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# Prevalence of Symptom-based Sexually Transmitted Infections and Related Factors among Incarcerated Men in Iran, 2013

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## Abstract

**Background:** Prisoners are at higher risk for sexually transmitted infections (STIs) than the general population. This study reported the prevalence and correlated factors of STI-related symptoms among male prisoners in Iran.

**Methods:** Participants were selected from 27 prisons across 16 Iranian provinces in 2013 using a multistage cluster sampling (N = 5490). Men aged ≥18 years who spent at least one week in prison and self-reported having had sex during the previous year were eligible and asked if they have had penile discharge (PD) or genital ulcers (GU) within the last year. Demographic variables, HIV/STIs-related knowledge, STIs care-seeking practices, HIV self-perceived risk, history of substance use, and sexual behaviors were collected by face-to-face interviews. HIV tests were completed using the ELISA method. Factors associated with STIs-related symptoms were examined using logistic regression models, and adjusted odds ratios (AOR) along with their 95% confidence intervals (CI) were reported.

**Results:** Of 2,620 eligible male prisoners (mean age ± SD = 35.7 ± 8.9), 6.9% reported symptoms for PD, GU, or both; of whom 36.2% had not sought STIs care inside prison. A history of injection drug use (AOR = 2.14; 95% CI: 1.45, 3.14), having access to condoms inside prison (AOR = 1.57, 95% CI: 1.08, 2.82), self-perceived risk of HIV (AOR = 1.52, 95% CI: 1.03, 2.24), and HIV-seropositivity (AOR = 3.30, 95% CI: 1.02, 10.61) were positively and having sufficient STIs-related knowledge (AOR = 0.63, 95% CI: 0.44, 0.89) was negatively associated with reporting STIs-related symptoms.

**Conclusion:** Despite the low prevalence of STIs among Iranian prisoners, initiation of screening among high-risk prisoners, including people who inject drugs and prisoners living with HIV, may prevent subsequent health effects. Current HIV/STIs prevention policies across Iranian prisons to help improve prisoners' HIV/STIs knowledge and encourage their HIV/STIs preventive practices should be reinforced.

**Keywords:** Sexually Transmitted Infections, Symptoms, Prisoners, Surveillance, Iran

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## Introduction

Prisoners are disproportionately at risk for sexually transmitted infections (STIs) and up to ten times more

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***↑What is "already known" in this topic:***
In various parts of the world, prisoners are known to be a group at a higher risk for sexually transmitted infections (STIs). STIs are known to be a risk factor for HIV acquisition. However, our knowledge about the status of STIs among Iranian incarcerated people is very limited.

***→What this article adds:***
We showed that around 7% of Iranian prisoners had at least one STIs-related symptom; injection drug use, condom accessibility inside prison, self-perceived risk of HIV, and HIV-seropositivity were risk factors for STIs-related symptoms while having sufficient STIs-related knowledge had a protective effect. Therefore, screening of prisoners at least among groups at higher risk is recommended.



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likely to contract STIs in comparison to the general population (1). Risky behaviors, including unprotected sex, multiple sexual partners, same-sex sex, and using alcohol or drugs before sex, may put them at a higher risk of contracting or transmitting STIs (1, 2). Overcrowding, poor living conditions, and poor access to sanitation and healthcare services, delay or lack of diagnosis and treatment may exacerbate this situation (3). Various studies have shown different rates of STIs among prisoners. In a meta-analysis conducted in 2012, the pooled prevalence of STIs in prisoners all around the world varied from 1.4% (Gonorrhea) to 12.3% (Chlamydia); the prevalence in women was higher than men (2). This is of particular concern because STIs can spread within and outside the prison before and post-release (3). The results of a modeling study indicated that decreased incarceration rates were positively associated with reduced human immunodeficiency virus (HIV) and hepatitis C virus (HCV) infections among incarcerated people who inject drugs (PWID) (4).

There are approximately 200,000 prisoners in Iran, which corresponds to 287 inmates per 100,000 of the general population (3). Most prisoners in Iran come from low socioeconomic backgrounds and have histories of risky sexual behaviors and substance use before incarceration (4, 5). However, our knowledge of STIs among prisoners in Iran is limited. Previous studies and the bio-behavioral surveillance systems have mainly focused on monitoring and controlling HIV and HCV among prisoners due to multiple previous HIV/HCV epidemics among this population during the past two decades ago. A narrow body of evidence reports the prevalence of various STIs as 2.3% for chlamydia, 6% for syphilis, 7% for human papillomavirus (HPV), and 26.3% for herpes simplex virus type2 (HSV-2) among Iranian prisoners (6). While methadone maintenance treatment (MMT), as a part of harm reduction and HIV/HCV control, are accessible inside Iran's prisons, programs such as STIs screening and condom distribution for prevention of other STIs inside prisons are limited. Therefore, in this nationwide study, we aimed to assess the prevalence and correlates of STI-associated symptoms among male prisoners of Iran. We used the data from a national HIV bio-behavioral surveillance survey of Iranian prisoners in 2013. The results of this study would help inform the development of appropriate policies regarding screening and treatment of STIs inside prisons.

## Methods

### Study sample

In 2013, prisoners who spent at least one week inside prison settings had not participated in similar studies within the last two months and provided verbal informed consent for participation in the study were recruited at 27 prisons in 16 provinces of Iran using multistage cluster sampling. First, based on the median number of prisoners in each prison, we classified the prisons into large (i.e., ≥500 prisoners) and small prisons (i.e., <500 prisoners). We then selected 14 large and 13 small prisons using stratified-random sampling. Participants in each prison were recruited proportional to the total size of prisoners in that prison. Eligible participants were those who self-reported having had sexual intercourse within the previous year. Overall, 2620 prisoners met the inclusion criteria. Female prisoners were excluded from analysis because of their small sample size (n =103).

### Data collection

We collected behavioral data through face-to-face interviews using a structured risk assessment questionnaire. At each site, a trained gender-matched interviewer conducted the interviews. The questionnaire consisted of 65 questions about socio-demographic status, primary HIV/STI-related risk factors, and prisoners' care-seeking behavior inside prison. After pre-test counseling, five dried blood spots were taken from participants who consented to HIV testing. Dried blood spots were tested for HIV using the ELISA method (Vironostika HIV Uni-Form II Ag/Ab, bioMérieux, France). Sample with a positive test for the first ELISA was rechecked by the second ELISA test. All tests were done by a central reference lab in Tehran, Iran. The test results were reported back to participants anonymously using a unique code. Post-test counseling was available at the prisons' clinic. Interviews and blood sampling were done in a private room.

### Dependent variable

Our study explored the prevalence and correlated factors of self-reported STI-associated symptoms among male prisoners. Participants were asked, "Have you had any genital ulcer (GU)/urethral discharge (UD) within the last year?" responses to each question (genital ulcer or urethral discharge) were coded as yes or no. To capture the care-seeking behavior of prisoners, individuals who reported at least one STI-associated symptom were asked, "What have you done inside prison for treatment of genital ulcer/urethral discharge?" Responses were coded as sought care inside prison, self-medicated, and did nothing.

### Independent variable

Socio-demographic variables included: age (<30, ≥30), education (≤high school, >high school), and marital status (single, divorced, widowed, and married). Drug history variables were last-month non-injection drug use (yes, no) and ever injection of drugs (yes, no). Sex-related behaviors included: ever experienced same-sex sexual practices (no, yes, while using condoms in the last sexual act or yes, without using condoms in the last act), the number of sex partners other than their spouse in the last 12 months (≤1, ≥2 partners). We also assessed if the participants had sufficient knowledge on sexual transmission of HIV (those who could identify both "staying with only one uninfected faithful partner" and "using a condom in sexual contacts" can prevent the chance of acquiring HIV were coded as yes, and otherwise as no), sufficient knowledge about women's STIs symptoms (those who identified at least two of four symptoms, including lower abdominal pain, abnormal vaginal discharge, genital ulcer, and swelling of groin were coded as yes, and otherwise no), and sufficient knowledge about men's STIs symptoms (those who identified at least two of four symptoms including abnormal





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penile discharge, genital ulcer, swelling of the groin, and swelling of testicles coded as yes, and otherwise no). Data were also collected on other covariates, including the self-perceived risk of HIV (yes, no) and HIV serostatus (positive, negative). Furthermore, to measure condom accessibility, we asked participants if they had access to condoms inside prison whenever they needed.

### Statistical analysis

Data were analyzed using Stata SE 12.0 survey package. To explore factors associated with STIs associated symptoms, we applied bivariable and multivariable logistic regression, and crude and adjusted odds ratios (AORs) along with their 95% confidence intervals (95% CI) were reported. Variables with a P-value <0.2 in the bivariable logistic regression analysis were entered into the multivariable regression model. The final model was reduced based on F-test, and P-values <0.05 were considered statistically significant.

### Ethics

The study protocol and procedures were reviewed and approved by the Research Review Board of the Kerman University of Medical Sciences, the Ministry of Health, and the Iran Prisons Organization (Ethics code: K/93/207). All interviews were conducted anonymously. No identifier was recorded in the questionnaires or blood samples. The questionnaire and lab tests were linked using a unique anonymous code.

## Results

The analytic sample consisted of 2620 eligible male prisoners. The mean age (SD) of the participants was 35.7 (8.9) years. Most participants were married (n=1895, 72.4%) and had up to high school education (n=1955, 74.7%). Around 60% of participants reported previous

*Table 1.* Binominal logistic regression analysis of factors associated with self-reported STIs symptoms among male Iranian prisoners who were sexually active within the last year (N = 2620)

| Variables | | Total (Column %) | Self-reported STI[1] symptoms N = 182 n (row %) | Not self-reported STIs symptoms N = 2,438 n (row %) | Crude OR (95% CI) | P-value |
|---|---|---|---|---|---|---|
| Age (years) | <30 | 879 (33.8) | 63 (7.2) | 816 (92.8) | 1 | |
| (n = 2603) | ≥30 | 1724 (66.2) | 119 (6.9) | 1605 (93.1) | 0.96 (0.63- 1.44) | 0.841 |
| Highest level of education | ≤High school | 1955 (74.7) | 140 (7.2) | 1815 (92.8) | 1 | |
| (n = 2616) | >High school | 661 (25.3) | 42 (6.3) | 619 (93.7) | 0.87 (0.65- 1.17) | 0.373 |
| Current Marital status (n = 2618) | Single/Divorced/ Widowed | 723 (27.6) | 72 (9.9) | 651 (90.1) | 1 | |
| | Married/Sigheh[2] | 1895 (72.4) | 110 (5.8) | 1785 (94.2) | 0.55 (0.39- 0.78) | 0.002 |
| History of lifetime incarceration | Never | 1104 (42.1) | 51 (4.6) | 1053 (95.4) | 1 | |
| (n = 2619) | Once | 611 (23.3) | 35 (5.7) | 576 (94.3) | 1.25 (0.87- 1.80) | 0.215 |
| | Several times | 904 (34.5) | 96 (10.6) | 808 (89.4) | 2.45 (1.89-3.18) | <0.001 |
| Last month non-injection drug use (n = 2611) | No | 2093 (80.2) | 130 (6.2) | 1963 (93.8) | 1 | |
| | Yes | 518 (19.8) | 51 (7.2) | 467 (92.8) | 1.64 (1.27- 2.13) | 0.008 |
| Ever injection of drugs | No | 1675 (80.9) | 110 (6.6) | 1565 (93.4) | 1 | |
| (n = 2071) | Yes | 396 (19.1) | 54 (9.8) | 342 (90.2) | 2.24 (1.59- 3.15) | <0.001 |
| Experiencing same-sex sexual contacts (n = 2606) | had no sex / used condom in last sex | 2367 (90.8) | 149 (6.3) | 2218 (93.7) | 1 | |
| | didn't use condom in last sex | 239 (9.2) | 33 (13.8) | 206 (86.2) | 2.38 (1.62- 3.49) | <0.001 |
| Number of sex partners other than spouse within the last 12 months (n = 975) | Having one or no partner | 512 (59.5) | 30 (5.8) | 482 (94.1) | 1 | |
| | At least having two partners | 463 (47.5) | 58 (12.5) | 405 (87.5) | 2.30 (1.42- 3.71) | <0.001 |
| Condom accessibility inside prison (n = 1923) | Not accessible | 1539 (80) | 107 (6.9) | 1432 (93.1) | 1 | |
| | Accessible | 384 (20) | 40 (10.4) | 344 (89.6) | 1.55 (0.99- 2.42) | 0.051 |
| Knowledge about STIs symptoms in women (n = 2620) | Insufficient | 487 (18.6) | 31 (6.4) | 456 (93.6) | 1 | |
| | Sufficient | 2133 (81.4) | 151 (7.1) | 1982 (92.9.4) | 1.12 (0.85- 1.46) | 0.392 |
| Knowledge about STIs symptoms in men (n = 2620) | Insufficient | 557 (21.3) | 51 (9.2) | 506 (90.8) | 1 | |
| | Sufficient | 2063 (78.7) | 131 (6.3) | 1932 (93.2) | 0.67 (0.50- 0.90) | 0.014 |
| Knowledge about sexual transmission of HIV (n = 2620) | Insufficient | 401 (15.3) | 31 (7.7) | 370 (92.3) | 1 | |
| | Sufficient | 2219 (84.7) | 151 (6.8) | 2068 (93.2) | 0.87 (0.63- 1.19) | 0.377 |
| Self-perceived risk of HIV | No | 1412 (61.2) | 75 (5.3) | 1337 (94.7) | 1 | |
| (n = 2307) | Yes | 895 (38.8) | 87 (9.7) | 808 (90.3) | 1.91 (1.48- 2.48) | <0.001 |
| HIV status | Negative | 2549 (99.1) | 175 (6.9) | 2374 (93.1) | 1 | |
| (n = 2571) | Positive | 22 (0.9) | 5 (22.7) | 17 (77.3) | 3.98 (1.24- 12.81) | 0.025 |

1: Having genital ulcer (GU) or urethral discharge (UD) within the last year.
2: Temporary marriage



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histories of incarceration (Table 1).

### *Knowledge regarding STIs and their associated symptoms*

Overall, 1,922 (73.3%) male prisoners had ever heard of STIs. Only 33.3% of participants (n=650) were able to describe at least one STIs-associated symptom in women. The most common symptom they referred to was abnormal vaginal discharge 68.5% (n=561). Furthermore, only 40.6% (n=1406) were able to describe at least one STIs-associated symptom in men. Penile discharge 71.7% (n=710) was the most-identified symptom. Of all participants, 81.4% (n=2133) and 78.7% (n=2063) had sufficient knowledge about STIs-associated symptoms in women and men, respectively.

### *STIs Prevalence*

Overall, 6.9% (95% CI: 6.0%, 7.9%, n=182) of participants reported that they had had at least one STIs related symptom (genital ulcer or urethral discharge) within the last year. The prevalence of having only urethral discharge was 4.1% (n = 108) and having only genital ulcer was 1.5% (n=38). Totally, 1.3% (n = 34) of participants had both symptoms, and 36.2% (n=66) of prisoners with symptoms had not sought STIs care inside prison.

### *STIs prevalence by subgroups*

STIs associated symptoms were more common among prisoners who had been previously incarcerated several times (10.6% vs. 4.6%), used non-injecting drugs in the last month (7.2% vs. 6.2%), reported injection drug use (9.8% vs. 6.6%), reported same-sex practices without condoms (13.8% vs. 6.3%), had at least two sexual partners other than their spouse in the previous year (12.5% vs. 5.8%), considered themselves at higher risk of HIV (9.7% vs. 5.3%), were living with HIV (22.7% vs. 6.9%), had insufficient knowledge about STIs symptoms in men (9.2% vs. 6.3%), and were single at the time of the study (9.9% vs. 5.8%) (Table 1).

Having STIs-related symptoms was significantly associated with the history of injection drug use (AOR = 2.14, 95% CI, 1.45, 3.14), condom accessibility inside prison (AOR = 1.57, 95% CI, 1.08, 2.82), self-perceived risk of HIV (AOR = 1.52, 95% CI, 1.03, 2.24), HIV-seropositivity (AOR = 3.30, 95% CI, 1.02, 10.61), and having sufficient STIs-related knowledge (AOR = 0.63, 95% CI, 0.44, 0.89) (Table 2).

## Discussion

We found that around 7% of prisoners have at least one STIs-related symptom; more than one-third of them had not sought STIs care and treatment inside prison. Having STI- related symptoms was positively associated with injection drug use, condom accessibility inside prison, self-perceived risk of HIV, HIV-seropositivity, and negatively associated with having sufficient STI-related knowledge.

Approximately 7% of male prisoners reported at least one of two STIs- related symptoms. The findings of a study in Kerman, Iran, showed that 2.8% of the general male population reported at least one STIs-related symptom. Another population-based study in 2011 showed that 29.7% of the male Iranian general population experienced at least one STIs-related symptom within the previous year (7). While we only asked prisoners about having two main symptoms, in the 2011 study, male participants were asked if they had one of four STIs-related symptoms within the previous year, and this may explain the lower prevalence of symptoms in our study. Furthermore, in the 2011 study, participants were recruited from streets and public places. Previous studies have shown that asking sensitive questions on the street provides more accurate responses than household and telephone-based surveys (8, 9). Similarly, confidentiality concerns and stigma toward STIs may be an issue inside prisons which may have resulted in lower rates of STIs self-report.

We estimated the prevalence of urethral discharge and genital ulcers in male prisoners at 4% and 1.5%, respectively. The results of a modeling study estimated the prevalence of urethral discharge and genital ulcers among the male Iranian general population to be 0.4% and 0.16%, respectively (10). It seems the prevalence of these symptoms in Iranian prisoners is 10 times that of the general population. Considering the high level of stigma and the high proportion of asymptomatic cases, the prevalence of STIs-related symptoms may be even higher than what was reported. The majority of studies on STIs in Iranian male prisoners are limited to HIV and viral hepatitis (11, 12) and there is no similar study that we could compare our results to. STIs prevalence in prisoners varies from 3% to

*Table 2.* The multivariable logistic regression analysis of factors associated with self-reported STIs symptoms among male Iranian prisoners who were sexually active within the last year (n = 2620)

| Variables | | Adjusted OR (95% CI) | P-value |
|---|---|---|---|
| Injection drug use | Never injected | 1 | |
| | Ever injected | 2.14 (1.45-3.14) | <0.001 |
| Condom accessibility inside prison | Not accessible | 1 | |
| | Accessible | 1.57 (1.08-2.82) | 0.027 |
| Knowledge about STIs Symptoms in men | Insufficient | 1 | |
| | Sufficient | 0.63 (0.44-0.89) | 0.012 |
| Self-perceived risk of HIV | No | 1 | |
| | Yes | 1.52 (1.03-2.24) | 0.033 |
| HIV status | Negative | 1 | |
| | Positive | 3.30 (1.02- 10.61) | 0.041 |





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9% around the world (2). Several studies indicate that the rate of STIs in prisoners is higher than the general population (13). A variety of risk factors including homosexuality, lack of access to condoms inside prisons, limited access to STIs care and treatment and a high level of stigma, put the prisoners at higher risk of getting and transmitting STIs (14). This is of particular concern, as untreated STIs predispose individuals to contracting HIV. It is estimated that HIV prevalence in Iranian prisoners is over eight times higher than that of the general population (14). Around 1.4% of Iranian prisoners are living with HIV (12). Prisoners could bridge HIV and STIs to the general population after their release (15). Therefore, as a part of second-generation HIV surveillance, STIs surveillance, care and treatment should be integrated into prisoners' health care system.

Although appropriate treatment of STIs could reduce the rate of HIV transmission, we realized that more than one-third of prisoners who had STIs-related symptoms sought no care inside prison. This is lower than the corresponding rate reported in two population-based national surveys, which reported only 33% of men who had STI-related symptoms in 2011 (7) and 49% in 2014 (16) had sought STIs care and treatment. While we did not collect any data on underlying reasons, a variety of factors, including stigma, accessibility of services, and confidentiality, has been suggested in previous studies as some of the barriers to accessing STIs care among prisoners (17).

In our study, having STIs-related symptoms was higher in prisoners who had ever injected drugs. Consistent with our results, other studies have shown an association between injection drug use and syphilis (18, 19). The use of injecting drugs contributes to risk-taking behaviors such as unsafe sex and having sexual partners due to trading sex for money or drugs (20, 21). Our findings highlight a need to promote safe sex in PWID. Furthermore, in resource-limited settings where screening of all prisoners is not feasible, prioritizing care for PWID who are at higher risk of STIs may be a more efficient way of STIs control inside prisons.

We also found an association between having STIs-related symptoms and condom accessibility inside prison. While previous evidence does not support this finding, one possible explanation may be reverse causality; meaning that prisoners who had STIs-related symptoms asked more for condoms inside prison. In addition, having sufficient knowledge on STIs-related symptoms in men decreased the chance of having any symptoms. Therefore, increasing prisoners' awareness of STIs by establishing sexual health education may be a key strategy for STIs control inside prisons. The chance of having STIs-related symptoms was higher in those who were living with HIV and those who considered themselves at higher risk of HIV. Indeed, STIs have been shown to make people more susceptible to HIV contraction (22).

The establishment of triangular clinics and MMT in Iran's prisons had great impacts on reducing the prevalence of HIV inside prison and drug injection risky behaviors. However, the coverage is not 100%. It is reported that only 15% of prisoners are being tested for HIV at their entrance to the prison, and there is no screening program for other STIs (23). Furthermore, the results of a national survey indicate that 55% of Iranian prisoners have had a history of unsafe sex in their lives (24). While prisoners are being taught about STIs in triangular clinics, most prisoners are reluctant to present their symptoms or seek treatment. It is necessary that policymakers consider prisons as one of the priority places for the prevention, screening, and treatment of STIs. Promotion of safer sex activities such as expanding condom accessibility and condom distribution services have been reported to be beneficial in previous studies (25). STIs testing, counseling and education, educating personnel and healthcare providers, and providing a confidential setting as well as making effective rapport between prisoners and health care providers should be promoted inside prisons. Lastly, revisiting criminal policies to reduce the flow of prisoners into prison settings may be beneficial in reducing STIs incidence among prisoners.

We would like to acknowledge the limitation of our study. Our survey was symptom-based and not etiology-based. Therefore, missing of asymptomatic cases as well as over-estimation of non-specific symptoms, including urethral discharge, is probable. Furthermore, the sensitivity and specificity of self-reported symptoms are lower than etiologic lab tests, which limit our ability for valid estimation of STIs prevalence in this population. Finally, the sensitive nature of questions we asked, and the high level of stigma may have resulted in some degrees of information bias and underreporting. We also could not distinguish if those reported STIs were infected inside or outside the prisons as our inclusion criteria allowed prisoners who had been incarcerated for one week to take part in the study but our question about the STIs was in the previous year's timeframe.

## Conclusion

Future intervention inside prisons should focus on screening, care, and treatment of STIs among prisoners in Iran, at least among high-risk subgroups such as people who inject drugs and people living with HIV. Furthermore, providing appropriate education and knowledge raising programs about HIV/STIs should be reinforced in this population.

## Acknowledgment

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### *Ethical Approval*

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.





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### Informed Consent

Verbal informed consent was obtained from all individual participants included in the study. The study protocol was reviewed and approved by the Ethics Committee of Kerman University of Medical Sciences, Kerman, Iran.

### Conflict of Interests

The authors declare that they have no competing interests.

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