Clinical and Socio-demographic Profile of Patients Attending Anti-Retroviral Therapy Centre in a Tertiary Care Hospital in Dehradun

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Abstract:

Introduction: HIV remains a major global health challenge, with 37.7 million people living with HIV worldwide and India bearing the second-highest burden at 2.32 million PLHIV (prevalence 0.22%). Antiretroviral therapy (ART) under the National AIDS Control Organization (NACO) has transformed HIV into a manageable chronic condition, yet regional variations in patient profiles necessitate ongoing assessments for targeted interventions. **Objectives:** The study aimed to identify key risk factors, common clinical presentations and potential areas for improving care and support systems to better manage the HIV epidemic in this region. **Methods:** Ethical approval was obtained from the Institutional Ethics Committee. Current cross-sectional study reviewed records of 360 HIV-positive patients registered at the ART centre from January 2021 to January 2024. Data from patients' white cards included socio-demographics (age, gender, occupation, education, residence), clinical details (WHO staging, baseline CD4 count, mode of transmission) and personal habits. Data was analysed using SPSS v 29.0 with descriptive statistics (means, frequencies) and chi-square tests ($p<0.05$). **Results:** Males predominated (63.9%; n=230), mean age was 35.29±12.74 years, mostly 30-40 years (35.8%). Rural residence (68.8%), married (73.9%), unemployed/homemakers (31.3%) and graduates (37.2%) were common. Sexual transmission was predominant (76%) followed by mother-to-child. Most presented at WHO Stage 1 (80.6%) with baseline CD4 ≥350 cells/mm³ (37.2%). **Conclusion**: Early-stage presentations reflect effective screening and ART access in Dehradun but male predominance, rural burden and behavioural risks highlight needs for gender-specific outreach, stigma reduction and prevention in productive-age groups to optimize HIV management.

Keywords: AIDS, ART, HIV, Immune system, Infections

Introduction:

The Human Immunodeficiency Virus (HIV) infection is a significant global health challenge, with approximately 37.7 million people living with HIV worldwide.[1] India has the second-highest HIV burden globally, with an estimated 23.19 lakh People Living with HIV (PLHIV), despite a relatively low national prevalence rate (0.22% as of 2020).[1] Antiretroviral

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Therapy (ART) has basically changed the picture of HIV management, transforming it from a fatal diagnosis into a chronic, manageable condition.National AIDS Control Organization (NACO), provides free ART services at designated centers across the country, significantly improving access to treatment and care.[2] Understanding the specific profiles of patients accessing these ART centers is crucial for designing and implementing targeted, effective public health interventions and support services. However, the clinical and socio-demographic profiles can vary across different regions and populations served by various ART centers. Therefore, there is a continuous need to assess the characteristics of the patient population to ensure optimal service delivery and to address specific regional challenges.

This study aims to describe the socio-demographic and clinical profile of patients attending Anti-Retroviral Therapy center in Northern India. By analyzing these profiles, the study aimed to identify key risk factors, common clinical presentations, and potential areas for improving care and support systems to better manage the HIV epidemic in this region.

Methods:

Study Type: A Record based cross- sectional study

Study setting: ART centre of a tertiary care hospital in Dehradun, providing free consultation, treatment and care for PLHIV under NACO program.

Study period: 3 years (January 2021 to January 2024)

Study Population: All patients who were HIV positive and registered at the ART Centre of a tertiary care hospital during the study period were included in the study. The patients with incomplete records like missing data on socio-demographic profile were excluded from the study which was 4 in number.

Sample Size: A total enumeration of 364registered HIV confirmed patients was taken from January 2021 to January 2024 but due to missing data of 04 patients, sample size came out to be 360.

Data Collection Tools and Techniques

Data was collected from routine patient treatment record (white card) at ART center of a tertiary care hospital in Dehradun. Records of 360 PLHIV of all ages attending the antiretroviral clinic were studied. The demographic information of the subjects was collected, along with the clinical profile and the treatment details. The clinical staging of HIV/AIDS was done according to the WHO clinical staging of HIV/AIDS 2005. Stage I- HIV infection is Asymptomatic and not categorized as AIDS, Stage II- includes, minor muco-cutaneous manifestations and recurrent upper respiratory tract infections and unexplained weight loss (<10% of presumed or measured body weight), Stage III- includes unexplained chronic diarrhea for longer than a month, severe bacterial infections and pulmonary tuberculosis and unexplained weight loss (>10% of presumed or measured body weight), stage IV- includes, Toxoplasmosis of the brain, Candidiasis of the esophagus, Trachea, Bronchi or lungs and Kaposi's Sarcoma; these diseases are indicators of AIDS. The functional status of the subjects was done as working, Ambulatory and bed ridden.

The information collected was divided into two main sections: In first section we have covered the sociodemographic profile like Age, Gender, Marital status, Education level, Occupation, etc. Also, in second section following parameters were covered like modeof HIV transmission, WHO clinical staging at presentation/ ART initiation, baseline CD4 count (cells/mm^3) at the time of study or ART initiation.

Data Analysis

Data Entry: The data was collected by medical interns after training them and was entered into a secure database using Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 29.0 software. Descriptive Statistics was used to summarize the data. Categorical variables (like gender, marital status) were presented as frequencies and percentages.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee (IEC) of Shri Guru Ram Rai Institute of Medical and Health Sciences vide letter number SGRR/IEC/05/23. Patient confidentiality was strictly maintained throughout the study; all data were

anonymized using unique study identification numbers, and no personal identifiers were recorded in the study database.

Results:

Out of the 360 HIV-positive patients enrolled, majority resided in rural areas (248, 68.8%) compared to urban areas (112, 31.2%) with a male predominance (230; 63.9%), followed by females (126; 35.0%) and transgenders (4; 1.1%). The mean age of the participants was. 35.29±12.74 years. The majority belonged to the productive age group of 30–40 years (129; 35.8%) followed by 19-29 years (102;28.3%). Participants aged ≤18 years and >60 years constituted a small proportion (24; 6.6%) and (13;3.6%) respectively.

Majority of study participants were unemployed/homemakers and students (140: 38.8%), predominantly females (83;65.8%). Service sector employees (government/private) formed the next major group (98; 27.2%), largely males (82;35.6%). Unskilled workers accounted for (66;18.3%), reflecting a sizable labor class. Businessmen class constituted (27;7.5%) of participants. Skilled and semi-skilled workers and retired individuals, formed smaller proportions.

A relatively high proportion were graduates (134;

Table 2: Socio-demographic characteristics of the study participants

Socio-demo graphic variables		Male n (%) (230; 63.9%) n (%)	Female (126; 35%) n (%)	Transgender (4; 1.11%) n (%)	Total (360;100%)
Placeof residence	**Rural**	174 (75.65)	70 (55.55)	4 (100)	248 (68.88)
	Urban	52 (22.60)	60 (47.61)	0(0.0)	112(31.11)
Age group	≤ 18	9 (3.9)	15 (11.9)	0 (0.0)	24 (6.6)
	19-29	72 (31.3)	29 (23.0)	1 (25.0)	102 (28.3)
	30 40	86 (37.3)	40 (31.7)	3 (75.0)	129 (35.8)
	41-51	25 (10.8)	30 (23.8)	0 (0.0)	55 (15.2)
	52-62	28 (12.1)	9 (7.1)	0 (0.0)	37 (10.2)
	> 62	10 (4.3)	3 (2.3)	0 (0.0)	13 (3.6)
Occupation	Service (Govt./ Pvt.)	82 (35.6)	16 (12.6)	0 (0.0)	98 (27.2)
	Business	23 (10.0)	3 (2.3)	1 (25.0)	27 (7.5)
	Unemployed/ Homemaker	48(20.87)	91(72.22)	1 (25.0)	140 (38.88)
	Semi skilled Worker	7 (3.04)	1 (0.79)	1 (25.00)	9 (2.5)
	Skilled Worker	13 (5.65)	0 (0.0)	0 (0.0)	13(3.61)
	Unskilled worker	50 (21.7)	15 (11.9)	1 (25.0)	66 (18.3)
	Retired	7 (3.0)	0 (0.0)	0 (0.0)	7 (1.9)
Education	Illiterate	16 (6.9)	22 (17.4)	0 (0.0)	38 (10.5)
	Primary School	30 (13.0)	23 (10.3)	1 (25.0)	54 (15.0)
	Middle School	52 (22.6)	23 (10.3)	3 (75.0)	78 (21.6)
	High School	22 (9.5)	13 (10.3)	0 (0.0)	35 (9.7)
	Intermediate	12 (5.2)	7 (5.5)	0 (0.0)	19 (5.2)
	Graduate	98 (42.6)	36 (28.5)	0 (0.0)	134 (37.2)
	Post-graduate and above	0 (0.0)	2 (1.5)	0 (0.0)	2(0.5)
Socio-economic Status (B.G.Prasd classification 2025)[3]	Lower	88 (38.2)	85 (67.4)	0 (0.0)	173 (48.0)
	Upper Lower	0 (0.0)	3 (2.3)	0 (0.0)	3(0.8)
	Lower Middle	2 (0.8)	4 (3.1)	0 (0.0)	6 (1.6)
	Upper Middle	13 (5.6)	4 (3.1)	0 (0.0)	17 (4.7)
	Upper	127 (55.2)	30 (23.8)	4 (100.0)	161 (44.7)

37.2%), suggesting good educational attainment in the study population. Middle school education was reported by (78; 21.6%), followed by primary schooling (54; 15.0%). Illiteracy was seen in (38; 10.5%, more common among females (22; 17.4%). Very few participants were post-graduates (2; 0.5%). Participants were mainly distributed at the extremes: Lower socio-economic class (173; (48%) and Upper class (161; 44.7%). Very few belonged to upper-lower, lower-middle, or upper-middle classes (Table-1).

Most participants were married (266, 73.9%), with (94, 26.1%) being unmarried. Among the 266 married patients, the majority lived together with their spouses (243, 91.4%), while (7, 2.6%) were separated or divorced, and (16, 6.0%) were widows or widowers. Spouse's HIV status was found positive in (139; 52.3%) and (67;25.2%) were negative while status of (60; 22.6%) of spouses was unknown. (Table 2)

Out of 360 participants, (137; 38.1%) reported alcohol consumption. Alcohol use was predominantly seen amongst males (128; 55.7%), while (7; 5.6%) were females and transgenders were (2; 50%). The majority of females (119; 94.4%) and slightly more than two-fifths of males (102; 44.3%) reported no alcohol use. Smokeless tobacco consumption was reported by (79; 21.9%) participants, exclusively among males. None of the females or transgender reported smokeless tobacco use. Overall, (281; 78.1%) participants did not consume smokeless tobacco. Most of the participants were nonsmokers (244;67.8%). Smoking was reported by (116;32.2%) participants. A marked male predominance was observed (109;47.4%) for smoking. Smoking was uncommon among females (6; 4.8%) and was reported by one transgender (1; 25%). (Table 3)

Table 2: Distribution of Study participants according to marital status and their spouse's HIV status.

Factors		Number (%)
Place of Residence	Rural	248 (68.8)
	Urban	112 (31.2)
	Total	360
Marital Status	Unmarried	94 (26.1)
	Married	266 (73.9)
Living Arrangement (n = 266)	Living Together	243 (91.4)
	Separated / Divorced	07 (2.6)
	Widow/ Widower	16 (6.0)
Spouses HIV status	HIV Positive	139 (52.3)
	HIV Negative	67 (25.2)
	Unknown	60 (22.6)

Table 3: Distribution of study participants according to personal habits

Alcohol	**Male (230) n (%)**	**Female (126) n (%)**	**Transgender (4) n (%)**	**Total (360) n (%)**
Yes	128 (55.7)	7 (5.6)	2 (50)	137 (38.1)
No	102 (44.3)	119 (94.4)	2 (50)	223 (61.9)
Tobacco Smokeless				
Yes	79 (34.3)	0 (0)	0 (0)	79 (21.9)
No	151 (65.7)	126 (100)	4 (100)	281 (78.1)
Smoking				
Yes	109 (47.4)	6 (4.8)	1 (25)	116 (32.2)
No	121 (52.6)	120 (95.2)	3 (75)	244 (67.8)

The sexual route was the most common mode of transmission, reported in (275 ;76%) study participants, accounting for over three-fourths of the cases. Mother-to-child transmission was reported in (17;5%) participants, while intravenous route accounted for (13;4%) cases. Blood transfusion was the least common mode of transmission, reported by (10 ;3%) participants. Although in (45;12%) participants, mode of transmission was unknown. (Figure 1)

Based on WHO clinical staging at the time of assessment, the majority of participants were classified as Stage1 (290;80.6%). This was followed by Stage2 in (35;9.7%) participants and Stage3 in (28;7.8%) participants. Only a small proportion was in advanced disease, with Stage 4 observed in (7;1.9%) participants. At ART initiation, the largest proportion of participants had a CD4 count >350 cells/mm³ (134;37.2%), indicating relatively preserved immune status at

Figure 1: Distribution of study participants according to Mode of transmission

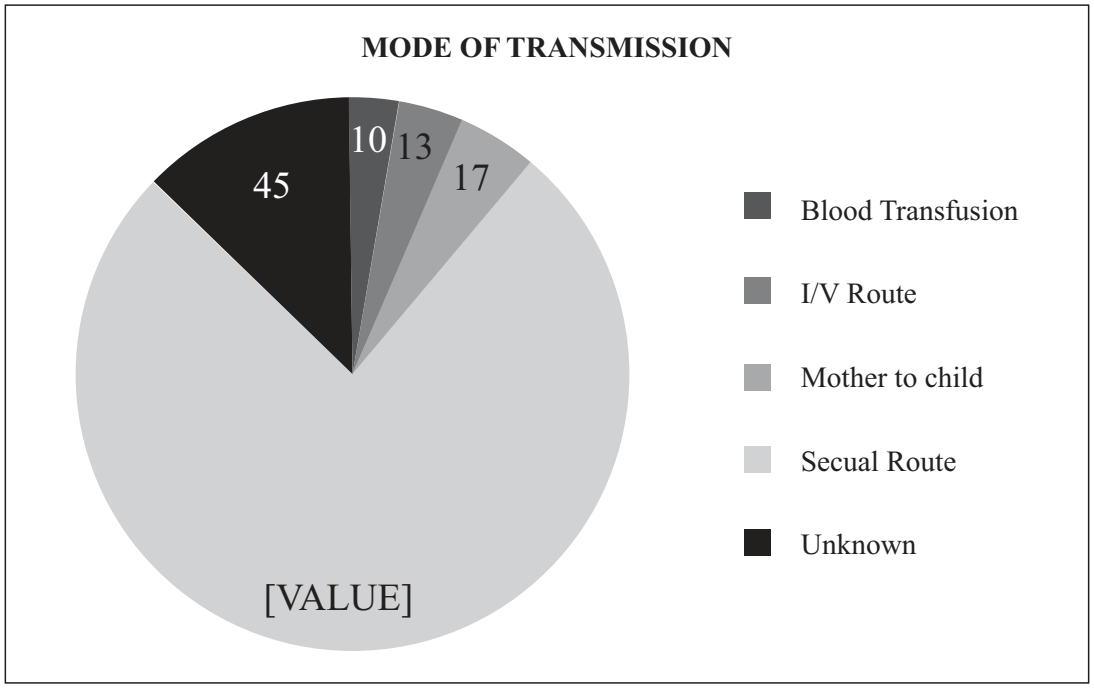

Table 4: Distribution of study participants according to clinical profile

Factors	Male (230) n (%)	Female (126) n (%)	Transgender (4) n (%)	Total (360) n (%)
WHO staging of AIDS				
Stage 1	190 (82.6)	98 (77.8)	2 (50.0)	290 (80.6)
Stage 2	21 (9.1)	12 (9.5)	2 (50.0)	35 (9.7)
Stage 3	19 (8.3)	9 (7.1)	0 (0.0)	28 (7.8)
Stage 4	5 (2.1)	2 (1.6)	0 (0.0)	7 (1.9)
CD4 count at the time of initiation of ART				
d" 50 cells/mm3	12 (5.2)	9 (7.1)	1 (25.0)	22 (6.1)
51-150 cells/mm3	39 (17.0)	18 (14.3)	0 (0.0)	57 (15.8)
151-250 cells/mm3	43 (18.7)	13 (10.3)	0 (0.0)	56 (15.6)
251-350 cells/mm3	38 (16.5)	23 (18.3)	1 (25.0)	62 (17.2)
>350 cells/mm3	86 (37.4)	46 (36.5)	2 (50.0)	134 (37.2)
Unknown	12 (5.2)	16 (12.7)	0 (0.0)	28 (7.8)

treatment start. This was followed by 251–350 cells/mm³ (62;17.2%), 51–150 cells/mm³ (57;15.8%) 151–250 cells/mm³ (56; 15.6%). Severe immunosuppression (≤50 cells/mm³) was noted in (22; 6.1%) participants. CD4 count data was not available for (28;7.8%) participants.

Lower CD4 counts (≤150 cells/mm³) were more commonly observed among males compared to females and transgender participants. However, higher CD4 counts (>350 cells/mm³) were also predominantly seen among males, reflecting their larger representation in the study population. Transgender participants constituted a very small proportion across all CD4 categories. (Table 4)

Discussion:

The studyfound that substantial number of HIV patients resided in rural areas (68.8%) which suggest higher HIV's hold into rural India, aligning with national trends where rural PLHIV often outnumber urban counterparts despite lower reported prevalence, driven by migration and limited local screening. Similar findings were observed in the study done by Doshi M et al[4] and Agarwal AK et al[5] in Gwalior, Madhya Pradesh. However, some studies contradict the findings and show higher representation 59.5% of urban areas as study done by Naik R et al[6] in Maharashtra and that done by Jha. A. et al[7] in New Delhi where 69.4% participants were from urban areas

In the current study, males predominated among ART center attendees (63.9%), followed by females (35.0%) and a small proportion of transgender individuals (1.1%). This male skew aligns with national patterns reported by the National AIDS Control Organization (NACO)[2], where males constituted about 60-65% of those registered at ART centers, reflecting higher male testing uptake and possibly greater mobility for care-seeking. The underrepresentation of females may stem from gender barriers, including stigma, household responsibilities and lower HIV awareness, as highlighted in NFHS-5 data from similar urban-rural settings[8]. Transgender representation, though low, mirrors NACO's estimates (0.5-2%), underscoring the need for targeted outreach to this high-risk group. Similar gender pattern was reported by Singh etal.[9] in Punjab and Kumari et al.[10] in Banaras UP. However studies by Tiruvaipati et al.[11] in Guntur and Uma T et al.[12] in Chennai, have reported near equal or high female distribution.

Majority of patients were in the productive age group of 30-40 years (35.8%), and 28.3% were aged 19-29 years, which is consistent with the epidemiological shift in India's HIV epidemic towards younger adults due to sexual route of transmission. Only 6.6% were d"18 years, likely reflecting vertical transmission prevention successes via programs like Prevention of Parent-to-Child Transmission (PPTCT). Older age groups (3.6%) were minimal, possibly due to competing morbidities or late diagnosis. This distribution emphasizes the socioeconomic burden on working-age populations, informing resource allocation for adherence support and livelihood programs. Similar findings were reported by studies done by Kotoky etal.[13] in Assam, Rajasekar et al.[14] in Tamil Nadu, Agarwal A K et al.[6] in Gwalior, Naik R et al.[7] in Maharashtra.

Among the total patients attending ART centre, the majority were unemployed or homemakers (38.88%), followed by those in the service sector (27.2%) and unskilled workers (18.3%). Similar findings were seen in a study done by Kotoky etal.[13] in Dibrugarh. Lower socioeconomic status (48%) and high illiteracy (10.5%) or primary education (15%) levels were found as vulnerabilities in ART recipients, where low education correlates with delayed presentation ,ignorance and poorer adherence to ART. This reflects that high-risk behavior is more among the unemployed who usually belong to the low socioeconomic status. Similar findings were reported by Uma T etal.[12] in Chennai, Jayarama S. et al[15] and Safren SA et al[16] in Chennai where the majority of the attendees had low literacy and belonged to a lower socio-economic background.

Among the patients attending ART centre, majority were married (73.9%), which underscores the heterosexual route as the most common in India. This finding is comparable to the study done by Nirmal et al[17] in Chennai where 60% of the respondents were married, Jayarama S et al[15] who reported that 70.3% of HIV-positive individuals were married and Joge US et al[18]

where 78% of participants were married. The current study showed that (52.3%) had spouses who were HIV positive, which is almost double that of spouses who were HIV negative. This is similar to the studies done by Naik et al[7] in Maharashtra where (61%) of patients had HIV-positive spouses and Balasundaram A et al[19] in Pudducherry who reported 75% HIV positive spouses.

Tobacco smoking, smokeless and alcohol consumption was found to be 32.2%, 21.9%, and 38.1% respectively in the present study. Similarly, Palanisamy et al [20] in their study reported 40% use of tobacco and alcohol amongst PLHIV. Almost similar finding for tobacco smoking and smokeless tobacco was reported by Naik et al [7] although their findings differ with alcohol use. However, in a study by Uma T [12] 68% PLHIV were having at least any one of the habits, like alcohol, smoking and intravenous drug usage. 27% prevalence of tobacco use among men was reported by Mdege et al[21] who collected data from 28 low-income and middle-income countries.

The present study revealed that 80.6% PLHIV were in stage 1 at the initiation of ART followed by stage 2,3 and 4. So, overall, most individuals were diagnosed and/or initiated treatment during the early stages of HIV disease. This finding is consistent with the findings of Kumawat S. et al.[22] in Rajasthan but is different from the study by Nayak, et al[23] who reported only 13.72% patients in stage 1.

The current study reveals sexual route as the most common mode of transmission of HIV and in 4% cases, route of transmission was intravenous. Almost similar finding (70.5%) was reported by Kumari etal.[10] as the predominant mode of transmission and 3.4% as intravenous transmission. Where as in the study by Baghel et al.[24] heterosexual route being the commonest mode of transmission contributed to approximately 82%.

The CD4 count is one of the most reliable investigations for clinical staging of patients and used to make decisions on treatment initiation. In the current study highest proportion of participants had a CD4 count >350 cells/mm³ (134;37.2%), indicating relatively preserved immune status at treatment start which is similar to findings of Sonani et al[25] from Surat. Severe immunosuppression (≤50 cells/mm³) was noted in (22; 6.1%) participants. However, the findings are in contrast to the findings by Kumari et al[10].

Limitation: The study is based on only one site that restricts the applicability of the findings to broader populations.

Conclusions:

This study describes a predominantly male (63.9%), rural (68.8%), productive-age (30-40 years) population attending the Dehradun ART centre, with sexual transmission (76%) and early HIV presentations (WHO Stage 1: 80.6%). These profiles confirm effective NACO-supported early diagnosis and ART access in Northern India, addressing the objective of characterizing regional patient characteristics for targeted interventions. The findings highlight needs for gender-sensitive outreach, stigma reduction in rural areas, and prevention amid high-risk behaviours, informing policy makers to optimize HIV care and curb transmission. Future multi-centre studies could enhance generalizability and assess long-term outcomes.

Recommendation:Based on the study findings, there should be enhanced gender-specific outreach programs targeting females and transgender individuals (1.1% representation) through community awareness campaigns to overcome stigma and improve ART centre attendance, given male predominance (63.9%). Strengthening of rural HIV screening and linkage-to-care initiatives, as 68.8% of patients were rural, to sustain early presentations (WHO Stage 1: 80.6%) and leverage NACO services effectively. Integration of behavioural counselling for high-risk habits (alcohol 38.1%, smoking 32.2%, predominantly males) within ART protocols should be there to boost adherence and reduce transmission risks in productive-age groups (35.8% aged 30-40 years).Prospective multi-centre studies across Northern India should be conducted to validate findings and evaluate long-term CD4 trends and adherence, addressing single-site limitations.

Declaration:

Conflict of Interest: NIL

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