retest reliability was not carried out which should have further helped to determine the reliability of the test instrument used in the study. Another study limitation is that the study was conducted in only one healthcare facility. Multi-centre studies will ensure that the results can be generalized.

In the study, 59.1% of patients adhered to therapy. Age and gender were significantly associated with adherence. With the exception of perceived susceptibility, all the health belief constructs correlated with adherence to therapy. Perceived barriers to adherence significantly predicted adherence of patients to therapy. Pharmacists should educate patients on importance of drug adherence for better blood pressure control.

## STATEMENT OF ETHICS

Ethical approval was obtained from the Human Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital with reference number OOUHREC/PHARM/B/000123.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTIONS

OAA was involved in study design, data collection and analysis. TOA and HO were involved in data collection and preparation of manuscript draft. All authors contributed to revision of the draft, reading and approval of the final manuscript.

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