ORIGINAL PAPER

Clinical profile and outcomes analysis of HIV infection

Ashwant Kumar[1], Yoganathan Chidambaram[2], Clement J. Dhas[2], Nekkanti Abilash[2], Murali Alagesan[2]

[1]Department of General Medicine, ESI Medical College, Coimbatore, India
[2]Department of General Medicine, PSG Institute of Medical Sciences and Research, Peelamedu, Coimbatore, India

Abstract

Introduction: India has the third largest number of human immunodeficiency virus (HIV) patients, but the national prevalence is continuously receding owing to dedicated health centers as well as highly active antiretroviral therapy (HAART), which is associated with newer manifestations and outcomes. Complete understanding of HIV paradigm would facilitate timely identification, intervention, and medical modulation to obtain maximum benefits with minimal side effects. The study aimed to analyze the clinical profile and disease outcomes of HIV patients.

Material and methods: This descriptive study included 200 HIV-positive patients, aged 20-70 years, attending or admitted to the study center. Participants were assessed for their demographic, medical, clinical, hematological, and viral characteristics as well as treatment rendered and disease outcomes. Descriptive statistics were applied.

Results: The participating cohort had a mean age of 40.52 ± 7.29 years and M : F ratio of 1.8 : 1. Most patients presented with fever (72.0%), weight loss (53.0%), anemia (11.5%), lymphadenopathy (11.0%), diabetes (23.0%), and respiratory involvement (47.5%). Tuberculosis (53.5%), candidiasis (29.5%), and *Pneumocystis jirovecii* pneumonia (11.5%) were the most prevalent opportunistic infections. HAART was dominated by tenofovir + efavirenz + emtricitabine (TEE) (55%), causing reduction in viral load and rise in CD4 count in about 71% of patients. Nearly 38% of participants showed a combination of clinical, immunological, and virological failures. Renal tubular necrosis (5%) was the most common adverse effect of HAART, while 1% developed immune reconstitution inflammatory syndrome.

Conclusions: All adult HIV patients should be screened for side effects associated with HAART medications in addition to typical HIV presentation.

HIV AIDS Rev 2024; 23, 4: 282-289
DOI: https://doi.org/10.5114/hivar/159109

Key words: acquired immunodeficiency syndrome, highly active antiretroviral therapy, HIV, immune reconstitution inflammatory syndrome, opportunistic infections, tuberculosis.

Introduction

Acquired immunodeficiency syndrome (AIDS) has evolved into a chronic health disease that is well-managed with antiretroviral treatment and opportunistic infections control. Nearly four decades have passed since human immunodeficiency virus (HIV) was first detected and identified as the root cause of the deadly pandemic called AIDS, yet it remains a key public health challenge [1, 2]. The global prevalence of HIV has surpassed 37 million people, with India being the third highest contributor to this number [1, 3]. In India, the first case of AIDS was recorded in 1986, and in 1987, a surveillance system was established. However, the national adult HIV

Address for correspondence: Yoganathan Chidambaram, MD, Department of General Medicine, PSG Institute of Medical Sciences and Research, Peelamedu, Coimbatore, India, e-mail: yoganathancc@gmail.com

Article history:
Received: 23.11.2022
Revised: 06.01.2023
Accepted: 09.01.2023
Available online: 30.10.2024

International Journal of HIV-Related Problems
HIV & AIDS Review

prevalence in India has been continuously declining from 0.54% in 2000 through 0.33% in 2010 to 0.22% in 2020 [4, 5].

This is largely attributed to the rapid expansion of HIV-specific healthcare centers as well as increased accessibility to timely testing, prophylactic regimens, and highly active antiretroviral therapy (HAART). HAART is utilized by 73% of HIV-positive patients globally [1, 3, 4]. While this treatment has vastly contributed to noticeable improvements in disease outcomes, it is associated with a host of newer manifestations, in addition to typically known HIV/AIDS profile, including medication-related toxicities and immune reconstitution inflammatory syndrome (IRIS) [4]. Highly active antiretroviral therapy is usually a life-long treatment regimen, unless the treating physician recommends a change in regimen due to associated adverse effects. These changing patterns of clinical presentations need further exploration to fully understand HIV spectrum [4].

The paradigm of HIV, if fully comprehended, would facilitate timely identification and interventions. It would also help to prevent or mitigate potential unnecessary adverse effects of therapy and improve patient-related outcomes. Moreover, it would help to observe HIV patients periodically, especially their utilization of anti-retroviral drugs or other forms of treatment.

Parameters, such as CD4 count and viral load can be used to represent the virological and immunological profile of HIV patients to determine treatment outcomes after initiation of HAART. Positive reaction to HAART treatment is depicted by a reduction in viral load and improvement in CD4 count in the host. Moreover, many short-term outcome-related studies have been conducted in various Asian countries, and short-term outcomes showed improvement in CD4 count and reduction in viral load after HAART therapy [6, 7]. Furthermore, it can guide modulation of medical therapy in these patients to derive maximum benefits with minimal side effects. Hence, this study aimed to analyze the clinical profile and short-term outcomes in HIV patients.

Material and methods

The present descriptive study was conducted at a tertiary care hospital in Tamil Nadu, India. The study period was from January 2014 to December 2019, and included recruitment of participants and short-term follow-up of one year, after obtaining ethical clearance from the Institutional Human Ethics Committee (Ref. No.: PSG/IHEC/2018/Appr/Exp/310). Convenience sampling was employed for the present study, and participants were selected using random sampling method among eligible consecutive patients who presented at the hospital. The participants for the present study were included if they were aged between 20-70 years, attended outpatient department (OPD) or were admitted in medical wards of the hospital where the study was conducted, tested positive for HIV, and provided written informed consent for participation in the study. Patients were excluded if they did not provide informed consent, were aged below 20 years or more than 70 years, they were not willing to receive treatment and follow-up at the hospital where the study was conducted, or were receiving treatment elsewhere.

Among the continuous OP/IP screened subjects ($n = 272$), 72 patients were excluded. Therefore, 200 patients (132 outpatients and 68 inpatients) were participated in the study and were included in the analysis. The selected participants were then assessed for their demographic characteristics, medical history, clinical profile, hematological investigations, HIV monitoring report, treatment rendered, and disease outcomes using a pre-formed questionnaire. Patient follow-up consisted of immunological profile (CD4 count), virological profile (viral load), and details of adverse effects due to HAART or change in regimen. Follow-up data were acquired every 6 months during patients' consecutive visits to the hospital. No drop out was recorded during the course of the study.

Statistical analysis

Data were analysed using Microsoft Excel. Continuous variables were represented by mean ± standard deviation (SD), while categorical variables were denoted by frequency tables.

Results

The current study analyzed 200 HIV-positive patients, with a mean age of 40.52 ± 7.29 years and male: female ratio of 1.8 : 1. Tables 1 and 2 present the descriptive statistics for

Table 1. Descriptive statistics of demographic details ($N = 200$)

Variables	*n* (%)
Age (years)	
21-30	21 (10.5)
31-40	83 (41.5)
41-50	82 (41.0)
51-60	14 (7.0)
Gender	
Male	129 (64.5)
Female	71 (35.5)
Occupation	
Homemaker	64 (32.0)
Coolie	17 (8.5)
Business	54 (27.0)
Farmer	32 (16.0)
Student	4 (2.0)
Teacher	4 (2.0)
Others	25 (12.5)
Marital status	
Married	181 (90.5)
Not married	19 (9.5)
Partners/family member affected	
Infected	137 (68.5)
Not infected	24 (12.0)
Unknown	20 (10.0)
Not married	19 (9.5)

Table 2. Descriptive statistics of medical history details

Medical history	*n* (%)
Smoking	
Yes	25 (12.5)
No	175 (87.5)
Alcohol	
Yes	27 (13.5)
No	173 (86.5)
Other drug abuse	
Nil	200 (100.0)
Comorbidities	
Nil	98 (49.0)
Diabetes mellitus	46 (23.0)
Chronic kidney disease	8 (4.0)
Coronary artery disease	7 (3.5)
Bronchial asthma/chronic obstructive pulmonary disease	9 (4.5)
Hypothyroidism	4 (2.0)
Systemic/hypertension	22 (11.0)
Chronic liver disease	4 (2.0)
Dyslipidemia	12 (6.0)
Gastroesophageal reflux disease	7 (3.5)
Anemia	15 (7.5)
Central nervous system	2 (1.0)
Autoimmune	1 (0.5)
Alternate therapy	
Nil	194 (97.0)
Siddha	4 (2.0)
Ayurveda	2 (1.0)
Pregnancy	
Yes	11 (5.5)
No	189 (94.5)

categorical and continuous variables, respectively. Over 90% of the patients were married, with 68.5% having HIV-infected partners/family members. Most patients were homemakers (32%) or running a business (27%). While 49% had no comorbidities, medical history revealed predominance of smoking (12.5%), alcoholism (13.5%), diabetes mellitus (23%), and hypertension (11%), and 5.5% were pregnant.

Table 3 showed that 12% of the patients requiring emergency admission, most patients reported fever (72%), weight loss (53%), and appetite loss (47.5%). Anemia (11.5%) and lymphadenopathy (11%) were the most common signs identified. Most cases showed respiratory (47.5%), gastrointestinal system (24.5%), dermatological (20%), and psychiatric (12.5%) involvement. Tuberculosis (TB) (53.5%), candidiasis (29.5%), and *Pneumocystis jirovecii* pneumonia (PJP) (11.5%) were the most prevalent opportunistic infections among the patients. Pulmonary TB, oral candidiasis, and cytomegalovirus (CMV) esophagitis dominating the clinical profile (Figures 1 and 2). Co-infection with hepatitis B (3%), hepatitis C (2%), *Treponema palladium* (0.5%), and dengue (1%) were also observed (Table 4).

Hematological investigation reports revealed a mean hemoglobin level of 11.31 ± 2.62 g/dl, mean platelet count of 225.79 ± 93.87 cells/µl, and mean creatinine level of 0.86 ± 0.69 mg/dl. The mean values of serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) were 64.91 ± 241.51 units/l and 43.62 ± 146.85 units/l, respectively (Table 4 and 5).

Table 5 showed that the mean initial CD4 count was noted to be 242.39 ± 219.86 cells/µl, with Table 6 showing that 56.5% of the patients having initial CD4 count ≤ 200 cells/µl. This CD4 count increased in nearly 71% of the participants and decreased in nearly 29% of the cases at first and second follow-up visits. The average relative increase in CD4 count during initial to first follow-up was 95.2%. Viral load reached over 1,000,000 in 10% of the patients at the initial visit, and reduced to 1% at the second follow-up visit.

While most patients were under HAART, few resorted to alternate modes of therapy (3%). Highly active antiretroviral

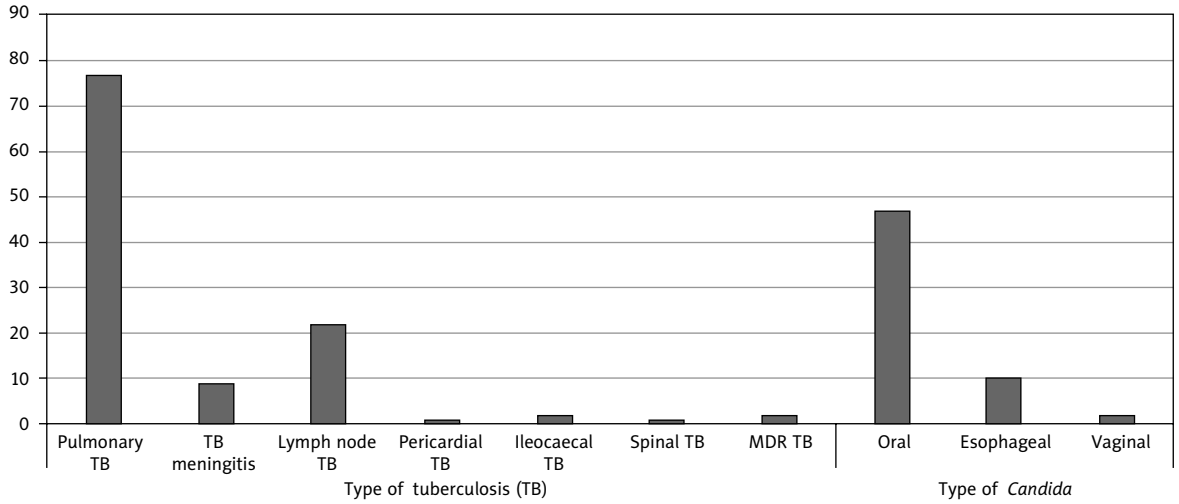

Figure 1. Distribution of patients by type of tuberculosis and type of *Candida*

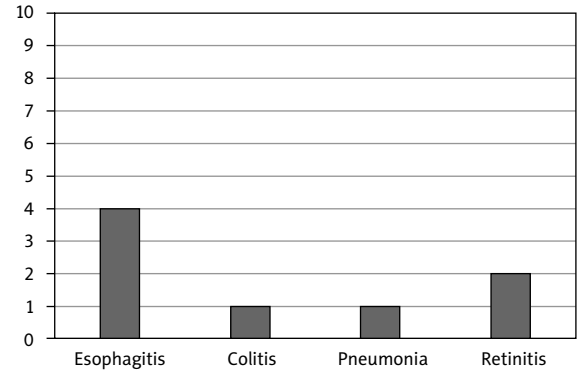

Figure 2. Distribution of subjects by type of cytomegalovirus

Table 3. Descriptive statistics of clinical profile details

Clinical profile	*n* (%)
Admission	
Emergency	24 (12.0)
Not emergency	176 (88.0)
Symptoms	
Fever	144 (72.0)
Weight loss	106 (53.0)
Loss of appetite	95 (47.5)
Cough	45 (22.5)
Breathlessness	25 (12.5)
Abdominal pain	5 (2.5)
Dysphagia	13 (6.5)
Dyspepsia	24 (12.0)
Diarrhea	10 (5.0)
Fatigue	21 (10.5)
Headache	7 (3.5)
Seizures	6 (3.0)
Signs	
Anemia	23 (11.5)
Jaundice	10 (5.0)
Cyanosis	0 (0.0)
Clubbing	1 (0.5)
Pedal edema	0 (0.0)
Lymphadenopathy	22 (11.0)
System	
Respiratory	95 (47.5)
Cardiovascular	1 (0.5)
Gastrointestinal	49 (24.5)
Central nervous system	12 (6.0)
Dermatological	28 (14.0)
Ocular	5 (2.5)
Lymphatic	19 (9.5)

Table 3. Cont.

Clinical profile	*n* (%)
Opportunistic infection	
Tuberculosis	107 (53.5)
Candidiasis	59 (29.5)
Herpes zoster	12 (6.0)
Pneumocystis pneumonia	23 (11.5)
Cytomegalovirus	8 (4.0)
Mycobacterium avium complex	2 (1.0)
Crypto meningitis	2 (1.0)
Central nervous system toxoplasmosis	2 (1.0)
Hodgkin lymphoma	1 (0.5)
Progressive multifocal leukoencephalopathy	1 (0.5)
Dermatological involvement	
Dermatitis	18 (9.0)
Tinea	6 (3.0)
Urticarial	2 (1.0)
Psoriasis	2 (1.0)
Herpes zoster	12 (6.0)
Psychiatry involvement	
Depression	18 (9.0)
Adjustment	4 (2.0)
Alcohol dependence syndrome	2 (1.0)
Schizophrenia	1 (0.5)

therapy was dominated by tenofovir + efavirenz + emtricitabine (TEE) (55%) and tenofovir + lamivudine + efavirenz (TLE) (31%). During follow-up, the regimen was changed to first-, second-, and third-line drugs in 25.5%, 25%, and 2% of the patients, respectively. Nearly 38% of the participants showed a combination of clinical, immunological, and virological failures. With regards to drug compliance, 24.5% of the patients defaulted on HAART for a mean duration of 15.29 ± 8.14 months. Although 84.5% of the cases did not have any side effects, renal tubular necrosis (5%) was seen to be the most common adverse effect of HAART, while 1% developed IRIS (Table 7).

Discussion

India has the third highest number of HIV patients worldwide, but the national prevalence is continuously receding owing to increased accessibility to dedicated health centers and HAART. However, HAART medications are associated with newer manifestations and outcomes. Complete understanding of the HIV paradigm would facilitate timely identification, intervention, and medical modulation to derive maximum benefits with minimal side effects. Hence, this study aimed to analyze the clinical profile and disease outcomes in HIV-positive patients.

Table 4. Descriptive statistics of blood report details

Blood reports	*n* (%)
Hemoglobin (g/dl)	
< 6.5	11 (5.5)
6.5-7.9	8 (4.0)
8.0-9.4	20 (10.0)
9.5-10.9	42 (21.0)
≥ 11.0	119 (59.5)
Creatinine (mg/dl)	
< 1.2	175 (87.5)
1.2-1.5	14 (7.0)
> 1.5	11 (5.5)
Total bilirubin (mg/dl)	
< 1.0	172 (86.0)
1.0-1.99	15 (7.5)
2.0-3.99	8 (4.0)
≥ 4.0	5 (2.5)
Serum glutamic oxaloacetic transaminase (units/l)	
< 50	163 (81.5)
50-300	27 (13.5)
301-1,000	9 (4.5)
> 1,000	1 (0.5)
Serum glutamic pyruvic transaminase (units/l)	
< 50	168 (84.0)
50-300	30 (15.0)
301-1,000	1 (0.5)
> 1,000	1 (0.5)
Albumin(g/dl)	
< 2.0	2 (1.0)
2.0-3.49	44 (22.0)
3.5-5.5	154 (77.0)
Alkaline phosphatase (IU/l)	
< 150	179 (89.5)
150-300	14 (7.0)
> 300	7 (3.5)
Gamma-glutamyl transferase (IU/l)	
< 50	112 (56.0)
50-100	44 (22.0)
101-200	25 (12.5)
201-500	16 (8.0)
> 500	3 (1.5)
Hepatitis B	
Yes	6 (3.0)
No	194 (97.0)
Hepatitis C	
Yes	4 (2.0)
No	196 (98.0)
Treponema pallidum hemagglutination	
Yes	1 (0.5)
No	199 (99.5)
Tropical infection	
Yes (dengue)	2 (1.0)
No	198 (99.0)

Table 5. Descriptive statistics of continuous variables

Variables	Mean ± SD
Age (years)	40.52 ± 7.29
Hemoglobin (g/dl)	11.31 ± 2.62
Total counts	7.35 ± 3.85
Platelet count (1,000 cells/μl)	225.79 ± 93.87
Creatinine (mg/dl)	0.86 ± 0.69
Total bilirubin (mg/dl)	0.87 ± 2.03
Serum glutamic oxaloacetic transaminase (units/l)	64.91 ± 241.51
Serum glutamic pyruvic transaminase (units/l)	43.62 ± 146.85
Albumin (g/dl)	3.75 ± 0.61
Alkaline phosphatase (IU/l)	101.64 ± 93.11
Gamma-glutamyl transferase (IU/l)	81.99 ± 109.94
CD4 count (cells/μl)	
Initial	242.39 ± 219.86
First follow-up	337.62 ± 262.80
Duration of default of highly active antiretroviral therapy (months)	15.29 ± 8.14

The participants included in the present study had a mean age of 40.52 ± 7.29 years, and this finding is reflected in previous scientific literature. Thinyane *et al.* [8] found a similar age distribution among HIV patients, with 80% of them aged < 50 years, as compared with 92% in the present research. Also, the M : F ratio closely resembled that found in Sivakumar *et al.* [2] study (1.7 : 1). Fever and weight loss were common presenting complaints in these patients, and this result is in accordance with Antwal *et al.*'s [6] research. However, this is in disagreement with a study conducted by Thinyane *et al.* [8], who showed that cough and diarrhea were the main complaints. Anemia and lymphadenopathy dominated the hematological profile, which was also observed by Sivakumar *et al.* [2], Patil *et al.* [4], Antwal *et al.* [6], and Thinyane *et al.* [8].

Respiratory involvement, especially pulmonary TB, was the predominant opportunistic infection reported by Patil *et al.* [4] (44.23%), Thinyane *et al.* [8] (41%), Chakravarty *et al.* [9] (38.8%), and Deshpande *et al.* [7] (62%). This was in accordance with the results of the present study. Tubercu-

Table 6. Descriptive statistics of HIV monitoring report details

HIV monitoring report	*n* (%)
CD4 count (cells/μl)	
Initial	
< 20	10 (5.0)
20-50	27 (13.5)
51-100	29 (14.5)
101-200	47 (23.5)
201-400	42 (21.0)
> 400	45 (22.5)
First follow-up	
< 20	10 (5.0)
20-50	9 (4.5)
51-100	10 (5.0)
101-200	42 (21.0)
201-400	63 (31.5)
> 400	66 (33.0)
Decrease	59 (29.5)
Increase	141 (70.5)
Second follow-up	
Decrease	12 (6.0)
< 20	1 (0.5)
20-50	7 (3.5)
51-100	13 (6.5)
101-200	23 (11.5)
201-400	61 (30.5)
> 400	83 (41.5)
Decrease	58 (29.0)
Increase	142 (71.0)
Viral load (IU/ml)	
Initial	
Undetermined	22 (11.0)
< 1,000	14 (7.0)
1,000-10,000	33 (16.5)
10,001-50,000	32 (16.0)
50,001-100,000	24 (12.0)
100,001-1,000,000	55 (27.5)
> 1,000,000	20 (10.0)
First follow-up	
Undetermined	127 (63.5)
< 1,000	21 (10.5)
1,000-10,000	18 (9.0)
10,001-50,000	12 (6.0)
50,001-100,000	5 (2.5)
100,001-1,000,000	12 (6.0)
> 1,000,000	5 (2.5)

Table 6. Cont.

HIV monitoring report	*n* (%)
Viral load (IU/ml) (cont.)	
Second follow-up	
Decrease	12 (6.0)
Undetermined	157 (78.5)
< 1,000	6 (3.0)
1,000-10,000	7 (3.5)
10,001-50,000	7 (3.5)
50,001-100,000	2 (1.0)
100,001-1,000,000	7 (3.5)
> 1,000,000	2 (1.0)

losis was closely followed by oral candidiasis in the results of the present study, and the same was observed by Sivakumar *et al.* [2] (17%), Thinyane *et al.* [8] (18.1%), and Chakravarty *et al.* [9] (20.3%). Antwal *et al.* [6] reported a high positive predictive value for past history of oral candidiasis (100%) and TB (78.8%), suggesting an 11 times higher chance of a patient testing reactive for HIV when there was a past history of TB. These findings are in line with those of the present study. Reduced CD4 count in HIV patients can make an individual highly susceptible to a host of infections, and TB infection can be considered the most common infection faced by HIV-positive patient.

Liver transaminase enzymes (SGOT, SGPT) were found to be elevated in 24% of HIV patients, while higher creatinine levels were seen in 6% of these patients in Sivakumar *et al.* [2] study, reflecting the results of the current research, most likely owing to HIV-associated nephropathy, or antiretroviral and anti-tuberculous medications.

HAART is a life-long treatment regimen, unless treating physician recommends to change it due to adverse effects, which can increase morbidity. Therefore, all patients involved in the study were advised to continue HAART indefinitely through the course of the research. When considering HIV patients on HAART treatment and associated changes in CD4 count and viral load, a reduction in viral load and an increase in CD4 count were observed in follow-up assessments in a vast majority of the participants. A study conducted by Antwal *et al.* [6] reported a mean CD4 count to be 295 cells/μl, while Deshpande *et al.* [7] found that HAART was associated with improvements in CD4 count and viral load, which is in concordance with the present findings. Antiretroviral medicines, once deemed too expensive and complicated for resource-limited regions, are now being taken by an estimated 27.5 million HIV patients worldwide [5]. Because of this treatment, HIV has been transformed from a deadly infection to a chronic disease through restoration of immune function, which can sometimes become dysregulated in nearly 10-20% of medicated patients, leading to an aberrant cytokine storm, referred to as IRIS [10, 11].

Table 7. Descriptive statistics of highly active antiretroviral therapy (HAART) details

HAART	*n* (%)
Regimen	
TEE	110 (55.0)
TLE	62 (31.0)
ZLE	9 (4.5)
ZLN	7 (3.5)
SLN	6 (3.0)
SLE	1 (0.5)
Others	5 (2.5)
Change in HAART regimen	
No	95 (47.5)
Regiment change (first-line)	
TLD	14 (7.0)
ALD	12 (6.0)
ALE	4 (2.0)
TLE	5 (2.5)
TED	10 (5.0)
TEE	6 (3.0)
Regiment change (second-line)	
ARD	37 (18.5)
ARR	6 (3.0)
TEAR	3 (1.5)
LRD	2 (1.0)
LEAR	2 (1.0)
Regiment change (third-line)	
DRD	3 (1.5)
MRAR	1 (0.5)
Clinical, immunological, and virological failures	
None	117 (58.5)
Immunological, virological	4 (2.0)
Clinical, immunological, virological	77 (38.5)
Immunological	1 (0.5)
Virological	1 (0.5)
Default of HAART	
Yes	49 (24.5)
No	151 (75.5)
Duration of default (months)	
2-6	14 (7.0)
7-12	18 (9.0)
13-24	14 (7.0)
25-36	2 (1.0)
37-48	1 (0.5)
No	151 (75.5)
Adverse effects of HAART	
No adverse effects	169 (84.5)
Renal tubular acidosis	10 (5.0)
Peripheral neuropathy	2 (1.5)
Bone marrow depression	2 (1.0)
Psychiatric side effects	5 (2.5)
Pancytopenia	6 (3.0)
Rashes/dermatological	2 (1.0)
Renal tubular acidosis/lactic acidosis	1 (0.5)
Deep venous thrombosis	1 (0.5)
Lipodystrophy	1 (0.5)
Hepatotoxicity	1 (0.5)
Immune reconstitution inflammatory syndrome	
Yes	2 (1.0)
No	198 (99.0)

Table 7. Cont.

ALD – abacavir + lamivudine + dolutegravir, ALE – abacavir + lamivudine + efavirenz, ARD – atazanavir + ritonavir + dolutegravir, ARR – atazanavir + ritonavir + raltegravir, DRD – darunavir + ritonavir + dolutegravir, LEAR – lamivudine + efavirenz + atazanavir + ritonavir, LRD – lopinavir + ritonavir + dolutegravir, MRAR – maraviroc + raltegravir + atazanavir + ritonavir, SLE – stavudine + lamivudine + efavirenz, SLN – stavudine + lamivudine + nevirapine, TED – tenofovir + efavirenz + dolutegravir, TEAR – tenofovir + efavirenz + atazanavir + ritonavir, TEE – tenofovir + efavirenz + emtricitabine, TLD – tenofovir + lamivudine + dolutegravir, TLE – tenofovir + lamivudine + efavirenz, ZLE – zidovudine + lamivudine + efavirenz, ZLN – zidovudine + lamivudine + nevirapine

This can result in acute clinical deterioration with significant morbidity and mortality [10, 11], however in the present study, IRIS was observed only in 1% of the participants. The most common HAART-related side effect noted was renal tubular necrosis, most likely associated with nucleotide reverse transcriptase inhibitors, such as tenofovir, which was a component of most of the regimens used in this study [12]. According to Matin *et al.* [13], the most prevalent comorbidities among HIV patients were diabetes (8.2%) and hypertension (3.7%), as also seen in the current research. While likely to be coincidental findings, these may also be attributed to the metabolic complications associated with antiretroviral therapy [14].

Hence, the present study sheds light on the clinical profile and outcomes associated with HIV and its treatment. To the best of the authors' knowledge, it includes the widest descriptive coverage of HIV-related parameters, which can provide meaningful directions for screening and managing HIV-positive patients. Monitoring HAART patients is highly recommended to facilitate timely drug substitutions, thus minimizing non-compliance and drug resistance [15].

However, this research was limited to one health center with a small sample size, and no correlations were drawn be-

tween the various parameters studied. Therefore, additional research in various health centers with a larger patient cohort is highly encouraged to investigate correlations between numerous variables involved.

Conclusions

All adult HIV patients should be screened for side effects associated with HAART medications in addition to the specific well-known clinico-pathological presentation of HIV.

Disclosures

1. Institutional review board statement: The study was approved by the Ethics Committee of the PSG Institute of Medical Science and Research, with approval number: PSG/IHEC/2018/Appr/Exp/310).
2. Assistance with the article: None.
3. Financial support and sponsorship: None.
4. Conflict of interests: None.

References

1. UNAIDS Data 2021. Geneva: Joint United Nations Programme on HIV/AIDS; 2021. Available at: https://www.unaids.org/sites/default/files/media_asset/JC3032_AIDS_Data_book_2021_En.pdf.
2. Sivakumar S, Prabakar B. Clinical and laboratory profile of newly diagnosed HIV-infected patients attending ART Centre, Government Thiruvannamalai Medical College Hospital, Thiruvannamalai. IOSR J Dent Med Sci 2016; 15: 19-31.
3. World Health Organization. HIV data and statistics. 2022. Available at: https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/hiv/strategic-information/hiv-data-and-statistics.
4. Patil VC, Patil HV. Clinical manifestations and outcome of patients with human immunodeficiency virus infection at tertiary care teaching hospital. Indian J Sex Transm Dis AIDS 2016; 37: 38-45.
5. National AIDS Control Organization. India HIV Estimates 2020 – NACO. Available at: http://naco.gov.in/hiv-facts-figures.
6. Antwal M, Gurjar R, Chidrawar S, Pawar J, Gaikwad S, Panchal N, et al. Clinical profile of HIV infected patients attending a HIV referral clinic in Pune, India. Indian J Med Res 2014; 140: 271-277.
7. Deshpande JD, Giri PA, Phalke DB. Clinico-epidemiological profile of HIV patients attending ART centre in rural Western Maharashtra, India. South East Asia J Public Health 2012; 2: 16-21.
8. Thinyane K, Cooper V. Clinical profiles of HIV-infected, HAART-naive patients admitted to a Tertiary Level Hospital in Maseru, Lesotho. The Internet Journal of Infectious Diseases 2013; 11.
9. Chakravarty J, Mehta H, Parekh A, Attili SV, Agrawal NR, Singh SP, et al. Study on clinico-epidemiological profile of HIV patients in eastern India. J Assoc Physicians India 2006; 54: 854-857.
10. Vinhaes CL, Araujo-Pereira M, Tibúrcio R, Cubillos-Angulo JM, Demitto FO, Akrami KM, et al. Systemic inflammation associated with immune reconstitution inflammatory syndrome in persons living with HIV. Life (Basel) 2021; 11: 65. DOI: 10.3390/life11010065.
11. Wong CS, Richards ES, Pei L, Sereti I. Immune reconstitution inflammatory syndrome in HIV infection: taking the bad with the good. Oral Dis 2017; 23: 822-827.
12. Dauchy FA, Lawson-Ayayi S, de La Faille R, Bonnet F, Rigothier C, Mehsen N, et al. Increased risk of abnormal proximal renal tubular function with HIV infection and antiretroviral therapy. Kidney Int 2011; 80: 302-309.
13. Matin N, Shahrin L, Pervez MM, Banu S, Ahmed D, Khatun M, et al. Clinical profile of HIV/AIDS-infected patients admitted to a new specialist unit in Dhaka, Bangladesh: a low-prevalence country for HIV. J Health Popul Nutr 2011; 29: 14-19.
14. Jain RG, Furfine ES, Pedneault L, White AJ, Lenhard JM. Metabolic complications associated with antiretroviral therapy. Antiviral Res 2001; 51: 151-177.
15. Pham MD, Romero L, Parnell B, Anderson DA, Crowe SM, Luchters S. Feasibility of antiretroviral treatment monitoring in the era of decentralized HIV care: a systematic review. AIDS Res Ther 2017; 14: 3. DOI: 10.1186/s12981-017-0131-5