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Evaluation of HIV Patients in the Intensive Care Unit: A Single-center Experience

Yoğun Bakım Ünitesinde HIV Hastalarının Değerlendirilmesi: Tek Merkez Deneyimi

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Abstract

Objective: Human immunodeficiency virus (HIV)-positive patients are admitted to intensive care units (ICU) due to various diseases, whether or not related to HIV. The characteristics of HIV-positive patients who were followed up in ICUs have also changed over the years. In this study, we aimed to evaluate the demographic data, laboratory findings, indication for admission, and mortality rate of HIV-positive patients admitted to ICU.

Method: The data of HIV-positive patients admitted to the ICU of University of Health Sciences Turkey, İstanbul Training and Research Hospital between January 2012 and January 2024 were retrospectively examined in this study. Patients >18 years of age who were detected to be anti-HIV positive by enzyme-linked immunosorbent assay before admission to ICU or during follow-up in ICU and who had Western Blot confirmation were included. Demographic characteristics of the patients, the reason for admission, comorbidities, acute physiology and chronic health evaluation II score, and laboratory findings were recorded through the hospital information system.

Results: Sixty-two patients with HIV admitted to the ICU were included in the study. Forty-five (72.5%) patients were male and 17 (27.4%) were female. 85.4% of patients required mechanical ventilation. Mortality was 69.3%. In non-survivors, the platelet and lymphocyte counts were statistically significantly lower than survivors (p=0.01). The duration of mechanical ventilation was shorter in survivors (p=0.01). CD4 T lymphocyte counts were statistically significantly lower in non-survivors (p=0.01). There was no relationship between HIV RNA level and mortality (p=0.06). The presence of viral hepatitis was associated with mortality (p=0.01).

Öz

Amaç: Yoğun bakım üniteleri (YBÜ), insan immün yetmezlik virüsü (HIV) pozitif hastaları, HIV ile ilişkili olsun ya da olmasın çeşitli hastalıklar nedeniyle kabul etmektedir. Zamanla YBÜ'lerinde izlenen HIV pozitif hastaların özelliklerinde de değişiklikler olmuştur. Bu çalışmayı yapmaktaki amacımız YBÜ'ye kabul edilen HIV pozitif hastaların özelliklerini, laboratuvar bulgularını, kabul koşullarını ve mortalite oranlarını değerlendirmektir.

Yöntem: Bu çalışmada Sağlık Bilimleri Üniversitesi, İstanbul Eğitim ve Araştırma YBÜ'ye Ocak 2012 ile Ocak 2024 tarihleri arasında başvuran HIV pozitif hastaların verileri retrospektif olarak incelenmiştir. YBÜ'ye alınmadan önce veya yoğun bakımda takip sırasında enzim bağlantılı immünosorbent testi ile anti-HIV pozitif olduğu tespit edilen ve Western Blot onayı olan, 18 yaş üstü hastalar çalışmaya dahil edildi. Hastaların demografik özellikleri, başvuru tanıları, yandaş hastalıkları, akut fizyoloji ve kronik sağlık değerlendirmesi II skoru ve laboratuvar bulguları hastane bilgi sistemi üzerinden kaydedildi.

Bulgular: YBÜ'ye kabul edilen 62 HIV hastası çalışmaya dahil edildi. Hastaların 45'i (%72,5) erkek, 17'si (%27,4) kadındı. Hastaların %85,4'ünün mekanik ventilasyon gereksinimi oldu. Mortalite oranı %69,3 olarak bulundu. Hayatta kalmayanlarda trombosit ve lenfosit sayıları hayatta kalanlara göre istatistiksel olarak anlamlı derecede düşüktü (p=0,01). Hayatta kalanlarda mekanik ventilasyon süresi daha kısaydı (p=0,01). CD4 T lenfosit sayıları hayatta kalmayanlarda istatistiksel olarak anlamlı derecede düşüktü (p=0,01). HIV RNA düzeyi ile mortalite arasında ilişki saptanmadı (p=0,06). Viral hepatitin varlığı mortalite ile ilişkili bulundu (p=0,01).

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Abstract

Conclusion: More patients with HIV are admitted to ICUs. In our study, the platelet, lymphocyte, and CD4 T lymphocyte counts were lower in non-survivors than in survivors at ICU admission. Duration of mechanical ventilation and presence of viral hepatitis were associated with mortality. These parameters can be used as mortality indicators upon admission to the ICU.

Keywords: HIV, intensive care unit, mortality

Öz

Sonuç: YBÜ'ye daha fazla HIV hastası kabul edilmektedir. Çalışmamızda, hayatta kalmayanların YBÜ'ye kabul sırasında trombosit, lenfosit ve CD4 T lenfosit sayıları hayatta kalanlara göre daha düşüktü. Mekanik ventilasyonun süresi ve viral hepatitin varlığı mortaliteyle bağlantılıydı. Bu faktörler YBÜ'ye kabul sırasındaki mortaliteyi tahmin etmek için kullanılabilir.

Anahtar kelimeler: HIV, mortalite, yoğun bakım ünitesi

Introduction

Human immunodeficiency virus (HIV)/AIDS; has been affecting more and more people every day since it was identified in 1981. It is an important public health problem that causes medical, social, and economic issues. According to the World Health Organization (WHO), the number of people with HIV infection worldwide is estimated to reach 39.0 million, and 1.3 million new cases will be identified by the end of 2022. The global incidence of HIV has decreased since 2015. However, it increases by 45% in the Eastern Mediterranean region, which includes Turkey (1). The ministry of health of Turkey reported that 39,437 people were HIV-positive in Turkey between 1985 and 2023. An increase in the incidence of the disease has been observed over the years. HIV prevalence is reported to be 0.1 per 100,000 in Turkey (2).

Unlike the years in which HIV was first identified, the aggressive course of the disease can now be controlled in many cases with the widespread use of combined antiretroviral treatments. Effective prevention, diagnosis, treatment, and care of HIV have made HIV a manageable disease. Therefore, people can live with it for a long time. As a result, patients die more frequently from comorbidities (3,4). Unawareness of HIV positivity may cause disease progression without any treatment and present itself with opportunistic infections as a result of severe immunosuppression (5).

HIV-positive patients have been admitted to intensive care units (ICU) due to various diseases, whether or not (3,4). The characteristics of HIV-positive patients who were followed up in ICUs have also changed over the years. Although it can be expected that the ICU admission rates of HIV-infected individuals will generally decrease after antiretroviral treatment, hospitalizations due to HIV treatment toxicity and non-HIV-related diseases occur worldwide (5,6).

Because of the increase in the incidence of HIV in Turkey, it has become more important to prevent delays in diagnosis, treatment, and death and to decrease the costs of this manageable disease. In this study, we aimed to evaluate the demographic data, laboratory findings, reason for admission, and mortality rate of HIV-positive patients admitted to the ICU.

Materials and Methods

The data of HIV-positive patients admitted to the ICU of University of Health Sciences Turkey, İstanbul Training and Research Hospital between January 2012 and January 2024 were retrospectively examined in this study. Patients >18 years of age who were detected to be anti-HIV positive by enzyme-linked immunosorbent assay at the time of admission to ICU or during follow-up in ICU and who had Western Blot confirmation were included. Patients with coronavirus disease-19 were not included in the study. Demographic characteristics of the patients, diagnosis of admission, comorbidities such as diabetes mellitus, hypertension acute physiology and chronic health evaluation (APACHE) II score, laboratory findings at admission to ICU, characteristics special for ICU such as length of stay, and duration of mechanical ventilation were recorded through the hospital information system. Patients had various comorbidities, and we classified them according to whether at least one comorbidity exists or not.

Ethics committee approval for this retrospective study was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Turkey, İstanbul Training and Research Hospital (date: 19.08.2022, decision no: 261). This study was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

Data were analyzed using SPSS 22 software. The distribution of variables was tested by Kolmogorov-Simirnov test. When the normality assumption was not met, non-parametric tests were used. Mann-Whitney U test were used to compare two independent groups. The chi-square test and the Fisher's exact test were used to examine the relationship between categorical variables.

A significance level of 0.05 was considered statistically significant.

Results

Sixty-two patients with HIV admitted to the ICU in University of Health Sciences Turkey, İstanbul Training and Research Hospital between January 2012 and January 2024 were included in the study. Forty-five (72.5%) of the patients were male and 17 (27.4%) were female. The average age was 48.14±14.1 years, the youngest patient was 24 years old, and the oldest patient was 89 years old. Although 41 (66.1%) patients were diagnosed with HIV at admission to the ICU, the anti-HIV positivity of 21 (33.8%) patients was known before admission to the ICU. In total, 40 (64.5%) patients received any antiretroviral agent during the follow-up in the ICU. Thirty-seven (59.6%) patients were admitted to the ICU from other services, 25 (40.3%) patients were admitted from emergency service to ICU. Thirty-two (51.6) patients were admitted to the ICU for respiratory reasons, 22 (35.4%) patients were admitted to the ICU for neurological reasons, 5(8.0%) patients were admitted to the ICU for postoperative care, and 3 (4.8%) patients were admitted to the ICU for cardiac reasons. Thirty-five (56.4%) patients had no comorbidities. However, there were 8 patients with hypertension, 5 patients with diabetes mellitus, 4 patients with chronic renal disease, 4 patients with chronic obstructive pulmonary disease, 2 patients with asthma, 3 patients with congestive heart failure, 1 patient with coronary artery disease.

At the time of intensive care admission, 20 (32.2%) patients had acute hepatic failure, and 35 (37.1%) had acute kidney failure. There was at least one positive viral hepatitis test in 12 (19.3%) patients. Viral hepatitis markers were negative in 50 (80.6%) patients. During the ICU follow-up, 53 (85.4%) patients required mechanical ventilation. Tracheostomy was performed in 9 of these patients in the ICU. In 27 (43.5%) patients, at least one culture sample was positive. Twelve (19.3%) patients were diagnosed with tuberculosis. Five (8%) patients received antituberculosis therapy for tuberculosis. In 45 (72.5%) patients, there was no evidence of tuberculosis. Mortality was 69.3%. Nineteen (30.6%) patients were discharged from the ICU to services. The number of patients with HIV follow-up in the ICU was 17 in 2023 and 2 in 2012. The number of patients increased over time (Figure 1).

There was no significant difference between non-survivors and survivors in terms of APACHE II score, length of hospital stay, and length of stay in ICU (respectively p=0.35, p=0.31 and p=0.99). The duration of mechanical ventilation was shorter in survivors (p=0.01). The relationship between ICU characteristics and mortality is presented in Table 1. There was no significant difference between non-survivors and survivors in terms of the reason for admission to the ICU (p=0.33). The presence of tuberculosis was not associated with mortality

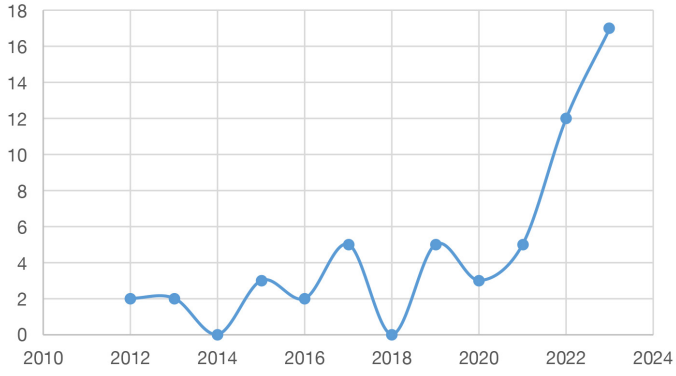

Figure 1. Number of patients with HIV admitted to the intensive care unit over the past years
HIV: Human immunodeficiency virus

Table 1. The relationship between the characteristics special for ICU and mortality

Variable	Group	n		Median (Ranj)	z	p
Length of stay in ICU (day)	Non-survivors	43	15.63±18.13	8.00 (72.00)	-0.02	0.99
	Survivors	19	15.53±20.99	6.00 (83.00)		
APACHE II	Non-survivors	43	20.40±11.39	18.00 (61.00)	-1.02	0.31
	Survivors	19	16.89±8.99	18.00 (38.00)		
Length of hospitalization (day)	Non-survivors	43	25.05±23.81	18.00 (109.00)	-1.02	0.31
	Survivors	19	33.11±29.85	20.00 (98.00)		
Duration of mechanical ventilation (day)	Non-survivors	43	14.14±18.50	7.00 (84.00)	-2.48	**0.01**
	Survivors	19	10.21±20.74	2.00 (84.00)		

z: Mann-Whitney U test, APACHE: Acute physiology and chronic health evaluation, ICU: Intensive care unit, SD: Standard deviation

(p=0.86). The presence of viral hepatitis was associated with mortality (p=0.01). Existence of any comorbidities, such as diabetes mellitus, hypertension, or chronic heart failure, was not associated with mortality. There was no relationship between HIV RNA level and mortality (p=0.06). The relationship between patient characteristics upon admission to the ICU and mortality is presented in Table 2. Hemoglobin, hematocrit, white blood cell, procalcitonin, and lactate levels measured at the time of intensive care admission were similar in both non-survivors and survivors (p>0.05). However, in non-survivors, the platelet and lymphocyte counts were statistically significantly lower than survivors (p=0.01). CD4 T lymphocyte counts were statistically significantly lower in non-survivors (p=0.01). The relationship between laboratory findings upon admission to the ICU and mortality is presented in Table 3.

Table 2. The relationship between the characteristics at admission into ICU and mortality

Variable	Group	Mortality				X^2	p
		Non-survivors		Survivors			
		n	%	n	%		
The reason for admission	Cardiac	3	100.00	0	0.00	3.46*	0.33
	Neurological	15	68.18	7	31.82		
	Postoperative	2	40.00	3	60.00		
	Respiratory	23	71.88	9	28.13		
The presence of at least one comorbidity	Yes	19	70.37	8	29.63	0.02	0.88
	No	24	68.57	11	31.43		
Viral hepatitis	Yes	12	100.00	0	0.00	6.58*	**0.01**
	No	31	62.00	19	38.00		
HIV RNA (copy/mL)	<10000	2	33.33	4	66.67	5.66*	0.06
	>10000	27	75.00	9	25.00		
	Not detected	2	40.00	3	60.00		
Presence of tuberculosis	Yes	8	66.67	4	33.33	0.31	0.86
	Suspicious	4	80.00	1	20.00		
	No	31	68.89	14	31.11		

X^2: Chi-square test, *: Fisher's exact test, HIV: Human immunodeficiency virus, ICU: Intensive care unit

Table 3. The relationship between the laboratory findings at admission into ICU and mortality

Variable	Group	n		Median (Ranj)	z	p
CD4 (cells/mm³)	Non-survivors	40	94.97±187.15	43.50 (1122.00)	-2.63	**0.01**
	Survivors	17	165.72±147.88	139.90 (494.00)		
	Survivors	19	15.53±20.99	6.00 (83.00)		
Lactate (mmol/L)	Non-survivors	40	2.51±2.82	1.88 (14.40)	-1.05	0.29
	Survivors	18	1.74±0.92	1.61 (4.02)		
Procalcitonin (µg/L)	Non-survivors	43	8.65±22.43	0.32 (100.00)	-0.68	0.49
	Survivors	19	4.70±16.48	0.34 (72.49)		
Hemoglobin (g/dL)	Non-survivors	43	9.90±2.17	9.70 (8.70)	-1.15	0.25
	Survivors	19	10.58±2.79	10.30 (11.30)		
Hematocrite (%)	Non-survivors	43	29.63±6.57	28.10 (26.90)	-1.03	0.30
	Survivors	19	31.43±7.78	29.40 (32.60)		
White blood cell count (10^9/L)	Non-survivors	43	7.25±6.18	6.73 (21.49)	-1.83	0.07
	Survivors	19	11.19±7.76	9.09 (31.00)		
Platelet (10^9/L)	Non-survivors	43	148.70±111.48	117.00 (382.00)	-2.75	**0.01**
	Survivors	19	248.84±145.75	215.00 (689.00)		
Lymphocyte (10^9/L)	Non-survivors	43	0.56±0.55	0.44 (2.50)	-2.77	**0.01**
	Survivors	19	5.16±18.14	0.86 (79.90)		

z: Mann-Whitney U test, ICU: Intensive care unit

Discussion

In the study, the number of patients with HIV who were followed up in our unit increased over the years. According to the WHO, the incidence of HIV has increased in the Eastern Mediterranean region (1). Our study may reflect this course. The gender statistics in this study are similar to those in the literature. It was reported that 81.5% of HIV-positive individuals were male, and 18.5% were female in Turkey (2). It is impressive that mortality is high. Only 19 (30.6%) patients were discharged from the ICU to services. It is higher than that of recent studies (6). The course of HIV infection has changed considerably since the 1990s with the introduction of antiretroviral drugs. This approach also affected the profile of HIV-positive patients admitted to the ICU. When the epidemic first emerged, most patients were hospitalized due to complications of HIV infection, such as sepsis. In recent years, life expectancy has been extended with effective treatments, and the number of patients admitted to the ICU for non-HIV-related reasons has increased (7). Only 21 patients had a diagnosis of HIV before admission to the ICU, and 40 patients could receive antiretroviral drugs. The low percentage of patients who were aware of HIV positivity before admission to the ICU was remarkable. In our study, the most common reason for admission to the ICU was respiratory distress (51.61%). This finding is consistent with the literature from the early 2000s (8). Patients may be admitted during advanced disease, which can be the main cause of high mortality. The high mortality rate may also be related to the presence of viral hepatitis. There was found that the presence of viral hepatitis and mortality in this study. All patients with viral hepatitis died. It has been reported that viral hepatitis can also increase mortality (9,10). Not receiving any antiretroviral drug may worsen the outcome, also (11). Studies have shown that comorbidities become more frequently the reason for mortality in HIV-positive patients after antiretroviral drug use, and the need for mechanical ventilation and hospitalization for HIV-related disease are associated with mortality (12). In this study, comorbidities were not associated with mortality. APACHE II score, length of hospital stay, and length of ICU stay were similar between survivors and non-survivors with HIV in ICU. Mechanical ventilation support was required in 85.48% of patients. The duration of mechanical ventilation was statistically significantly shorter in patients discharged. The need for mechanical ventilation was associated with mortality, consistent with the literature (6). This result shows that the profile of patients in the study was similar to that of patients in the early period of the epidemic. Similar to recent studies, in non-survivors, the platelet, lymphocyte, and CD4 T lymphocyte counts were lower than those in survivors at admission to the ICU (6). These parameters can be used as mortality indicators upon admission to the ICU.

Conclusion

The incidence of HIV positivity also increases. More patients with HIV are admitted to ICUs. In our study, the platelet, lymphocyte, and CD4 T lymphocyte counts were lower in non-survivors than in survivors at ICU admission. Duration of mechanical ventilation and presence of viral hepatitis were associated with mortality. These parameters can be used as mortality indicators upon admission to the ICU. Further studies are required.

Ethics

Ethics Committee Approval: Ethics committee approval for this retrospective study was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Turkey, İstanbul Training and Research Hospital (date: 19.08.2022, decision no: 261). This study was conducted in accordance with the Declaration of Helsinki.

Informed Consent: Informed consent was obtained verbally and in writing from all participants.

Footnotes

Authorship Contributions

Concept: S.B., A.N.S., D.N.S., Design: S.B., A.N.S., D.N.S., Data Collection or Processing: S.B., A.N.S., D.N.S., Analysis or Interpretation: S.B., A.N.S., Literature Search: S.B., A.N.S., D.N.S., Writing: S.B., A.N.S., D.N.S.

Conflict of Interest: No conflict of interest was declared by the authors.

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