

# Six-month follow-up of Iranian women in methadone treatment: drug use, social functioning, crime, and HIV and HCV seroincidence

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**Background:** In general, information about women who use drugs comes from studies performed in the West. Whether women in countries such as Iran are likely to enter drug treatment or how they will respond is not known.

**Purpose:** To examine the short-term impact of methadone maintenance treatment (MMT) on drug use, dependence, social functioning, crime, and human immunodeficiency virus (HIV) and hepatitis C virus (HCV) risk behavior and seroincidence in female drug users in Iran.

**Methods:** Women were eligible for inclusion in the study if they were assessed as dependent on opiates according to the International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10). The sample comprised 78 female heroin or opium users who attended the Persepolis women's drug treatment clinic in Tehran between 2007 and 2008. Participants were followed up in 2009/2010. Heroin and the use of other drugs, social functioning, involvement in crime, and involvement in HIV and HCV risk behavior were measured by self-report. The prevalence and incidence of HIV and HCV were measured by serology and self-report.

**Findings:** Of the 78 women recruited, 40 were followed up, and this occurred approximately 7 months later. One in four women reported a history of drug injection. At follow-up there were significant reductions in self-reported heroin use on ICD-10 dependence scores. Subjects with more severe drug dependence at baseline were significantly more likely to be criminally active than less severely dependent subjects. Baseline prevalence for HIV and HCV was 5% and 24%, respectively. At follow-up, no one had acquired HIV infection, but one participant had acquired HCV, giving an incidence rate of 7.1 per 100 person-years.

**Conclusion:** This research provides the first evidence that Iranian female drug users can enter MMT and respond well. Within a few months of entering MMT, improvements occurred in heroin use, levels of dependence, social functioning, and HIV risk behavior. While the incidence of blood-borne viral infections was low, there was a serious risk of HIV transmission among this cohort and also to participants' needle and sexual contacts. In a country with high levels of drug use, the high levels of HCV among female drug users require more women to enter drug treatment if an HIV epidemic is to be avoided. Many participants had a chronic drug problem and had had little or no previous exposure to MMT. The introduction or expansion of women-only drug treatment services is urgently needed in order to engage more women in treatment.

**Keywords:** women drug users, Iran, drug treatment clinic, risk behavior

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## Introduction

Opiate dependency is a major public health and social problem. Although women are half as likely as men to develop a drug abuse problem,<sup>1</sup> they have higher rates of morbidity than male users.<sup>2</sup> Female users experience more severe psychiatric, medical, and

employment complications.<sup>3</sup> Powis et al<sup>4</sup> found drug-using sexual partners to be an important influence over women's drug use, with most female injectors having been given their first injection by a male sexual partner.

Women users presenting for treatment have been found to have high levels of psychiatric and medical comorbidity, as well as a history of physical and/or sexual abuse.<sup>5</sup> Women entering treatment have been found to be three times more likely to meet criteria for current major depression than women not in treatment.<sup>6</sup> Women tend to start drug use later but seek treatment sooner than men.<sup>7</sup> The vast majority of research on female drug users has occurred in the developed world. Whether these findings are applicable to women in developing countries is not known.

In Iran an estimated 1.1 million people are dependent on opioids.<sup>8</sup> Iran has introduced many initiatives to reduce human immunodeficiency virus (HIV) among its injecting population,<sup>9,10</sup> but most initiatives have been aimed towards male users, who make up the vast majority of people seeking treatment. In 2002, Iran adopted a policy of harm reduction and included women as a target group, both as users and as partners of male users. However, efforts to target Iranian female users have been unsuccessful. Two studies that aimed to recruit sizeable numbers of female users failed to do so.<sup>11,12</sup> Meanwhile, a study of patients at a general practitioner's surgery found that Iranian women experienced greater stigmatization from being drug users than men and were therefore reluctant to seek treatment.<sup>13</sup> As a consequence, little is known about female drug users in Iran.

Effective health care interventions for drug users need to match the target population's specific risk factors. Women-only drug treatment clinics tend to attract female drug users who would not normally enter drug treatment.<sup>14</sup> With this premise in mind, the Persepolis clinic for female drug users was established in south Tehran in 2007.<sup>15</sup> The aim of this study was to examine the effects of methadone maintenance treatment (MMT) on drug use, dependence, social functioning, crime, and HIV and hepatitis C virus (HCV) risk behavior and seroincidence.

## Methods

### Setting and participants

The setting was the Persepolis Clinic, a non-governmental organization that provided free MMT, sexual health care, a needle and syringe program, primary health care, counseling, employment training, legal aid, and a women's room for women in Tehran. Clinic staff included a director, a coordinator, a doctor, two nurses, a midwife, a social worker,

a psychologist, a lawyer, an accountant, a research coordinator, two research assistants, and several administrative staff. All staff other than the director were female. Methadone was dispensed daily under the supervision of a nurse.

All clients on methadone were eligible for inclusion in the study. Researchers independent of the clinic approached women to participate.

### Measures

Women who presented at the clinic were asked to complete a registration form. After a few weeks, women were invited to be interviewed about their demographic characteristics, lifetime drug use and treatment history, and drug-related health problems during the month before starting MMT at the clinic. The Opiate Treatment Index<sup>16</sup> was used to assess the use of heroin and other drugs and criminal behaviors (injecting and sexual practices), physical health, and social functioning. The authors administered the drug dependence section of the World Health Organization's International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10),<sup>17</sup> specifically asking participants to answer with regard to their use of heroin, kerack (a concentrated form of heroin), opium, or other opioids. MMT data were obtained from clinic intake data and participants' self-reports in interview. Screening for HIV and HCV was performed with rapid enzyme-linked immunosorbent assay on finger-prick blood samples (HIV Rapid test and HCV rapid test kits Acon Laboratories, Inc, San Diego, CA; InTec Products, Inc, Xiamen, China). Participants were recruited at the clinic<sup>18</sup> and were to be followed up at 6 months. Two female researchers were trained to administer the baseline interviews, which had been piloted and modified. Interviews took between 90 and 120 minutes to complete and covered the month before entering treatment, and 1 and 6 months before both interviews.

The Human Research Ethics Committee of the University of New South Wales, Australia (HREC # 07065), and the Research and Ethics Committee at the Iranian National Center for Addiction Studies at the Tehran University of Medical Sciences, Iran, approved the research. Informed consent was obtained from all participants prior to data collection, and participants received US\$5 compensation for their time and inconvenience.

### Data analysis

Descriptive statistics were reported as frequency and mean with standard deviation (SD) and range (R). For proportions data with matched repeated measures (eg, percentage of participants

tolerant to opioids at baseline versus [vs] follow-up) the McNemar-Bowker test for the homogeneity of marginal distributions was used to compare changes in proportions between time periods.<sup>19</sup> If the sample size was small in any cells of the contingency table, an exact binomial test was used in place of the McNemar-Bowker test. Pearson chi-square test was used to compare unmatched proportions, and where sample sizes were too small, Fisher's exact test was used. A repeated measures analysis of variance (ANOVA) was used to assess changes in continuous repeated measures variables over time. The number of items endorsed on the ICD-10 was used to measure severity of dependence.<sup>20</sup> Participants were classified as being either criminally active or not in the month before commencing MMT, according to whether they scored above zero on any of the measures comprising the crime score. ANOVA was then used to compare the ICD-10 dependence scores between people who were and people who were not criminally active. Differences between those lost to follow-up and those who completed the study were analyzed using one-way ANOVA and Pearson chi-square test. All analyses were carried out using SPSS software (v 18; SPSS, Inc, Chicago, IL). The date of seroconversion was taken as the midpoint between the last negative and the first positive antibody tests.

## Results

From August 2007 to October 2008, 78 (80%) of the 97 clients who were eligible were recruited into the study. No information was collected on the number of women who declined to participate, their reasons for declining, or if they differed from the women recruited.

The demographic characteristics of the cohort at baseline appear in Table 1 and elsewhere.<sup>15,18</sup> The mean age of participants was 36 years and their main ethnic background was Persian (65%). About half of the participants were married (55%), but some were widowed (18%), divorced (14%), or separated (9%). Literacy levels were moderate, with three-quarters (78%) being able to read and write, although 15% had received no schooling. In the month before registration, participants were engaged in home duties (53%), unemployed (26%), or working (19%). Over two-thirds of participants (69%) reported a history of opium use and their mean age of initiation was 25 years. Slightly more participants reported a history of heroin use (87%), with initiation occurring at a mean age of 28 years. Most reported that smoking was their dominant route of heroin administration (89%). Participants' initial use of heroin or opium occurred with their partner (44%), a friend (36%), alone (14%), or with another (6%), and participants had, on average, been using drugs for a decade.

**Table 1** Demographic characteristics of the cohort at baseline

| Demographic characteristic                             | Cohort (N = 78)   |
|--|-------------------|
| Mean age [y (SD; R)]                                   | 36 (10.16; 18–61) |
| Ethnic background                                      |                   |
| Persian [% (n)]  | 65.4 (51)         |
| Azeri [% (n)]  | 16.7 (13)         |
| Baloch [% (n)]   | 15.4 (12)         |
| Marriage   |                   |
| First [% (n)]  | 41.0 (32)         |
| Second [% (n)]   | 10.3 (8)          |
| Temporary [% (n)]                                      | 3.8 (3)           |
| Able to read and write [% (n)]                         | 78.2 (61)         |
| Occupation in month before registration                |                   |
| Home duties [% (n)]                                    | 52.6 (41)         |
| Unemployed [% (n)]                                     | 25.6 (20)         |
| Employed [% (n)]                                       | 19.2 (15)         |
| Proportion who have ever used opium [% (n)]            | 69.2 (54)         |
| Mean age at first use of opium [y (SD; R)]             | 25 (8.39; 13–48)  |
| Proportion who have ever used heroin [% (n)]           | 87.2 (68)         |
| Mean age at first use of heroin [y (SD; R)]            | 28 (9.51; 9–56)   |
| Current heroin user at registration [% (n)]            | 48.7 (38)         |
| Smoking as main route of heroin administration [% (n)] | 88.5 (69)         |
| Mean duration of drug problems [y (SD; R)]*            | 10.5 (9.9; 0–40)  |

**Note:** \*Refers to the drug problems measured by the drug dependence questions of the International Statistical Classification of Diseases and Related Health Problems, tenth revision (see Table 3).

**Abbreviations:** R, range; SD, standard deviation; y, years.

Typically, participants first used alcohol, cannabis, and opium, and then heroin and stimulants. Sixty-nine percent (n = 54) and 87% (n = 68) of participants reported a history of opium and heroin use, respectively, with initiation occurring at a mean age of 25 and 28 years (SD: 9.51; R: 9–48 and 9–56 years), respectively (Table 2).

## Follow-up

Of the 78 participants who completed the baseline interview, 40 (51%) were followed up at a mean of 7 months (SD: 1.05; R: 4–9 months) later. Those lost to follow-up did not differ from those followed up on age, age at first heroin use, life-time duration of heroin use, ever having injected, educational achievement, marital status, use of rental accommodation, and employment status.

**Table 2** Drugs ever used by clients (N = 78) and mean age at first use

| Drug       | Ever used [% (n)] | Mean age at first use (years) |
|------------|-------------------|-------------------------------|
| Alcohol    | 12.8 (10)         | 21                            |
| Cannabis   | 12.8 (10)         | 23                            |
| Opium      | 69.2 (54)         | 25                            |
| Heroin     | 87.2 (68)         | 28                            |
| Stimulants | 26.9 (21)         | 32                            |

All participants received MMT during the period of observation. The mean daily dose of methadone was 67 mg (R: 25–160 mg). Participants missed being dosed on an average of 20 days during a 6-month period of treatment. Only 20% of the women reported having ever had any form of treatment for their drug use.

The proportion of subjects who reported using heroin in the month before entering MMT had decreased significantly at follow-up (62.5% vs 12.5%,  $n = 40$ ; McNemar-Bowker test: 16.696; df: 3;  $P = 0.001$ ). Likewise, subjects' reports of stimulant use decreased significantly from baseline to follow-up (5% vs 0%,  $n = 40$ ; exact binomial test,  $P = 0.022$ ). At follow-up, there were significant reductions on every ICD-10 symptom of dependence and the overall dependence score decreased from a mean of 7.3 to a mean of 1.6 ( $F_{1,39} = 199.4$ ;  $P = 0.0001$ ) (see Table 3). At follow-up, participants reported a significant decrease in the number of days per month where they experienced a drug problem, from 15.4 days before MMT (SD: 13.62; R: 0–30;  $n = 40$ ) to

0.4 days per month at follow-up (SD: 1.38, R: 0–7,  $n = 40$ ;  $F_{1,39} = 32.6$ ,  $P = 0.0001$ ). Participants rated the severity of these drug-related problems at a mean of 3.56 out of 4 (SD: 0.95; R: 0–4;  $n = 40$ ) before MMT, which decreased to 0.65 out of 4 at follow-up (SD: 1.41; R: 0–4;  $n = 40$ ), and this change in severity of drug problem was significant ( $F_{1,39} = 219.2$ ;  $P < 0.0001$ ).

## Social functioning

Scores below 30 on the twelve-item SF-12 Health Survey indicate severe psychological distress.<sup>14</sup> Participants' overall social functioning scores had improved significantly at follow-up (pre-MMT mean SF-12 score: 22.19, SD: 6.7,  $N = 40$ ; pre-follow-up mean SF-12 score: 24.98, SD: 5.49,  $n = 40$ ;  $F_{1,39} = 9.43$ ,  $P = 0.004$ ). More severely dependent clients benefited the most from treatment, with greater increases in social functioning scores relative to less-dependent users ( $F_{1,25} = 4.37$ ;  $P = 0.04$ ;  $n = 26$ ). The most severely dependent women also showed greater decreases in ICD-10 dependence scores over the 6-month follow-up period than less dependent users ( $F_{1,39} = 22.6$ ;  $P = 0.0001$ ;  $N = 40$ ).

When the participants were asked about the frequency with which they visited friends, there was a significant increase, from 44% to 67% in regular contact, from baseline to follow-up (McNemar-Bowker: 20.8; df: 10;  $P = 0.02$ ;  $n = 39$ ). Participants' level of satisfaction with support received from friends improved, with more subjects reporting being "satisfied" or "very satisfied" with support from friends at follow-up (61%,  $n = 26$ ) than at baseline (38%,  $n = 26$ ). There was no significant improvement in participants' depression scores or in their general health scores.

## Criminal activity

Subjects with more severe drug dependence prior to commencing MMT (scoring above 5 on the ICD-10) were significantly more likely to be criminally active at baseline interview ( $P = 0.05$ , Fisher's exact test) than less severely dependent subjects (scoring less than 5 on the ICD-10). There was no significant difference in the average crime score for subjects between interviews (baseline crime score mean = 1.16, SD: 2.17,  $n = 43$ ; follow-up crime score mean = 0.57, SD: 1.16,  $n = 23$ ;  $F_{1,22} = 1.42$ ,  $P = 0.25$ ).

## HIV and HCV risk behavior

Approximately one in four women (24%) reported a history of drug injection and had their first injection at a mean age of 27.3 years (SD: 7.46; R: 14–38). On average, subjects had been injecting for 1.6 years (SD: 0.81; R: 0.5–3 years).

**Table 3** Measurements on the dependence scale of the International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10), at baseline ( $n = 40$ ) and follow-up ( $n = 40$ )

| Measurement  | Baseline<br>MMT [% (n)] | Follow-up<br>[% (n)] | P-value |
|--|-------------------------|----------------------|---------|
| Compulsion to use opioids ("craving")                              | 85.0 (34)               | 27.5 (11)            | <0.0001 |
| Difficulty controlling use of opioids                              | 87.5 (35)               | 20.0 (8)             | <0.0001 |
| Withdrawal symptoms  | 82.5 (33)               | 15.0 (6)             | <0.0001 |
| Using opioids to relieve withdrawal symptoms                       | 90.0 (36)               | 12.5 (5)             | <0.0001 |
| Tolerance  | 70.0 (28)               | 5.0 (2)              | <0.0001 |
| Not varying pattern of use of opioids                              | 52.5 (21)               | 7.5 (3)              | <0.0001 |
| Neglect other pleasures or interests in favor of using opioids     | 87.5 (35)               | 25.0 (10)            | <0.0001 |
| Experience psychological or physical harm because of opioid use    | 85.0 (34)               | 25.0 (10)            | <0.0001 |
| Persistent use of opioids despite evidence of harmful consequences | 90.0 (36)               | 22.5 (9)             | <0.0001 |
| <b>Score</b>   |                         |                      |         |
| Total (mean)*  | 7.3                     | 1.6                  | <0.0001 |
| SD   | 2.59                    | 2.76                 |         |
| R  | 0–9                     | 0–9                  |         |

**Notes:** \*Total ICD-10 score is calculated as the sum total of the number of items endorsed out of the nine items listed; a score of 3 or higher indicates a diagnosis of drug dependence.

**Abbreviations:** MMT, methadone maintenance treatment; R, range; SD, standard deviation.



One participant reported injecting two or three times a day in the month prior to registration without sharing syringes. No participants reported having shared a needle in the 1-month period before baseline and follow-up. Almost one-third (31%,  $n = 24$ ) of participants had a tattoo but few reported sharing the tattoo needle (3%). One-fifth (21%,  $n = 16$ ) of participants had piercings and one reported using a shared needle.

Just over half of the participants (58%,  $n = 45$ ) reported being sexually active in the month prior to baseline, with most (41%,  $n = 32$ ) reporting one sexual partner only and 2% reporting two partners. For those 40 women from whom we were able to collect follow-up data, participants' reports of sexual risk behavior improved in four areas (see Table 4). In the month prior to baseline, some participants reported having had unprotected sex with a stranger (10%,  $n = 40$ ), in exchange for drugs (10%,  $n = 40$ ) and for money (15%,  $n = 40$ ), but no one reported these behaviors at follow-up. Reports of condom use with regular partners had doubled at follow-up, from 20% to 43% ( $n = 17$ ).

## HIV and HCV seroprevalence and incidence

Results for serology and self-report are presented in Table 5. If participants declined to provide a blood sample, their self-reported result was added to give a combined result. At baseline, three participants reported being HIV positive but declined to provide a blood sample. Results from self-reports and serology were combined to give a prevalence of 5% for HIV and 24% for HCV (see Table 5). At follow-up, no participants had acquired HIV infection, but one had acquired HCV infection, giving an incidence rate of 7.1 per 100 person-years.

## Discussion

This 6-month follow-up study of Iranian female drug users in MMT found improved outcomes in a number of areas.

**Table 4** Improvements in sexual behavior\* over time, from baseline ( $n = 40$ ) to follow-up ( $n = 40$ )

| Behavior                                 | Baseline [% (n)] | Follow-up [% (n)] | $\chi^2$ (df); P-value |
|--|------------------|-------------------|------------------------|
| Unsafe sex with a stranger               | 10.0 (4)         | 0 (0)             | 4.2 (1); <0.05         |
| Unsafe sex for drugs                     | 10.0 (4)         | 0 (0)             | 4.2 (1); <0.05         |
| Unsafe sex for money                     | 15.0 (6)         | 0 (0)             | 6.4 (1); <0.02         |
| Always use a condom with regular partner | 20.0 (8)         | 42.5 (17)         | 4.7 (1); <0.05         |

**Note:** \*Sexual behavior measured using the Opiate Treatment Index quantifying sexual behavior during (a) the month before baseline and (b) the month before follow-up interview.

**Abbreviations:**  $\chi^2$ , chi-square; df, degrees of freedom.

**Table 5** Human immunodeficiency virus (HIV) and hepatitis C virus (HCV) self-report and seroprevalence

| Method      | HIV [% (n)] | HCV [% (n)] |
|-------------|-------------|-------------|
| Self-report | 5 (46)      | 6 (44)      |
| Serology*   | 0 (34)      | 30 (33)     |
| Combined    | 5 (51)      | 24 (50)     |

**Note:** \*Serology measured using rapid enzyme-linked immunosorbent assay (Acon Laboratories, Inc, San Diego, CA; InTec Products, Inc, Xiamen, China) on finger-prick blood samples.

MMT had decreased their use of heroin and, more important, there were significant improvements in participants' dependence diagnoses. Improvements were also seen in social functioning and HIV risk behavior, with no and low transmission of HIV and HCV infection, respectively.

It is important that the dose of methadone is appropriate for the patient.<sup>21</sup> In comparison with other studies of women in drug treatment, subjects of the present study were much older but had less exposure to drug treatment.<sup>2</sup> This might have been because of the fact that Iranian women suffer from stigmatization as drug users and therefore delay entry to treatment,<sup>13</sup> or it might have been because Iranian treatment services were insufficiently tailored to women's needs. Clients at drug services in Iran are overwhelmingly male, which may explain the lack of prioritizing for women drug users.

The women with HCV infection might have acquired it from syringe sharing<sup>22</sup> or from sharing tattoo needles.<sup>23</sup> Either way, with one-third of participants positive for HCV, it is not known whether an epidemic can be avoided. Conversely, few women had HIV infection, and with expanded drug treatment an epidemic can be averted. There have been calls for gender-specific drug treatment services because of the greater severity of drug and employment problems of heroin-using women than men.<sup>24</sup>

According to estimates there are 1 million people dependent on opiates in Iran, but it is unclear what proportion of this figure are women. Regardless, the number of female opiate users is likely to be considerable. In addition to offering methadone, the Persepolis clinic provided primary and sexual health care, access to psychological and legal services, and a harm reduction service in a nonjudgmental setting.<sup>15</sup> These ancillary services were well patronized by clients.

Most of the participants in this study had not received any help for their drug use before coming to the clinic and this might in part have been because of the discrimination faced by women drug users.<sup>13</sup> Two studies that attempted to recruit Iranian females managed to enroll just seven between them.<sup>11,12</sup> Therefore, ideally more women-only drug services

should be established; at the very least, existing drug services should allocate specific times daily for female clients only, to facilitate their entry into treatment. Whether the authors can generalize from the study group to the population of female drug users in Iran is not known, as information on this population is severely lacking. More research is required on female drug users in and out of drug treatment in Iran, and over longer study periods, as benefits such as reduced rates of mortality<sup>25</sup> and incarceration<sup>26</sup> are found to occur after several years of methadone treatment.

The study's reliance on self-report data for drug use and HIV and HCV results was a limitation, as was the low follow-up rate. Given the sensitivities surrounding sex work in Muslim countries, this line of questioning in the study was limited to protect the safety and privacy of the subjects. Many of the women had been in treatment for a period of from several months to a year when interviewed. Because of this, it is possible that the interviews did not adequately capture improvements in scores for crime, depression, or general health.

## Conclusion

This study is important, as it reveals a group of drug users who initially were not engaged in treatment but who improved on a range of measures once engaged. The implications of these improvements are important for the subjects and for society in general. More important were the significant improvements in the subjects' dependence diagnoses. Improvements were also seen in social functioning and in HIV risk behavior, with no and low transmission of HIV and HCV infection, respectively.

Women-only drug treatment services in Iran and other countries in the region are likely to facilitate women's engagement in drug treatment and should be introduced or expanded urgently. For the most part, the women were chronic drug users with a multitude of problems. These women require intensive help if they are to recover from the harms associated with years of drug use.

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## Disclosure

The authors report no conflicts of interest in this work.

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