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Original Article

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Prevalence of non-compliance to prescribed antihypertensive medication among hypertensive middle-aged adults at a tertiary care hospital, Faisalabad, Pakistan: a descriptive cross-sectional study

Sana Liaqat [a], Kamran Afzal [b], Afsar Ali [c], Umair Arif [d], Shagufta Parveen [e]

[a] *Charge Nurse, Surgical Emergency, Allied Hospital, Faisalabad.*
[b] *HOD, Department of Pathology, Tertiary Care Hospital, Rawalpindi.*
[c] *Lecturer, Department of Nursing, The University of Lahore, Lahore.*
[d] *PHD Student, Xian Jiao Tong University, China.*
[e] *Nursing Instructor, The National University of Medical Sciences, Rawalpindi.*
Correspondence: *sanaliaqat134@gmail.com*

ABSTRACT

BACKGROUND & OBJECTIVE: Uncontrolled hypertension due to non-compliance with prescribed treatment is one of the main reasons for premature illness and mortality in Pakistan. There is a lack of data on the prevalence of non-compliance with prescribed antihypertensive therapy among hypertensive middle-aged adults in Pakistan. To determine the overall prevalence of non-compliance with prescribed antihypertensive medication among middle-aged hypertensive patients at a tertiary care hospital in Faisalabad, Pakistan.

METHODOLOGY: A Descriptive cross-sectional study was conducted over six months from December 2023 to May 2024. All hypertensive patients aged between 40 and 59 years who are conveniently available are included in this study. Data were directly collected from participants by using a structured questionnaire Hill-Bone Medication Adherence Scale. Informed consent was obtained, and participants were briefed on the research topic. The researcher explained the questionnaire in Urdu, which was completed in their presence, ensuring confidentiality to respect participants' ethical rights.

RESULTS: A non-compliance score below 25 suggests a low non-compliance rate of 1.56%. Scores between 25-35 indicate moderate non-compliance at 8.31%. Scores of 35-45 show substantial non-compliance with a rate of 62.86%. Severe non-compliance, with scores above 45, results in a high rate of 27.27%.

CONCLUSION: The study reveals varying compliance levels among hypertensive patients, highlighting minimal to severe non-compliance, necessitating targeted interventions to reduce non-compliance rates.

KEYWORDS: Antihypertensive Agents, Hypertension, Medication Non-adherence.

INTRODUCTION

Hypertension is a global health condition that affects a wide range of age groups and populations. The global prevalence of hypertension has risen to approximately 1.13 billion adults, accounting for around 31% of the population, with two-thirds of these cases occurring in low- and middle-income countries (LMIC) [1]. The World Health Organization (2023) projected 1.28 billion global hypertension cases, with 46% undiagnosed. Only 42% receive diagnosis and treatment, and 21% control it. Hypertension accounts for over half of the global disease burden, causing numerous premature deaths annually [2].

There are 3.5 billion adults worldwide with suboptimal blood pressure levels; estimates suggest that 1in every 4 adults is diagnosed with hypertension. Annually, 17.3 million individuals die either from uncontrolled hypertension or its related complications worldwide [3]. Hypertension affects approximately 18% of Pakistanis aged 15 and above, with rural areas showing a prevalence of 16.2% and urban areas 21.6%. However, the management of hypertension remains a significant challenge in Pakistan, with a notably low number of patients achieving controlled blood pressure levels [4].

A staggering 70% of hypertensive individuals in the country are unaware of their condition, leading to approximately 5.5 million men and 5.3 million women suffering from untreated or poorly managed hypertension [5].

Research indicates that the primary cause of poorly controlled hypertension is medication non-compliance to prescribed treatment. Antihypertensive medications are pivotal for managing hypertension by regulating blood pressure and reducing associated risks [6].

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Non-compliance rates among patients with chronic illnesses have been estimated to be as high as 50% or more worldwide [7]. Non-compliance rate was slightly higher in females 49% vs. 47% in males [8]. In the United States, poor medication compliance is responsible for 5% of avoidable hospital admissions, resulting in an annual cost of around $100 billion in both direct and indirect losses [9]. Non-compliance with treatment can be intentional or unintentional. Intentional non-compliance involves patients choosing not to follow their prescription, while unintentional non-compliance occurs inadvertently due to factors like forgetfulness or confusion. Addressing unintentional non-compliance necessitates patient education and overcoming practical barriers [10,11].

Numerous variables contribute to non-compliance, including side effects, complex regimens, financial constraints, and asymptomatic hypertension, leading to poor blood pressure control, increased cardiovascular risks, and worsened clinical outcomes [12]. Recommended antihypertensive medication violation was common in Pakistan (37.7%), and inadequate medication compliance may be an accountable cause for poor blood pressure control [13].

Failure to comply with prescribed medication regimens not only results in unfavorable health outcomes with increased morbidity and mortality rates but also contributes to elevated utilization and inefficiency of healthcare resources [14]. A study in Islamabad, Pakistan, found that 38.3% of participants had high compliance, 24% had moderate compliance, and 37.7% were non-compliant with their prescribed antihypertensive therapy, highlighting a high prevalence of non-compliance which may explain poor blood pressure control in the population [15].

A study in Karachi, Pakistan, found that 62.5% of patients took medication daily, 15.5% intermittently, 6.5% were non-adherent, 35% preferred monthly follow-ups, 35.5% never monitored their blood pressure, and over half skipped prescribed medication, believing their BP was mostly controlled [16]. Uncontrolled hypertension poses a significant risk for cardiovascular diseases, with non-compliance identified as the primary reason for its lack of control [17]. Non-compliance to recommended antihypertensive medication is a significant widespread dilemma, and Pakistan is likely to experience similar challenges [18].

There are limited studies conducted in Pakistan on the prevalence of non-compliance with prescribed antihypertensive treatment among patients with hypertension. The literature revealed that the rate of non-compliance with prescribed anti-hypertensive medications was high in middle-aged hypertensive patients. However, there is no study conducted on this age group. Considering the aforementioned concerns, this study aimed to assess the prevalence of noncompliance to antihypertensive medications among middle-aged hypertensive patients in Faisalabad. Assessing non-compliance in this population is vital for tailoring interventions to enhance compliance and manage hypertension, leading to decreased complications and improved public health outcomes in the region.

METHODOLOGY

The research methods were consistent with Helsinki's declaration and approved by the ethical committee and institutional review board of the National University of Medical Sciences with ERC number (409-AAA-ERC-AFPGMI). Upon obtaining formal permission from the Medical Superintendent of the respective facility, the researcher visited the selected location. A descriptive cross-sectional study was conducted at a tertiary care hospital in Faisalabad, Pakistan. This study was conducted in six months from December 2023 to May 2024.

The target population of the study was all middle-aged hypertensive patients who were visiting this specified facility. The sample size of 385 was calculated using the population proportion formula. Non-randomized convenient sampling was used to collect the data from the study participants. Data was collected from study participants by using a structured questionnaire Hill-Bone Medication Adherence Scale. It was developed in the English language at the Johns Hopkins School of Nursing. Permission for utilizing this tool in this research study had been taken by a concerned person via email. Hill Borne Scale consists of 14 questions that evaluate patient behaviors in three key behavioral categories of high blood pressure management i.e. appointment Keeping (3 items), diet (2 items), and medication Adherence (9 items).

This study tool used a 5 Likert scale. The questionnaire that was used in this study is a pre-tested, pre-validated, and reliable instrument. An expert panel first reviewed the scale's content validity, focusing on cultural sensitivity and the instrument's applicability to low literacy levels. Cronbach alpha of hill borne scale for the English version is 0.846 (Jingjing et al., 2019). The average correlations between items within the set of 14 were measured at 0.18 and 0.28(Commodore-Mensah et al., 2023). Informed consent was sought, and participants were properly informed about the research topic. The researcher in this study was accessible to the participants, providing guidance and assistance throughout the data collection process. The questionnaire was explained by the researcher in Urdu language. The questionnaire was completed in the presence of the researcher and to respect the participants' ethical rights, confidentiality was maintained.

According to the inclusion and exclusion criteria, all participants who were available at the facility at the time of data collection were included in this study. Patients who regularly visited the hospital were included, but their treatment adherence varied widely. Regular attendance did not necessarily indicate compliance; some patients attended appointments yet failed to follow prescribed treatment regimens. This variability underscored the need for a comprehensive assessment of non-compliance, regardless of hospital attendance. Pregnant women, newly diagnosed patients, and individuals with mental illnesses were excluded. All patients were included who were diagnosed with essential hypertension, capable of communicating in Urdu, and were between 40 to 59 years old.

The data was analyzed by using SPSS Software version IBM-26 and jupyter notebook 6.5.4 for its proper analysis. A preliminary data analysis was undertaken to address missing, normal, excessive, and aberrant values. All variables were categorical, with frequencies and percentages calculated. For this logistic regression model was employed on a dataset where participants of non-compliance with their antihypertensive medication are considered to be dependent variables and age, gender, education level, income, location, and occupation, are considered to be independent variables. $\text{logit}(P(Y=1))=\ln((P(Y=1)/(1-P(Y=1))=\beta_0+\beta_1X_1+..+\beta_K X_K$ (1)where$P(Y=1)$ is the robability of non-compliance (the event of interest). $\text{logit}(P(Y=1))$ Is the log-odds of non-compliance. β^' s are the coefficients concerning their independent variables. The classification of individuals as non-compliant is based on specific criteria. A score of less than 25 indicates no non-compliance. A score between 25 and 34.9 signifies mild non-compliance, while a score from 35 to 44.9 reflects moderate non-compliance. A score above 45 represents severe non-compliance.

RESULTS

The study included 385 participants, with 50.1% aged 53-59 years, 44.2% aged 39-45 years, and 5.7% aged 46-52 years. Educational backgrounds varied: 25.2% had no formal education, 21.3% had matriculation, 21.8% had primary education, 14.0% had intermediate education, and 5.2% were graduates. Employment status showed 53.5% unemployed, 31.4% salaried, 11.7% in business, and 3.4% students. Middle-aged adults often engage in lifelong learning to enhance their skills, transition to new careers, or pursue personal interests. In this study, 3.4% of individuals in the middle-aged group pursued education, primarily on a part-time basis. Among these students, the majority were professionals seeking to advance their careers or shift into new fields. Their primary sources of income included jobs in sectors such as education, healthcare, and business, reflecting a diverse range of professions. Household incomes were 37.9% (10,000-20,000 Rs), 34.8% (21,000-30,000 Rs), 17.9% (31,000-40,000 Rs), and 9.4% (>41,000 Rs).Participants were nearly equally split between urban (50.1%) and rural (49.9%) areas.

This was identified from the demographic features of the patients, as detailed in the address. Females made up 61.0% and males 39.0%. A majority (89.9%) used anti-hypertensive medications, while 10.1% did not (Table-I). Most respondents (35.6%) forget to take their medication sometimes, 24.7% most of the time, and 7.5% all the time, while 41.8% decide not to take it sometimes, 8.4% most of the time, and 2.9% all the time. Salty food consumption is reported most of the time by 41.8%, with 45.2% shaking salt on food sometimes. Fast food is eaten most of the time by 46.8%. Getting appointments and missing them is fairly even, with 34.8% missing appointments sometimes and 20.5% most of the time. Not obtaining prescribed pills happens sometimes for 41.0%, running out of pills sometimes for 45.5%, and skipping medication before clinic visits is common, with 39.0% doing so 1-3 days before.

Table-I: Demographic Data.

Sr.no	Variable	Frequency (f) n%
1	**Age**	
	39 to 45 years	170(44.2)
	46 to 52 years	22(5.7)
	53 to 59 years	193(50.1)
2	**Level of education**	
	No formal education	97(25.2)
	Primary	84(21.8)
	Middle	54(14.0)
	Matric	82(21.3)
	Intermediate	48(42.5)
3	Graduation	20(5.2)
	Current occupation	
	Student	13(3.4)
	Jobless	206(53.5)
	Salaried worker	121(31.4)
	Business (own/partner)	45(11.7)
4	**Household income**	
	10000-20000/Rs	146(37.9)
	21000-30000/Rs	134(34.8)
	31000-40000/Rs	69(17.9)
	>41000/Rs	36(9.4)
5	**Current location**	
	Urban	193(50.1)
	Rural	192(49.9)
6	**Gender**	
	Male	150(39.0)
	Female	235(61.0)
7	**Are you taking anti-hypertensivemedications?**	
	Yes	346(89.9)
	No	39(10.1)

Most of the time, missing medication when feeling better is reported by 29.6% and 33.5% when feeling sick. Never taking others' pills is reported by 40.0%. Missing medication due to lack of care happens most of the time for 39.7% (Table-II). out of 385 participants, 346(90%) had non-compliance and 39(10%) did not had it (Figure -I).Therefore, the variation in non-compliance based on our model ranges from 83.8% with the Nagelkerke R2 methods which are better outcomes (Table-III). This test is used for checking how well the logistic model fits the data, so according to outcomes, the chi-squared value is 10.308 which is significant at a p-value of 0.013 (Table-IV).

Table-II: Descriptive statistics of non-compliance with prescribed anti-hypertensive medications among middle-aged adults.

Sr.no	Statement	NA/DK	None of the time	Some of the time	Most of the time	All the time
1	How often do you forget to take your HBP medicine?	9 (2.3)	115(29.9)	137(35.6)	95(24.7)	29(7.5)
2	How often do you decide not to take your HBP medicine?	19(4.9)	161(41.8)	123(31.9)	71(8.4)	11(2.9)
3	How often do you eat salty food?	6(1.6)	80(20.8)	161(41.8)	103(26.8)	35(9.1)
4	How often do you shake salt, fondor, or aromat on your food before you eat it?	6(1.6)	174(45.2)	118(30.6)	62(16.2)	25(6.5)
5	How often do you eat fast food? (KFC, McDonald's, fat cook, fish and chips)?	10(2.6)	180(46.8)	123(31.9)	54(14.0)	18(4.7)
6	How often do you get the next appointment before you leave the clinic?	13(3.4)	10(28.6)	117(30.4)	112(29.1)	33(8.6)
7	How often do you miss scheduled appointments?	15(3.9)	134(34.8)	128(33.2)	79(20.5)	29(7.5)
8	How often do you leave the dispensary without obtaining your prescribed pills?	14(3.6)	158(41.0)	139(36.1)	53(13.8)	21(5.5)
9	How often do you run out of HBP pills?	14(3.6)	96(24.9)	175(45.5)	77(20.0)	23(6.0)
10	How often do you run out of HBP pills?	10(2.6)	150(39.0)	109(28.3)	89(23.1)	27(7.0)
11	How often do you miss taking your HBP pills when you feel better?	17(4.4)	102(26.5)	105(27.3)	114(29.6)	47(22.2)
12	How often do you miss taking your HBP pills when you feel sick?	12(3.1)	158(41.0)	129(33.5)	59(15.3)	27(7.0)
13	How often do you take someone else's HBP pills?	13(3.4)	154(40.0)	122(31.7)	64(16.6)	32(8.3)
14	How often do you miss taking your HBP pills when you care less?	15(3.9)	137(35.6)	153(39.7)	60(15.6)	20(5.2)

The Wald test is used to determine the statistical significance of each of the independent variables. So, age, education level, occupation, and gender have a significant effect on the model using p-values 0.002, 0.001, 0.021, and 0.006 respectively and income and residence do not have a significant effect on the model using p-values 0.831 and 0.101 respectively. For each additional year increase in age, the odds of the outcome occurring increase by approximately 13.9% (since 1.138983−1=0.138983 or 13.9%).

This suggests that older individuals are slightly more likely to experience the outcome. For each level of education, the odds of the outcome occurring decrease by approximately 8.4% (since 1−0.915788=0.0842121 or 8.4%). This suggests that higher education is associated with a lower likelihood of experiencing the outcome. in occupation level, the odds of the outcome occurring increase by approximately 66.8% (since 1.667826−1=0.667826 or 66.8%). This suggests that a higher occupation status is associated with a higher likelihood of experiencing the outcome.

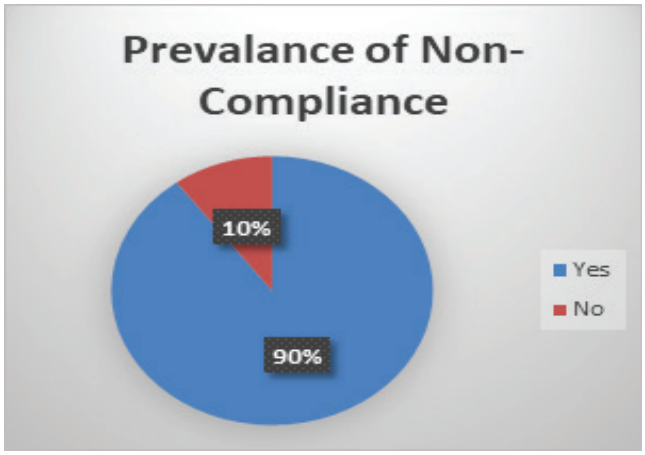
For each unit increase in income, the odds of the outcome occurring increase by approximately 7.4% (since 1.073907−1=0.073907 or 7.4%). This indicates that higher income is associated with a higher likelihood of the outcome. Residence indicating different living conditions, this odds ratio indicates that one type of residence is associated with a 22.6% decrease in the odds of the outcome occurring compared to the other type (since 1−0.774499=0.2255011 or 22.6%).

The gender odds ratio indicates that one gender (e.g., male) is approximately 71.9% more likely to experience the outcome compared to the other gender (e.g., female). This assumes the outcome is coded as 1 for presence and 0 for absence. This value represents the odds of the outcome when all predictor variables are at their baseline values. It's the baseline odds of the outcome in the absence of any effect from the predictors (Table -V). Accuracy is a good general measure of performance but can be misleading in imbalanced datasets. The accuracy of the model is 93.5%.

Precision is crucial in cases where false positives have a significant impact, such as medical diagnoses. The precision of the model is 95.2%. This indicates that when the model predicts the positive class (Class-1), it is correct 95.2% of the time. The sensitivity (or recall) of the model is 96.8%. This means that the model correctly identifies 96.8% of the actual positive cases. High recall is important when it is critical to capture as many positive cases as possible, even at the expense of some false positives. The specificity of the model is 80%. This measures the proportion of actual negative cases that are correctly identified as negative. In other words, 80% of the true negative cases were correctly predicted. Specificity is important in ensuring that negative cases are not falsely identified as positive. The F1 Score of the model is 0.96%.

This is the harmonic mean of precision and recall, providing a balance between the two metrics. A high F1 score indicates that the model performs well on both precision and recall, making it suitable for applications where both metrics are important (Figure-II). An AUC of 92% reflects a robust model with strong performance in classifying instances. It suggests that the model is effective at discriminating between the two classes and should be very useful in practical applications where distinguishing between positive and negative outcomes is crucial (Figure-III).

Figure -I: Prevalence of non-compliance with prescribed antihypertensive medications among middle-aged adults.



A non-compliance score below 25 out of 70 suggests minimal variability in compliance behaviors, resulting in a low non-compliance rate of 1.56%. A mild non-compliance score between 25 to 35 out of 70 suggests a moderate level of variability in compliance behaviors, leading to a non-compliance rate of 8.31%. The moderate non-compliance score, falling between 35 to 45 out of 70, indicates a substantial degree of inconsistency in adherence behaviors, with a resultant compliance rate of 62.86%. Severe non-compliance categorized by scores of 45 and above out of 70, denotes a significant level of inconsistency in compliance behaviors, resulting in a high non-compliance rate of 27.27%.

Table -III: Model summary.

Model Variations			
Step	**-2 Log likelihood**	**Cox & Snell R Square**	**Nagelkerke R Square**
1	245.385[a]	0.718	0.838

Table -IV: Hosmer and lemeshow test.

Step	Chi-square	Df	Sig.
1	10.308	8	0.013

Table -V: Variables in the Equation.

	B	S.E.	Wald	Df	Sig.	Exp(B)	Odd ratio
Step 1[a]	Age	0.016	0.184	1	0.002	1.016	1.13898
	Education	-0.200	0.167	1	0.001	0.819	0.91578
	Occupation	-1.053	0.092	1	0.021	0.349	1.66782
	Income	0.174	0.200	1	0.831	1.191	1.07390
	Residence	0.046	0.355	1	0.101	1.047	0.77449
	Gender	0.439	0.095	1	0.006	1.551	1.71862
	Constant	1.668	1.121	1	0.137	5.300	1.34159

Figure II: Confusion Matrix of Logistic Regression Model.

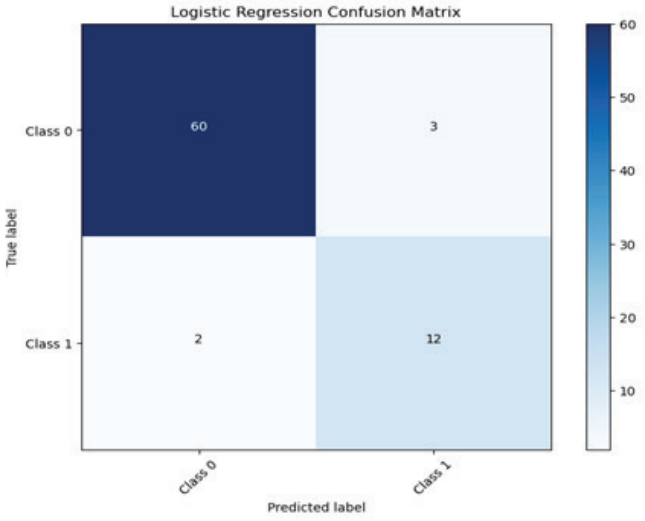
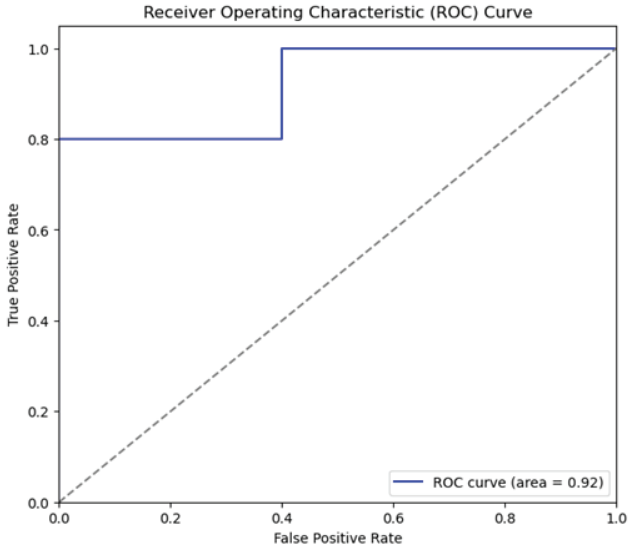


Figure-III: ROC-Curve of Logistic Regression Model.



DISCUSSION

Managing and controlling hypertension poses significant challenges that require a focus on both pharmacological and behavioral modifications. According to the World Health Organization (2023), poor compliance with treatment is the main reason for uncontrolled blood pressure. High compliance has been shown to reduce complications and enhance individual health outcomes. In this research, the Hill-Bone Medication Adherence Scale was utilized to determine medication compliance. This scale is a validated and reliable tool that has been widely recognized and employed globally.

In this study, it was found that 1.56% of the patients demonstrated minimal non-compliance, while 8.31% exhibited a slight variation in adherence behaviors. Furthermore, 62.86% displayed moderate non-compliance, and 27.27% exhibited severe non-compliance. These findings are higher than those reported in studies conducted in Malaysia (39.3%), Asia (48%), and New Delhi (35.3%). This suggests that compliance to high blood pressure medications is notably higher in developed countries, likely attributed to superior healthcare services, increased disease awareness, and socioeconomic disparities. Additionally, the rate is lower compared to previous studies conducted in Morocco (91%), Kenya (64%), and India (74.4%). This could be due to socio-demographic characteristics, variations in sample size, and challenges in accessing health services [19].

A study in Saudi Arabia on hypertensive individuals reveals that 48.5% are over 50 years old, 58% are female, 62.3% are highly educated, 46.7% are employed, and 42% have health insurance. Additionally, 47.6% have been managing hypertension for over six years. The study finds medication compliance levels at 6.2% high, 67.4% medium, and 26.4% low. Higher compliance is linked to being over 50 years old, female, widowed, and without other chronic illnesses, illustrating the influence of demographic, social, and health factors on compliance [20].

The Latvian study found 45.9% medication non-compliance, with the lowest compliance (38.2%) in patients on medication for 2–4.9 years. Despite 84.7% having home blood pressure monitors, only 25.3% regularly checked their blood pressure. Financial factors significantly affected compliance: net income ($p = 0.004$), medication co-payments ($p = 0.007$), and cost-reduction options ($p = 0.002$). Our study highlighted varying non-compliance levels, with moderate non-compliance in 62.86% of patients, indicating a critical concern for healthcare providers and policymakers [21].

A Ghanaian study reported 89.2% compliance with antihypertensive medications, yet over half of the patients had uncontrolled blood pressure. This contrast suggests issues like self-reporting bias, timing of measurements, and counterfeit medications. Our study found high rates of moderate and severe non-compliance, highlighting barriers like socioeconomic factors and limited healthcare access. The Ghanaian study's high compliance but poor control implies that compliance alone may not ensure optimal outcomes, potentially due to medication quality or systemic issues. Key factors affecting compliance included hypertension awareness, perceived seriousness, and daily alcohol consumption, emphasizing the importance of patient education and lifestyle adjustments [22].

Our study's non-compliance prevalence aligns with literature showing suboptimal medication compliance among hypertensive patients. The Jimma University study in Ethiopia found reduced compliance linked to concurrent health conditions, alcohol consumption, free medications, and using a combination of antihypertensive drugs. These insights underscore the need to understand obstacles to compliance. Demographic details, such as gender and average age, suggest varying compliance patterns, offering practical insights for tailored interventions to improve compliance.

The Pakistani study found that 56.2% of participants were male with an average age of 54.4 years. Uncontrolled Grade I hypertension was prevalent in 72.7%, and 48.44% struggled to afford medication. Financial constraints and uncontrolled hypertension were key non-compliance factors, while education and counseling improved compliance. Both studies reveal the complexity of non-compliance, with the current study indicating moderate to severe non-compliance and the Pakistani study highlighting financial barriers and the benefits of education and counseling [23].

A Nepalese study found that 62.67% of 150 participants had good compliance with hypertension medication, with higher rates among females. Lower compliance was linked to higher BMI and taking three or more pills daily. Consistent with our findings, increased pill burden correlated with non-compliance. Both studies highlight that non-compliance is influenced by factors such as forgetfulness, ineffective counseling, and missed follow-ups, with our study showing significant moderate to severe non-compliance [24].

A Zablotska study highlighted the link between medication knowledge and compliance in managing uncontrolled blood pressure. Varied levels of knowledge among participants indicate the need for tailored educational interventions. Both studies show the complexity of medication compliance, influenced by patient understanding, socio-economic status, health beliefs, and healthcare access. Addressing these requires a holistic approach considering individual patient needs and obstacles [25].

Our study and research from Pakistan offer insights into hypertension medication compliance. Our study shows diverse non-compliance behaviors, with moderate non-compliance prevalent. Pakistan's study indicates a 64% compliance rate, with diabetes mellitus prevalent. Most patients in Pakistan were prescribed a single antihypertensive medication. Depression and anxiety were notable, influencing compliance. Certain demographics, like ages 61-75 and higher education levels, showed higher compliance. Anxiety correlated with compliance and hypertensive crisis episodes, highlighting psychological and clinical factors. Comprehensive patient factors are vital for effective compliance strategies [26].

The study shows varying non-compliance levels: minimal (1.56%), slight (8.31%), moderate (62.86%), and severe (27.27%). Compared to Addenbrooke's Hospital study, non-compliance was higher (40.3%), with 14.4% completely non-compliant and 25.9% partially non-compliant. Gender disparities were significant, with women 3.3 times more prone. Polypharmacy affected 52% of patients, increasing non-compliance risk. Bendroflumethiazide had 45.5% non-compliance, chlortalidone 11.8%. Tailored interventions and medication management are crucial for addressing these issues.

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LIMITATIONS

The use of convenience sampling instead of random sampling in our study may have led to sampling errors, affecting the applicability of the results to a broader population. Additionally, the study being conducted at a single center limits the generalizability of the findings.

Recommendations/Suggestions: Tailored interventions addressing forgetfulness, medication decision-making, and dietary habits are crucial. Implement educational programs on medication management and healthy lifestyle choices. Improve appointment scheduling systems to reduce missed appointments. Enhance access to medications and monitor stock levels. Educate patients on the importance of consistent medication compliance and provide self-management support. Address underlying factors contributing to non-compliance, such as socioeconomic status and health beliefs. Collaborate with healthcare providers to develop personalized strategies for improving medication compliance among hypertensive middle-aged adults.

CONCLUSION

The study concluded significant non-compliance to prescribed antihypertensive medication among middle-aged adults in Faisalabad, Pakistan. Moderate non-compliance is prevalent, indicating a need for tailored interventions addressing diverse compliance behaviors. Strategies focusing on medication reminders, dietary modifications, and improving healthcare access may enhance adherence and ultimately improve hypertension management outcomes in this population.

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Sana Liaqat: Substantial contributions to the conception and design of the work.
Kamran Afzal: The acquisition and analysis of data for the work.
Afsar Ali: Interpretation of data for the work.
Umair Arif: Drafting the work.
Shagufta Parveen: Reviewing it critically for important intellectual content.

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