Prevalence of HIV and HCV among injecting drug users in three selected WHO-EMRO countries: a meta-analysis

Shah Jahan Shayan1*, Rajab Nazari1 and Frank Kiwanuka2

Abstract
Background: HIV and Hepatitis C Virus (HCV) infections are responsible for a significant burden of mortality and morbidity, particularly in developing countries. This study sought to determine the prevalence of HIV and Hepatitis C among injecting drug users in Afghanistan, Iran, and Pakistan.

Methods: This review conforms to the Preferred Reporting Guidelines for Systematic Reviews and Meta-Analysis (PRISMA) statement. Databases including PubMed, Scopus, Web of Science/Knowledge, SID.ir, and MAGIRAN were searched. Studies that were published from 2003 up to 2018 were considered for analysis. Studies were screened for inclusion in duplicate, and also, that data were narratively synthesized.

Results: We report on data from 79 articles. The total number of participants in studies that assessed the prevalence of HIV among injecting drug users included 68,926 participants, while those from studies that assessed HCV prevalence were 23,016 participants. Overall HIV and HCV prevalence among injecting drug users in the three selected countries were 9.1% (95% CI 6.9–12.0%) and 48.3% (95% CI 43.9–52.7%), respectively. Iran had the highest HIV prevalence of 11.0% among injectable drug users (95% CI 8.4–14.2%), while Afghanistan had the lowest HIV prevalence of 3.1% (95% CI 1.5–6.3%) among three selected countries. In Pakistan, the prevalence of HIV was 8.6% (95% CI 4.8–15.0%). Regarding HCV prevalence, Pakistan had the highest while Afghanistan had the lowest, 54.4% (95% CI 33.5–73.9%) and 37.3% (95% CI 35.2–39.4%), respectively. HCV prevalence in Iran was 47.7% (95% CI 43.4–52.0%).

Conclusion: Injecting drug users form a special cohort of persons at risk of HIV and Hepatitis C infections. The prevalence of HIV and Hepatitis noted from our findings is significantly high. Awareness of the grave risk of spreading HIV and Hepatitis C associated with sharing needles is recommended among this sub-group of drug users.

Keywords: HIV, Hepatitis C, Injecting drug users, Iran, Afghanistan, Pakistan

Background
HIV and Hepatitis C Virus (HCV) infections are among the most significant public health challenges globally. They bear a significant burden of mortality and morbidity, particularly in developing countries. In 2017, WHO reported that 36.9 million people were living with HIV globally with record of 940,000 deaths [1]. HIV suppresses the immune system, in so doing, it makes the infected person susceptible to infectious diseases that may lead to death [2]. HCV can also invade the central nervous system that leads to severe neurological problems [3]. With regard to HCV, there are 177.5 million infected adults globally and up to 0.5 million deaths every year. Hepatitis due to HCV has the potential to become chronic, consequently leading to cirrhosis of the liver which may cause liver cancer and death [4].
Both HIV and HCV can be spread through body fluids. Certain behaviors like sharing injection equipment can lead to transmission of such pathogens[3, 5].

Estimates have indicated that, in Afghanistan, 5900 people living with HIV, in Iran and Pakistan 60,000 and 150,000 people living with HIV, respectively [1]. The prevalence of HCV in Afghanistan according to a systematic review in 2015 was estimated to be 0.7% among the general population [6]. In Pakistan and Iran, the prevalence of HCV among the general population was 4.8% and 0.3%, respectively [7, 8]. HCV and HIV are heavily associated with injecting drug users (IDUs) and are highly susceptible to transmission of HIV and HCV through sharing sharp materials such as infected needles/syringes[9].

Globally, there are approximately 13 million IDUs; of these, estimates have shown that 1.7 million are infected with HIV[1, 10]. In addition, approximately 10% of HIV infections are transmitted through sharing materials during injectable drug usage. Concerning HCV, the prevalence of HCV among injecting drug users is estimated at 67% globally. Co-infection of HCV and HIV accounts for about 2.2 million people, with more than half of these being among IDUs[1].

Furthermore, Aceijas and colleagues (2007) revealed that about 50% of IDUs were HCV positive in 49 countries. Prevalence of HCV was reported with significant variance from 2% up to 100% [11]. There was no study assessing the extent of HIV and HCV among IDUs in the WHO-EMRO region to the best of our knowledge. Needless to say, this region has profound significance concerning drug production and usage. In fact, Afghanistan is the leading producer of opium in the world [12]. This does not only influence drug usage; it has a fundamental role in distribution chains to other countries, especially those in the neighborhood, particularly Pakistan and Iran.

Moreover, decades of political instability in this region have caused millions of people to migrate to Iran and Pakistan. This said trafficking of drugs goes hand in hand with the movement of people between borders. This can increase the risk of transmission of disease between countries specifically among IDUs relative to other regions of the world.

Prevention efforts among IDUs which focus only on individual behavior modification are likely to result in only a partial decrease in HIV and HCV transmission. To tackle this problem effectively, there is a need for regional interventions at the macro-level. In order to have a collaborative effort toward controlling HIV and HCV among IDUs in an effective manner, baseline data are needed. To serve this goal, we performed a systematic review of studies in these three countries.

Review Question
What is the prevalence of HIV and HCV among IDUs in Afghanistan, Pakistan, and Iran?

Methods
Protocol This review conforms to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement (Moher, 2009). To ensure that there was no similar work to ours, we did a preliminary scoping search in the International prospective registers of systematic reviews (PROSPERO), Cochrane Library, and Google scholar. The search was done on 1/12/2020.

Eligibility criteria Studies that reported the prevalence of HIV and HCV among injecting drug users published in English and Persian languages in peer-review Journals from 2003 up to 2018 in Afghanistan, Pakistan, and Iran were included (see Table 1).

Databases Articles were searched in PubMed, Scopus, Web of Science, Embase, SID.ir, and MAGIRAN.

Search strategy Keywords included “Human Immunodeficiency Virus” “Hepatitis C Virus,” “Substance abuse,” “Injecting Drug User,” “Injecting Drug Abuser,” “Intravenous Drug Abuse” “Drug Misuse,” “Drug Abuse,” “Drug Dependence,” “Afghanistan,” “Pakistan,” and “Iran” from 2003 up to 2018 (Table 2). The reference lists of the selected articles were also hand-searched to find additional relevant studies.

Study selection We created an endnote (version X.7) Library to store and manage the references. Two reviewers independently search for the articles compared to their articles found and always reached consensus on studies to exclude or include based on the inclusion criteria described above.

Data collection process For articles that met the inclusion criteria, information was extracted and recorded in piloted data set in an excel spreadsheet. For included studies, we assessed the study findings’ main outcome, including the prevalence of HIV or HCV. Selected articles were kept for future narrative, and excluded articles were also kept in a separate file for future reference was

| Table 1 | Inclusion criteria applied to selected articles |
| --- | --- |
| **Inclusion criteria** | |
| The study reported on the prevalence of HIV and/or HCV | |
| The sample was injecting drug users | |
| Samples were tested for antibodies to HIV and HCV by enzyme-linked immunosorbent assay | |
| The study that was published in English or Persian | |
| The study that was conducted in either Afghanistan, Pakistan, or Iran | |
| The study was an empirical study published in a peer-review journal | |
| The study was published from 2003 up to 2018 | |
appropriate. The following items were extracted from studies: author, country, year, study design, setting, sample size, and HIV or HCV prevalence.

Risk of bias in individual studies The studies were appraised based on the selection criteria (Table 1) and the Joanna Briggs Institute (JBI) critical appraisal tool for systematic reviews checklist for prevalence studies [13]. This tool is a rating list with nine criteria, which can be answered as yes (coded as 1), no (coded as 0), not applicable (coded as NA), or unclear (coded as ?); thus, the score for each study ranged from 0 to 9. Depending on its score, we rated each study as low risk [7–9], moderate risk [4–6], or high risk of bias [1–3].

Data analysis We used a Random Effects model to estimate the pooled prevalence. The result was displayed in a forest plot and shown high heterogeneity. Our review resulted in 83 peer-review articles from three countries concentrated on HIV and HCV prevalence. Data were reported as the proportion of the infected numbers among total injecting drug users. Prevalence from each article was collected in the form of a table (Table 3, 4, and 5) and then inserted in Comprehensive Meta-Analysis (CMA) version 3. The pooled prevalence of HIV and HCV was calculated with a 95% confidence interval and stratified by country.

Results Characteristics and quality of included studies In this review, 116 studies were screened, and 79 articles were included for data extraction (Fig. 1), 57 studies from Iran, 18 from Pakistan, and four from Afghanistan. The total number of participants in studies that assessed the prevalence of HIV among IDUs included 68,926 participants, while those from studies that assessed the prevalence of HCV were 23,016 participants. The study of Emmanuel (2013) contributed the highest number of participants (n=46,351). Most studies identified were conducted in Iran. The majority of studies in Iran were carried out in non-community settings such as health centers and prisons. Those conducted in Pakistan and Afghanistan were carried out in community settings. All studies used a cross-sectional study design (Table 3 and 4). In Iran, the country-level analysis revealed that 17,261 IDUs were identified for HIV prevalence analysis while 17,894 participants were included in HCV analysis. In Pakistan, 49,547 IDUs were included in HIV studies, while 3004 participants were identified for the HCV prevalence analysis. In Afghanistan, a total of 2118 IDUs were included in both HIV and HCV prevalence analysis. Co-infection was reported in 15 articles with 5252 participants in three countries. Tables 3, 4, and 5 show the prevalence of HIV, HCV, and co-infection from studies identified in the three selected countries. The JBI assessment tool showed that 58 articles were with low risk of bias, 20 with moderate, and 1 with a high risk of bias (Table 3 and 4).

Prevalence of HIV and HCV in Iran, Pakistan, and Afghanistan Overall, HIV and HCV prevalence among IDUs in the three selected countries were 9.1% (95% CI 6.9–12.0%) and 48.3% (95% CI 43.9–52.7%), respectively. In country level analysis, Iran had the highest HIV prevalence among IDUs while Afghanistan had the lowest among three selected countries, 11.0% (95% CI 8.4–14.2%) and 3.1% (95% CI 1.5–6.3%), respectively. In Pakistan, the prevalence of HIV was 8.6% (95% CI 4.8–15.0%).

With respect to HCV prevalence, Pakistan had the highest prevalence while Afghanistan had the lowest, 54.4% (95% CI 33.5–73.9%) and 37.3% (95% CI
| Study                        | Country | Year of Publication | Design                  | Setting                                      | Sample size | HIV Prevalence | JBI Score |
|-----------------------------|---------|---------------------|-------------------------|----------------------------------------------|-------------|----------------|-----------|
| Rahimi-Movaghar et al. [16] | Iran    | 2009                | Cross-sectional         | Treatment center and community                | 899         | 10.7%          | 8         |
| Khajehkazemi et al. [17]    | Iran    | 2013                | Cross-sectional         | Facilities center                            | 2290        | 15.2%          | 7         |
| Javadi et al. [18]          | Iran    | 2013                | Cross-sectional         | Drop in center                               | 539         | 1.1%           | 9         |
| Imani et al. [19]           | Iran    | 2008                | Cross-sectional         | Rehabilitation center                        | 133         | 0.8%           | 7         |
| Zamani et al. [20]          | Iran    | 2006                | Cross-sectional         | Drop in center and community                  | 207         | 23.2%          | 7         |
| Khani et al. [21]           | Iran    | 2003                | Cross-sectional         | Prison                                       | 346         | 1.2%           | 7         |
| Mirahmadzadeh et al. [22]   | Iran    | 2009                | Cross-sectional         | Harm reduction centers                        | 936         | 20.5%          | 9         |
| Davoodian et al. [23]       | Iran    | 2009                | Cross-sectional         | Prison                                       | 249         | 15.1%          | 9         |
| Hosseini et al. [24]        | Iran    | 2010                | Cross-sectional         | Detention center                             | 417         | 24.4%          | 7         |
| Malekinejad et al. [25]     | Iran    | 2015                | Cross-sectional         | Drop in centers and hospital                 | 548         | 26.6%          | 9         |
| Nakhkepooye et al. [26]     | Iran    | 2012                | Cross-sectional         | Hospital                                     | 205         | 18.5%          | 9         |
| Kazerouni et al. [27]       | Iran    | 2009                | Cross-sectional         | Community                                    | 360         | 24.7%          | 7         |
| Sarveqad et al. [50]        | Iran    | 2005                | Cross-sectional         | Hospital                                     | 53          | 5.6%           | 7         |
| Aminzadeh et al. [28]       | Iran    | 2007                | Cross-sectional         | Hospital                                     | 70          | 30%            | 7         |
| Moradi et al. [29]          | Iran    | 2012                | Cross-sectional         | Prison                                       | 118         | 4.2%           | 6         |
| Khorvash et al. [49]        | Iran    | 2009                | Cross-sectional         | Hospital                                     | 92          | 9.7%           | 5         |
| Kheirandish et al. [30]     | Iran    | 2010                | Cross-sectional         | Detention center                             | 459         | 24.4%          | 9         |
| Zamani et al. [31]          | Iran    | 2005                | Cross-sectional         | Treatment center                             | 165         | 15.2%          | 8         |
| Ramezani et al. [32]        | Iran    | 2014                | Cross-sectional         | Clinic                                       | 100         | 19%            | 6         |
| Sofian et al. [33]          | Iran    | 2012                | Cross-sectional         | Detention center                             | 153         | 5.9%           | 6         |
| Rahbar et al. [51]          | Iran    | 2004                | Cross-sectional         | Prison and community                          | 101         | 7%             | 5         |
| Zamani et al. [52]          | Iran    | 2010                | Cross-sectional         | Community                                    | 118         | 0.7%           | 6         |
| Taghizadeh et al. [53]      | Iran    | 2014                | Cross-sectional         | Homeless                                     | 3044        | 3.7%           | 8         |
| Ghasemian et al. [54]       | Iran    | 2011                | Cross-sectional         | Hospital                                     | 88          | 18.2%          | 7         |
| Alavi et al. [55]           | Iran    | 2012                | Cross-sectional         | Prison and Treatment center                  | 109         | 47.7%          | 6         |
| Dibajet et al. [56]         | Iran    | 2013                | Cross-sectional         | Prison                                       | 970         | 6.4%           | 9         |
| Ilami et al. [57]           | Iran    | 2012                | Cross-sectional         | Community                                    | 158         | 9.9%           | 6         |
| Alizadeh et al. [58]        | Iran    | 2005                | Cross-sectional         | Prison                                       | 149         | 0.6%           | 9         |
| Mir-Nasseri et al. [59]     | Iran    | 2011                | Cross-sectional         | Prison and rehabilitation center             | 458         | 15.5%          | 7         |
| Study                          | Country       | Year of Publication | Design          | Setting                        | Sample size | HIV Prevalence | JBI Score |
|-------------------------------|---------------|---------------------|-----------------|--------------------------------|-------------|----------------|-----------|
| Sharif et al. [60]            | Iran          | 2009                | Cross-sectional | Hospital                       | 200         | 1.5%           | 7         |
| Khodadadizadeh et al. [61]    | Iran          | 2006                | Cross-sectional | Drop in Center                 | 31          | 9.7%           | 9         |
| Hashemipour et al. [62]       | Iran          | 2013                | Cross-sectional | Community                      | 1599        | 1.5%           | 7         |
| Sharifi-Mood et al. [63]      | Iran          | 2006                | Cross-sectional | Hospital                       | 31          | 25.8%          | 7         |
| Alipour et al. [36]           | Iran          | 2013                | Cross-sectional | Drop-in-center                 | 226         | 9.4%           | 6         |
| Alavi et al. [46]             | Iran          | 2007                | Cross-sectional | Hospital                       | 154         | 67.53%          | 9         |
| Eskandarieh et al. [68]       | Iran          | 2013                | Cross-sectional | Rehabilitation center          | 402         | 18.8%          | 6         |
| Honarvar et al. [74]          | Iran          | 2013                | Cross-sectional | Counseling center              | 233         | 7.7%           | 7         |
| Aminaghi et al. [80]          | Iran          | 2017                | Cross-sectional | Prison                         | 851         | 8.3%           | 8         |
| Kuo et al. [34]               | Pakistan      | 2006                | Cross-sectional | Harm reduction center          | 351         | 0%             | 8         |
| Emmanuel et al. [35]          | Pakistan      | 2009                | Cross-sectional | Community                      | 400         | 51.3%          | 9         |
| Achakzai et al. [37]          | Pakistan      | 2007                | Cross-sectional | Community                      | 50          | 24%            | 3         |
| Bokhari et al. [64]           | Pakistan      | 2007                | Cross-sectional | Community                      | 799         | 11.9%          | 7         |
| Platt et al. [65]             | Pakistan      | 2008                | Cross-sectional | Community                      | 404         | 2%             | 7         |
| Khanani et al. [66]           | Pakistan      | 2010                | Cross-sectional | Clinic                         | 20          | 10%            | 5         |
| Emmanuel et al. [67]          | Pakistan      | 2013                | Cross-sectional | Community                      | 46351       | 37.8           | 9         |
| Ilyas Jat et al. [69]         | Pakistan      | 2018                | Cross-sectional | Hospital                       | 280         | 3.2%           | 8         |
| Abbasi et al. [70]            | Pakistan      | 2009                | Cross-sectional | Hospital                       | 300         | 0.3%           | 7         |
| Parviz et al. [81]            | Pakistan      | 2006                | Cross-sectional | Community and rehabilitation center | 231        | 0.4%           | 6         |
| Altaf et al. [82]             | Pakistan      | 2007                | Cross-sectional | Harm-reduction program        | 161         | 0.6%           | 8         |
| Akram et al. [83]             | Pakistan      | 2017                | Cross-sectional | Community                      | 200         | 47%            | 7         |
| Ruisenor Escudero et al. [71] | Afghanistan   | 2014                | Cross-sectional | Community                      | 548         | 7.1%           | 7         |
| Nasir et al. [9]              | Afghanistan   | 2010                | Cross-sectional | Community                      | 623         | 1.8%           | 7         |
| Todd et al.[12]               | Afghanistan   | 2011                | Cross-sectional | Community                      | 483         | 2.1%           | 7         |
| Todd et al. [38]              | Afghanistan   | 2007                | Cross-sectional | Clinic                         | 464         | 3%             | 8         |
Table 4  Key characteristics of included studies on HCV

| Study                        | Country  | Year of Publication | Design          | Setting                                    | Sample size | HCV prevalence | JBI Score |
|------------------------------|----------|---------------------|-----------------|--------------------------------------------|-------------|----------------|-----------|
| Rahimi-Movaghar et al. [16] | Iran     | 2009                | Cross-sectional | Treatment center and community             | 899 (F 38) | 34.5%          | 8         |
| Alavi et al. [39]            | Iran     | 2010                | Cross-sectional | Hospital                                   | 333         | 30.9%          | 8         |
| Mir-nasseri et al. [40]      | Iran     | 2011                | Cross-sectional | Prisons and rehabilitation centers         | 518 (F = 54)| 69.5%          | 7         |
| Imani et al. [19]            | Iran     | 2008                | Cross-sectional | Rehabilitation center                      | 133         | 11.3%          | 7         |
| Khani et al. [21]            | Iran     | 2003                | Cross-sectional | Prison                                     | 346         | 47.7%          | 7         |
| Mir-Nasserir et al. [41]     | Iran     | 2005                | Cross-sectional | Prison and drop in center                  | 467         | 66%            | 7         |
| Kaffashian et al. [42]       | Iran     | 2010                | Cross-sectional | Prison                                     | 951         | 42%            | 8         |
| Ataei et al. [43]            | Iran     | 2010                | Cross-sectional | Prison and drop in center                  | 1485        | 43.4%          | 7         |
| Nikhoooy et al. [26]         | Iran     | 2012                | Cross-sectional | Hospital                                   | 154         | 42.2%          | 8         |
| Esmaeili et al. [44]         | Iran     | 2012                | Cross-sectional | Community and drop in center               | 895         | 34.5%          | 7         |
| Nokhodian et al. [46]        | Iran     | 2012                | Cross-sectional | Drop in center                             | 531         | 47.1%          | 7         |
| Sarveqad et al. [50]         | Iran     | 2005                | Cross-sectional | Hospital                                   | 53          | 67.9%          | 7         |
| Aminzadeh et al. [28]        | Iran     | 2007                | Cross-sectional | Hospital                                   | 70          | 36%            | 7         |
| Ilami et al. [57]            | Iran     | 2012                | Cross-sectional | Community                                  | 158         | 42.4%          | 6         |
| Khovashet et al. [49]        | Iran     | 2009                | Cross-sectional | Hospital                                   | 92          | 57.6%          | 5         |
| Mirahmadizadeh et al. [22]   | Iran     | 2009                | Cross-sectional | Harm reduction center                      | 936 (F = 60)| 43.4%          | 9         |
| Davoodian et al. [23]        | Iran     | 2009                | Cross-sectional | Prison                                     | 249         | 64.8%          | 8         |
| Hosseini et al. [24]         | Iran     | 2010                | Cross-sectional | Detention center                           | 417         | 80%            | 7         |
| Kheirandishet et al. [30]    | Iran     | 2009                | Cross-sectional | Rehabilitation center                     | 454         | 80%            | 8         |
| Zamani et al. [20]           | Iran     | 2007                | Cross-sectional | Drop in center                             | 202         | 52%            | 6         |
| Ramezani et al. [32]         | Iran     | 2014                | Cross-sectional | Clinic                                     | 100         | 56%            | 6         |
| Sofian et al. [33]           | Iran     | 2012                | Cross-sectional | Detention center                           | 153         | 59.5%          | 6         |
| Rahbar et al. [51]           | Iran     | 2004                | Cross-sectional | Community and Prison                       | 101         | 59.4%          | 5         |
| Ghasemian et al. [54]        | Iran     | 2011                | Cross-sectional | Hospital                                   | 88 (F = 1)  | 37.5%          | 7         |
| Amiri et al. [72]            | Iran     | 2007                | Cross-sectional | Prisoners                                 | 81          | 88.9%          | 7         |
| Nobari et al. [73]           | Iran     | 2012                | Cross-sectional | Community                                 | 1747 (F = 14)| 34%            | 7         |
| Alizadehet al. [58]          | Iran     | 2005                | Cross-sectional | Prison                                     | 149         | 31.5%          | 9         |
| Alavi et al. [75]            | Iran     | 2009                | Retrospective study | Document                               | 142 (F = 12)| 52.1%          | 6         |
| Study                           | Country     | Year of Publication | Design                    | Setting                        | Sample size | HCV prevalence | JBI Score |
|--------------------------------|-------------|---------------------|---------------------------|-------------------------------|-------------|----------------|-----------|
| Sharif et al. [60]             | Iran        | 2009                | Cross-sectional Hospital  |                               | 200 (F = 23)| 12%            | 6         |
| Khodadadizadeh et al. [61]     | Iran        | 2006                | Cross-sectional          | Drop in Center                 | 31          | 25.8%          | 8         |
| Sharifi-Mood et al. [63]        | Iran        | 2006                | Cross-sectional          | Hospital                       | 31 (F = 1)| 22.7%          | 7         |
| Zamani et al. [52]             | Iran        | 2010                | Cross-sectional          | Community                      | 118 (F = 3)| 59.4%          | 6         |
| Kassaian et al. [76]           | Iran        | 2012                | Cross-sectional          | Prison                         | 1943 (F = 5)| 41.6%          | 9         |
| Sharhani et al. [84]           | Iran        | 2017                | Cross-sectional          | Drop-in-center                 | 606         | 54.8%          | 7         |
| Rezaie et al. [85]             | Iran        | 2016                | Cross-sectional          | Drop-in-center                 | 410         | 42%            | 7         |
| Honarvar et al. [74]           | Iran        | 2013                | Cross-sectional          | Counseling center              | 233         | 40.3%          | 7         |
| Eskandarieh et al. [68]        | Iran        | 2013                | Cross-sectional          | Rehabilitation center         | 402 (F = 16)| 65.9%          | 6         |
| Alipour et al. [36]            | Iran        | 2013                | Cross-sectional          | Drop-in-center                 | 226         | 38.6%          | 5         |
| Alavian et al. [86]            | Iran        | 2013                | Cross-sectional          | Treatment center               | 259 (F = 4)| 50%            | 5         |
| Atei et al. [87]               | Iran        | 2011                | Cross-sectional          | Community                      | 136         | 19.8%          | 5         |
| Keramat et al. [88]            | Iran        | 2011                | Cross-sectional          | Counseling center              | 199         | 63.3%          | 8         |
| Mir-Nasseri et al. [89]        | Iran        | 2008                | Cross-sectional          | Prison and rehabilitation center| 518 (F = 54)| 59.5%          | 8         |
| Moradi et al. [90]             | Iran        | 2018                | Cross-sectional          | Prison                         | 678         | 42.5%          | 9         |
| Rehman et al. [47]             | Pakistan    | 2011                | Cross-sectional          | Community                      | 200         | 24%            | 5         |
| Kuo et al. [34]                | Pakistan    | 2006                | Cross-sectional          | Harm reduction center          | 351         | 88%            | 7         |
| Akhtar et al. [48]             | Pakistan    | 2016                | Cross-sectional          | Community                      | 241         | 36.1%          | 5         |
| Achakzai et al. [37]           | Pakistan    | 2007                | Cross-sectional          | Community                      | 50          | 60%            | 3         |
| Butt et al. [77]               | Pakistan    | 2010                | Cross-sectional          | Prison                         | 76          | 84.2%          | 6         |
| Platt et al. [65]              | Pakistan    | 2008                | Cross-sectional          | Community                      | 404         | 14.9%          | 7         |
| Khanani et al. [56]            | Pakistan    | 2010                | Cross-sectional          | Clinic                         | 20          | 35%            | 5         |
| Illyas Jat et al. [89]         | Pakistan    | 2018                | Cross-sectional          | Hospital                       | 280 (F = 24)| 16.8%          | 7         |
| Rehan et al. [78]              | Pakistan    | 2009                | Cross-sectional          | Community                      | 779         | 89.3%          | 9         |
| Ali et al. [79]                | Pakistan    | 2011                | Cross-sectional          | Clinic                         | 42          | 14.28%         | 5         |
| Abbasi et al. [70]             | Pakistan    | 2009                | Cross-sectional          | Hospital                       | 300         | 44.7%          | 6         |
| Altaf et al. [86]              | Pakistan    | 2007                | Cross-sectional          | Harm-reduction program         | 161         | 94.3%          | 7         |
Table 4 (continued)

| Study            | Country       | Year of Publication | Design           | Setting       | Sample size | HCV prevalence | JBI Score |
|------------------|---------------|---------------------|------------------|---------------|-------------|----------------|-----------|
| Waheed et al. [91]| Pakistan      | 2017                | Cross-sectional  | Community     | 100         | 72% (F = 1)    | 5         |
| Ruisenor Escudero et al. [71]| Afghanistan     | 2014                | Cross-sectional  | Community     | 548         | 40.3%          | 7         |
| Nasir et al. [9]  | Afghanistan    | 2010                | Cross-sectional  | Community     | 623         | 36%            | 7         |
| Todd et al. [12]  | Afghanistan    | 2011                | Cross-sectional  | Community     | 483         | 36.1%          | 7         |
| Todd et al. [38]  | Afghanistan    | 2007                | Cross-sectional  | Clinic         | 464         | 36.6%          | 8         |
35.2–39.4%), respectively. HCV prevalence in Iran was 47.7% (95% CI 43.4–52.0%). Co-infection of HIV and HCV in three selected countries was 7.6% (95% CI 4.4–12.8%).

**Publication bias**

There was no significant publication bias on HCV rate as shown by the result of the Egger test ($P = 0.1$), while there was publication bias on HIV rate ($P = 0.001$).

**Discussion**

We present seminal evidence on the prevalence of HIV and HCV among IDUs in three selected countries in the EMRO-WHO region. These countries are in the neighborhood of each other. The pooled prevalence of HIV and HCV was assessed separately using country-level findings.

HCV prevalence rate was significantly high in the three selected countries; overall prevalence was 48.3% (95% CI 43.9–52.7%). We report an overall average HIV prevalence of 9.1% (95% CI 6.9–12.0%). We acknowledge the fact that most studies have been done mainly in Iran. Indeed, a review of HIV among IDUs in the Middle East and North Africa also indicated that only Iran had a substantial number of studies on this subject [14]. Nonetheless, similar studies have reported a higher prevalence of HIV in Iran 15% [5–25], Pakistan 10.8% (9.6–12.1), and Afghanistan 3.4% (1.7–5.1) [15]. These estimates are similar to the findings of our review.

Another systematic review that sought to estimate the global prevalence of HCV infection among IDUs revealed that HCV prevalence among IDUs in Pakistan ranged from 78 to 93%, while that in Iran ranged from 54.9 to 80.1% [11]. This is inconsistent with our finding primarily due to differences regarding sources of information that were used. This could be attributed to the time difference and grey literature considered in the former review. Those studies were done a decade ago, and also substantial numbers of grey literature and experts’ views were included in the analysis. Noteworthy, in our study, we used only peer-reviewed articles; however, the former reviews considered various sources, including peer-reviewed papers, reports from relevant organizations, books and booklets, slides, press articles, and personal communiqués. These provide a broad scope of findings; however, they are liable to systematic bias associated with such designs.

The large range estimates reflect uncertainty about estimates derived from these studies. Secondly, the time difference between these studies may affect the results.

The variability among countries in terms of the number of studies that reported prevalence of HIV and HCV among IDUs might be due to varied research capacity across the three selected countries and varying investment in research capacity building. This issue may be a basis to initiate collaborations aimed at capacity building. Moreover, it could serve as a turning point and priority for tackling various public health challenges.

### Table 5 Key characteristics of included studies on co-infection of HIV and HCV

| Author               | Country | Year of Publication | Design     | Setting                        | Sample Size | Co-infection of HIV and HCV | JBI Score |
|----------------------|---------|---------------------|------------|--------------------------------|-------------|-----------------------------|-----------|
| Alavi et al. [75]    | Iran    | 2009                | Cross-sectional | Hospital                      | 142         | 8.5%                         | 6         |
| Davoodian et al. [23]| Iran    | 2009                | Cross-sectional | Prison                        | 249         | 14.5%                        | 8         |
| Hosseiniet al. [24]  | Iran    | 2010                | Cross-sectional | Detention center              | 417         | 24%                          | 7         |
| Javadi et al. [18]   | Iran    | 2013                | Cross-sectional | Drop in center                | 539         | 1.1%                         | 9         |
| Rahimi-Mofaghar et al. [16] | Iran | 2010                | Cross-sectional | Treatment center and Community | 895         | 8.7%                         | 8         |
| Ramezani et al. [32] | Iran    | 2014                | Cross-sectional | Clinic                        | 100         | 15%                          | 6         |
| Sofian et al. [33]   | Iran    | 2012                | Cross-sectional | Detention center              | 153         | 5.2%                         | 6         |
| Zamani et al. [20]   | Iran    | 2007                | Cross-sectional | Drop in center and Community   | 202         | 9.4%                         | 7         |
| Alavi et al. [46]    | Iran    | 2007                | Cross-sectional | Hospital                      | 154         | 50%                          | 7         |
| Honarvar et al. [74] | Iran    | 2013                | Cross-sectional | Counseling center            | 233         | 6.4%                         | 7         |
| Achakzai et al. [37] | Pakistan| 2007                | Cross-sectional | Community                    | 50          | 20%                          | 3         |
| Escudero et al. [71] | Afghanistan| 2014               | Cross-sectional | Community                    | 548         | 6.8%                         | 7         |
| Nasir et al. [9]     | Afghanistan| 2011               | Cross-sectional | Community                    | 623         | 1.8%                         | 7         |
| Todd et al. [38]     | Afghanistan| 2007               | Cross-sectional | Clinic                        | 464         | 1.5%                         | 8         |
| Todd et al. yyy(12)  | Afghanistan| 2011               | Cross-sectional | Community                    | 483         | 1.7%                         | 7         |
Regarding the geographical scope of the studies, nearly all of the included articles in our review were from the largest cities of these three selected countries. This is in one way reflective of the availability of resources in these cities and, on the other hand, imbalanced research attention to countrysides. The Iceberg term can be used for this situation due to those geographic areas that are deprived of resources. In order to have a clear picture of the situation, we need studies with larger sample sizes. These should also include different geographical areas.

The available evidence has emphasized that HIV and HCV infections represented a major adverse health consequence among IDUs. This causes a considerable health burden in this region. Our review is the first research of its kind that illustrates HIV and HCV rates among IDUs in the context of three neighboring countries that are highly implicated in drug smuggling and production globally. Comprehensive public health interventions are required to address this problem nationally and internationally.

However, the limitation of the study should be considered in the time of using the findings, in which grey literature was not included in the study. Due to the low capacity of research, especially in Afghanistan, this could influence the result and hide the actual rate of HIV and HCV among IDUs.
Conclusions

Our review revealed that the prevalence of HIV and HCV is significantly high among IDUs in Iran, Afghanistan, and Pakistan. Injecting drug users are at high risk of HIV and HCV transmission and can spread infections to the community due to unhealthy behavior, including syringe change and unsafe sex. Therefore, interventions are required at different levels of prevention for this high-risk group.

Abbreviations

HIV: Human immunodeficiency virus; HCV: Hepatitis C Virus; IDUs: Injecting drug users; WHO-EMRO: World Health Organization-East Mediterranean Regional Office.

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Authors' contributions

SJS & RN contributed to curation and methodology. SJS, RN, and FK contributed to methodology, database search, data extraction, and writing the final manuscript. All authors read and approved the final manuscript.

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Competing interests

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Author details

1 Department of Fundamental of Nursing, School of Nursing, Kabul University of Medical Sciences, Jamal Mina, 3rd District, Kabul, Afghanistan. 2 Department of Nursing Sciences, University of Eastern Finland, Kuopio, Finland.

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