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CHALLENGES IN HAART COMPLIANCE: FACTORS CONTRIBUTING TO POOR ADHERENCE IN HIV PATIENTS

Original Research

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ABSTRACT

Background: Highly Active Antiretroviral Therapy (HAART) has significantly reduced HIV-related morbidity and mortality by suppressing viral replication and improving immune recovery. However, maintaining adherence above 95% remains challenging, particularly in low- and middle-income countries where social stigma, limited literacy, and comorbid conditions persist. Poor adherence not only diminishes treatment efficacy but also promotes drug resistance and continued transmission of infection, underscoring the importance of identifying context-specific determinants of non-compliance among HIV patients.

Objective: To identify the factors associated with poor adherence to HAART among individuals living with HIV in a tertiary care setting in Lahore, Pakistan.

Methods: A descriptive cross-sectional study was carried out at the HIV clinic of a tertiary hospital in Lahore between January and June 2024. A total of 210 HIV-positive patients aged 18 years or older, who had been on HAART for at least six months, were enrolled using consecutive sampling. Adherence was evaluated through a structured questionnaire and verified by pharmacy refill data. Missing more than 5% of prescribed doses in the previous 30 days was considered poor adherence. Data were analyzed using SPSS version 25. Descriptive statistics were calculated, while chi-square and logistic regression tests identified associations and independent predictors of non-adherence, with $p < 0.05$ considered significant.

Results: The study included 142 males (67.6%) and 68 females (32.4%) with a mean age of 37.4 ± 9.2 years. Overall, 84 participants (40%) were non-adherent to HAART. Major reasons for non-adherence included forgetfulness (38.1%), stigma or fear of disclosure (25%), drug side effects (20.2%), financial constraints (10.7%), and tuberculosis co-infection (6%). Logistic regression revealed significant associations between poor adherence and low educational status (p=0.01), stigma (p=0.02), and TB co-infection (p=0.04).

Conclusion: Poor adherence to HAART remains a major barrier to optimal HIV care in Pakistan. Stigma, limited literacy, and co-existing tuberculosis emerged as key predictors. Interventions enhancing patient education, psychosocial counseling, and integration of TB/HIV services are vital for improving adherence and long-term treatment outcomes.

Keywords: Adherence, Antiretroviral Therapy, Compliance, HIV, Pakistan, Stigma, Tuberculosis.

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INTRODUCTION

Human Immunodeficiency Virus (HIV) infection remains one of the most pressing global public health concerns, with an estimated 39 million people living with HIV worldwide as of 2022 (1). Despite substantial advancements in therapeutic management, HIV continues to exert a profound impact on global morbidity and mortality. The introduction of Antiretroviral Therapy (ART), particularly Highly Active Antiretroviral Therapy (HAART), has revolutionized the management of HIV infection, transforming it from a fatal disease into a manageable chronic condition (2). Consistent adherence to ART—typically exceeding 95%—is essential for sustained viral suppression, immune restoration, and prevention of drug resistance (3). However, maintaining this level of adherence poses a significant challenge, particularly in low- and middle-income countries where social, economic, and health system constraints prevail. In Pakistan, the HIV epidemic has shown a concerning upward trend over the past decade. According to recent national estimates, more than 210,000 individuals are currently living with HIV, with a large proportion remaining undiagnosed or inadequately treated (4). Although free ART services are provided through national and provincial AIDS control programs, adherence remains suboptimal among many patients. Contributing factors include social stigma and discrimination, fear of disclosure, economic hardship, lack of family support, and treatment-related challenges such as high pill burden, adverse drug reactions, and comorbid infections—particularly tuberculosis (TB) (5,6). Limited awareness and inconsistent follow-up within resource-constrained healthcare systems further exacerbate the problem. Poor adherence not only compromises therapeutic efficacy but also facilitates the emergence of drug-resistant viral strains, increases the risk of disease progression, and elevates transmission rates within the community (7-9). Addressing these barriers requires a comprehensive understanding of the determinants of non-adherence to HAART in local contexts. Therefore, the present study was undertaken to identify and analyze the factors contributing to poor adherence to HAART among HIV-positive patients attending a tertiary care center in Lahore, with the objective of guiding targeted interventions to improve treatment outcomes and strengthen national HIV control efforts.

METHODS

A descriptive cross-sectional study was conducted at the HIV Clinic of [Hospital Name], Lahore, between January and June 2024, to assess the factors influencing adherence to Highly Active Antiretroviral Therapy (HAART) among individuals living with HIV. The study population comprised adult patients diagnosed with HIV who had been receiving HAART for at least six months prior to enrollment. A total of 210 participants were recruited using a consecutive sampling technique to ensure representation of all eligible patients visiting the clinic during the study period. Participants were included if they were aged 18 years or older, had a confirmed HIV-positive diagnosis verified through standard diagnostic protocols, had been on HAART for a minimum of six months, and provided written informed consent to participate in the study. Critically ill patients who were unable to complete the interview and those with incomplete medical or treatment records were excluded to maintain data accuracy and reliability. Data collection was carried out using a pretested, structured questionnaire designed to capture detailed socio-demographic characteristics (age, gender, marital status, education, occupation, and income), clinical information (duration of HIV diagnosis, regimen type, comorbid conditions, and reported side effects), and treatment adherence patterns. Adherence was evaluated using a dual approach: patient self-report and verification through pharmacy refill records. Consistent with established criteria, patients missing more than 5% of their prescribed doses within the preceding 30 days were classified as having poor adherence (1). All data were coded and entered into IBM SPSS Statistics version 25 for analysis. Descriptive statistics, including frequencies and percentages, were calculated for categorical variables, while means and standard deviations were computed for continuous variables. The Chi-square test was applied to assess associations between categorical variables and adherence status. Logistic regression analysis was performed to identify independent predictors of poor adherence while controlling for potential confounders. Statistical significance was set at a p-value of less than 0.05. Ethical approval for the study was obtained from the Institutional Review Board (IRB) of the relevant institute ensuring adherence to ethical research standards. Written informed consent was obtained from all participants prior to inclusion, and confidentiality of all personal and medical information was strictly maintained throughout the study.

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RESULTS

Among the 210 HIV-positive patients included in the study, the mean age was 37.4 ± 9.2 years. The majority were male (67.6%), while females comprised 32.4%. More than half of the participants (52%) had either no formal education or only primary-level education. Overall, 84 participants (40%) were found to be non-adherent to Highly Active Antiretroviral Therapy (HAART), based on self-reports and pharmacy refill records. The most frequently reported reasons for poor compliance were forgetfulness (38.1%), stigma or fear of disclosure (25%), medication side effects (20.2%), financial constraints (10.7%), and tuberculosis (TB) co-infection (6%). Statistical analysis revealed significant associations between poor adherence and low educational attainment ($p = 0.01$), perceived stigma ($p = 0.02$), and TB co-infection ($p = 0.04$). Further stratified analysis revealed that non-adherence varied across demographic subgroups. Patients aged 30–39 years demonstrated the highest rate of poor adherence (46.4%), followed by those aged 40–49 years (38.2%), while younger patients under 30 years showed comparatively better compliance (28.6%). Gender-wise comparison indicated that non-adherence was more prevalent among males (42.6%) than females (34.3%), though this difference did not reach statistical significance ($p = 0.08$). Multivariate logistic regression analysis identified low educational attainment (Adjusted Odds Ratio [AOR]: 2.37; 95% Confidence Interval [CI]: 1.28–4.39; $p = 0.01$), stigma or fear of disclosure (AOR: 1.94; 95% CI: 1.10–3.42; $p = 0.02$), and co-existing tuberculosis infection (AOR: 1.82; 95% CI: 1.04–3.16; $p = 0.04$) as independent predictors of poor adherence to HAART. These results underscore the multifactorial nature of non-compliance, suggesting that both psychosocial and clinical factors contribute significantly to suboptimal treatment adherence among HIV-positive patients.

Table 1: Demographic Characteristics of Study Participants (n = 210)

Variable	Categories	Frequency (n)	Percentage (%)
Age (years)	<30	42	20.0
	30–39	97	46.2
	40–49	55	26.2
	≥50	16	7.6
Mean ± SD (years)		37.4 ± 9.2	
Gender	Male	142	67.6
	Female	68	32.4
Educational Status	No formal/Primary	109	52.0
	Secondary or above	101	48.0

Table 2: Adherence Status to HAART

Adherence Status	Frequency (n)	Percentage (%)
Adherent	126	60.0
Non-adherent	84	40.0
Total	210	100.0

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Table 3: Reasons for Poor Compliance to HAART among Non-Adherent Patients (n = 84)

Reason	Frequency (n)	Percentage (%)
Forgetfulness	32	38.1
Stigma/Fear of Disclosure	21	25.0
Side Effects	17	20.2
Financial Constraints	9	10.7
TB Co-infection	5	6.0

Table 4: Factors Associated with Non-Adherence to HAART

Factor	p-value	Adjusted Odds Ratio (AOR)	95% Confidence Interval (CI)	Significance
Low Educational Status	0.01	2.37	1.28–4.39	Significant
Stigma/Fear of Disclosure	0.02	1.94	1.10–3.42	Significant
TB Co-infection	0.04	1.82	1.04–3.16	Significant
Male Gender	0.08	1.41	0.95–2.27	Not significant
Age 30–39 years	0.06	1.33	0.98–2.11	Not significant

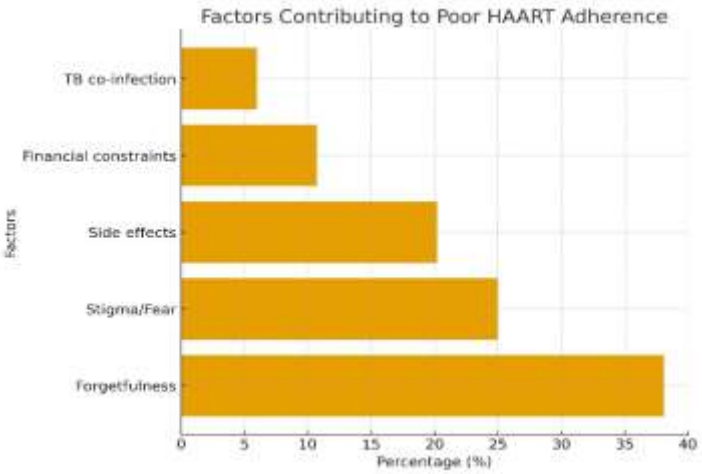

Figure 2 Factors Contribution to Poor HAART Adherence

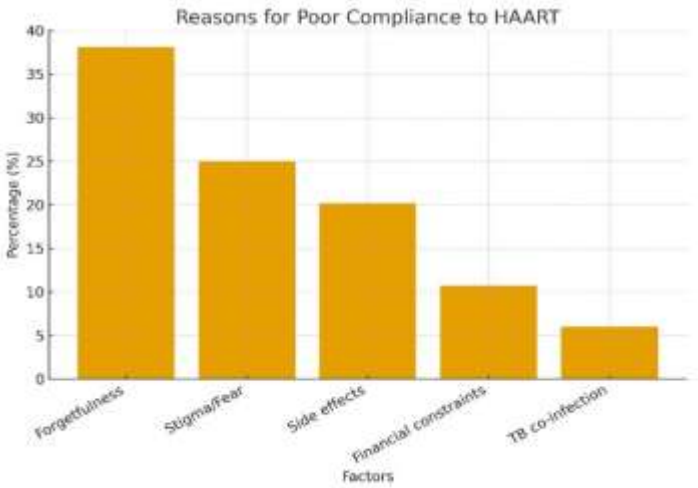

Figure 2 Reasons for Poor Compliance to HAART

DISCUSSION

The present study revealed a non-adherence rate of 40% among patients receiving Highly Active Antiretroviral Therapy (HAART), which is consistent with findings from several low- and middle-income countries reporting similar adherence challenges (10,11). This figure underscores the persistent difficulties faced by individuals living with HIV in maintaining optimal treatment compliance, despite the availability of free antiretroviral therapy through public health programs. The predominance of forgetfulness and stigma as leading causes of poor adherence highlights both behavioral and socio-cultural barriers influencing treatment continuity in Pakistan. Low literacy emerged as a significant determinant of poor adherence, suggesting that inadequate understanding of disease processes and treatment

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importance remains a critical obstacle. Patients with limited education may struggle to comprehend medication instructions or recognize the long-term benefits of sustained therapy. Similar findings have been reported in regional studies, where limited health literacy has been associated with inconsistent ART use and poorer clinical outcomes (12-14). This reinforces the need for patient-centered educational interventions designed in culturally sensitive and linguistically accessible formats. Stigma and fear of disclosure also played a major role in non-adherence. Many patients avoided taking medication in front of others due to societal discrimination and misconceptions surrounding HIV. This aligns with previous research demonstrating that internalized stigma often leads to concealment behaviors, social withdrawal, and treatment interruptions (15). Reducing stigma through community-based awareness campaigns, peer-support programs, and confidential counseling could play a pivotal role in improving adherence outcomes. Co-morbid tuberculosis (TB) further compounded the problem of non-compliance. The co-existence of HIV and TB increases pill burden, enhances treatment fatigue, and may cause overlapping drug toxicities, which together contribute to poor adherence. Studies from similar resource-limited settings have documented comparable challenges, emphasizing the necessity of integrated HIV-TB management programs to improve patient retention and minimize adverse effects (16-18).

The findings of this study carry several implications for public health practice. Strengthening psychosocial support mechanisms, simplifying HAART regimens, and enhancing patient follow-up can significantly improve adherence rates. Furthermore, developing multidisciplinary care models that integrate medical, psychological, and social services would provide a more holistic framework for patient management. In terms of strengths, this study provides locally relevant data on adherence patterns and associated factors within a tertiary-care context, contributing valuable insight into barriers specific to the Pakistani population. However, several limitations must be acknowledged. The single-center design limits generalizability to broader populations, while reliance on self-reported adherence introduces potential recall and social desirability bias. The cross-sectional nature of the study also restricts causal inference, as temporal relationships between predictors and adherence could not be established. Future research should employ longitudinal and multi-center designs, incorporating objective adherence measures such as electronic monitoring or biomarker validation to enhance reliability (19-21). Additionally, qualitative studies exploring patient perceptions and lived experiences would deepen understanding of psychosocial determinants. Addressing these methodological gaps in future investigations could inform more comprehensive adherence-improvement strategies and strengthen national HIV control efforts.

CONCLUSION

Poor adherence to antiretroviral therapy remains a major impediment to achieving sustained viral suppression and improved quality of life among individuals living with HIV. The study concludes that stigma, low literacy, and tuberculosis co-infection are pivotal contributors to treatment non-compliance, reflecting the interplay of social, educational, and clinical determinants. Strengthening patient counseling services, promoting family and community support, and integrating TB and HIV treatment programs are critical strategies to enhance adherence. Implementing these targeted interventions can significantly improve therapeutic outcomes, reduce disease transmission, and strengthen long-term HIV control efforts within resource-limited healthcare settings.

AUTHOR CONTRIBUTION

Author	Contribution
Maryam Haroon*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published

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