

Original Article

## Antiretroviral therapy, CD4, viral load, and disease stage in HIV patients in Saudi Arabia: a 2001–2013 cross-sectional study

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### Abstract

**Introduction:** The incidence of HIV/AIDS is increasing worldwide and in the Middle East. In this study, we analyzed the use of antiretroviral therapy (ART), the patterns of CD4 and viral load (VL), and stage of presentation.

**Methodology:** Laboratory variables, ART use, and CD4 count were obtained and analyzed retrospectively.

**Results:** A total of 997 cases from eight HIV/AIDS care providers were included. Of the total cases, 274 (28.3%) had a CD4 count of < 200 cells/mm<sup>3</sup>, and 413 (42.3%) had a viral load of > 5 log<sub>10</sub>. Of the total cases, 50% were on highly active antiretroviral therapy (HAART), and the majority of cases were asymptomatic (70%). Of those patients on ART, 247 (39.5%) took tenofovir/emtricitabine combined with either efavirenz (147; 14.7%) or lopinavir/ritonavir (100; 10%), and 158 (15.8%) were on lamivudine and zidovudine with either efavirenz (32; 3.2%) or lopinavir/ritonavir (126; 12.6%). Other combinations were used in 70 (7%) patients. The mean (± standard deviation) of baseline CD4 and viral load were 401 cells/mm<sup>3</sup> (322 cells/mm<sup>3</sup>) and 4.6 log<sub>10</sub> (1.3 log<sub>10</sub>), respectively. At diagnosis, 72% of patients were asymptomatic; 50% had AIDS and 20% had CD4 count < 350.

**Conclusions:** ART use was in line with international guidelines, but the number of patients receiving ART was lower than expected. Large proportions of cases presented late with AIDS at diagnosis or had CD4 < 350. Further data is needed to evaluate the medical care of patients with HIV/AIDS in the Kingdom of Saudi Arabia.

**Key words:** Saudi Arabia; HIV/AIDS; antiretroviral therapy (ART); CD4; CDC stage.

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### Introduction

Following the emergence of the HIV/AIDS epidemic in the early 1980s, there was a response to early cases of HIV/AIDS in the Kingdom of Saudi Arabia (KSA). The first cases were reported in the KSA around 1984, following which, surveillance of HIV commenced. However, formal concerted activities related to HIV/AIDS were only launched after the inception of the National AIDS Program (NAP) as a directorate of the Public Health branch of the Ministry of Health in 1996 [1].

Reliable monitoring of this program remains a challenge due to the lack of dependable data collection systems across a wide range of public and private sector providers of HIV/AIDS care, and due to hard-to-reach risk groups in a country as vast as the KSA. Nonetheless, in the last decade, returns of prevalence and risk behavior data to the World Health

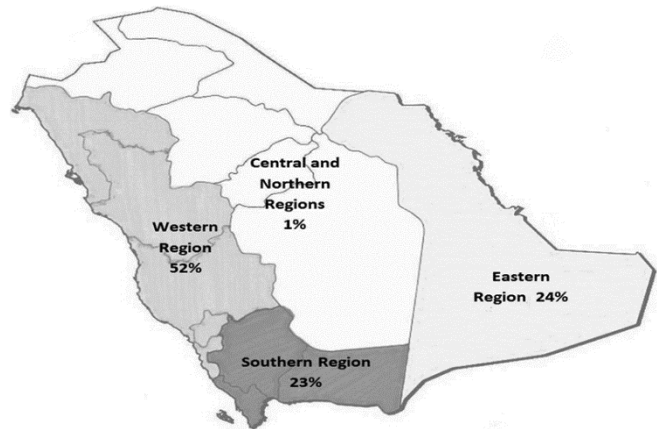
Organization (WHO)'s UNAIDS program has been regular despite the widely held belief that these reports underestimate the real burden of HIV/AIDS in the KSA. The most recent UNAIDS country progress report published in 2014 revealed that the incidence of HIV among Saudis has increased by 44% in 2013 compared to 2012 [2]. However, the overall prevalence of HIV/AIDS is consistently low (< 0.2%). The prevalence of HIV seems to be heterogeneous between the populations of the same country and across countries in the Middle East and North Africa (MENA) WHO region. The overall incidence and prevalence of HIV/AIDS is widely thought to be understating the real burden of disease due to incomplete surveys and the widespread stigmatization in this region [3-5]. In addition, clinic-based cohort studies have suggested that patients are presenting late with AIDS. It is hoped that with better surveys, and

more programmatic work to reduce the stigma associated with HIV/AIDS, the epidemic in this region will be better understood and reduced [6,7].

There is scarce published data on the use of antiretroviral therapy in the KSA. Presently, there are no agreed-upon national treatment guidelines; the international guidelines are presumably being used, albeit on an *ad hoc* basis. Therefore, clinical practice is likely to be diverse due to the lack of agreed-upon national or local treatment standards [7].

According to the 2013 World Development Report, the KSA is considered a high-income country. By law, ART should be available free of charge. However, options for treating affected patients are still limited. Viral resistance testing is not available to most treating centers, and co-receptor and HLA-B 5701 screening are not accessible to most providers. Monitoring of response to ART is important to evaluate the medical care of people living with HIV/AIDS, especially in light of reports that mortality associated with HIV/AIDS is high in the KSA and elsewhere in the MENA region. In the era of ART, in both resource-rich and resource-poor countries alike, late presentation and poor access to services, among other factors, are associated with high mortality [8-10]. In this study from the KSA, we describe the pattern of ART use, baseline CD4 and viral load, and disease stage at diagnosis. We aimed to determine the ART that patients received and whether the therapy was in line with international treatment guidelines, to determine the baseline CD4 and viral load (VL), and to determine whether late presentation was an issue. We anticipated this study would serve as a baseline to measure future progress, a first step to fill in many gaps in the information about medical care of people living of HIV/AIDS in the KSA. Thus, we hope, through further future similar work in the area of HIV medical care, to inform providers to standardize care, reduce morbidity and mortality, monitor and reduce resistance to ART, and ultimately improve the quality of life for those living with HIV/AIDS [11-13].

**Figure 1.** Geographic distribution of the included patients



**Methodology**

Data on new HIV patients reported in the KSA from 2001–2013, as reported to the HIV surveillance system according to the Ministry of Health requirement, were analyzed, along with ART used, CD4 count, VL, and the Centers for Disease Control and Prevention (CDC) stage at diagnosis.

The data was stored in a Microsoft Excel sheet, and then transferred to SPSS (version 21) software for analysis.

**Results**

Data from 977 patients living with HIV were available from eight providers in all regions of the KSA. The regions included Western, 52%; Southern, 23%; Eastern 24%; and others, 1% (Figure 1).

Of the total cases, the majority were asymptomatic (70%), 274 (28.3%) had a CD4 count of < 200 cells/mm<sup>3</sup>, and 413 (42.3%) had viral load of > 5 log<sub>10</sub> (Table 1). Fifty percent of cases had a CD4 count of < 350 cells/mm<sup>3</sup>. The mean nadir CD4 and baseline VL were 401 cells/mm<sup>3</sup> (± 322) and 4.6 log<sub>10</sub> copies/mL (± 1.3). Of the total cases, 50% were on highly active antiretroviral therapy (HAART), and efavirenz/tenofovir/emtricitabine was the most frequently used combination (14.7%), followed by lopinavir/ritonavir and lamivudine/zidovudine (12.6%)

**Table 1.** Cross-tabulation of CD4 count and viral load categories

	CD4 level		Total	
	> 200	< 200		
Viral load category	< 100,000	381 (39%)	183 (18.7%)	564 (57.7%)
	> 100,000	227 (23.3%)	186 (19%)	413 (42.3%)
<b>Total</b>	<b>703 (72%)</b>	<b>274 (28%)</b>	<b>977 (100%)</b>	

(Table 2). A total of 3.2% of patients received efavirenz/lamivudine/ziduvudine and lopinavir/ritonavir, and 10% received tenofovir/emtricitabine.

Table 3 displays the CDC stage and test setting of the participants at the time of diagnosis. The largest proportions were those in CDC stages A1–3, which included high-risk asymptomatic patients such as prisoners, patients who inject drugs (PWID), and patients who were contacts of known cases.

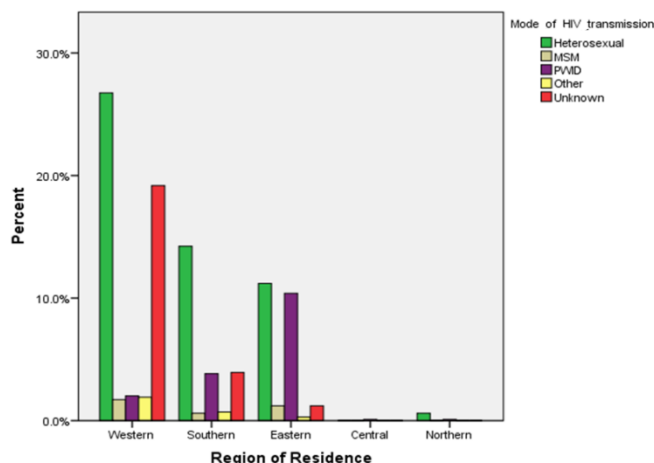
The risk categories by regions revealed that the Western region followed by the Eastern and Southern regions had the highest proportion of people living with HIV/AIDS, at 54%, 24%, and 23%, respectively. In addition, results showed that the commonest mode of transmission was heterosexual, followed by unknown mode of transmission, except in the Eastern region, where PWID was the second-most common (Figure 2).

**Discussion**

Our results suggested that 50% of the patients were taking ART. Also, the great majority were taking the recommended first-line or alternative therapies per international authoritative guidelines [14-18].

Consistent with previously published reports, most of the patients lived in the Western region of the KSA, and they were asymptomatic at diagnosis [15-18]. The

**Figure 2.** Mode of transmission by region



majority of cases were asymptomatic (70%), indicating success of the screening program to identify high-risk behavior and test those who might be at high risk of HIV infection.

To our knowledge, this is the first time that the use of ART has been described in HIV/AIDS patients in the KSA, and there is no similar data with which to compare our results. In our sample, 80% of patients were diagnosed between 2006 and 2013, a period in which all authoritative international HIV treatment guidelines at least recommended the use of ART in patients whose CD4 count was ≤ 350, especially since

**Table 2.** Frequency of antiretroviral therapy used

Antiretroviral (ARV) medication	Percent of PLHIV on ARV at time of study
Efavirenz/truvada	147 (14.7%)
Kaletra/truvada	100 (10.0%)
Efavirenz/combivir	32 (3.2%)
Kaletra/combivir	126 (12.6%)
Others	70 (7.0%)
Not on ART	522 (52.4%)
<b>Total</b>	<b>997 (100%)</b>

PLHIV= People living with HIV

**Table 1.** HIV status and CDC disease stage

	Reason for HIV test		
	Screening	High risk	Symptomatic
	%	%	%
A1	10.1	16.5	1.6
A2	15.5	14.3	1.5
A3	4.9	5.3	1.7
B1	0.0	0.7	1.0
B2	1.3	2.7	2.8
B3	0.8	1.4	2.7
C1	0.1	0.4	0.2
C2	0.2	0.6	1.8
C3	1.5	2.3	7.8

2011 [16-19].

The therapeutic combinations used in ART reflected international treatment guidelines, with the exception of first-line protease inhibitors (PIs) [14-18]; lopinavir/ritonavir are not considered first-line drugs [14].

The mean CD4 counts and VLs reflected a mixed patient population, ranging from routine premarital screening to sick patients in hospitals, as was described in a previous study [7].

The Central region – mainly the city of Riyadh – is underrepresented in our sample, as data could only be obtained from providers under the Ministry of Health, and non-Ministry of Health providers dominate HIV/AIDS care in Riyadh. Therefore, we advise caution in generalizing our result in this region.

## Conclusions

Our results showed that while the ART drugs in use were generally in line with international guidelines, the proportion of patients taking them was lower than anticipated, and the number of patients who presented late was considerably higher than desired. Therefore, we recommend that ART and HIV testing should be offered more actively. Further and better surveillance data that include new variables, such as CD4, are needed to monitor drug treatment of HIV/AIDS. This will expand on our findings, and provide clearer insight into the drug therapy of HIV/AIDS in the KSA. Future studies should also evaluate the differences in outcome and survival between those who received ART and those who did not.

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