**REVIEW: HIV Infection in Women: A Clinico-epidemiological Analysis of HIV/AIDS Patients‏ in Western Iran**

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| **ARTICLE INFO** | | |  | **ABSTRACT** |
| **Submitted:** | | 20 Feb 2024 | **Introduction:** HIV infection has spread over the last 30 years and has a significant impact on health, welfare, employment, and criminal justice sectors, affecting all social and ethnic groups throughout the world. The chronic infection caused by this pathogen may lead to acquired immunodeficiency syndrome (AIDS) if not adequately controlled and managed. This study aims to analyze the epidemiological characteristics, drug resistance pattern, and survival status of HIV-infected women in Kermanshah, Iran.  **Material and Methods:** This retrospective study was performed on 113 HIV-positive women from March 2018 to June 2022. All patients were confirmed to have laboratory-confirmed HIV infection by the Regional Reference Laboratory of the Vice-Chancellor of Health. Data was extracted from Healthcare Reports and approved by HIV specialists.  **Results:** Of 113 HIV-infected women, 52.2% were aged between 20-40 years of old, with a mean age of 38.21±13.25. Of the 113 HIV-positive women, 2 (1.8%) always, 11 (9.7%) sometimes, and 100 (88.5%) never used condoms. 15 cases (13.3%) had prison history. Out of 113 HIV-positive women, 21 cases (18.6%) had a history of sexual contact with non-spouses. In addition, 3 cases (2.7%) had sex in exchange for money or goods. The most common way of HIV transmission was sexual intercourse (69.0%). 44 people (38.9%) had CD4+ less than 200. Out of 113 HIV-positive women, 15 cases (13.3%) had died.  **Conclusion:** Recent developments in HIV research and surveillance and several program evaluations have led to a better understanding of the HIV epidemic and improved ARV therapy in Iran and key affected populations. |
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Introduction

uman immunodeficiency virus (HIV) is a lentivirus with the capability of impairing cell-mediated immunity. The chronic infection caused by this pathogen may lead to acquired immunodeficiency syndrome (AIDS) if not properly controlled and managed(1). The global prevalence of HIV infection approximates 0.7% in individuals of 15–49 years of age. Nevertheless, this estimate varies according to geographical location and socioeconomic status. HIV-1 and HIV-2 account for the majority of HIV subtypes. HIV is capable of diversification and recombination, especially in areas like Asia where multiple genetic subtypes are present and co-circulating(2, 3).

The most common transmission routes of HIV infection include blood and other body fluids exposure, drug abuse, sexual transmission, and maternal transmission(4). However, a shift from parenteral route to sexual transmission has been demonstrated in different parts of the world as a result of control and preventive strategies(5, 6).

Antiretroviral therapy (ART) has revolutionized the HIV status and AIDS incidence in the general population; it has significantly decreased HIV-associated morbidity and mortality. However, this increased life expectancy in HIV-infected patients has led to an increased prevalence of long-term complications like malignancies in this population(7-9).

Most of the women are infected with HIV through high-risk heterosexual contact. Women are more prone for HIV infection compared to men during intercourse. Human Immunodeficiency Virusinfected women account for almost half the number of cases of HIV worldwide. Despite reduction in HIV prevalence among the population, the percentage of women contracting the disease seems to have increased. The social implications are also different in females (10).

Investigation of the epidemiology of HIV infection in every community can help us determine the dynamics of HIV transmission and its emerging trends and also provide the roadmap for prioritizing programs of prevention and control(11). Kermanshah province possesses one of the highest incidence and prevalence rates of HIV infection among the total Iranian population. The present study has been carried out to evaluate the epidemiological and demographical characteristics, drug resistance pattern, and survival status of HIV-infected women in Kermanshah, Iran during March 2018 to June 2022.

Methods

**Kermanshah province**

The city of Kermanshah is the capital of Kermanshah Province, located in the western part of Iran. Kermanshah is the largest and central city in the west. Kermanshah Province is one of the 31 provinces of Iran, which has 14 cities.

**Data sources**

The data presented in this study come from two Behavioral Disease Counseling Centers sources in Kermanshah city: Ratafia and Vahdat Center. These centers work according to the HIV/AIDS Surveillance System in the Islamic Republic of Iran. Iran implemented the HIV / AIDS control and surveillance program many years ago. The HIV / AIDS surveillance system in Iran has a large structure with many achievements in reducing new HIV cases, especially in some high-risk groups such as injecting drug users, as well as reducing HIV transmission from infected mothers to their children, strengthening this surveillance system, especially for sexual high-risk groups. Descriptive trends overall and demographic information are presented. Microsoft Excel 2010 (Redmond, Washington, United States [US]) software was used for data cleaning and analysis.

**Study Design and Patients**

This retrospective study was performed on 113 HIV-positive women from March 2018 to June 2022. All patients were confirmed to have laboratory-confirmed HIV infection by the Regional Reference Laboratory of the Vice-Chancellor of Health. Data was extracted from Healthcare Reports and approved by HIV specialists and research assistants of the study. The CD4+ T-cells were counted using the BD FACSCalibur flow cytometer.

**Statistical analysis**

Categorical variables were presented as frequencies and percentages, while mean and standard deviations analyzed continuous variables. We performed statistical analyses using Stata software (version 14.1) (Stata Corp, College Station, TX, USA).

**Ethics**

The Research Ethics Committee at the Deputy of Research of Kermanshah University of Medical Science (KUMS) approved the study (IR.KUMS.MED.REC.1402.380). In addition, individual personal information was kept secure and confidential.

Results

**Figure 1** shows frequency of women according to year of diagnosis Of 113 HIV-infected women, 52.2% were aged between 20-40 years of old, with a mean age of 38.21±13.25. Of the 113 HIV-positive women, 2 (1.8%) always used condoms, 11 (9.7%) sometimes used condoms, and 100 (88.5%) never used condoms. 15 cases (13.3%) had prison history. 17 cases (15.0%) were spouses of high-risk individuals(Figure 1). Out of 113 HIV-positive women, 21 cases (18.6%) had a history of sexual contact with non-spouses. In addition, 3 cases (2.7%) had sex in exchange for money or goods. Of these 24 cases, 5 people (4.4%) had a history of injection addiction and 4 people (3.5%) had a history of joint injection (use of shared needles). 23 cases (20.3%) were illiterate, 36 cases (31.9%) had primary education, 22 cases (19.5%) had middle school education, 25 cases (22.1%) had high school education, and 7 cases (6.2%) had university education.

The most common way of HIV transmission was sexual intercourse (69.0%). 44 people (38.9%) had CD4+ less than 200 Out of 113 HIV-positive women, 15 cases (13.3%) had died **Table 1**.

**Figure 1. Frequency of women according to year of diagnosis.**

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| **Table 1. Sociodemographic and clinical information of patients.** | | |
| **Variable** | **Subgroup** | **N(%)/ mean±SD** |
| Age | - | 38.21±13.25 |
| Use a condom | Always | 2(1.8) |
| Sometimes | 11(9.7) |
| Never | 100(88.5) |
| Prison history | Yes | 15(13.3) |
| No | 98(86.7) |
| Spouses of high-risk individuals | Yes | 17(15.0) |
| No | 96(85.0) |
| **Table 1 continue** | | |
| history of sexual contact with non-spouses | Yes | 21(18.6) |
| No | 92(81.4) |
| Addiction | Yes | 24(21.2) |
| No | 89(78.8) |
| Injection Drug Use | Yes | 5(4.4) |
| No | 108(95.6) |
| Sharing needles | Yes | 4(3.5) |
| No | 109(96.5) |
| Education | Illiterate | 23(20.3) |
| Primary school | 36(31.9) |
| Secondary school | 22(19.5) |
| High school | 25(22.1) |
| College | 7(6.2) |
| Marital status | Married | 59(52.2) |
| Single | 13(11.5) |
| Widow/ Separated | 41(36.3) |
| Transmission | Intravenous drug use | 3(2.7) |
| Sex | 78(69.0) |
| Mother-to-child | 5(4.4) |
| Unknown | 27(23.9) |
| CD4+ | <200 | 44(38.9) |
| 200-499 | 32(28.4) |
| >500 | 37(32.7) |
| Viral load | - | 419647.61±252933.12 |
| Tuberculosis evaluation | Smear positive pulmonary TB | 2(1.8) |
| Non | 111(98.2) |
| Hepatitis C | Yes | 1(0.9) |
| No | 112(99.1) |
| Antiretroviral medications | under treatment | 94(83.1) |
| Non-adherence to treatment | 3(2.7) |
| Non-referral | 1(0.9) |
| Death | 15(13.3) |
| Mortality | Yes | 15(13.3) |
| No | 98(86.7) |

Discussion

HIV was first identified among men who had sex with men (MSM) in Europe and the United States of America at the time(12). Since its emergence in the 1980s, HIV/AIDS has infected about 79 million people worldwide(13). In 2020, ~1.5 million individuals were newly infected with the virus(13). The first patient with HIV infection in Iran was a boy diagnosed with hemophilia in 1986(14). Since then, Iran has witnessed a high level of HIV infection especially among people who inject drugs (PWID). The first case of HIV transmission through unsafe drug injection was identified in 1989. The annual number of reported HIV cases has been very low in the country since the first major outbreak of HIV infection in PWID in 1996–7(15).

Despite a global decline in the number of new HIV infections, in countries like Iran, the incidence of HIV infection is increasing. Using the UNAIDS spectrum and modeling, it is estimated that in 2019, 59,000 (95%CI 33,000 to 130,000) people are living in Iran with HIV, and each year, about 4,100 (95%CI 1,200 to 12,000) new infections and 2,500 (95%CI 1,200 to 5,600) AIDS-related deaths occur in the country(14). Also, according to the report from the Iranian national HIV registry system, 38,966 people were diagnosed with HIV infection by the end of 2018. The majority were male (83%) and aged between 16 to 40 years old (67.6%). The number of HIV-infected people died due to any cause was 15,845 by the end of 2018(14).

HIV/AIDS has become one of the biggest killer infectious diseases worldwide (16). The goal of the United Nations is to end the AIDS epidemic by 2030, which is also the wish of many countries in the world (17). It is estimated that 38.6 million people in the world are living with HIV/AIDS, and so far 25 million people have died as a result, most of them especially in developing countries, including Iran, in the age group of 15-49 years. have been (18). AIDS is still considered as a stigmatized disease in the world, which has destructive effects on the society from the economic and social point of view. This disease is one of the main obstacles to the development of societies and affects most of the poor population. AIDS does not recognize any age or gender boundaries, and to reduce its prevalence, the cooperation of the general public, health care providers, and community managers is necessary (19). Therefore, the present study was conducted with the aim of epidemiological investigation of HIV positive women referred to the Kermanshah Behavioural Diseases Center between 2018 and 2022. It is hoped that an effective   
step can be taken in order to control this disease by identifying and prioritizing the risk factors.

During the years 2018 to 2022, 280 HIV positive patients were diagnosed. Of these, 167 patients were male (59.6%) and 113 (40.4%) were female. In their study, Sarasht et al. stated that most of the patients were men (55%) (20). In this regard, John Beyer and his colleagues showed in their study that the prevalence of HIV/AIDS was higher in men than in women (69% vs. 31%) (21).

In addition, in the present study, most of the women with HIV/AIDS (52.2%) were between 20 and 40 years old. It seems that because the highest percentage of frequency in terms of age range is related to the group of 20 to 40 years where people have the most sexual activity, the cause of the disease is, as is known, through sexual contact in this age range.

The findings of the present study showed that sexual intercourse (69%) is the most important risk factor for disease transmission in women with HIV/AIDS covered by Kermanshah Behavioral Diseases Counseling Center, and the risk factor for mother-to-child transmission (4.4%) and injection addiction (2.7%) %) is in the second and third place. In addition, from the total number of infected people (113 people), the cause of the disease of 27 people has been declared unknown; Therefore, it is absolutely important and vital to create a culture in the field of increasing the awareness of people in the society about the ways of disease transmission and creating a suitable platform in order to increase the number of clients infected with the virus to the relevant centers.

Two studies conducted in Shiraz and Tehran have reported that the main cause of the spread of the AIDS epidemic is injecting drug use and then sexual transmission (22, 23). Also, the results of a review study conducted in Bhutan (a country in South Asia) that examined the 22-year epidemiological situation of HIV in this country show that one of the major risk factors is having multiple sexual partners at the same time in both the female and male sexes. It is a man and these relationships occur outside of marriage or before marriage (24). In Isfahan, the mode of infection of most of the HIV positive patients under investigation was reported through injecting drug addiction and then unsafe and unprotected sexual intercourse (25). A meta-analysis study conducted in Australia reported that in low- and middle-income countries, injecting drug use has the highest contribution to the burden of AIDS (26). The study conducted in Vietnam has also introduced injecting drug use and sexual contact as the most important model of disease transmission (27). In general, injecting drug users may engage in high-risk sex under the influence of drugs, therefore they are at high risk of contracting HIV through sexual intercourse.

In addition, based on the results of the present study, 88.5% of women with HIV/AIDS stated that they never used condoms. In another study that examined the performance of vulnerable and at-risk women in Tehran regarding AIDS, only 17.2% of women always used condoms (28). Due to the increase in sexual transmission of disease in Iran, it is necessary to prevent HIV transmission. Education about the dangers of unprotected sex should be considered in the programs of counseling centers for behavioral diseases. Overall, strategies to target sex trade behaviors and improve condom use, as well as strengthen HIV surveillance and intervention in high-risk populations, are necessary for health-related professions.

In the current study, 13.3% of women infected with HIV/AIDS had a history of staying in prison, which can be one of the factors that encourage high-risk behaviors such as injecting drug use and sexual relations. The incidence of these three high-risk factors and their interdependence have been reported in different studies (29, 30). According to the high-risk behavior prevention policy, harm reduction strategies in prisons include methadone treatment as opposed to injecting drugs, using disposable syringes for injection, focusing on preventing unprotected sex, such as making condoms available. Educational interventions to increase people's awareness can also help independently develop harm reduction programs.

In the current study, it was determined that in total, 38.9% of women were in the AIDS stage (the number of CD4+ T cells is less than 200 cells per microliter), which seems that most of these patients entered the disease due to the delay in referral and timely diagnosis of the infection. They have become AIDS phase. A ten-year study conducted in Isfahan reported that 30.7% of the patients under study had reached the stage of AIDS (25). The research conducted in Tehran also reported that 78.2% of the examined patients were in the advanced stage of AIDS (23). There are many reasons that cause the referral of HIV/AIDS patients in the last stages of the disease, factors such as social stigma, lack of familiarity and lack of access to counseling centers, lack of trained personnel and improper follow-up of personnel and other unknown causes. Therefore, it is necessary to provide extensive and continuous information about the risk factors of disease and to introduce counseling centers in the society.

The results of our study showed that out of a total of 113 women with HIV/AIDS under investigation, 21 (18.6%) had a history of sexual contact with a non-spouse (outside the family framework). In addition, 6 people (5.3%) were temporarily married, 13 people (11.5%) were single, 21 people (18.6%) had a deceased spouse, and 20 people (17.7%) were separated from their spouse (53% in total). It is necessary to be aware of the consequences of unhealthy sexual relations, as well as to teach important health tips in the field of high-risk behaviors to young people who are mainly at risk. Risky behaviors are more observed in low-educated and uninformed people, as well as in unemployed and financially needy people who also have delinquent behaviors. People with multiple sex partners are at higher risk of contracting sexually transmitted diseases, including AIDS, than those with reliable sex partners. It is likely that single and divorced people have a wider sexual network, which leads to more sexual partners, which in turn increases HIV/AIDS infection and subsequent death from the disease.

*Conclusion*

According to the findings of the present study, sexual intercourse is the most important risk factor for disease transmission in women with HIV/AIDS covered by Kermanshah Behavioral Diseases Counselling Center. The results of this study show that it is very necessary to inform the society about the risk factors of HIV/AIDS and ways to prevent it. Education in schools, prisons, trade associations such as hairdressers and policymakers to prepare educational programs in this field for target groups are recommended. Considering that cultures and behaviours are different in different regions and provinces, it is suggested to conduct similar studies in other provinces. Based on the findings of the present study, on the one hand, the low rate of condom use in sexual behaviour, on the other hand, it is suggested to monitor the coverage of the services provided (consultation, level of access, and the rate of condom use)   
in comprehensive urban and rural health service centers. Practical, effective and transparent control programs regarding sexual behaviours should be designed   
and developed.

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*Conflicts of interest*

The authors declare no conflict of interest.

*Authors' contributions*

All authors were involved in the conception and design, analysis and interpretation of the data, drafting of the manuscript and revising it critically for intellectual content, approved the final version for submission, and agreed to be accountable for all aspects of the work.

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