Addiction

REVIEW

doi:10.1111/j.1360-0443.2012.03926.x

Evidence of HIV epidemics among non-injecting drug users in Iran: a systematic review

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ABSTRACT

Aims In Iran, injecting drug users have been recognized as a high-risk group for HIV/AIDS for years. However, evidence of HIV epidemics in non-injecting drug users (non-IDUs) has also been found in recent years. The aim of this systematic review was to determine the prevalence of HIV in non-IDUs in Iran. **Methods** International and regional databanks, including Pubmed, ISI, CINAHL, ASCI and IMEMR, as well as domestic databanks such as IranPsych, IranMedex SID and research reports were searched, and extensive personal contacts were made. All studies with HIV testing conducted between 1998 and 2007, which included non-IDU subjects, were gathered and their qualities were assessed. HIV prevalence was pooled for each gender and stratified to several categories. The prevalence of HIV in non-IDUs and IDUs was compared using pooled odds ratios in a fixed meta-analysis model. **Results** Overall, 10 studies with 2275 non-IDU samples were included. Six of the studies were conducted in prison settings, two in treatment centres, one in a community setting and one in a shelter setting. Four studies were performed in Tehran, the capital city of Iran. The pooled HIV prevalence was 5.4% [95% confidence interval (CI) 3.7–7.4] after 2005, which was significantly higher than the prevalence before 2005 [1.6% (95% CI 1.0–2.3)]. IDUs were 4.36 (95% CI 2.63–7.24) times more likely to be infected with HIV than non-IDUs. **Conclusion** Iran is facing a major HIV epidemic among non-injecting illicit drug users, which necessitates an urgent preventive response.

Keywords Blood-borne pathogens, HIV prevalence, Iran, non-injecting drug use, systematic review, trend.

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Submitted 7 September 2011; initial review completed 29 November 2011; final version accepted 25 April 2012

INTRODUCTION

In Iran, drug dependence is the second leading cause of burden of diseases in the male population after traffic accidents [1]. The only national population survey concerning this issue has estimated that there are approximately 3.7 million current illicit drug users, of whom 1.2 million are drug-dependent [2]. The United Nations Office for Crime and Drugs (UNODC) also reports that Iran has the highest rate of opioid use world-wide [3].

UNODC estimates that, world-wide, there are between 16 and 38 million problem drug users [3]. It is also estimated that 11.0–21.2 (mean 15.9) million people inject drugs [4]. Therefore, it may be the case that, on average, more than half of problem drug users globally have injected in the past 12 months. In Iran, however, the proportion is much less. According to a national drug situation assessment in 2006, more than 20% of the drug dependents had reported injecting drug use in the previous year [5]. Therefore, non-injecting drug users (non-IDUs) constitute a large group of drug users in the country.

HIV prevalence is estimated to be between 0.1 and 0.2% in the Iranian general population, and by mid-2010 a total of 22 250 cases of HIV infection had been identified [6]. While injecting drug use accounts for 10% of HIV infection world-wide [4], it is responsible for about 70% of HIV transmissions in Iran [6]. In fact, for years IDUs were known as the only group in Iran with a concentrated HIV epidemic.

In many countries, non-IDUs are regarded as an 'at-risk' group for HIV infection. In recent years there has also been some evidence of HIV epidemics among non-injecting drug users in Iran. This study aims to collect and review systematically the findings of all available studies, and to determine the prevalence of HIV in non-IDUs in

Iran. Using meta-analysis, it also compares the risk of HIV in non-IDUs versus IDUs. In addition, this review provides an overview of the qualities and limitations of the studies.

METHODS

Search strategy

Comprehensive searches were conducted on peer-reviewed literature databases, including Medline through PubMed, ISI Web of Science, Asian Science Citation Index (ASCI), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Index Medicus of Eastern Mediterranean Region (IMEMR). Iranian scientific databases including IranMedex, Iranian Databank for HIV Research, Iranian Databank of Hepatitis Research/conference, the databank for research in mental health in Iran (IranPsych), Scientific Information Databank (SID) and the Databank of Iranian Research Institute for Information Science and Technology (IranDoc) were also searched.

The MeSH terms and text words (and their combinations and truncated synonyms) were adapted as appropriate to search each database by combining the following three sets of terms: (i) English transcription of Iran and its cities with universities of medical sciences and their names, adopted from Farhoudian *et al*. [7] AND (ii) terms related to drug use, drug use disorders and the names of illegal drugs used in Iran as well as terms related to incarceration AND (iii) terms related to HIV/AIDS. The details are described in Appendix S1 (online supporting information, please see details given at the end). Iranian databanks were searched for related studies only with terms related to HIV/AIDS. The Persian keywords for HIV/AIDS were equivalent to their English words, and all probable combinations were considered.

All available Iranian conference proceedings related to HIV/AIDS and the reference lists from relevant studies were also searched manually. Extensive contacts with experts were made to find additional relevant studies. No language limitation was set and authors were contacted for accessing missing data.

Inclusion criteria

Studies were eligible if they fulfilled the following criteria: (i) the presence of observational studies on a representative sample of drug users (DUs); (ii) the presence of HIV testing as well as a confirmatory test; (iii) the study had to be conducted within the 10-year period between 1998 and 2007; and (iv) definition of non-IDU in the study had to include a life-time negative history of injecting drug use.

Exclusion criteria

Studies were excluded if: (i) they were conducted on high-risk DU samples, such as tuberculosis patients; (ii) current non-injecting drug use was used as the definition of non-IDU; and (iii) there were missing or confusing data on key information such as sample size that could not be accessed or resolved by contact with the authors. The excluded studies [8–22] are described in Table 1.

Quality assessment and data extraction

In order to assess the quality of the report of the included studies, a simple checklist including the following criteria was generated by the authors: (i) clearly defined sources and methods of sampling; (ii) response rates of more than 70% or accounting for non-response cases; (iii) the presence of gender-specific HIV prevalence; (iv) the presence of specific data on non-IDUs; (v) the reported year of study implementation. The numbers of fulfilled criteria are presented in Table 2.

The titles and abstracts of citations obtained through the search strategy were screened and the full texts of potentially eligible studies were obtained. All potentially relevant studies were assessed independently by two reviewers (M.A.E. and A.R.M.) for inclusion. The two investigators also assessed independently the studies' quality and extracted the data. Disagreements were settled by consensus.

The following data were extracted: bibliometric characteristics, year of study implementation, study location (province), recruitment setting, method of HIV testing, sampling method, sample size, pattern of drug use, age characteristics of participants, refusal rate, HIV test results, gender and gender-specific data.

Statistical analysis

According to the different socio-economic profiles of male and female non-IDUs, the HIV prevalence rates were extracted, presented and calculated separately for each gender. In addition, the HIV prevalences were pooled for the total sample, and were stratified by province, recruitment setting and year of study implementation. The 95% confidence interval (CI) of the HIV prevalence for each study and each stratum was calculated using the binomial distribution model. The prevalence of HIV in non-IDUs and IDUs was compared using pooled odds ratios (OR) in a fixed meta-analysis model and was illustrated in a forest plot. The analyses were performed using STATA software, version 8 (Stata Corporation, College Station, TX, USA, 2003) and Review Manager (RevMan) version 5.0 (Copenhagen: the Nordic Cochrane Center, the Cochrane Collaboration, 2008).

Table 1 Excluded studies and the reasons for exclusion.

First author, year of publication	*Reasons for exclusion*
Alaei, 2003 [8]	Study on drug addicts and specific data on non-IDUs not provided; missing data on key information; personal contacts unsuccessful
Astarki, 2008 [9]	Study on drug users and specific data on non-IDUs not provided; personal contacts unsuccessful
Farahbakhsh, 2006 [10]	Study on hospitalized patients and specific data on non-IDUs not provided; missing data on key information; personal contacts unsuccessful
Ghaleh Aghaei, 2006 [11]	Study on prisoners and specific data on non-IDUs not provided; personal contacts unsuccessful
Haghshenas, 2000 [12]	Study on prisoners with positive PPD or clinical symptoms of TB
Javadi, 2006 [13]	Study on prisoners and specific data on non-IDUs not provided; personal contacts unsuccessful
Khamisipour, 2000 [14]	Non-IDUs not found in the sample groups
Lawrinson, 2008 [15]	Non-IDU was defined as no injecting drug use in last month
Mohammad-Alizadeh, 2005 [16]	Confirmatory HIV test results not performed
Mohammadzadeh, 2006 [17]	Study on prisoners and specific data on non-IDUs not provided; personal contacts unsuccessful
Mojtahedzadeh, 2008 [18]	Missing data on key information; personal contacts unsuccessful
Naghshvarian, 2008 [19]	Retrograde study of patient files in a drug treatment centre; largely unknown results on HIV testing
Tajbakhsh, 2008 [20]	Study on prisoners and specific data on non-IDUs not provided; missing data on key information; personal contacts unsuccessful
Talaie, 2007 [21]	Study on intoxicated drug users and specific data on non-IDUs not provided; missing data on key information; personal contacts unsuccessful
Vahdani, 2006 [22]	Study on street children and specific data on non-IDUs not provided

IDU: injecting drug user; PPD: purified protein derivative; TB: tuberculosis.

RESULTS

A total of 86 studies (40 English and 46 Persian) were potentially relevant. According to the inclusion criteria, 51 studies (26 English and 25 Persian) were not included. This left 35 (21 Persian and 14 English) studies, which included 20 peer-reviewed journal papers, 12 congress abstracts, one final report of a research and two theses. Ten studies were excluded because they were either duplicates or a subset of a published or unpublished study by the same authors. After detailed evaluation of full texts and extensive personal communication, 15 studies (10 Persian and five English) were excluded according to other exclusion criteria (Table 1).

Finally, 10 studies (five English and five Persian) were included in this review and are presented in Table 2. The documents used for all included studies were papers published in peer-reviewed journals, except one, which was the final report of a research study [23]. The sample sizes of non-IDUs were between 10 and 597.

Three studies were carried out only on men, three only on women and four included both genders. In the four studies with both male and female samples, 72 women and 967 men were included in total, which indicates a female to male ratio of 1 : 13.4.

In one study [24], the sample size for each gender was not provided; this study was conducted on prison inmates, and none of the 140 cases had tested positive for HIV. Therefore, the gender-specific results displayed in Table 3 have been extracted from nine studies.

Age characteristics of the samples were not provided in most studies. In those reported, most of the participants were in their 30s or 40s. Also, opium was the main drug of use in most studies.

Pooled HIV prevalence

Overall, in 10 included studies with 2275 non-IDU samples, there was a pooled HIV prevalence of 2.6% (95% CI: 2.0–3.4). The total number of non-IDU men in six studies with male samples was 1931. In the most recent study in Tehran, in two studies HIV prevalence ranged from zero to 6.6%. There was a pooled HIV prevalence in male samples of 3% (95% CI: 2.3–3.9).

Six studies included female non-IDUs. Three studies concerned non-IDUs, of which only a small proportion was female. Three other studies were carried out on female prisoners or women in shelters and only a proportion of these were drug users. The data on female drug users is extracted and presented in the last two columns of Table 3. The total female sample in these studies was 204, ranging from 10 to 92. There were no HIV-positive cases in five studies. The pooled prevalence of HIV in female samples was 1% (95% CI: 0.1–3.5), which was lower than that of males; however, the difference was not significant. The results are presented in Table 3.

Stratified pooled prevalence

Four of the 10 studies were carried out in Tehran, the capital city of Iran, and the other six were conducted in five of the other 29 Iranian provinces. Therefore, data for

Table 2 Characteristics of included studies.

First author, year of publication	*Year of study implementation*	*Province*	*Definition of drug use*	*Main drug of use*	*Recruitment setting*	*Recruitment method*	*Age characteristics*	*Quality (numerals of fulfilled criteria)*
Mohraz, 2008 [23]	2007–08	Tehran	Current drug use	Opioid (opium and heroin)	Community	RDS	37.5 (±12.2)	2–5
Hajiabdolbaghi, 2007 [25]	2006	Tehran	Life-time drug use	Cannabis and ecstasy	One NGO centre for runaway women and girls	All enrolled in centre in specific time-period	NK	3–5
Ghanbarzadeh, 2006 [26]	2005	St Khorasan	Drug dependence	Opium	One Prison—female sample	All volunteers	NK	1, 3, 4
Zamani, 2005 [27]	2003–04	Tehran	Drug dependence	Opium	One abstinence-based and two MMT centres	Consecutive sampling	Half the men were <30	1, 3–5
Khodadadizadeh, 2006 [28]	2003	Kerman	Drug dependence	Opium	One drug treatment centre	Convenience non-probability sampling— all male clients	Age range: 18–45 Mean age: 26.2 (±4.8)	1, 4, 5
Azarkar, 2007 [24]	2004	St Khorasan	NK	NK	One prison	Stratified random sampling	NK	1, 4, 5
Khodabakhshi, 2007 [29]	2002–03	Golestan	Drug dependence	Opium	One prison	Randomized sampling, addicted prisoners	Age range: 18–45 Mean age: 29	4, 5
Jahani, 2005 [30]	2002	Tehran	Life-time drug use	NK	One prison— female sample	NK	NK	3–5
Khani, 2003 [31]	2001	Zanjan	Drug dependence	Opium	One prison	Census, male prisoner drug addicts	NK	3, 5
Mirahmadizadeh, 2001 [32]	1998	Fars	Drug dependence	NK	One male compulsory residential centre	Census	NK	3–5

MMT: methadone maintenance treatment; NGO: non-governmental organization; NK: not known; RDS: respondent-driven sampling.

Table 3 HIV prevalence among non-IDUs in studies from Iran.

First author, year of publication	Year of study implementation	Province	Recruitment setting	Male			Female	
				Tested sample	No. of positive HIV cases	HIV prevalence (95% CI)	Tested sample	No. of positive HIV cases
Mohraz, 2008 [23]	2007	Tehran	Community	488	32	6.6 (4.5–9.1)	44	2
Hajiabdolbaghi, 2007 [25]	2006	Tehran	Shelter	–	–	–	10	0
Ghanbarzadeh, 2006 [26]	2005	St Khorasan	Prison	–	–	–	92	0
Zamani, 2005 [27]	2004	Tehran	Treatment centre	390	21	5.4 (3.4–8.1)	18	0
Khodadadizadeh, 2006 [28]	2003	Kerman	Treatment centre	149	0	0	–	–
Khodabakhshi, 2007 [29]	2003	Golestan	Prison	89	3	3.4 (0.7–9.5)	10	0
Jahani, 2005 [30]	2002	Tehran	Prison	–	–	–	30	0
Khani, 2003 [31]	2001	Zanjan	Prison	218	0	0	–	–
Mirahmadizadeh, 2001 [32]	1998	Fars	Prison	597	2	0.34 (0.04–1.2)	–	–
Pooled	–	–	–	1931	58	3.0 (2.3–3.9)	204	2

CI: confidence interval.

24 provinces are lacking. The pooled prevalence of HIV infection in studies conducted in Tehran was significantly higher than that in other provinces (5.6% versus 0.4%) (Table 4).

As the harm reduction services have been expanded in Iran since 2005, the studies were divided into two subgroups according to the year of implementation. Seven studies were carried out from 1998 to 2004, while three studies were conducted between 2005 and 2007. The pooled HIV prevalence was 5.4% (95% CI 3.7–7.4) after 2005, which was significantly higher than the prevalence before 2005 [1.6% (95% CI 1.0–2.3)] (Table 4).

The studies were stratified according to the setting in which they were conducted. Six studies were carried out in prisons or compulsory residential centres. In two studies, the samples were recruited from drug treatment settings; one was carried out in a community setting and the other in a shelter for runaway women. The studies were classified into prison and non-prison settings, with almost similar sample sizes. Pooled HIV prevalence was much higher in non-prison settings and the difference was statistically significant.

Risk of HIV infection of non-IDUs compared with the risk in IDUs

Seven studies included both non-IDUs and IDUs, with a total sample of 1593 and 829, respectively. There was no significant statistical heterogeneity ($\chi^2 = 3.84$, $P = 0.43$). The meta-analysis showed that IDUs were 4.36 (95% CI: 2.63–7.24) times more likely to be infected with HIV than were non-IDUs (Fig. 1).

DISCUSSION

This is the first systematic review on HIV prevalence among non-IDUs conducted in Iran. We found only two other systematic reviews on HIV prevalence among non-IDUs, one from China and one from Brazil [33,34].

This systematic review included 2275 non-IDUs from 10 studies, conducted over a 10-year period (1998–2007). The prevalence has increased significantly, from 1.6% before 2005 to 5.4% since 2005. Although non-IDUs were not considered previously as one of the most at-risk groups, at present we are facing a concentrated epidemic among this group. In Iran, a concentrated epidemic has been present among IDUs since 1996. However, it seems that in this country, non-IDUs are also vulnerable and likely to be exposed to HIV, and are critical to the dynamics of the epidemic and the response, as defined for the most at-risk groups for HIV. HIV prevalence is still low among female sex workers who are not injecting drug users, and there is no evidence that it has reached the critical level of 5%. No information is

Table 4 Subgroup analysis of pooled HIV prevalence in total studied non-IDUs (male and female).

Variables		*No. of studies*	*Sample size*	*Pooled prevalence %*	*95% CI*
Place of study	Tehran	4	980	5.6	4.1–7.0
	Other cities	6	1295	0.4	0.1–0.9
Year of study implementation	≥2005	3	634	5.4	3.7–7.4
	<2005	7	1641	1.6	1.0–2.3
Recruitment setting	Prison	6	1176	0.4	0.1–1.0
	Non-prison	4	1099	5.0	3.8–6.5
Pooled		10	2275	2.6	2.0–3.4

IDUs: injecting drug users; CI: confidence interval.

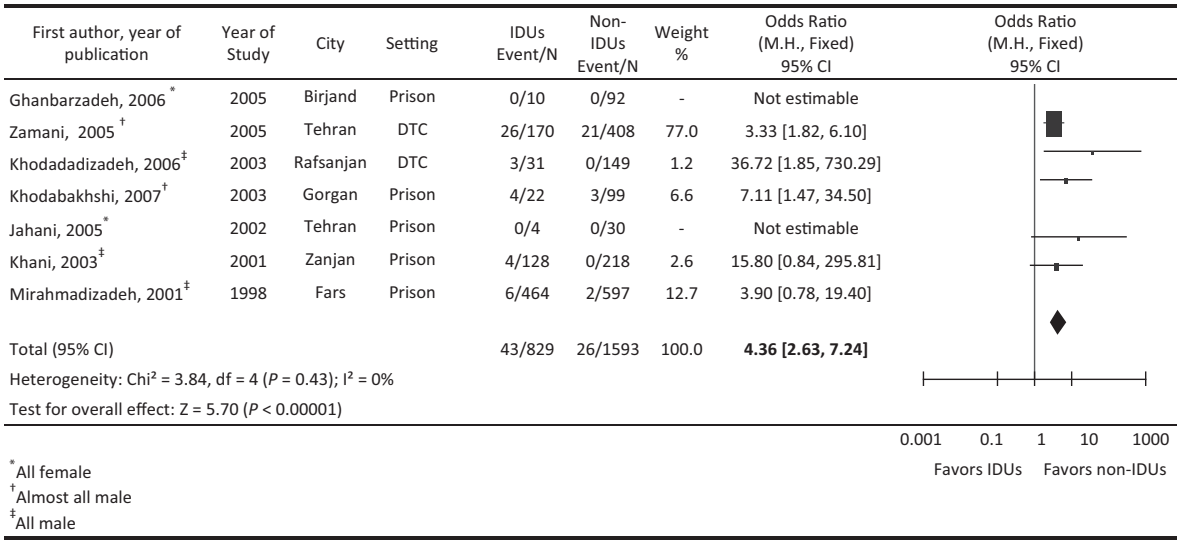

Figure 1 Risk of HIV infection among injecting drug users (IDUs) compared with non-IDUs in Iran; CI: confidence interval; M.H.: Mantel–Haenszel

available for HIV prevalence in men having sex with men in Iran [35]. Therefore, based on the above-mentioned facts, and according to current knowledge, non-IDUs are the second most at-risk group for HIV infection in Iran, and this is the first identified HIV epidemic among non-IDUs in the Middle East.

The review showed that HIV prevalence among IDUs is 4.3 times higher than non-IDUs. Some studies show a higher HIV risk for IDUs compared with non-IDUs. Another systematic review from Iran, which included studies conducted in a similar time-frame, has been published on HIV prevalence among IDUs [36]. The pooled HIV prevalence for the 22 studies included was reported to be 13.4%, which supports our results. In Brazil and China, two systematic reviews revealed that HIV prevalence among IDUs was significantly higher than non-IDUs [33,34]. Also, a study in South Florida (United States) showed that most HIV-positive new IDUs had become infected due to high-risk behaviours before they initiated injection [37].

However, studies from Canada (OPICAN cohort study), Baltimore (United States) and Tijuana (Mexico) have shown either an almost similar HIV prevalence in the two groups or an insignificant difference [38–40]. Strathdee & Stockman [41] have explained three possible mechanisms for high HIV prevalence among non-IDUs: a high degree of mixing or bridging between IDUs and non-IDUs as well as an overlapping of social and sexual networks of the two groups, a high level of unprotected sex among non-IDUs especially stimulant users and sharing of non-injection drug paraphernalia. Overall, the evidence shows that non-IDUs are also at risk of HIV, and in each community the risk depends on the level of unsafe injecting and sexual behaviour among the two groups.

A high degree of mixing of non-IDU groups with IDUs has been reported in Tehran, especially in the marginalized areas [42], which could explain the high rate of HIV infection in non-IDUs. It is also possible that unprotected sex and having IDU sex partners contribute to this feature. However, there have been very limited studies on the sexual behaviour of non-IDUs in Iran. In a study on a male group of non-IDUs, 'never using condom during sex' was associated significantly with HIV-1 infection [27]. In another study, those non-IDUs who had sex with

a non-spouse showed a greater chance of HIV infection [23]. Studies from Iran have shown a correlation between imprisonment and risk behaviours in prisons and HIV infection among IDUs [27,43]. However, the available studies on non-IDUs have not shown such a relationship in the latter group.

In the studies included in this review, the most common drug of use was opium. Opium is usually used by traditional users whose socio-economic situation is more similar to the general population. The most common stimulant substance used in Iran is methamphetamine, which is called 'Shisheh'. Although Shisheh was a common drug of use in Iran during the conducting of this review, it used to be extremely rare and was not detected even in large-scale studies before 2005 [44]. Therefore, the high rate of HIV prevalence in non-IDUs could not be attributed to stimulants and the high-risk behaviour associated with stimulant use. In Iran, one study has assessed the correlation of type of life-time drug used with HIV prevalence among non-IDUs and found no relationship except for hashish [23]. Those who had used hashish had a threefold increase in risk of HIV infection compared to users of other groups of drugs. In many countries, HIV infection is high among amphetamine-using men who have sex with men (MSM). Although high-risk sexual behaviours have also been reported to be common in non-injecting stimulant users who are not MSM [45], there is not enough evidence regarding the correlation of HIV infection with high sexual risk behaviour in this population. However, due to the recent increase in heroin and methamphetamine use among non-IDUs in Iran [5], an increase in HIV infection among non-IDUs is expected to occur in the near future. Therefore, specific studies need to be conducted in order to assess HIV prevalence and correlated factors in non-injecting users of these drugs.

We have analysed HIV prevalence in female drug users separately. Generally, female drug users suffer from lower socio-economic status compared with males, and their drug use is associated highly with poverty, crime and sex work [46,47]. High-risk sexual behaviours are also common in drug-using females [5]. However, there have been limited studies conducted on HIV prevalence in females in Iran. The total sample size of studies included in this systematic review was too small to calculate HIV prevalence in the female non-IDU population. Although the female/male ratio of drug use in Iran is 1/12 : 1/20 [5,44,48], and the included sample shows a similar proportion, female drug users need greater attention because of the high rate of sex work and low level of health and social conditions [49].

Tehran, the capital city of Iran, is located in Tehran province, which is one of the 31 Iranian provinces. The area of Tehran province is less than 1% of the area of the country, while it holds 16.7% of the country's population [50]. This review showed that more than 40% of the total sample had been selected from the city of Tehran. The pooled HIV prevalence is much larger in the studies conducted in Tehran than those of other cities, and there are either insufficient or no data on other parts of the country, especially for recent years. In order to reach a clearer understanding of national estimations, it is necessary to conduct studies in various parts of the country. The typical recruitment settings, such as drug treatment centres, centres providing harm reduction facilities, prisons and places where drug users gather, are distributed all over the country; therefore, conducting such studies are feasible.

Even though subgroup analysis showed that HIV prevalence in prisons is less than in non-prison settings, it should be noted that most prison studies were conducted at an earlier time. Some information from Iran suggests that sexual risk behaviour is not significantly different in groups of drug users recruited from three different settings of prison, community and treatment centres [5]. However, repeated studies on drug users in prisons are needed in order to monitor the situation in this subgroup.

All included studies were conducted in urban areas. The urban population consists of 68.5% of the whole population [50]. Although IDUs are congregated highly in urban areas, traditional use of opioid drugs is also common in rural areas [2]. Conversely, rural drug users might be included in studies carried out in urban settings, subsequent to being treated in drug treatment centres in nearby cities or after being arrested for the purchase of drugs or for other crimes. Therefore, generalizing the results to all non-IDUs of the country should be conducted with caution.

Drug use is considered a crime, and is a covert behaviour. This has resulted in various limitations in conducting research. In addition to the under-reporting of drug use and risk behaviours, many IDUs might deny injecting drug use to downplay the severity of their use. This could result in a misclassification of a group of IDUs in the non-IDU group. Unlike HIV, the risk of sexual transmission of hepatitis C virus (HCV) is rare. Therefore, HCV prevalence helps in understanding of the probability of this misclassification. Four of the included studies in this review had provided information on HCV prevalence among their non-IDU samples, which were between 3.3 and 16.4% [24,28–30]. Given that HCV prevalence in the Iranian general population is less than 1% and the reported rate in IDUs is between 11 and 90% [51], this feature raises the possibility of misclassification of a group of IDUs as non-IDUs.

Despite the high burden of drug use disorders and large number of drug users, the number of studies is generally small [52]. Nevertheless, injecting drug use has

received growing attention by researchers. Another systematic review from Iran on HIV prevalence among IDUs included 22 studies with 3916 IDUs, which is close to twice the number included in this study [36].

In addition, the quality of most studies had important shortcomings. The most common weaknesses were missing data on refusal rate and incomplete explanations of sources and sampling methods. These are very important limitations, and might decrease the sample representativeness. All studies utilized convenience sampling except the most recent one [23], in which the recruitment method was respondent-driven sampling (RDS). To determine the national HIV prevalence in hard-to-reach populations, it is recommended to design methods to ensure country-level representative sampling, such as RDS, even though a hybrid sampling plan using several methods might also be useful [53].

The second national strategic plan for HIV prevention and control (2007–09) included non-IDUs as one of the main target groups. Providing treatment facilities as well as education are the main strategies envisaged for non-IDUs in the plan [54]. Opioid substitution treatment is widely available in the country and is also provided to non-injecting heroin dependents. However, in the last decade great attention has been paid towards providing harm reduction services for IDUs. The results of this review show that HIV prevention programmes for non-IDUs should also receive urgent attention. The large number of non-IDUs in Iran, who are mainly married and live with their families, makes them an important target group for HIV prevention. The transition of non-injecting drug use to injecting drug use raises an essential public health risk for the spread of HIV. Accordingly, measures for preventing transition and promoting safe sex behaviour should be used widely. Several factors, such as the high cost of drug use, heroin impurity, curiosity, experiencing greater pleasure, imprisonment, limited possibility of smoking and self-treating drug dependence by buprenorphine injecting, have been reported as reasons for switching from non-injecting to injecting drug use [42,55]. Strategies can be designed and tested for addressing any of these factors. Overall, there is a need to expand the efforts for inhibiting the increasing trend of HIV prevalence among non-IDUs as well as IDUs.

Declarations of interest

None.

Acknowledgements

This study was supported financially by the Ministry of Health, contract number 132/8545 from the Tehran University of Medical Sciences. We appreciate the kind cooperation of Behnam Sadeghirad, Behnam Farhoudi, Abbas Sedaghat, Seyed Ahmad Seyedalinaghi, Maryam Foroughi, Nahid Ghanbarzadeh, Ali Khodadadizadeh, Saman Zamani, Behnaz Khodabakhshi, and Parastoo Kheirandish for providing us with the necessary information and Mohsen Malekinejad and Siamak Molvi for their valuable comments.

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Supporting information

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Appendix S1 Search strategy for Medline

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