

No Evidence of HIV Infection Among the General Population of Mashhad, Northeast of Iran

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Abstract

Background: HIV/AIDS is a serious global health problem with an adverse impact on human health and his socioeconomic status in different countries.

Objectives: The aim of the present study was to estimate the prevalence of HIV infection in Mashhad city.

Methods: This cross sectional study was performed since May to September 2009 in Mashhad, Iran. A total of 1,678 individuals ranged 1-90 years of age were selected randomly from different geographical regions of the city, proportionate to sex and age distribution of the population according to 2006 census. Enzyme-linked immunosorbent assay (ELISA) was used to screen anti-HIV antibodies and the positive samples were confirmed by Western Blot (WB) assay. In anti-HIV positive cases, antibodies to human T-lymphotropic virus type 1 (HTLV-1) and hepatitis C virus (HCV) as well as the surface antigen of hepatitis B virus (HBV) were evaluated by the ELISA Kits.

Results: A total of 1,651 serum samples were analyzed for anti-HIV antibodies. A total number of 751 of participants were males (45.5%) and 900 were females (54.5%). The mean age was 27.9 ± 19.0 and 30.0 ± 18.0 years, respectively. Anti-HIV seropositivity was detected in 12 cases (0.73%, 95% CI: 0.38 - 1.27 percent). No samples were further confirmed by WB technique, thus the overall prevalence of HIV infection was 0 (95% CI: 0.00 - 0.22 %). No case with co-infection of HBV, HCV, or HTLV-1 was observed in individuals who showed seroactivity for HIV antibodies.

Conclusions: This first population-based survey showed no evidence of HIV infection in the general population of Mashhad. It seems that implemented health policies and strategies have contributed to this low prevalence and this shall be continued.

Keywords: HIV, Acquired Immunodeficiency Syndrome, Prevalence, Iran

1. Background

HIV/AIDS is a serious global health problem with several adverse impacts on human health, sociocultural and economic status in different countries (1). At the beginning of the HIV epidemic, AIDS was introduced as “the plague of the century” in the literature (2). Even though, nowadays, HIV is on the downward trend in some countries, the global trend is remarkably upward (3). It was estimated that 33.2 million people are living with HIV around the world. Furthermore, 2.5 million are newly infected and 2.1 million of patients with AIDS die annually (4).

According to the latest WHO report, the prevalence rate of HIV/AIDS in Iran is mostly limited to some high risk groups especially injecting drug users (IDUs) (5, 6). In 2012, Ministry of Health and Medical Education estimated that 53,000 to 100,000 people were living with HIV/AIDS in Iran. The prevalence of HIV infection among Iranian adults was estimated to be 0.2% (5, 6).

Although the most cases of HIV infection in Iran have

been recognized in IDUs (7), serious concerns have arisen about the spread of the virus in the community via unsafe sexual contact (8). Iran’s Health Ministry alarmed the population about a “third wave” to consider sexual contacts as the main route of HIV transmission (8). Furthermore, a national survey in 2010 showed a high prevalence of HIV infection among Iranian female sex workers (4.5%) with a prevalence of 3.1% among those without a history of injection drug use (9).

To our knowledge, there is no survey on HIV infection prevalence in the general population of Iran. Mashhad is the center of Razavi Khorasan province, north-east of Iran. With a population of about 2.5 million, it is known as the second largest holy city in the world (www.mums.ac.ir/main/en/mashhadinfo). According to the Province Health Center report, about 700 HIV positive cases were reported since 1986 to March 2016 in this region.

2. Objectives

The aim of the present study was to investigate the prevalence of HIV infection and the related risk factors in the general population of Mashhad.

3. Methods

3.1. Study Population and Sample Size

This cross sectional study was performed in the general population of Mashhad since May to September 2009 by the Academic Center for Education, Culture, and Research (ACECR), Razavi Khorasan Branch, Mashhad, Iran. This study was approved and supervised by Research Deputy of ACECR- Razavi Khorasan Branch regarding methodological and ethical issues. A total of 1,678 individuals aged 1 to 90 years were selected randomly by multistage sampling methods from all twelve municipality areas of the city. In each household, one person was selected so that we tried to include equal ratios of the both sexes as well as ten percentile for the age according to the 2006 census in each area. All participants were interviewed using a questionnaire including data on demographic characteristics and related risk factors.

3.2. Sample Collection and Serological Assay

Briefly, after obtaining informed consent, a 5 mL peripheral blood sample was collected from each participant. The serum samples were kept at -20°C for further assays. Then, serums were tested for the presence of anti-HIV antibodies using a commercial specific enzyme-linked immunosorbent assay (ELISA) kit (ACON Laboratories, USA). Reactive samples were confirmed by Western blotting (WB) (MP Diagnostics, Singapore) according to the manufacturers' instructions. In HIV-positive sera, antibodies to HTLV-1 (MP Biomedicals Asia Pacific Pte Ltd, Singapore) and HCV (Adaltis Italia S.p.A., Italy) as well as the surface antigen of HBV (Adaltis Italia S.p.A., Italy) were assessed by the ELISA Kits according to the manufacturer's instructions.

3.3. Statistical Analysis

Data were analyzed by SPSS software ver.16.0 (SPSS, Chicago, IL) using Chi-square, Fisher exact, and t tests. Statistical significance was set at $P < 0.05$.

4. Results

A total of 1,651 serum samples were taken and analyzed for anti-HIV antibodies. A total number of 751 of participants were male (45.5%) and 900 were female (54.5%) with

Table 1. Socio-Demographic Data of the Study Population in Mashhad, Iran

Variable	Number	Percent
Sex		
Male	751	45.5
Female	900	54.5
Age, y		
≤ 5	103	6.2
5 - 14	284	17.4
15 - 24	418	25.3
25 - 34	311	18.8
35 - 44	189	11.4
45 - 54	160	9.7
55 - 64	105	6.4
> 65	81	4.9
Marital status (people older than 14)		
Single	777	48.3
Married	775	48.2
Divorced/ Widowed	57	3.5
Literacy (people older than 5)		
Illiterate	110	7.4
Primary school/secondary school	626	41.9
High School	494	33.0
Academic education	265	17.7
Family income (million Rials per month^a)		
< 3	799	51.0
3 - 5	544	34.7
> 5	223	14.2
Ethnic background		
Fars	1421	86.9
Turk	100	6.1
Afghani	62	3.7
Others	54	3.3

^a Approximately U.S.\$ 100 at the time of the survey.

the mean age of 27.9 ± 19.0 and 30.0 ± 18.0 years, respectively. Other demographic characteristics of the participants are shown in [Table 1](#).

In the primary screening of the 1,651 samples by ELISA, anti-HIV seropositivity was detected in 12 cases (0.73%, 95% CI: 0.38 - 1.27 percent); eight individuals showed a positive result and four cases had borderline results. No samples were further confirmed by western blot (WB) technique. Therefore, based on WB results, overall prevalence of HIV infection was 0 (95% CI: 0.00 - 0.22 percent). [Table 2](#) shows demographic and risk factor data for 12 HIV seropositive subjects. No co-infection with HCV, HBV, and HTLV-1 was seen in anti-HIV positive cases.

5. Discussion

The present study is the first population-based sero-epidemiological work on HIV infection in Iran. The preva-

Table 2. Demographic and the Risk Factor Data Among Individuals with Anti-HIV Seropositivity in ELISA Test

NO.	Sex	Age, y	Marital Status	Education, y	Race	Risk Factor
1	Female	39	Single	High school	Fars	History of hospitalization and surgery
2	Female	13	Single	Secondary school	Fars	None
3	Male	11	Single	Primary school	Fars	History of hospitalization and surgery
4	Male	21	Single	High school	Fars	None
5	Female	19	Married	High school	Fars	None
6	Female	34	Married	High school	Fars	History of hospitalization and surgery
7	Female	38	Married	High school	Fars	Mistory of hospitalization, surgery, and blood transfusion
8	Male	3	-	-	Fars	None
9	Female	25	Single	High school	Fars	History of hospitalization and blood transfusion
10	Female	11	Single	Secondary school	Fars	None
11	Female	30	Married	Secondary school	Fars	History of hospitalization and surgery
12	Female	18	Single	High school	Fars	None

lence of HIV infection was reported in a large representative sample of individuals including all ages, selected from the entire districts in Mashhad. Importantly, estimating the burden of HIV infection is the main priority in researches on new and efficient measures to control the infection in the community. The HIV epidemic has reached an alarming stage and attracted the wide interest of the community in Iran (10). Accurate data regarding HIV prevalence and incidence in the general population can help health authorities to plan more effective programs at the national level.

Interestingly, no case with HIV infection was observed in the general population of Mashhad. Similarly, the prevalence of HIV infection in Iranian blood donors was reported as low as 0.004% in 2007 (11). Furthermore, several studies reported no evidence of HIV seropositivity in Iranian thalassemia and hemophilia population and a low prevalence of the infection among hemodialysis patients (12).

Middle East and North Africa region have one of the lowest HIV prevalence rates (0.1%) in the world (3). However, new cases with HIV infection have risen by 35% between 2001 and 2012 in this area. Furthermore, AIDS-related deaths increased by 66% in this region compared to a worldwide fall of 35% between 2005 and 2013 (13). Similarly, a very low HIV prevalence has been reported in the general population of Sichuan, China (14). The prevalence of the infection in Yanyuan was reported as low as 0.06% and in Muli no one was found to be HIV positive. The authors concluded that HIV infection rate in Yanyuan was similar to the average rate in all over China, and that the HIV epidemic had not spread to the general population.

Some studies from other countries demonstrated a higher prevalence of HIV in the general population. A survey in 1998 to 2000 in Salvador, Brazil, indicated that the overall HIV-1 seropositivity among 3,437 residents was 0.55% (15). In another national survey in Niger in 2002, HIV prevalence in 6,056 blood samples from the population aged 15 to 49 years was 0.87% (16). Additionally, the HIV prevalence among 13,026 subjects aged 15 to 49 years, differed from 0.8% to 1.43% in three districts of Karnataka state, south India (17). In 2008, Behanzin et al., (18) reported a prevalence of HIV infection as high as 3.1% among 2,507 individuals aged 15 to 49 years from Cotonou, the largest city of Benin.

Common worldwide viral blood-borne infections are HBV, HCV, HIV, and HTLV-1 (19). Generally, co-infections of the abovementioned viral infections are vital for the health authorities. These co-infections could be associated with increased risk of disease-related morbidity and mortality due to changes in the natural history of infections, increasing risk of progression to severe hepatic injury, and hepatotoxicity following antiretroviral therapy (20). There was no HIV/HCV, HIV/HBV, or HIV/HTLV-1 co-infection in the current study. It seems that the prevalence of these co-infections depends on their rates in the community. The overall HBsAg positivity in the general population of Mashhad was 1.39%, which is lower than the national prevalence of HBV infection (21). In addition, the prevalence of HCV infection in this area has been reported to be lower than other large cities in Iran (22).

In conclusion, this first population-based survey showed no evidence of HIV infection in the general population of Mashhad. It seems that implemented

health policies and strategies have contributed to this low prevalence and this shall be continued. These might have included efforts on public awareness and free HIV counseling and testing services at public health facilities.

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Footnotes

Authors' Contribution: Study concept and design, Mohammad Reza Hedayati-Moghaddam; acquisition of data, Sanaz Ahmadi Ghezeldasht, Mohammad Reza Hedayati-Moghaddam, and Rahele Miri; data analysis, Mohammad Reza Hedayati-Moghaddam; drafting of the manuscript, Sanaz Ahmadi Ghezeldasht, Arman Mosavat, and Rahele Miri; and final revision, Mohammad Reza Hedayati-Moghaddam.

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References

1. Schaechter M. Desk encyclopedia of microbiology. Academic Press; 2010.
2. Tavooosi A, Zaferani A, Enzevaei A, Tajik P, Ahmadi-zhad Z. Knowledge and attitude towards HIV/AIDS among Iranian students. *BMC Public Health*. 2004;4:17. doi: [10.1186/1471-2458-4-17](https://doi.org/10.1186/1471-2458-4-17). [PubMed: [15157281](https://pubmed.ncbi.nlm.nih.gov/15157281/)].
3. World Health Organization. . UNAIDS: Global Report: UNAIDS report on the global AIDS epidemic. Geneva: WHO; 2010.
4. Haghdoost A, Sadeghi M, Nasirian M, Mirzazadeh A, Navadeh S. Research priorities in the field of HIV and AIDS in Iran. *J Res Med Sci*. 2012;17(5):481-6. [PubMed: [23626616](https://pubmed.ncbi.nlm.nih.gov/23626616/)].
5. Alam-Mehrjerdi Z, Abdollahi M, Higgs P, Dolan K. Drug use treatment and harm reduction programs in Iran: A unique model of health in the most populated Persian Gulf country. *Asian J Psychiatr*. 2015;16:78-83. doi: [10.1016/j.ajp.2015.06.002](https://doi.org/10.1016/j.ajp.2015.06.002). [PubMed: [26168763](https://pubmed.ncbi.nlm.nih.gov/26168763/)].
6. World Health Organization. . Global update on HIV treatment 2013: results, impact and opportunities. 2013

7. Mojtahedzadeh V, Razani N, Malekinejad M, Vazirian M, Shoaee S, Saberi Zafarghandi MB, et al. Injection drug use in Rural Iran: integrating HIV prevention into Iran's rural primary health care system. *AIDS Behav*. 2008;12(4 Suppl):S7-12. doi: [10.1007/s10461-008-9408-y](https://doi.org/10.1007/s10461-008-9408-y). [PubMed: [18521737](https://pubmed.ncbi.nlm.nih.gov/18521737/)].
8. Haghdoost AA. Modelling of HIV/AIDS in Iran up to 2014. *J AIDS HIV Res*. 2011;3(12) doi: [10.5897/jahr11.030](https://doi.org/10.5897/jahr11.030).
9. Mirzazadeh A, Nedjat S, Navadeh S, Haghdoost A, Mansournia MA, McFarland W, et al. HIV and related risk behaviors among female sex workers in Iran: bias-adjusted estimates from the 2010 National Bio-Behavioral Survey. *AIDS Behav*. 2014;18 Suppl 1:S19-24. doi: [10.1007/s10461-013-0548-3](https://doi.org/10.1007/s10461-013-0548-3). [PubMed: [23857356](https://pubmed.ncbi.nlm.nih.gov/23857356/)].
10. Khodayari-Zarnaq R, Ravaghi H, Mohammad Mosaddeghrad A, Sedaghat A, Mohraz M. HIV/AIDS policy agenda setting in Iran. *Med J Islam Repub Iran*. 2016;30:392. [PubMed: [27579283](https://pubmed.ncbi.nlm.nih.gov/27579283/)].
11. Abolghasemi H, Maghsudlu M, Kafi-Abad SA, Cheraghali A. Introduction to Iranian blood transfusion organization and blood safety in Iran. *Iran J Public Health*. 2009;38(1):82-7.
12. Rezvan H, Abolghassemi H, Kafabad SA. Transfusion-transmitted infections among multitransfused patients in Iran: a review. *Transfus Med*. 2007;17(6):425-33. doi: [10.1111/j.1365-3148.2007.00794.x](https://doi.org/10.1111/j.1365-3148.2007.00794.x). [PubMed: [18067646](https://pubmed.ncbi.nlm.nih.gov/18067646/)].
13. UNAIDS. . Global aids update. 2016
14. Dai S, Shen Z, Zha Z, Leng R, Qin W, Wang C, et al. Seroprevalence of HIV, syphilis, and hepatitis C virus in the general population of the Liangshan Prefecture, Sichuan Province, China. *J Med Virol*. 2012;84(1):1-5. doi: [10.1002/jmv.22214](https://doi.org/10.1002/jmv.22214). [PubMed: [22027998](https://pubmed.ncbi.nlm.nih.gov/22027998/)].
15. Dourado I, Milroy CA, Mello MA, Ferraro GA, Castro-Lima Filho H, Guimaraes ML, et al. HIV-1 seroprevalence in the general population of Salvador, Bahia State, Northeast Brazil. *Cad Saude Publica*. 2007;23(1):25-32. doi: [10.1590/S0102-311X2007000100004](https://doi.org/10.1590/S0102-311X2007000100004). [PubMed: [17187101](https://pubmed.ncbi.nlm.nih.gov/17187101/)].
16. Boisier P, Ouwe Missi Oukem-Boyer ON, Amadou Hamidou A, Sidikou F, Ibrahim ML, Elhaj Mahamane A, et al. Nationwide HIV prevalence survey in general population in Niger. *Trop Med Int Health*. 2004;9(11):1161-6. doi: [10.1111/j.1365-3156.2004.01324.x](https://doi.org/10.1111/j.1365-3156.2004.01324.x). [PubMed: [15548311](https://pubmed.ncbi.nlm.nih.gov/15548311/)].
17. Banandur P, Rajaram SP, Mahagaonkar SB, Bradley J, Ramesh BM, Washington RG, et al. Heterogeneity of the HIV epidemic in the general population of Karnataka state, south India. *BMC Public Health*. 2011;11 Suppl 6:S13. doi: [10.1186/1471-2458-11-S6-S13](https://doi.org/10.1186/1471-2458-11-S6-S13). [PubMed: [22376218](https://pubmed.ncbi.nlm.nih.gov/22376218/)].
18. Behanzin L, Diabate S, Minani I, Lowndes CM, Boily MC, Labbe AC, et al. Decline in HIV prevalence among young men in the general population of Cotonou, Benin, 1998-2008. *PLoS One*. 2012;7(8):ee43818. doi: [10.1371/journal.pone.0043818](https://doi.org/10.1371/journal.pone.0043818). [PubMed: [22952773](https://pubmed.ncbi.nlm.nih.gov/22952773/)].
19. Curry M, Chopra S, Dienstag J. Viral hepatitis in: Mandell gl, bennett je, dolin r. Principles and practice of infectious diseases. 7 ed. New York: Churchill-Livingstone; 2010. pp. 1577-93.
20. Leeratanapetch N, Suseangrut W. Hepatitis B virus and hepatitis C virus Co-infection with HIV patients at khon kaen hospital. *Khon Kaen Med J*. 2010;32(2):229-38.
21. Fathimoghaddam F, Hedayati-Moghaddam MR, Bidkhorri HR, Ahmadi S, Sima HR. The prevalence of hepatitis B antigen-positivity in the general population of Mashhad, Iran. *Hepat Mon*. 2011;11(5):346-50. [PubMed: [22087159](https://pubmed.ncbi.nlm.nih.gov/22087159/)].
22. Ghazvini K, Shamsian K, Rezaee A, Shamsian A, Bidkhorri H, Hedayati-Moghaddam MR. Prevalence of hepatitis C virus infection in Mashhad, a north-eastern city of Iran. *J Viral Hepat*. 2012;19:5-30. doi: [10.1111/j.1365-2893.2012.01652.x](https://doi.org/10.1111/j.1365-2893.2012.01652.x).