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Coronavirus Pandemic

Effects of the COVID-19 pandemic on HIV care in people newly diagnosed with HIV infection

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Abstract

Introduction: This study was planned to understand the continuity of the follow-up and treatment of people newly diagnosed with HIV infection during the COVID-19 pandemic. We compared the pre-pandemic to the pandemic period, focusing on factors such as diagnosis, accessing treatment, staying on treatment, and viral suppression, as the pandemic had the potential to disrupt HIV care.

Methodology: The one-year follow-up data of patients diagnosed in 2018 (pre-pandemic era) and 2020 (pandemic era) were compared. Each patient's age, gender, employment and educational status, sexual orientation, comorbidities, quantitative HIV RNA levels (qRT-PCR), and $CD4^+$ cell counts during outpatient follow-up visits, regular use of the treatment, and regular visits to the outpatient clinic were investigated retrospectively.

Results: We had 192 new patients during the pre-pandemic period in 2018 (Group A) and 118 new patients during the pandemic in 2020 (Group B). There was no difference between the two groups regarding patient age and gender. The number of newly diagnosed HIV patients during the pandemic period decreased compared to the previous period ($p < 0.001$). Compliance with treatment rates was similar in both periods. There was no statistical difference in HIV RNA between the two groups after one year of treatment.

Conclusions: The COVID-19 pandemic has had the potential to disrupt the continuity of HIV care among individuals. Although the COVID pandemic had a statistically significant effect on attendance at HIV care programs, treatment compliance was not impaired due to rapid action on drug supply and correct policy implementation during the pandemic.

Key words: COVID-19; pandemics; HIV; retention in care.

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Introduction

Since the first reports from Wuhan, China, in December 2019, the coronavirus disease 2019 (COVID-19) has spread quickly worldwide. On March 11, 2020, the World Health Organization (WHO) officially declared a pandemic status [1].

In Turkey, the first COVID-19 case was reported by the Ministry of Health in March 2020, and the number of cases increased rapidly[2]. This pandemic has caused a health threat globally. It not only affected the economy but also burdened the healthcare systems all around the world. Special patient groups, such as people living with HIV (PLWH), have also been affected by this pandemic. COVID-19 has posed a risk to approximately 37.9 million HIV-positive individuals [3]. The management of HIV depends on engagement in the HIV care continuum, which includes diagnosis, linkage to care, receipt of care, retention in care, and achievement of maintaining viral suppression [4]. While some international agencies are working in partnership with Governments and community partners to sustain HIV service delivery to PLWH, the COVID-19 pandemic posed several barriers and challenges to the HIV continuity of care [5].

This study was planned to understand whether the continuity in the follow-up and treatment of newly diagnosed people was affected by the COVID-19 pandemic compared to the pre-pandemic period. Getting a diagnosis, accessing treatment, staying on treatment, and achieving and maintaining HIV viral suppression might be disrupted due to the pandemic.

Methodology

Patients diagnosed at Health Sciences University, Istanbul Bakirkoy Dr. Sadi Konuk Training and Research Hospital in 2018 before the pandemic era and patients diagnosed in 2020 during the COVID pandemic were included in the study. Our hospital is a tertiary hospital affiliated with the University of Health Sciences, so it covers all clinical departments. HIV

screening is performed pre-operative, before blood donation, pre-marital, pre-employment, before immunosuppressive therapy, and during pregnancy. HIV screening is also performed in case of clinical necessity and upon patient request. PLWHs are monitored periodically in our center at the intervals recommended by international guidelines. The follow-up data of the patients included in the study were collected retrospectively from patient files and electronic information systems. For each patient, the study evaluated age, gender, employment and educational status, sexual orientation, comorbidities such as diabetes, hypertension, coronary artery disease, asthma/ chronic obstructive pulmonary disease (COPD); Hepatitis B surface antigen (HbsAg), anti-Hepatitis C virus (anti-HCV) antibody positivity status and HIV RNA quantitative analysis of real time polymerase chain reaction (qRT-PCR) of blood samples (using artus HI Virus-1 QS-RGQ Kit Qiagen, Germany) and $CD4^+$ cell counts (Beckman Coulter Inc., Fullerton, California, USA) during outpatient follow-up visits, regular treatment use, and regular outpatient clinic visits; the effects of the pandemic on HIV care and influencing factors were investigated comparing pre-pandemic to pandemic period follow-ups.

We compared the one-year follow-up and treatment of HIV patients who were diagnosed in 2018 when there was no pandemic (Group A) and the one-year follow-up of the newly diagnosed patients in 2020 during the pandemic (Group B). We also studied syphilis, VDRL (Venerial Disease Research Laboratory) test results of HIV patients to identify whether the pandemic period affected transmission.

Ethics Approval

Helsinki Declaration has been followed for involving human subjects in the study. The study's ethics consent was obtained from our hospital's local ethics committee (Rec. Num: 2023/233). Written informed consent was waived, given the retrospective nature of this study.

Statistical Analysis

Continuous variables were defined as mean ± standard deviation, while categorical variables were defined as numbers and percentages. Chi-square tests were performed to compare categorical variables. Statistical Package for Social Sciences (SPSS) version 20.0 was performed for statistical analyses. Results with a $p < 0.05$ were considered statistically significant.

Results

We had 192 new patients (8.9 % female, 91.1 % male) admitted to the outpatient clinic during the pre-pandemic period in 2018 (Group A) and 118 new patients (8.5 % female, 91.3 % male) during the pandemic period in 2020 (Group B). There was no difference between the two groups regarding patient age and gender profile. Demographic data such as employment, sexual orientation; comorbidities such as diabetes, hypertension, coronary artery disease, asthma/COPD; HBsAg, and anti-HCV positivity status are shown in Table 1.

There was also no statistical difference in HIV RNA levels between the two groups after one year of treatment (Table 1). When the number of patients coming for outpatient visits after diagnosis is

Table 1. Comparison of demographic characteristics, CD4+ counts, virological data, comorbidities, and serological status of PLWH.

Variables	Group A* (n:192)	Group B** (n:118)	*p*
Gender			
Female (n) (%)	17 (8.9%)	10 (8.5%)	0.908
Male(n) (%)	175 (91.1%)	108 (91.5%)	
Age (Median) (Year)	33	34	0.208
Hypertension (n) (%)	4 (2.1%)	5 (4.2%)	0.309
Diabetes Mellitus (n) (%)	2 (1%)	3 (2,5%)	0.373
Coronary Artery Disease (n) (%)	3 (1.6%)	4 (3.4%)	0.433
Zona disease at the time of diagnosis (n) (%)	3 (1.6%)	1 (0.8%)	1.000
Asthma / Chronic obstructive pulmonary disease (n) (%)	4 (2.1%)	5 (4.2%)	0.309
HbsAg (Hepatitis B surface antigen) positivity	7 (3.6%)	5 (4.2%)	0.771
Anti HCV antibody positivity	2 (1%)	2 (1.7%)	0.637
Having a job at the time of diagnosis	146 (76%)	90 (76.3%)	0.963
VDRL (Venereal disease research laboratory) positivity	2 (1.3%)***	11 (11.3%)****	< 0.001
$CD4^+$ (Median) (cell/mm^3) (first visit)	405	437	0.491
HIV RNA (copies/mL) (first visit) (Median)	123119	113053	0.196
HIV RNA (copies/mL) (12th month) (Median)	negative	negative	0.418
Sexual Orientation			**0.384**
Bisexual	31 (16.1%)	26 (22%)	
Homosexual	75 (39.1%)	40 (33.9%)	
Heterosexual	86 (44.8%)	52 (44.1%)	

Group A*: Patients diagnosed in 2018 (1-year follow-up) (Pre-Pandemic); Group B**: Patients diagnosed in 2020 (1-year follow-up) (During the Pandemic); ***: tested in 157 patients; ****: tested in 97 patients.

Table 2. Number of patients missing or attending follow-up visits after diagnosis.

Number of patients (n)	Group A* (n:%) n:192	Group B** (n:%) n:118	*p*
1st month			
missing follow-up visits	18 (9.4%)	78 (66.1%)	< 0.001
attending follow-up visits	174 (90.6%)	40 (33.9%)	
3rd month			
missing follow-up visits	19 (9.9%)	69 (58.5%)	< 0.001
attending follow-up visits	173 (90.1%)	49 (41.5%)	
6th month			
missing follow-up visits	31 (16.1%)	52 (44.1%)	< 0.001
attending follow-up visits	161 (83.9%)	66 (55.9%)	
9th month			
missing follow-up visits	33 (17.2%)	83 (70.3%)	< 0.001
attending follow-up visits	159 (82.8%)	35 (29.7%)	
12th month			
missing follow-up visits	34 (17.7%)	69 (58.5%)	< 0.001
attending follow-up visits	158 (82.3%)	49 (41.5%)	

Group A*: Patients diagnosed in 2018 (1-year follow-up) (Pre-Pandemic); Group B**: Patients diagnosed in 2020 (1-year follow-up) (During the Pandemic).

considered, the number of patients during the pandemic period significantly decreased compared to the previous period ($p < 0.001$) (Table 2). It is observed that the COVID pandemic has a statistically significant effect in terms of staying in HIV care (Table 2).

The HIV RNA levels and CD4 cell counts along the follow-up have also been analyzed and compared in Table 3. There was no difference between HIV RNA levels and CD4 values during follow-up.

We also analyzed our patients' VDRL test results. Out of 254 test results, 13 were positive. 11 (11.3%) of VDRL-positive patients were in Group B, and 2 (1.3%) were in Group A. Comparing VDRL test results in PLWH between groups A and B, we observed that syphilis, one of the sexually transmitted diseases, increased significantly in PLWH diagnosed during the COVID period ($p < 0.001$) (Table 1).

When the education levels between the two groups were compared, 125 (65.1%) people in group A had primary, secondary, and high school education, while the number of university graduates was 67 (34.9%). In Group B, 90 (76.3%) people had primary, secondary, and high school education, while 28 people (23.7%) were university graduates ($p = 0.038$).

Of 310 patients, 192 were in Group A, and 118 were in Group B. During a one-year follow-up, we observed that 153 patients (79.7%) were taking medication regularly in Group A, and 87 (73.7%) were taking medication regularly in Group B. When the patients were examined regarding compliance with treatment, compliance rates were similar in both periods ($p = 0.223$). Treatment compliance was not statistically impaired.

When we examined the total number of HIV tests conducted, 27,438 tests were conducted in 2018, and only 22835 tests were conducted in 2020.

Discussion

According to the results we obtained in our study, the COVID pandemic has affected the HIV care continuum. Although the patient profile was similar in gender and age, a significant difference was found between the two groups regarding staying in care.

HIV testing is the vital first step towards initiation into the HIV care continuum. Quarantine, social distancing, and community containment measures made it difficult to access routine HIV testing. It complicates the UNAIDS global initial 90-90-90 target proposed by the United Nations [6]. Timely links to HIV care may be interrupted during the COVID-19 pandemic. Although HIV self-test kits are available in some places, self-testing remains a significant challenge in environments where access to these kits is limited. Therefore, further efforts are needed to increase

Table 3. HIV RNA levels and CD4 counts of groups during follow-up.

Variables	Group A*	Group B**	*p*
HIV RNA (Median) (copies/mL) – 1st month	126.5	171	0.477
CD4 (Median) (cell/mm^3) – 1st month	463	354.5	0.532
HIV RNA (Median) (copies/mL) – 3rd month	7	268	0.089
CD4 (Median) (cell/mm^3) – 3rd month	579	461	0.080
HIV RNA (Median) (copies/mL) – 6st month	negative	negative	0.284
CD4 (Median) (cell/mm^3) – 6st month	573	466	0.792
HIV RNA (Median) (copies/mL) – 9th month	negative	negative	0.198
CD4 (Median) (cell/mm^3) – 9th month	550	526	0.728
HIV RNA (Median) (copies/mL) – 12th month	negative	negative	0.476
CD4 (Median) (cell/mm^3) – 12th month	643	617	0.564

Group A*: Patients diagnosed in 2018 (1-year follow-up) (Pre-Pandemic); Group B**: Patients diagnosed in 2020 (1-year follow-up) (During the Pandemic).

access and facilitate testing. Achieving global HIV prevention goals and continuity in HIV infection follow-up requires successful involvement in all steps of diagnosis, treatment, and subsequent care. The HIV care continuum starts from the first step of testing.

Although Turkey is a country where the HIV patient population is increasing [7], the number of newly diagnosed patients who applied to our outpatient clinic before the pandemic decreased from 192 to 118 during the pandemic. This result may be related to the decrease in patients tested and detected. Both the total number of tests performed for HIV screening and new cases diagnosed with HIV infection appear to be lower than in the pre-COVID era. This situation might be a consequence of the lockdown, government restrictions, and the psychological influence of the COVID-19 pandemic on people. In a study conducted at Vanderbilt University in Nashville (United States of America), it was observed that the number of HIV outpatients decreased, and the number of admissions of new patients decreased during the COVID-19 epidemic as well [8]. In other publications, it was shown that there were interruptions in patient follow-up due to clinical closures during the COVID-19 pandemic, and this was indicated as the reason for the decrease in the number of patients admitted. During the pandemic, 82% of the clinics in South Carolina were partially or entirely closed, and the decreased number of patient admissions supported this situation [9].

In a publication made in Guatemala [10], the rate of HIV testing decreased to 54.7%, and testing was the first step and significantly interrupted the HIV care continuum. All these findings are consistent with the results of studies in various countries such as Italy [11], Kenya [12], and Sub-Saharan Africa [13]. In studies conducted in China, the HIV care continuum was also interrupted, and it was reported that patients with a diagnosis did not apply to outpatient clinics and could not be included in the treatment and follow-up system. The study by Ridgway *et al.* also supports that the COVID-19 epidemic significantly affects HIV care stay [15]. In our hospital, our HIV clinic was entirely closed for three months, and then it continued to serve partially.

In addition to the decrease in new applications, the follow-up visits we carry out every three months have also decreased. This situation can be associated with the closure of polyclinics at the beginning of the pandemic, people's anxiety about coming to health institutions, the isolation rules of the Ministry of Health, and many other factors. HIV patients who need to start antiretroviral therapy (ART) as soon as possible may have undergone treatment delays in hospitals because healthcare workers were busy treating COVID-19 patients. In addition, as public health officials focused on COVID-19 control, global resources for HIV treatment were limited, and it worsened the HIV care process. Continuation of ART may be disrupted as hospital admissions are restricted due to the implementation of city lockdowns or traffic controls, and ART compliance could be disrupted in a pandemic. WHO and UNAIDS worked together to ensure continuous HIV prevention, testing, and treatment services during the COVID era [16]. Due to the importance of the continuation of treatment and compliance, countries have taken various measures to prevent interruptions in the HIV care continuum. For example, China has issued a document guaranteeing free antivirals to ensure drug continuity, publishing treatment management agencies [17]. Thailand, the USA, and many other countries also take many precautions to get treatment regularly for the HIV care continuum [18]. HIV patients may find it challenging to reach ART treatment despite all these precautions. Restriction of access to treatment affects the HIV care continuum. In the first days of the pandemic, the Ministry of Health announced that all patients with chronic illnesses could obtain their medicines from pharmacies without going to the health centers for drug prescriptions in Turkey [2].

In our study, although the patients could not come to the hospital and could not have their examinations and follow-up visits, they had access to medications, and no difference was statistically apparent in their compliance with the treatment. $CD4^+$ cell count, HIV RNA levels, and age did not change in the two groups we examined. There was also no difference in terms of HIV RNA levels and $CD4^+$ counts between the groups during the follow-up (Table 3).

With these results, our cases' treatment compliance and treatment responses were affected positively, which can be directly associated with the Ministry of Health's rapid action on drug supply and correct policy implementation during the pandemic. The study of Izzo *et al*. in Northern Italy found that patients' compliance with treatment was good during the pandemic. They successfully managed to ensure a continuum of care during a pandemic for most of our HIV outpatients through telemedicine and home delivery services for ART, highlighting the importance of continuous counseling to maintain patients' adherence to the care process [11]. Many studies are showing the benefits of telehealth applications in maintaining HIV care [19]. Integrating telehealth systems into the health system in our country seems to be the right approach to minimize

the difficulties in maintaining HIV care, which we found in our study.

There are limited studies reporting data on changes in viral suppression rates comparing time periods during the pandemic with periods before the pandemic. Our research shows no statistical difference in achieving viral suppression between the pandemic period and before. Similarly to our study, some publications found no significant difference in viral suppression [20,21].

While publications support that social distancing measures taken during the COVID-19 pandemic led to changes in sexual behavior and, therefore, caused a decrease in sexually transmitted diseases, there are also publications saying the opposite, as our study. However, a recent review on this topic, including 20 articles from 12 countries, found that the majority of patients (25-60%) did not reduce the number of sexual partners during the pandemic. Similar findings were revealed in studies conducted on men who have sex with men (MSM), endorsing increased sexual activity during COVID-19 pandemic as well as an increased number of sex partners [22]. The possibility that an actual decrease in sexual activity may not occur has been revealed in many studies. This is a very reasonable explanation for the decline we observed in STD reporting in some publications; structural challenges may lie beneath [23].

In this study, the rate of VDRL positivity has increased. This may be related to the increase in unprotected sexual contact due to various factors during the pandemic period, and this could also lead to an increase in HIV infections, which will be possible to verify in the coming years.

Informing people about protection methods may also be incomplete as they generally do not prefer and avoid coming to health institutions.

The vaccination program in our country started in January 2021 and started with the inactivated COVID vaccine CoronaVac, primarily to cover healthcare workers, elderly care home residents and employees, and the population over the age of 65 [24,25]. The Pfizer-Biontech vaccine was able to arrive months later, and the population covered by the vaccination program was gradually expanded. Therefore, unfortunately, our patients were not included in the vaccination program during the period covered by the study. A future study with the inclusion of patients after vaccination programme will be beneficial as COVID vaccination might also represent a call for checkups.

When education status was evaluated, it was observed that university graduates were diagnosed less frequently during the pandemic period than before. We think this can be attributed to the educated group being more conscious about isolation measures during the epidemic period.

There is a need for more awareness and education activities for the prevention of sexually transmitted diseases in our country.

Limitations

Patients who did not visit our hospital for follow-up but may have gone to another outpatient clinic have been excluded from further data collection. Since we could not reach all of them, we may not have been able to track whether they were regularly undergoing follow-up in another health institution. Patients hospitalized due to serious illness but subsequently applying to our outpatient clinic were not included in the study.

Conclusions

With the onset of the COVID-19 pandemic, most countries facing the risk of SARS-CoV-2 infection have taken precautions, causing barriers and challenges in maintaining the HIV care continuum, with even worse possible consequences in places with weaker health systems. Governments, community-based organizations, and international partnerships should work together to maintain the continuity of HIV care during the COVID-19 pandemic, with special efforts to ensure timely access to HIV care and to prevent disruption of services.

The COVID-19 pandemic has had the potential to disrupt the continuity of HIV care among individuals. It may also be beneficial to creatively adapt remote access to physical and mental health services to meet these patients' individual and social needs. We are still monitoring the consequences of the COVID-19 pandemic among PLWH. More research is needed to know the long-term effects of the pandemic on the health of PLWH.

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Conflict of interests

No conflict of interests is declared.

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