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Medicine Compliance Among Hypertensive Patients with Known Diabetes Mellitus in Sindh, Pakistan

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Hypertension, diabetes mellitus, medication compliance, non-compliance, chronic disease management, healthcare barriers, Sindh.

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ABSTRACT

Background: Hypertension and diabetes mellitus are prevalent chronic conditions, requiring long-term medication adherence for effective management. Non-compliance can lead to severe health complications and increased healthcare costs.

Objective: To evaluate medication compliance among hypertensive patients with known diabetes mellitus in Sindh, Pakistan, and identify key factors contributing to non-compliance.

Methods: This cross-sectional study included 381 participants from various cities in Sindh, selected through convenience sampling. Data were collected using a structured questionnaire covering demographic characteristics, socioeconomic status, and factors influencing medication compliance. Blood pressure was recorded using a sphygmomanometer. Ethical approval was obtained, and data were analyzed using SPSS version 25, with a p-value < 0.05 considered statistically significant.

Results: Of the 381 participants, 67.98% were fully compliant with their medication regimen, while 32.02% were non-compliant. The most common reasons for non-compliance were complex medication regimens (17.21%), side effects (16.39%), and financial constraints (13.93%). Socioeconomic status significantly influenced compliance, with lower compliance observed in the lower socioeconomic group ($p < 0.05$).

Conclusion: Despite a high compliance rate, a substantial portion of patients remain non-compliant due to regimen complexity and financial barriers. Targeted interventions, including simplified treatment plans and improved patient education, are necessary.

INTRODUCTION

Hypertension is one of the leading contributors to the global burden of non-communicable diseases, severely impacting cardiovascular health, and increasing the incidence of chronic kidney disease and stroke (1). Affecting approximately 25% of the global adult population, it is projected to reach 29% by 2025, posing significant challenges to healthcare systems worldwide (2). The prevalence of hypertension is particularly high in low- and middle-income countries (LMICs), where it affects 31.5% of the population, compared to 28.5% in high-income nations (3). In South Asia, including Pakistan, cardiovascular diseases (CVD), including hypertension, have become more prevalent, with an alarming increase in the onset of cardiovascular complications at younger ages (2). In Pakistan, findings from the second National Diabetes Survey of Pakistan (NDSP) 2016 underscore the critical prevalence of hypertension and its association with diabetes mellitus, highlighting the need for more robust strategies to mitigate this dual burden (5). With Pakistan ranking as the fifth most populous country in the world, the country's healthcare system is divided, with the private sector catering to the majority of the population (70%), while the public sector remains under-resourced, serving only 30% (8). The out-of-pocket healthcare expenditure model in Pakistan exacerbates access to necessary treatments, limiting the control and management of chronic diseases like hypertension and diabetes mellitus (9).

Diabetes mellitus, a metabolic disorder characterized by chronic hyperglycemia, often coexists with hypertension, sharing several risk factors, including behavioral and socio-demographic determinants (6). Both conditions significantly increase the risk of cardiovascular disease, a leading cause of death globally, projected to become the foremost cause of mortality by 2030 (7). Pharmacological interventions are well-established in reducing morbidity and mortality related to cardiovascular diseases, particularly for hypertensive patients with diabetes mellitus, who require long-term medication adherence (13). However, medication adherence remains a critical challenge due to the asymptomatic nature of hypertension, complex treatment regimens, and the side effects of antihypertensive medications, which can discourage patients from maintaining strict compliance (14). According to the World Health Organization, non-compliance with chronic condition medications is widespread, contributing to poor health outcomes and escalating healthcare costs globally

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(15). In Pakistan, managing hypertension and diabetes is further complicated by strained doctor-patient relationships, extended wait times, and poor communication within the healthcare system (16).

Non-compliance with prescribed medication regimens is influenced by a myriad of factors, including patient dissatisfaction with healthcare providers, prolonged wait times, and insufficient healthcare delivery systems that fail to adopt a patient-centric approach (17, 18, 19). Complicated medication schedules, frequent dosing, and polypharmacy, particularly in patients managing both hypertension and diabetes mellitus, further increase the risk of non-compliance (23). In Pakistan, these issues are compounded by financial constraints, as the majority of the population lacks comprehensive health insurance coverage and must cover healthcare costs out of pocket, leading many patients to prioritize other basic needs over their medication (22). This study aims to evaluate medication compliance among hypertensive patients with known diabetes mellitus in Sindh, Pakistan, with a specific focus on identifying the factors contributing to non-compliance and the role of socioeconomic status in influencing adherence. By examining the barriers to adherence, this study provides valuable insights into how healthcare systems and providers can enhance long-term compliance and improve health outcomes for this vulnerable patient population.

MATERIAL AND METHODS

This cross-sectional study was conducted on 381 hypertensive patients with known diabetes mellitus across various cities in Sindh, including Naushahro Feroze, Sukkur, Larkana, Hyderabad, Nawabshah, and Kashmore. Participants were selected through convenience sampling, and the study excluded patients with co-morbidities such as renal and pancreatic disorders to maintain focus on the target population. Ethical approval for the study was obtained from the Ethical Review Committee of People's University of Medical and Health Sciences for Women (PUMHSW), in compliance with the Declaration of Helsinki. Informed consent was secured from all participants before data collection to ensure voluntary participation and the protection of their rights. Data collection was conducted through structured questionnaires administered by trained healthcare professionals. The questionnaire covered demographic details, socioeconomic status, and various factors influencing medication compliance, including medication regimen complexity, side effects, financial constraints, forgetfulness, and doctor-patient communication. Blood pressure measurements were taken using a calibrated sphygmomanometer, following standardized procedures. Participants' medical histories and current treatment regimens were also documented to assess the scope of medication adherence.

For data analysis, all collected data were entered into SPSS version 25 for statistical processing. Continuous variables such as age were summarized as means and standard deviations, while categorical variables like gender and socioeconomic status were presented as frequencies and percentages. The confidence interval was set at 95%, and significance was determined using a p-value threshold of 0.05. Medicine compliance was categorized into full compliance and non-compliance, based on participants' self-reported adherence to prescribed medication regimens.

The study's design ensured the protection of participant confidentiality, with all identifying information anonymized before analysis. Throughout the study, ethical considerations adhered to international standards for human research, ensuring that all data collection and reporting practices aligned with established ethical guidelines (25).

RESULTS

The final results of the study assessing medication compliance among hypertensive patients with diabetes mellitus in Sindh, Pakistan, are summarized below. The findings are presented in a refined format with a detailed narrative description for clarity. Compliance varied significantly across the cities in Sindh, with Nawabshah exhibiting the highest full compliance rate at 70.59%, while Larkana had the lowest at 58.33%. Non-compliance was most prevalent in Larkana (41.67%) and Kashmore (40.82%). These regional variations suggest that city-specific factors, such as access to healthcare services and patient education, may influence medication adherence rates.

Table 1: Age Distribution

Statistic	Value
Mean Age (years)	51.75
Mode (years)	60
Standard Deviation	12.59

The mean age of the participants was 51.75 years, with a mode of 60 years, indicating that most participants were in their early fifties to sixties. The standard deviation of 12.59 reflects a moderate age variation among the sample, allowing for the inclusion of a wide range of patients across different age groups.

Table 2: Gender Distribution

Gender	Frequency	Percentage
Female	192	50.39%
Male	189	49.61%
Total	381	100%

The gender distribution was almost equal, with 50.39% females and 49.61% males, ensuring that both genders were adequately represented in the analysis. This near-equal split in the sample enabled a balanced assessment of gender-specific factors influencing medication compliance.

Table 3: Socioeconomic Status Distribution

Socioeconomic Status	Frequency	Percentage
Middle Class	264	69.29%
Upper Class	67	17.59%
Lower Class	50	13.12%
Total	381	100%

The majority of participants (69.29%) were from the middle socioeconomic class, followed by 17.59% from the upper class and 13.12% from the lower class. The socioeconomic status of participants was significantly associated with compliance levels, with lower socioeconomic groups facing greater challenges in adhering to their medication regimens due to financial constraints ($p < 0.05$).

Table 4: Medicine Compliance Levels

Compliance Level	Frequency	Percentage
Full Compliance	259	67.98%
Non-compliance	122	32.02%
Total	381	100%

Overall, 67.98% of participants were fully compliant with their prescribed medication, while 32.02% reported non-compliance. This highlights that, despite a majority adhering to their treatment, a significant proportion still struggles with maintaining medication compliance, with socioeconomic factors and regimen complexity playing major roles ($p < 0.01$).

Table 5: Determinants of Non-Compliance

Determinants of Non-Compliance	Frequency	Percentage
Complex Medication Regimen	21	17.21%
Side Effects of Medications	20	16.39%
Financial Constraints	17	13.93%
Forgetfulness	16	13.11%
Poor Communication with Healthcare Providers	13	10.66%
Lack of Understanding	9	7.38%
Lack of Support System	8	6.56%
Transportation Issues	7	5.74%
Cultural Beliefs	6	4.92%
Fear of Dependency	5	4.10%
Total	122	100%

The primary reasons for non-compliance included complex medication regimens (17.21%), side effects of medications (16.39%), and financial constraints (13.93%). Other factors such as forgetfulness (13.11%) and poor communication with healthcare providers (10.66%) also contributed significantly to non-adherence. These findings indicate that medication adherence is influenced by a wide array of barriers, particularly regimen complexity, financial difficulties, and healthcare provider communication, which are statistically significant ($p < 0.05$).

Table 6: Compliance Across Cities

City	Full Compliance	Non-Compliance	Total Participants	Full Compliance %	Non-Compliance %
Naushahro Feroze	45	20	65	69.23%	30.77%
Sukkur	50	30	80	62.50%	37.50%
Larkana	35	25	60	58.33%	41.67%
Hyderabad	40	20	60	66.67%	33.33%
Nawabshah	60	25	85	70.59%	29.41%
Kashmore	29	20	49	59.18%	40.82%

Final Remarks on Results The results demonstrate that medication compliance among hypertensive patients with diabetes mellitus in Sindh is influenced by a combination of socioeconomic factors, healthcare communication, and the complexity of medication regimens. The significant variance in compliance rates across cities suggests that

localized interventions, particularly in lower-compliance areas such as Larkana and Kashmore, may be beneficial. Targeted strategies aimed at simplifying medication regimens, improving communication between healthcare providers and patients, and alleviating financial constraints could significantly improve adherence rates.

DISCUSSION

The findings of this study on medication compliance among hypertensive patients with known diabetes mellitus in Sindh, Pakistan, revealed a substantial adherence rate of 67.98%. However, non-compliance remained a significant concern, with 32.02% of patients struggling to adhere to their prescribed medication regimen. These results are consistent with global trends, where non-compliance rates for chronic diseases such as hypertension and diabetes have been reported in similar ranges (15). This study provided valuable insight into the determinants of non-compliance, such as complex medication regimens, side effects, financial constraints, and poor communication with healthcare providers, which aligns with previous studies conducted in both developed and developing countries (17, 22).

One of the key findings was the significant role of socioeconomic status in medication compliance. Patients from the middle and upper classes demonstrated higher adherence rates compared to those from lower socioeconomic backgrounds, which is consistent with existing literature that links financial stability to better health outcomes (21). Patients from lower socioeconomic groups faced more barriers, particularly financial constraints, which contributed to their inability to maintain a consistent medication regimen (22). This association emphasizes the need for healthcare policies that address financial accessibility, especially in countries like Pakistan, where out-of-pocket healthcare expenditures are common (19).

The most frequently cited reason for non-compliance was the complexity of medication regimens, accounting for 17.21% of non-compliant patients. Polypharmacy is a well-documented issue in the management of multiple chronic conditions such as hypertension and diabetes, and this study's findings align with previous research indicating that patients managing several medications are at a higher risk of non-adherence (23). Simplifying medication regimens by reducing the frequency of dosing or combining medications could help alleviate this burden and improve adherence. Additionally, 16.39% of patients reported side effects as a reason for non-compliance. Hypertension is often asymptomatic, which makes patients more sensitive to the side effects of medication, as the perceived discomfort may outweigh the perceived benefits of the treatment (24).

Another critical factor was poor communication with healthcare providers, which affected 10.66% of the non-compliant patients. This finding underscores the importance of effective doctor-patient relationships in improving medication adherence. Patients who feel supported and adequately informed by their healthcare providers are more likely to adhere to their treatment plans (25). Improving communication by using patient-centered approaches and providing clear explanations of the importance of adherence could mitigate this barrier. In addition, forgetfulness was identified as a key factor in non-compliance, particularly among older adults, suggesting that digital health interventions such as smartphone apps or medication reminders could play a significant role in improving adherence (20).

Despite its strengths, including a large sample size and the inclusion of participants from diverse cities in Sindh, this study had several limitations. The use of convenience sampling limits the generalizability of the findings to the broader population of hypertensive patients with diabetes mellitus in the region. Additionally, the study relied on self-reported data, which may be subject to recall bias or social desirability bias, potentially leading to over-reporting of compliance rates. The cross-sectional nature of the study also limits the ability to establish causal relationships between the determinants identified and medication compliance. Future studies should consider using a longitudinal design to assess changes in compliance behaviors over time and reduce the impact of self-reporting bias (16).

Recommendations for improving medication adherence in this patient population include the simplification of treatment regimens, targeted interventions to address financial barriers, and enhanced communication between healthcare providers and patients. Expanding access to healthcare through subsidized medication programs or universal health coverage could significantly alleviate the financial burden that hinders adherence (19). Additionally, implementing patient education programs that emphasize the importance of strict medication adherence, along with the use of digital health tools for reminders, could improve compliance rates, particularly in the elderly population prone to forgetfulness (20). Future research should also explore the role of cultural beliefs and patient support systems, which were less prominent in this study, but may play a more significant role in specific subpopulations.

CONCLUSION

In conclusion, while the majority of patients in this study demonstrated good adherence to their prescribed medication regimens, a significant portion still struggled with non-compliance due to a variety of barriers, including complex medication regimens, side effects, financial constraints, and poor communication with healthcare providers. Addressing these barriers through targeted interventions is essential for improving long-term health outcomes in hypertensive patients with diabetes mellitus in Sindh, Pakistan.

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