

Evaluation of HIV Patients in the Pandemic

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What is known on this subject?

In this study, we aimed to examine the general characteristics and clinical and laboratory data of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) cases admitted to an infectious diseases outpatient clinic and to contribute to the scarce epidemiological data in our country.

What this study adds?

In this study, we aimed to examine the general characteristics and clinical and laboratory data of HIV/AIDS cases admitted to infectious diseases outpatient clinics and to contribute to the scarce epidemiological data in our country.

ABSTRACT

Objective: To analyze the overall characteristics and clinical and laboratory data of human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) cases followed up in our clinic during the pandemic.

Material and Methods: Our study included 60 HIV/AIDS patients who were followed up in our center between January 1, 2020 and June 1, 2022. This study was conducted at the Department of Infection Disease, University of Health Sciences Turkey, Kartal Dr. Lütfi Kırdar City Hospital. Retrospective cross-sectional study.

Results: In this study, 57 were male (95%), 3 were female (5%), and the median age was 35 (27-45) years. The median value of HIV-RNA was 168.31 IU/mL. In serological tests, 36% (n=21) of the patients were positive for *Toxoplasma gondii* immunoglobulin G (IgG) antibody, cytomegalovirus (CMV) IgG (n=59) 98%, anti-hepatitis C virus (HCV) (n=2) 3.4%, venereal disease research laboratory (VDRL) (n=10) 17%, and *T. pallidum* antibody (n=15) 25.9%. CD4 T-cell count: 329 cells/μL, 17% CD4, CD8 cell count: 888 cells/μL, 53% CD8, CD4/CD8 ratio: 0.35. The prevalence of serological markers of the patients was as follows: anti-hepatitis A virus IgG was positive in 45 (77.6%), hepatitis B surface antigen 0%, hepatitis B surface antibody 32 (55.2%), hepatitis B core antibody-IgG 17 (29.3%), anti-HCV 2 (3.4%), VDRL 10 (17.2%), anti-*Treponema pallidum* 15 (25.9%), CMV-IgG 59 (98%), and *Toxo*-IgG 21 (36.2%).

Conclusion: In recent years, it has been observed that our patients can express their sexual identities more easily, and therefore, the rate of unknown transmission has decreased.

Keywords: HIV, AIDS, epidemiology

Introduction

The pandemic caused by severe acute respiratory syndrome-coronavirus 2 infection has infected 2.5 million people globally and

resulted in more than 165,000 deaths as of 20 April (1).

Human immunodeficiency virus (HIV) is a retrovirus that belongs to the lentivirus subgroup. Following the identification of HIV

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infection in the early 1980s, the pathogen was isolated in 1983 and has been one of the most significant public health problems in the world for more than 40 years (2). The first case was diagnosed in our country in 1985, and the number of cases is increasing day by day in our country as well as in the world. According to the Ministry of Health Public Health data for 2022, there are 30,293 diagnosed patients with HIV in our country (3).

In 2020, the first year of the coronavirus disease-2019 pandemic, there was a sharp decline in the number of HIV diagnoses reported, and in 2021, the number of new HIV diagnoses reported in the World Health Organization European Region was almost 25% below pre-pandemic levels. In 2021, approximately 300 new HIV diagnoses will be made every day in the Eastern Europe/Central Asia Region, including our country (4).

Material and Methods

In this study, we aimed to examine the general characteristics and clinical and laboratory data of HIV/acquired immunodeficiency syndrome (AIDS) cases admitted to infectious diseases outpatient clinics and to contribute to the scarce epidemiological data in our country. Patients who received treatment in our clinic between January 1, 2020 and June 1, 2022 participated in the study. Serum HIV infection markers were detected by an automated electrochemiluminescence immunoassay (Cobas e411, Roche Diagnostics) during the study period. A definite diagnosis of HIV infection was considered as reactive HIV 1/2 antigen/antibodies. This was verified by a confirmatory method (Western blot, lineimmunoassay or indirect immunofluorescence) in the Central Public Health Laboratory. CD4+ T-lymphocyte counts were determined by flowcytometry “flow account” method (Beckman Coulter, United Kingdom). Cases were classified according to the HIV/AIDS case definition first approved by the Centers for Disease Control and Prevention (CDC) in 1993 (5).

This study was approved by the University of Health Sciences Turkey, Kartal Dr. Lütfi Kırdar City Hospital Ethics Committee Commission on 25/01/2023 with the decision number 2022/514/242/18.

Statistical Analysis

Mean, standard deviation, median minimum, maximum, frequency, and ratio values were used to determine the descriptive statistics of the data. The distribution of variables was measured by the Kolmogorov-Smirnov test. Independent samples t-test and Mann-Whitney U test were used to analyze

quantitative independent data. Chi-square test was used in the analysis of qualitative independent data, and Fisher's exact test was used when chi-square test conditions were not provided. SPSS 28.0 program was used in the analyses.

Results

At the first examination of HIV/AIDS cases who applied to infectious diseases outpatient clinics during the pandemic, 57 were male (95%), 3 were female (5%), and the median age was 35 (27-45) years. Of the patients, 59 were Turkish nationals (98%) and 1 was a foreign national (2%). The most common transmission method was sexual contact in 58 (96.7%) patients. In two (3.3%) patients, the transmission method was detailed and there was no intravenous drug user. In terms of sexual orientation, 23 (38%) were men who had sexual behavior with men (MSM) and 35 (58%) were men who had heterosexual contact. Comorbidities were diabetes mellitus (DM) in 5 (8%), hypertension (HT) in 5 (8%), hypertriglycaemia in 4 (6%), hypercholesterolaemia in 3 (5%), depression in 3 (5%), malignancy in 2 (3%), syphilis keratitis in 2 (3%), heart disease in 2 (3%), lung disease in 1 (1%), kidney disease in 1 (1%), and hyperthyroidism in 1 (1%). When the patients were classified according to the CDC Surveillance Criteria, 15 patients were in stage 1 (25%), 30 patients were in stage 2 (50%), and 15 patients were in stage 3 (25%). When CDC clinical categories were analyzed, 45 patients were in category A (75%), 11 patients were in category B (18%), and 4 patients were in category C (7%), which means advanced AIDS stage. Laboratory values were found to be within normal limits (Table 1).

The median value of HIV-RNA was 168.31 IU/mL. In serological tests, 36% (n=21) of the cases were positive for *Toxoplasma gondii* immunoglobulin G (IgG) antibody, cytomegalovirus (CMV) IgG (n=59) 98%, anti-hepatitis C virus (HCV) (n=2) 3.4%, venereal disease research laboratory (VDRL) (n=10) 17%, and *T. pallidum* antibody (n=15) 25.9%. Purified protein derivative (PPD) ≥ 5 mm induration in HIV-positive individuals before treatment for latent tuberculosis was accepted as positive. The results were >5 mm in two of the patients. CD4 T-cell count, 329 cells/ μ L, 17 % CD4; CD8 cell count, 888 cells/ μ L, 53% CD8; CD4/CD8 ratio was 0.35 (Table 2).

The prevalence of serological markers of the patients were as follows: anti-hepatitis A virus (HAV)-IgG was positive in 45 (77.6%), anti-hepatitis B surface antigen 0%, anti-hepatitis B surface antibody 32 (55.2%), anti-hepatitis B core antibody-IgG 17 (29.3%), anti-HCV 2 (3.4%), VDRL 10 (17.2%), anti-*Treponema pallidum* 15 (25.9%), CMV- IgG 59 (98%), and *Toxo*-IgG 21 (36.2%) (Table 3).

Table 1. Laboratory values of patients

Laboratory parameters	Min-max	Median	Mean values
Leukocyte (x10 ³)	1.77-15.10	6.32	6.46±2.12
Hg (g/dL)	1.37-16.90	14.45	13.59±2.46
Plateletcount (x10 ³ /L)	0.19-464.00	217.00	221.17±97.53
Lymphocyte (x10 ³)	0.00-4.90	1.82	1.98±0.96
Glucose (mg/dL)	67.00-218.00	93.50	96.07±21.94
HbA1c (%)	4.00-11.20	5.50	5.66±1.05
Creatinin (mg/dL)	0.42-1.11	0.80	0.80±0.14
GFR (mL/sec)	72.00-154.00	110.00	110.38±16.40
Cholesterol (mg/dL)	101.00-329.00	157.00	161.93±41.31
HDL (mg/dL)	24.00-74.00	36.00	37.80±10.32
LDL (mg/dL)	45.00-259.00	93.00	101.39±40.54
Triglyceride (mg/dL)	48.00-327.00	108.00	126.24±58.68
ALT (U/L)	10.00-349.00	22.50	42.82±65.74
AST (U/L)	14.00-481.00	23.00	38.07±64.03
ALP (U/L)	12.00-184.00	77.00	78.64±27.49
GGT (mg/dL)	9.00-165.00	23.00	34.68±29.85
LDH (U/L)	144.00-666.00	217.50	227.28±78.12
CK (U/L)	17.00-2675.00	75.00	174.60±385.19
Total bilirubin (mg/dL)	0.11-1.52	0.51	0.58±0.31
Protein (g/dL)	0.16-95.00	79.50	79.40±12.03
Albumine (g/dL)	32.00-56.00	43.00	43.14±5.22

HbA1c: Analysis of glycated hemoglobin, GFR: Glomerular filtration rate, HDL: High density lipoprotein, LDL: Low density lipoprotein, ALT: Alanine amino transferase, AST: Aspartate aminotransferase, ALP: Alkaline phosphatase, GGT: Gamma glutamyl transferase, LDH: Lactatede hydrogenase, CK: Creatine kinase, Min: Minimum, max: Maximum

Table 2. Laboratory values of patients

	Min-max	Median	Mean values (± SD/n %)
PPD (mm)	0.00-25.00	0.00	2.52±5.28
HIV-RNA (x10 ³)	9.21-39380.10	168.31	1772.34±6144.14
CD4 T-cell/μL	20.00-1000.00	329.00	351.63±209.58
CD4 %	2.00-47.00	17.00	18.47±9.51
CD8 T-cell/μL	129.00-3920.00	888.00	1054.14±685.93
CD8 %	11.00-81.00	53.00	52.36±13.62
CD4/CD8	0.02-1.68	0.35	0.39±0.27

PPD: Purified protein derivative, HIV: Human immunodeficiency virus, SD: Standard deviation, Min: Minimum, Max: Maximum

Discussion

There were 34,453 HIV (+) individuals and 2,177 AIDS cases in our country from 1985 to 2022. Of these, 81.4% were male and 18.6% were female. If we look at the distribution of cases by mode of transmission, we know that 43.8% of cases are sexually transmitted, and the mode of transmission of 68.5% of these cases is heterosexual sexual intercourse (3).

In the study by Gökengin (6) in 2022, the number of HIV-positive people was 2,971, 82.93% were male and 17.07% were female. 17.94% of the cases were foreign nationals (6).

In our study, 95% were male and 5% were female, and the median age was 35 years (27-45). Similar to the studies conducted in our country, most patient populations consisted of young and male patients (7). Turkish nationals (98%) and 1 person was of foreign nationality (2%). The rates of women

Table 3. Prevalence of serological markers in 60 adult HIV-infected patients

ELISA tests	(n=71)	%
Anti-HAV-IgG	45	77.6%
HBsAg	0	0
Anti-HBs	32	55.2%
Anti-HBc-IgG	17	29.3%
Anti-HCV	2	3.4%
Anti- <i>Treponema pallidum</i>	15	25.9%
VDRL	10	17.2%
CMV-IgG	59	98%
Toxo-IgG	21	36.2%

HIV: Human immunodeficiency virus, HAV: Hepatitis A virus, IgG: Immunoglobulin G, HBsAg: Hepatitis B surface antigen, HBs: Hepatitis B surface antibody, HBc: Hepatitis B core antibody, HCV: Hepatitis C virus, VDRL: Venereal disease research laboratory, CMV: Cytomegalovirus

and foreign nationals were found to be lower compared with the studies.

In 2016, in a study conducted with 1,292 HIV-infected individuals in a cohort involving five centers in Turkey, the rate of MSM was 40%. In 2016, when 2,530 cases were examined in a cohort including 33 centers in our country, the rate of MSM patients was reported as 27.5% (8).

The most common way of contamination in HIV infection in the world is through heterosexual sexual contact, and there are reported rates of 79.3%, 81%, 60%, 35.9%, 61.1%, and 63.1% in our country (7,9,10). In our analysis, the heterosexual sexual transmission level was 58%, which is consistent with other studies. Karaosmanoglu et al. (11) reported an MSM rate of 38% in their patient cohort, which is the highest rate reported in our country to present. In our study, MSM was found to be 38%, which is compatible with the studies.

In 2021, more than half of newly diagnosed patients with AIDS have CD4 350/ mm³ at diagnosis, indicating that they are likely to have lived with undetected HIV for up to 8 or 10 years (4). In our study, CD4 T-cell count was 329 cells/μL, 17% CD4, CD8 T-cell count was 888 cells/μL, 53% CD8, and the CD4/CD8 ratio was 0.35. This is thought to be due to the difficulties in applying to the hospital and having examinations due to the pandemic.

While the rate of patients diagnosed with AIDS and advanced stage (CD4-cell count below 200) was 40% according to the CDC diagnostic criteria, 18% in our study and 7% in the AIDS phase were observed in Çerçi et al. (7). With increased awareness and new treatment options, it has become easier for patients to receive an early diagnosis (9).

When the comorbidities were analyzed, DM and HT were the most common diseases. The prevalence of diabetes in HIV-infected patients has been found to be higher than that in the general population in many studies (12). The prevalence of DM in HIV-infected patients has been reported to be between 2% and 14% (13).

In the Turkish Prevalence Study of DM, HT, Obesity, and Endocrinological Diseases, the prevalence of diabetes in the general population in Turkey was found to be 7.2%, and the prevalence of diabetes in our HIV-diagnosed patients was found to be quite similar to many studies in the literature. Publications are reporting that the prevalence of HT in AIDS patients is higher than in the normal population as well as those reporting that it is consistent with the normal population. In a large cohort, the prevalence of HT was reported to be 8.5%, and the prevalence of 8% in our study was similar to that in other studies (14).

Every patient with a positive HIV diagnosis should be screened for opportunistic infections and other sexually transmitted diseases before treatment. The most common opportunistic infection in HIV patients is TB, and Kurtaran et al. (15) found a rate of HIV-TBC co-infection of 5.7% in their study. Different algorithms are used according to the prevalence of TB and the level of development of countries. It is one of the leading causes of death in HIV/AIDS patients (16).

Globally, it is estimated that approximately 30% of HIV-infected people have a (usually latent) infection with *Mycobacterium tuberculosis*; this rate varies from 14% in Europe to 46% in Southeast Asia. In the 2017 Global Tuberculosis Report, HIV prevalence in newly diagnosed and relapsed tuberculosis (TB) cases in Turkey ranged from 0% to 4.9% (17). No patients with TB were detected in our study. Among patients with CD4 T-cell counts below 200/mL, positive induration of ≥5 mm was detected in two patients in response to PPD, and expanded tests were performed among these individuals.

Because the transmission routes for HIV infection and syphilis are similar, co-infection with syphilis is commonly observed in individuals infected with HIV. Lesions caused by syphilis also increase the risk of HIV transmission. HIV infection can lead to the suppression of the host immune system, which can also affect the clinical course of syphilis (18). *T. pallidum* and HIV are sexually transmitted disease agents that can infect the same host together.

The prevalence of syphilis in HIV-infected patients was 12.9% in the study by Aydin et al. (19), Sarigül et al. (20), who reported the rate of association with syphilis as 25% (18).

In our study, the VDRL test was 17% and syphilis antibody positivity was 25.9%. CMV, the virus infects 60% to 70% of adults in industrialized countries and up to 100% in developing countries. It can be life-threatening for immunocompromised individuals such as HIV-infected persons, organ transplant recipients, or newborn infants. In our study, CMV IgG was 98% (21).

Hepatitis has been diagnosed as a major worldwide public health problem, with a high prevalence and burden of morbidity and mortality and poor diagnostic and therapeutic techniques. Hepatitis patients are affected by HIV, hepatitis B, and hepatitis C with different transmission efficiencies (22).

The prevalence of HCV among HIV-infected participants in this study was 41%. As reported in other parts of the world, a study confirms that HCV is a major threat to people living with HIV/AIDS in China (23). In the report by Lee et al. (24), HAV seropositivity was found to be 21.2%.

Wooten and Karris (25) reported that the prevalence of HAV infection tends to be higher (15.1-96.3%) in HIV-infected individuals than in non-infected individuals.

In the study conducted by Aydin et al. (26) in our country, hepatitis B 6.2% and hepatitis C 0.9 and the rate of hepatitis C was 3% in the study that research in Turkey conducted by Kaptan et al. (27). In our study, hepatitis B was observed in 29%, hepatitis C in 3.4%, and HAV in 77.6%.

Toxoplasmosis is usually asymptomatic in non-immunized persons, and latent infection may persist for the lifetime of the host. *Toxoplasmosis* in HIV/AIDS patients was first reported in 1983. In patients with AIDS, the parasite can reactivate and cause disease, usually when the CD4 count falls below 100 cells/L. It is the most common central nervous system infection in AIDS patients (28). *T. gondii* IgG seroprevalences

reported in studies conducted in HIV-infected patients in various countries around the world were between 5.4% and 93.3%, and in our study, *T. gondii* IgG antibody positivity was 36% (29). Although the rates of reaching and staying in treatment of HIV-diagnosed patients in our country are high, the rates of diagnosis are not at the desired level (6).

Conclusion

To control the HIV epidemic and prevent new cases, each country needs to know their patient population well and determine the transmission methods and risk factors. In our country, it is necessary to organize vaccination programs in line with our local epidemiological data to inform about protective sexual behavior and to raise awareness about vaccination.

Ethics

Ethics Committee Approval: This study was approved by the University of Health Sciences Turkey, Kartal Dr. Lütfi Kırdar City Hospital Ethics Committee Commission on 25/01/2023 with the decision number 2022/514/242/18.

Informed Consent: Retrospective study.

Authorship Contributions

Surgical and Medical Practices: S.D.K., B.K., M.E.I., Concept: S.D.K., B.K., M.E.I., Design: S.D.K., B.K., M.E.I., Data Collection or Processing: S.D.K., B.K., M.E.I., Analysis or Interpretation: S.D.K., B.K., M.E.I., Literature Search: S.D.K., B.K., M.E.I., Writing: S.D.K., B.K., M.E.I.

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