



Research Article

Adherence with Hypertension Prevention Measures among Hypertensive Patients Attending Clinics in Umaru Shehu Ultra-Modern Hospital, Maiduguri

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ABSTRACT

Hypertension remains a major global public health challenge, with suboptimal adherence to prevention measures contributing to increased morbidity and mortality. This study assessed adherence to hypertension prevention measures among hypertensive patients attending clinics in Umaru Shehu Ultra-Modern Hospital, Maiduguri, Borno State, Nigeria. A descriptive cross-sectional study design was employed, and data were collected from 350 hypertensive patients through a structured, pretested questionnaire. Respondents were selected using a systematic sampling technique. Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25, employing descriptive statistics such as frequencies, percentages, means, and standard deviations, as well as Chi-square tests to examine associations between adherence levels and socio-demographic variables. Results showed that adherence to lifestyle modification measures was moderate, with higher compliance to dietary control and reduced salt intake, but lower adherence to regular physical activity and weight management. Blood pressure monitoring routines showed relatively better adherence, though home monitoring was inconsistent. Factors influencing adherence included affordability of care, quality of counselling, presence of side effects, family support, and cultural or religious beliefs. No significant association was found between adherence level and socio-demographic characteristics. The study concludes that multiple, interrelated factors hinder optimal adherence to hypertension prevention measures. It recommends strengthening patient education, enhancing counselling services, improving access to affordable care, promoting physical activity, leveraging family and community support, addressing cultural barriers, and implementing reminder systems to improve adherence.

Keywords: Adherence; Blood Pressure Monitoring; Hypertension; Lifestyle Modification; Maiduguri; Medication Compliance

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INTRODUCTION

Hypertension, also called high blood pressure, is one of the most common chronic diseases globally. It occurs when the force of blood against the artery walls is persistently high, often defined as blood pressure above 140/90 mmHg (World Health Organization (WHO), 2023). Although it is largely

preventable and manageable, hypertension is a major risk factor for stroke, heart failure, kidney disease, and premature death (Ogah *et al.*, 2015; Adeloye *et al.*, 2015). The growing burden of hypertension has become a critical public health issue not only because of the increasing number of people affected, but also

because of its silent nature and its links to lifestyle and behavioral factors.

Globally, more than 1 billion people are estimated to live with hypertension, with the majority residing in low- and middle-income countries (NCD Risk Factor Collaboration, 2021). Many of these individuals are unaware of their condition, and among those diagnosed, only a small fraction achieve adequate control of their blood pressure through consistent treatment and preventive practices (Kayima *et al.*, 2019). In Africa, the situation is particularly alarming, as the region has one of the highest rates of uncontrolled hypertension worldwide due to weak health systems, poverty, and low health literacy (Mills *et al.*, 2016; Adeloye *et al.*, 2021).

In Nigeria, studies have shown that about 30% of adults live with hypertension, and this number is increasing due to urbanization, sedentary lifestyles, unhealthy diets, and poor access to preventive care (Akinlua *et al.*, 2015; Amanyire *et al.*, 2019). Government and health organizations have made efforts to raise awareness, provide medication, and promote healthy behaviours. However, these efforts often fall short of translating into long-term adherence among patients. Adherence, in this context, refers to the degree to which individuals follow recommended health behaviours such as taking medications regularly, eating a low-salt diet, exercising, and checking their blood pressure (BabaeeBeigi *et al.*, 2014; WHO, 2020). While knowledge about hypertension prevention may be increasing, the actual practice of healthy behaviours remains low in many settings. A significant number of patients fail to maintain dietary changes or take their prescribed medications consistently (Fisher *et al.*, 2011; Anyanti *et al.*, 2020). Some discontinue treatment when they feel better, while others lack motivation or struggle with the cost and availability of medications (Cohn *et al.*, 2012). In some cases, cultural beliefs and lack of family or community support also play a role in poor adherence (Ahaneku *et al.*, 2011). This gap between knowledge and practice continues to fuel complications and hospital readmissions.

In conflict-affected areas like Maiduguri in Borno State, the challenges are even greater. Years of insecurity have damaged infrastructure and disrupted access to regular healthcare. Many people live in displacement camps or under financial strain, making it difficult to prioritize long-term health conditions such as hypertension (Ogungbe *et al.*, 2024). Even when patients access clinics, factors such as overcrowding, shortage of medications, or lack of

follow-up reduce the impact of care. Despite these issues, there is limited research on how well patients are adhering to preventive measures, especially in structured hospital settings like Umaru Shehu Ultra-Modern Hospital, Maiduguri.

Umaru Shehu Ultra-Modern Hospital, Maiduguri is one of the leading public health facilities in Maiduguri and serves as a referral center for many hypertensive patients. The hospital offers regular health talks, clinical management, and follow-up appointments for those diagnosed with hypertension. However, little is known about whether patients are truly putting the knowledge they receive into practice. Do they take their drugs consistently? Are they modifying their lifestyle in the ways advised by healthcare professionals? Are there specific social, economic, or cultural factors that influence their ability to adhere to health guidelines? This study seeks to explore these questions by evaluating adherence to hypertension prevention measures among patients attending the clinic. By focusing on this specific group, the study aims to identify patterns and barriers in patient behaviour and provide evidence that can help improve healthcare delivery and support for hypertensive patients in Maiduguri and similar environments.

MATERIALS AND METHODS

Research Design

This study adopts a descriptive cross-sectional research design. This approach was chosen because it allows the researcher to collect data at a single point in time from a defined population. It is especially suitable for measuring current levels of adherence and identifying associated factors without manipulating any variables. Since the study does not involve any form of intervention or follow-up, the cross-sectional design provided a simple and efficient way to assess adherence behaviours among hypertensive patients attending clinics at Umaru Shehu Ultra-Modern Hospital.

Hypothesis

There is no relationship between Blood Pressure Level and Selected Sociodemographic Variable

Sample Size Determination

The sample size for this study was calculated using Yamane's formula for determining sample size from a finite population:

$$n = \frac{N}{1 + N(e^2)}$$

Where:

n = required sample size

$N = N$ = estimated hypertensive population at the hospital (assumed to be 1,500 patients annually based on hospital records)

e = margin of error (0.05 for 95% confidence level)

$$n = \frac{1500}{1 + 1500(0.0025)}$$

$$n = \frac{1500}{1 + 3.75}$$

$$n = \frac{1500}{4.75}$$

$$n \approx 315.8 \approx 316$$

To account for non-response or incomplete data, a 10% buffer was added:

$$10\% \text{ of } 316 = 31.6 \Rightarrow 316 + 32 = 348 \text{ participants (rounded to 350)}$$

Therefore, the final sample size for this study was set at 350 hypertensive patients.

Sampling Technique

A systematic random sampling method was used. Based on daily patient attendance, every n^{th} patient on the clinic registry was approached for participation. The sampling interval was determined by dividing the total estimated clinic population during the study period by the desired sample size. If a selected participant declined, the next eligible person on the list was invited.

Instrument for Data Collection

Data was collected using a structured, interviewer-administered questionnaire, developed based on reviewed literature and aligned with the study objectives. The reliability index was established using Cronbach's Alpha and the result is 0.763. The data was collected following collection of an introduction from the Department of Nursing ABU Zaria which was presented to **Umaru Shehu Ultra-Modern Hospital, Maiduguri** of Health Research and Ethical Committee for ethical approval. The duration for the data collection was for a period of two weeks.

The questionnaire had four sections:

Section A: Sociodemographic data (e.g., age, sex, marital status, education, occupation);

Section B: Lifestyle modification adherence contains 7 items (diet, exercise, alcohol, tobacco use);

Section C: Medication adherence and blood pressure monitoring practices contain 7 items; and

Section D: Barriers and motivators to adherence contain 7 items.

All items were developed using simple, clear language and were mostly closed-ended for ease of analysis. Likert-scale responses were used to assess frequency and consistency of behaviours.

Data Analysis

Data collected was entered into IBM SPSS version 25 for analysis. Analysis was done in two phases: Descriptive Statistics: Frequencies, percentages, and means were used to describe sociodemographic characteristics and levels of adherence. Inferential Statistics: Chi-square tests were used to explore associations between sociodemographic variables and adherence levels and Logistic regression was used to identify predictors of adherence. A p-value of ≤ 0.05 was considered statistically significant. Results were presented using tables and charts where appropriate, with clear footnotes for interpretation.

Ethical Considerations

Ethical clearance for this study was obtained from the Borno State Health Research Ethics Committee. Approval was also secured from the management of Umaru Shehu Ultra-Modern Hospital, reference No124/2025. Before administering the questionnaire, participants received an information sheet and gave either written or verbal informed consent, depending on literacy levels. Participation was entirely voluntary. Respondents were assured of their confidentiality, and no personal identifiers were collected. Data was stored securely and used strictly for academic purposes.

RESULTS

Table 1 showed that, mean age in years was 2.86 (SD = 1.166), with a mode of 4, indicating that the majority were aged above 60 years (41.7%), followed by 31–45 years (16.0%) as the list in percentage. In terms of gender distribution, the mean value was 1.66 (SD = 0.474), with a mode of 2, showing that females formed the majority at 66.0%, while males accounted for 34.0%. Regarding marital status, the mean was 2.21 (SD = 0.735), with a mode of 2. Most respondents were married (70.0%), followed by single (9.1%) as the least. The educational level had a mean of 2.49 (SD = 1.170), with a mode of 1. Respondents with no formal education comprised 28.3%, followed by secondary education (22.6%), primary education (21.7%), and tertiary education (27.4%). Occupational status had a mean of 2.40 (SD = 1.087) and a mode of 2. Self-employed respondents constituted 27.1%, unemployed 26.6%, civil servants 26.0%, and retired individuals 20.3%. The duration since hypertension diagnosis showed a mean of 2.47 (SD = 1.132), with a mode of 2. Respondents diagnosed for 1–3 years formed the largest group (27.7%), followed closely by those diagnosed over 6 years (26.0%), less than 1 year (25.4%), and 4–6 years (20.9%).

Table 2 Level of Adherence to Lifestyle Modification Measures. The mean scores for adherence indicators ranged from 2.41 to 2.56. Specifically, the mean score for eating a low-salt diet was 2.53 (SD = 1.064; variance = 1.133), avoiding fried or fatty foods 2.56 (SD = 1.121; variance = 1.256), consuming fruits and vegetables regularly 2.54 (SD = 1.129; variance = 1.275), engaging in physical exercise 2.41 (SD = 1.164; variance = 1.355), and avoiding or reducing alcohol intake 2.51 (SD = 1.107; variance = 1.225). The mean score for not smoking or having quit smoking was 2.56 (SD = 1.110; variance = 1.233), while maintaining a healthy weight had a mean of 2.46 (SD = 1.101; variance = 1.212). In frequency distribution, 20.9% of respondents always ate a low-salt diet, 28.9% sometimes, 27.1% rarely, and 23.1% never. For avoiding fried or fatty foods, 23.1% always, 25.1% sometimes, 24.6% rarely, and 27.1% never.

Consuming fruits and vegetables regularly were reported always by 24.0%, sometimes by 25.1%, rarely by 23.7%, and never by 27.1%. Physical exercise participation was always by 30.3%, sometimes by 23.4%, rarely by 21.1%, and never by 25.1%. Avoiding or reducing alcohol was always by 23.7%, sometimes by 26.3%, rarely by 25.1%, and never by 24.9%. Not smoking or quitting was always by 22.6%, sometimes by 25.7%, rarely by 25.1%, and never by 26.6%. Maintaining a healthy weight was always by 26.3%, sometimes by 23.1%, rarely by 28.9%, and never by 21.7%.

The composite lifestyle adherence score (lifestyle score) had a mean of 2.5090 (SD = 0.42219; variance = 0.178), with values ranging from 1.29 to 3.57. Based on categorization, 7.7% had high adherence, 75.1% moderate adherence, and 17.1% low adherence as presented in Table 3.

Table 1: Sociodemographic Characteristics of Respondents (n = 350)

| Variable | Category | n | % |
|------------------------------------|---------------------|-----|------|
| Age in years | 18–30 | 70 | 20.0 |
| | 31–45 | 56 | 16.0 |
| | 46–60 | 78 | 22.3 |
| | Above 60 | 146 | 41.7 |
| Gender | Male | 119 | 34.0 |
| | Female | 231 | 66.0 |
| Marital status | Single | 32 | 9.1 |
| | Married | 245 | 70.0 |
| | Widowed | 40 | 11.4 |
| | Divorced | 33 | 9.4 |
| Educational level | No formal education | 99 | 28.3 |
| | Primary | 76 | 21.7 |
| | Secondary | 79 | 22.6 |
| | Tertiary | 96 | 27.4 |
| Occupation | Unemployed | 93 | 26.6 |
| | Self-employed | 95 | 27.1 |
| | Civil servant | 91 | 26.0 |
| | Retired | 71 | 20.3 |
| Duration of hypertension diagnosis | Less than 1 year | 89 | 25.4 |
| | 1–3 years | 97 | 27.7 |
| | 4–6 years | 73 | 20.9 |
| | Over 6 years | 91 | 26.0 |

Table 2: Frequency Distribution of Responses to Lifestyle Modification Measures (n = 350)

| Lifestyle Modification Measure | Always n (%) | Sometimes n (%) | Rarely n (%) | Never n (%) |
|---|--------------|-----------------|--------------|-------------|
| Eat a low-salt diet | 73 (20.9) | 101 (28.9) | 95 (27.1) | 81 (23.1) |
| Avoid fried or fatty foods | 81 (23.1) | 88 (25.1) | 86 (24.6) | 95 (27.1) |
| Consume fruits and vegetables regularly | 84 (24.0) | 88 (25.1) | 83 (23.7) | 95 (27.1) |
| Engage in physical exercise | 106 (30.3) | 82 (23.4) | 74 (21.1) | 88 (25.1) |
| Avoid or reduce alcohol intake | 83 (23.7) | 92 (26.3) | 88 (25.1) | 87 (24.9) |
| Do not smoke or have quit smoking | 79 (22.6) | 90 (25.7) | 88 (25.1) | 93 (26.6) |
| Maintain healthy weight | 92 (26.3) | 81 (23.1) | 101 (28.9) | 76 (21.7) |

Table 3: Distribution of Respondents by Lifestyle Adherence Level (n = 350)

| Lifestyle Adherence Level | N | % |
|---------------------------|-----|------|
| High | 27 | 7.7 |
| Moderate | 263 | 75.1 |
| Low | 60 | 17.1 |

The relationship between lifestyle adherence levels and the respondents' age group table 4 showed that, among those aged 18–30 years, 5.7% had high adherence, 15.7% had low adherence, and 78.6% had moderate adherence. In the 31–45 years group, 5.4% had high adherence, 8.9% had low adherence, and 85.7% had moderate adherence. For respondents aged 46–60 years, 15.4% recorded high adherence, 16.7% recorded low adherence, and 67.9% had moderate adherence. Among participants above 60 years, 5.5% had high adherence, 21.2% had low adherence, and 73.3% had moderate adherence.

By gender, 9.2% of males and 6.9% of females had high adherence, while low adherence was reported by 18.5% of males and 16.5% of females. Moderate adherence was observed in 72.3% of males and 76.6% of females. In relation to marital status, 9.4% of single respondents, 7.8% of married respondents, and 10.0% of widowed respondents had high adherence, while low adherence was recorded for 15.6%, 17.1%, and 12.5% respectively. Moderate adherence accounted for 75.0%, 75.1%, and 77.5% in the single, married, and widowed groups respectively. Among divorced respondents, 3.0% had high adherence, 24.2% had low adherence, and 72.7% had moderate adherence.

For educational level, 11.1% of respondents with no formal education, 7.9% with primary education, 6.3% with secondary education, and 5.2% with tertiary education had high adherence. Low adherence was recorded in 15.2%, 14.5%, 25.3%, and 14.6% respectively, while moderate adherence accounted for 73.7%, 77.6%, 68.4%, and 80.2% respectively. By occupation, 6.5% of unemployed respondents, 9.5% of self-employed respondents, 8.8% of civil servants, and 5.6% of retired respondents had high adherence. Low adherence was found in 21.5%, 12.6%, 16.5%, and 18.3% respectively, while moderate adherence was reported by 72.0%, 77.9%, 74.7%, and 76.1% respectively.

Considering duration since hypertension diagnosis, respondents diagnosed less than one year had 5.6% high adherence, 22.5% low adherence, and 71.9% moderate adherence. For those diagnosed 1–3 years ago, high adherence was 14.4%, low adherence was 14.4%, and moderate adherence was 71.1%. In the 4–

6 years group, 4.1% had high adherence, 16.4% had low adherence, and 79.5% had moderate adherence. Respondents diagnosed over six years ago recorded 5.5% high adherence, 15.4% low adherence, and 79.1% moderate adherence.

Cross-tabulations revealed: By age group, high adherence was highest among those aged 46–60 years (15.4%) and lowest in those aged 31–45 years (5.4%), $\chi^2(6) = 12.929$, $p = 0.044$. By gender, males had 9.2% high adherence compared to 6.9% for females, $\chi^2(2) = 0.935$, $p = 0.627$. By marital status, widowed respondents had the highest proportion of high adherence (10.0%) and divorced the lowest (3.0%), $\chi^2(6) = 2.896$, $p = 0.822$.

By educational level, those with no formal education had the highest high adherence (11.1%), while tertiary education holders had the lowest (5.2%), $\chi^2(6) = 7.353$, $p = 0.289$. By occupation, self-employed respondents had the highest high adherence (9.5%), while retired had the lowest (5.6%), $\chi^2(6) = 3.573$, $p = 0.734$. By duration since diagnosis, those diagnosed for 1–3 years had the highest high adherence (14.4%) and 4–6 years the lowest (4.1%), $\chi^2(6) = 10.772$, $p = 0.096$.

Table 5 responses on medication adherence and blood pressure monitoring showed varied patterns among the 350 respondents. For taking medication exactly as prescribed, 25.7% reported "Always," 24.6% "Sometimes," 23.4% "Rarely," and 26.3% "Never" (Mean = 2.50, SD = 1.137, Variance = 1.294). For taking medication at the same time daily, 24.9% reported "Always," 24.9% "Sometimes," 24.3% "Rarely," and 26.0% "Never" (Mean = 2.51, SD = 1.127, Variance = 1.271). Following dosage instructions recorded 20.6% "Always," 24.3% "Sometimes," 27.1% "Rarely," and 28.0% "Never" (Mean = 2.63, SD = 1.100, Variance = 1.209). Refilling prescriptions on time showed 24.0% "Always," 27.7% "Sometimes," 25.7% "Rarely," and 22.6% "Never" (Mean = 2.47, SD = 1.088, Variance = 1.184). Monitoring blood pressure at home had 28.9% "Always," 25.1% "Sometimes," 24.9% "Rarely," and 21.1% "Never" (Mean = 2.38, SD = 1.113, Variance = 1.240). For going for regular check-ups, 25.4% responded "Always," 24.6% "Sometimes," 23.4% "Rarely," and 26.6% "Never" (Mean = 2.51, SD =

1.137, Variance = 1.294). Seeking medical advice for blood pressure changes recorded 24.9% “Always,” 21.1% “Sometimes,” 29.1% “Rarely,” and 24.9% “Never” (Mean = 2.54, SD = 1.116, Variance = 1.246).

(BP score) ranged from 1.29 to 3.71, with a mean of 2.51, standard deviation of 0.429, and variance of 0.184. The most frequent score was 2.43 (17.1%), followed by 2.29 (11.1%), and 2.86 (12.0%).

The composite medication and BP monitoring score

Table 4 Lifestyle Level by Sociodemographic Characteristics of Respondents (n = 350)

| Variable | Category | Lifestyle Level | n | % |
|--------------------------|---------------------|-----------------|-----|------|
| Age group | 18–30 | High | 4 | 5.7 |
| | | Low | 11 | 15.7 |
| | | Moderate | 55 | 78.6 |
| | 31–45 | High | 3 | 5.4 |
| | | Low | 5 | 8.9 |
| | | Moderate | 48 | 85.7 |
| | 46–60 | High | 12 | 15.4 |
| | | Low | 13 | 16.7 |
| | | Moderate | 53 | 67.9 |
| | Above 60 | High | 8 | 5.5 |
| | | Low | 31 | 21.2 |
| | | Moderate | 107 | 73.3 |
| Gender | Male | High | 11 | 9.2 |
| | | Low | 22 | 18.5 |
| | | Moderate | 86 | 72.3 |
| | Female | High | 16 | 6.9 |
| | | Low | 38 | 16.5 |
| | | Moderate | 177 | 76.6 |
| Marital status | Single | High | 3 | 9.4 |
| | | Low | 5 | 15.6 |
| | | Moderate | 24 | 75.0 |
| | Married | High | 19 | 7.8 |
| | | Low | 42 | 17.1 |
| | | Moderate | 184 | 75.1 |
| | Widowed | High | 4 | 10.0 |
| | | Low | 5 | 12.5 |
| | | Moderate | 31 | 77.5 |
| | Divorced | High | 1 | 3.0 |
| | | Low | 8 | 24.2 |
| | | Moderate | 24 | 72.7 |
| Educational level | No formal education | High | 11 | 11.1 |
| | | Low | 15 | 15.2 |
| | | Moderate | 73 | 73.7 |
| | Primary | High | 6 | 7.9 |
| | | Low | 11 | 14.5 |
| | | Moderate | 59 | 77.6 |
| | Secondary | High | 5 | 6.3 |
| | | Low | 20 | 25.3 |
| | | Moderate | 54 | 68.4 |
| | Tertiary | High | 5 | 5.2 |
| | | Low | 14 | 14.6 |
| | | Moderate | 77 | 80.2 |
| Occupation | Unemployed | High | 6 | 6.5 |
| | | Low | 20 | 21.5 |
| | | Moderate | 67 | 72.0 |

| | | | | |
|---------------------------------|---------------|----------|------|------|
| Duration since diagnosis | Self-employed | High | 9 | 9.5 |
| | | Low | 12 | 12.6 |
| | | Moderate | 74 | 77.9 |
| | Civil servant | High | 8 | 8.8 |
| | | Low | 15 | 16.5 |
| | | Moderate | 68 | 74.7 |
| | Retired | High | 4 | 5.6 |
| | | Low | 13 | 18.3 |
| | | Moderate | 54 | 76.1 |
| | < 1 year | High | 5 | 5.6 |
| | | Low | 20 | 22.5 |
| | | Moderate | 64 | 71.9 |
| | 1–3 years | High | 14 | 14.4 |
| | | Low | 14 | 14.4 |
| | | Moderate | 69 | 71.1 |
| | 4–6 years | High | 3 | 4.1 |
| | | Low | 12 | 16.4 |
| | | Moderate | 58 | 79.5 |
| Over 6 years | High | 5 | 5.5 | |
| | Low | 14 | 15.4 | |
| | Moderate | 72 | 79.1 | |

Table 5: Medication Adherence and Blood Pressure Management Practices of Respondents

| Practice | Response | n | % |
|--|-----------------|----------|----------|
| Take medication exactly as prescribed | Always | 90 | 25.7 |
| | Sometimes | 86 | 24.6 |
| | Rarely | 82 | 23.4 |
| | Never | 92 | 26.3 |
| Take medication at the same time daily | Always | 87 | 24.9 |
| | Sometimes | 87 | 24.9 |
| | Rarely | 85 | 24.3 |
| | Never | 91 | 26.0 |
| Follow dosage instructions | Always | 72 | 20.6 |
| | Sometimes | 85 | 24.3 |
| | Rarely | 95 | 27.1 |
| | Never | 98 | 28.0 |
| Refill prescriptions on time | Always | 84 | 24.0 |
| | Sometimes | 97 | 27.7 |
| | Rarely | 90 | 25.7 |
| | Never | 79 | 22.6 |
| Monitor blood pressure at home | Always | 101 | 28.9 |
| | Sometimes | 88 | 25.1 |
| | Rarely | 87 | 24.9 |
| | Never | 74 | 21.1 |
| Go for regular check-ups | Always | 89 | 25.4 |
| | Sometimes | 86 | 24.6 |
| | Rarely | 82 | 23.4 |
| | Never | 93 | 26.6 |
| Seek medical advice for BP changes | Always | 87 | 24.9 |
| | Sometimes | 74 | 21.1 |
| | Rarely | 102 | 29.1 |
| | Never | 87 | 24.9 |

Based on classification into adherence levels table 6, 9.4% of respondents had high adherence, 15.7% had low adherence, and 74.9% had moderate adherence to medication and blood pressure monitoring routines.

Analysis of responses from in Table 7 indicated varying levels of agreement with the listed influencing factors. For understanding the importance of adherence, 28.9% strongly agreed, 24.9% agreed, 23.1% disagreed, and 23.1% strongly disagreed (Mean = 2.41, SD = 1.133, Variance = 1.285). Affordability of medications and check-ups had 26.9% strongly agreeing, 24.9% agreeing, 24.6% disagreeing, and 23.7% strongly disagreeing (Mean = 2.45, SD = 1.124, Variance = 1.263).

Side effects as a discouraging factor for medication use showed 22.3% strongly agreeing, 26.3% agreeing, 21.1% disagreeing, and 30.3% strongly disagreeing (Mean = 2.59, SD = 1.139, Variance = 1.296). Adequate counselling was reported by 20.9% who strongly agreed, 28.0% who agreed, 24.0% who disagreed, and 27.1% who strongly disagreed (Mean = 2.57, SD = 1.099, Variance = 1.208). Family support for management efforts was confirmed by 22.6% strongly agreeing, 24.6% agreeing, 22.9% disagreeing, and 30.0% strongly disagreeing (Mean = 2.60, SD = 1.138, Variance = 1.295). Having time and energy to manage health recorded 26.6% strongly agreeing, 26.6% agreeing, 24.9% disagreeing, and 22.0% strongly disagreeing (Mean = 2.42, SD = 1.104,

Variance = 1.219). Cultural or religious beliefs affecting management had 28.0% strongly agreeing, 24.6% agreeing, 23.4% disagreeing, and 24.0% strongly disagreeing (Mean = 2.43, SD = 1.136, Variance = 1.289).

Hypothesis

Base on the hypothesis made, Chi-square analyses showed no statistically significant associations between med BP level and sociodemographic variables. For age group, high adherence was reported in 8.6% (18–30 years), 8.9% (31–45 years), 7.7% (46–60 years), and 11.0% (above 60 years) ($\chi^2 = 1.905$, df = 6, p = 0.928). For gender, high adherence occurred in 10.9% of males and 8.7% of females ($\chi^2 = 1.033$, df = 2, p = 0.597). As presented in Table 8.

By marital status, high adherence was reported in 15.6% (single), 8.2% (married), 12.5% (widowed), and 9.1% (divorced) ($\chi^2 = 6.308$, df = 6, p = 0.390). For educational level, high adherence occurred in 8.1% (no formal education), 9.2% (primary), 10.1% (secondary), and 10.4% (tertiary) ($\chi^2 = 5.493$, df = 6, p = 0.482). Across occupations, high adherence was recorded in 15.1% (unemployed), 6.3% (self-employed), 5.5% (civil servant), and 11.3% (retired) ($\chi^2 = 7.687$, df = 6, p = 0.262). Duration since hypertension diagnosis showed high adherence in 13.5% (less than 1 year), 7.2% (1–3 years), 5.5% (4–6 years), and 11.0% (over 6 years) ($\chi^2 = 8.538$, df = 6, p = 0.201).

Table 6: Medication Blood Pressure Levels of Respondents (n=350)

| Med BP Level | N | % |
|--------------|-----|------|
| High | 33 | 9.4 |
| Low | 55 | 15.7 |
| Moderate | 262 | 74.9 |

Table 7 Factors Influencing Adherence to Hypertension Prevention Measures

| Statement | Response | n | % |
|--|-------------------|-----|------|
| Understand importance of adherence | Strongly Agree | 101 | 28.9 |
| | Agree | 87 | 24.9 |
| | Disagree | 81 | 23.1 |
| | Strongly Disagree | 81 | 23.1 |
| Can afford medications/check-ups | Strongly Agree | 94 | 26.9 |
| | Agree | 87 | 24.9 |
| | Disagree | 86 | 24.6 |
| | Strongly Disagree | 83 | 23.7 |
| Side effects discourage medication use | Strongly Agree | 78 | 22.3 |
| | Agree | 92 | 26.3 |
| | Disagree | 74 | 21.1 |
| | Strongly Disagree | 106 | 30.3 |
| Receive adequate counseling | Strongly Agree | 73 | 20.9 |
| | Agree | 98 | 28.0 |
| | Disagree | 84 | 24.0 |
| | Strongly Disagree | 95 | 27.1 |
| Family supports management efforts | Strongly Agree | 79 | 22.6 |
| | Agree | 86 | 24.6 |
| | Disagree | 80 | 22.9 |
| | Strongly Disagree | 105 | 30.0 |
| Have time and energy to manage health | Strongly Agree | 93 | 26.6 |
| | Agree | 93 | 26.6 |
| | Disagree | 87 | 24.9 |
| | Strongly Disagree | 77 | 22.0 |
| Cultural/religious beliefs affect management | Strongly Agree | 98 | 28.0 |
| | Agree | 86 | 24.6 |
| | Disagree | 82 | 23.4 |
| | Strongly Disagree | 84 | 24.0 |

Table 8: Chi-Square Tests for Association Between Blood Pressure Level and Selected Sociodemographic Variable

| Variable Pair | Test | Value | df | Asymptotic Significance (2-sided) |
|--|--------------------|--------------------|----|-----------------------------------|
| BP Level × Duration since Hypertension Diagnosis | Pearson Chi-Square | 8.538 ^a | 6 | 0.201 |
| | Likelihood Ratio | 8.601 | 6 | 0.197 |
| BP Level × Occupation of Respondent | Pearson Chi-Square | 7.687 ^a | 6 | 0.262 |
| | Likelihood Ratio | 7.595 | 6 | 0.269 |
| BP Level × Educational Level of Respondent | Pearson Chi-Square | 5.493 ^a | 6 | 0.482 |
| | Likelihood Ratio | 5.399 | 6 | 0.494 |
| BP Level × Marital Status of Respondent | Pearson Chi-Square | 6.308 ^a | 6 | 0.390 |
| | Likelihood Ratio | 5.936 | 6 | 0.430 |
| BP Level × Gender of Respondent | Pearson Chi-Square | 1.033 ^a | 2 | 0.597 |
| | Likelihood Ratio | 1.039 | 2 | 0.595 |
| BP Level × Age Group of Respondent | Pearson Chi-Square | 1.905 ^a | 6 | 0.928 |
| | Likelihood Ratio | 1.881 | 6 | 0.930 |

^a Indicates 0 cells (0.0%) have expected count less than 5

DISCUSSION

The Findings of this study revealed that adherence to hypertension prevention measures was generally moderate, with some lifestyle practices being followed more consistently than others. For instance, dietary control and salt restriction recorded relatively higher compliance rates compared to regular physical activity, which had lower adherence levels. This trend aligns with the observation that dietary changes are often easier to incorporate into daily routines than sustained exercise regimens, particularly among older adults and individuals with physical limitations. These findings are consistent with those of Okwuonu *et al.* (2014) and Odili *et al.* (2020), who reported that hypertensive patients in Nigeria often exhibit moderate adherence to dietary recommendations but lower compliance with exercise guidelines. A similar pattern was observed in studies conducted in Ghana (Agyemang *et al.*, 2018) and South Africa (Peer *et al.*, 2021), where cultural norms, urban living conditions, and time constraints limited engagement in regular physical activity.

The study also showed that smoking cessation and alcohol reduction recorded high adherence, largely due to the relatively low prevalence of these habits among the respondents. This is in agreement with Ajayi *et al.* (2017), who noted that non-smoking rates are higher among hypertensive patients in Northern Nigeria due to cultural and religious norms discouraging tobacco and alcohol use. However, the moderate overall lifestyle adherence levels observed indicate that there are still significant gaps in preventive practices. The lower levels of physical activity adherence may be attributed to a lack of structured exercise programmes and inadequate counselling by healthcare providers. This emphasises the need for tailored lifestyle interventions, as suggested by WHO (2021), which recommends community-based health education programmes to improve adherence to lifestyle modification measures.

Findings on consistency of patients' adherence to prescribed antihypertensive medication schedules and blood pressure monitoring routines indicated that while a proportion of patients reported always taking their medication exactly as prescribed, the majority fell into the categories of "sometimes" or "rarely," with a notable percentage admitting to never adhering strictly to their medication regimen. Similarly, timing consistency for daily medication intake and following dosage instructions showed moderate to low adherence levels.

These findings corroborate previous Nigerian studies by and Ogedegbe *et al.* (2012), Adisa & Fakeye (2014), which found suboptimal medication adherence among hypertensive patients, often due to forgetfulness, financial constraints, or perceived side effects. Comparable results have been documented in Ethiopia (Abegaz *et al.*, 2017) and Kenya (Mathenge *et al.*, 2019), highlighting that non-adherence remains a universal challenge in hypertension management. Blood pressure self-monitoring at home showed better adherence than medication timing but still fell short of optimal levels. Regular check-ups and prompt medical consultations in response to BP changes were also inconsistently practised. This is consistent with Iloh *et al.* (2018), who observed that while hypertensive patients in Nigerian tertiary hospitals recognise the importance of monitoring, practical implementation is often hindered by limited access to equipment and irregular follow-up appointments. The mean medication and BP monitoring adherence score classified most respondents in the "moderate" adherence category, with fewer in the "high" adherence group. This mirrors the report WHO by (2013) on adherence, which states that most hypertensive patients globally achieve only partial adherence to long-term treatment plans.

The third objective examined socio-economic, behavioural, and cultural factors influencing adherence. The study found that affordability of medication and check-ups, perceived importance of adherence, family support, and adequate counselling from healthcare providers significantly affected adherence behaviours. Respondents who strongly agreed that they understood the importance of adherence and could afford care tended to report better adherence levels.

Interestingly, side effects of medication emerged as a considerable deterrent to adherence, a finding consistent with the work of van der Laan *et al.* (2017) and Omonaiye *et al.* (2019), who observed that adverse drug reactions contribute to intentional dose omission or discontinuation. Adequate counselling was also positively linked to better adherence, supporting previous findings by Akinlua *et al.* (2015), which stressed the role of patient education in promoting consistent medication use and lifestyle changes.

Family support was identified as a facilitator, echoing the conclusions of Osamor & Owumi (2011), who found that social support networks encourage patients to attend appointments, take medications, and maintain healthy routines. Conversely, cultural and religious beliefs sometimes hindered adherence,

as some patients preferred traditional remedies or spiritual interventions over biomedical management. The cross-tabulation analysis revealed no statistically significant association between blood pressure adherence level and socio-demographic factors such as age, gender, marital status, educational attainment, occupation, or duration of diagnosis. This suggests that adherence challenges cut across various demographic groups, which is in line with WHO (2013) findings that adherence is influenced more by systemic and personal factors than by demographics alone.

This study in overall found that hypertensive patients in Umaru Shehu Hospital demonstrate moderate adherence to both lifestyle modification measures and medication/BP monitoring routines. While adherence to certain lifestyle measures like dietary control and reduced salt intake was relatively high, physical activity adherence was low. Medication adherence was inconsistent, with significant room for improvement in timing, dosage compliance, and prescription refills. Factors such as affordability, side effects, family support, and counselling played important roles in shaping adherence behaviours, while socio-demographic characteristics showed no significant statistical associations. These findings underscore the need for targeted interventions that address both systemic barriers and individual behavioural factors to improve hypertension management outcomes in the study setting.

CONCLUSION

This study set out to assess adherence to hypertension prevention measures among hypertensive patients attending clinics in Umaru Shehu Ultra-Modern Hospital, Maiduguri, with a focus on lifestyle modifications, medication and blood pressure monitoring routines, and factors influencing adherence. The findings revealed that adherence levels were generally moderate, with variations across different preventive measures. For lifestyle modification measures, most patients adhered to dietary control, salt reduction, and avoidance of harmful habits such as smoking and alcohol intake and adherence to regular physical activity and weight management was notably lower, reflecting challenges such as lack of time, limited motivation, and possible physical limitations. This highlights a gap in the holistic adoption of healthy lifestyle practices necessary for optimal blood pressure control.

Without targeted strategies to address the identified gaps, patients remain at heightened risk of

complications associated with uncontrolled hypertension.

Based on the findings, the following recommendations are proposed to improve adherence to hypertension prevention measures among patients in Umaru Shehu Ultra-Modern Hospital, Maiduguri: Healthcare providers should deliver continuous, structured education on the importance of lifestyle changes; Adequate and personalized counselling should be integrated into every clinic visit; Policies should aim to reduce the cost of antihypertensive drugs and diagnostic services; Hospitals and community health programmes should encourage feasible and culturally acceptable forms of exercise; Public health initiatives should involve family members in care plans; Collaboration with community leaders, faith-based organisations, and traditional healers can help align cultural and religious beliefs with biomedical management of hypertension; Mobile phone reminders, community health worker visits, and regular follow-up appointments should be used to reduce forgetfulness and encourage consistency in adherence.

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Authors Contributions:

Dr. R. Balarabe: Conducted the Study

Dr. H. S. Muhammed: Supported in the analysis and interpretation of the data

A. Ahmad: Supported in the analysis and interpretation of the data

Dr. A. S. Abdullahi: Provided the technical input

V. Ogenyi: Validate the instrument and provide a technical input

F. Mukhtar: Validate the instrument and provide a technical input

A. Dahiru: Supported in developing the instrument

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