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The effectiveness of peer education interventions on HIV- and HBV-preventive behaviours in women with substance-related disorders: a cluster randomised control trial

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Abstract

Introduction: Substance-related disorders (SRDs) have become a problematic phenomenon in many countries, including Iran. Risky sexual behaviours are highly prevalent among people with SRDs. This study aimed to evaluate the effectiveness of a peer education program on preventive behaviours related to human immunodeficiency virus (HIV) and hepatitis B virus (HBV) in women with SRDs.

Material and methods: One hundred eligible female drug abusers from 10 drop-in centres located in Tehran were entered into the study using convenience sampling. The intervention included six training sessions. Sessions were held in small groups and conducted by peer educators. The primary topics discussed were problem-solving skills, and HIV/HBV disease-related information including testing, transmission, and prevention. All participants completed demographic and sexual function questionnaires prior to, one-, and three-months post-intervention.

Results: The results showed a significant decrease in the percentage of drug (96.00%, 75.55%, 73.52%, $p = 0.001$) and alcohol use (32.00%, 13.33%, 2.90%, $p = 0.000$) prior to sexual intercourse in the intervention group. Additionally, the number of sex acts under the influence of drugs and alcohol decreased significantly ($p < 0.001$). The number of sexual partners ($p < 0.000$) significantly declined, but total drug use indicated no change. We found increases in the percentage of women who reported having had a recent HIV test ($p < 0.001$) and in condom use ($p < 0.001$), but the control group showed no significant difference.

Conclusions: Based on current results, peer education programs can have a positive effect on high-risk sexual behaviours related to HIV and HBV in women with substance-related disorders. The potential influence of peers in health interventions should be given greater consideration.

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Key words: condom use, educational programmes, knowledge, high school students, prevention.

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Introduction

Substance-related disorders (SRDs) have become one of the most serious social and health system issues in recent years [1]. There is no reliable estimation of substance-related disorders in Iran, but according to the last prevalence study, the number of drug users was estimated at 1,325,000, which accounted for 2.65% of the population over 15 years old. According to the Ministry of Health of Iran, the ratio of women to men with SRDs is one to eight [2]. Currently, Iranian studies indicate that in Iran 9.6% of the drug-dependent people are women, representing an increased tendency to substance abuse in Iran [3].

Substance abuse plays a major role in human immunodeficiency virus (HIV) infection transmission; approximately 29% of HIV-infected women contracted the virus through injecting drugs, and another 15% contracted it through sexual contact with an HIV-infected drug user. In 2017, an estimated 47% of new infections occurred among key populations and their partners [4, 5]. Despite significant advances in the prevention of HIV/acquired immunodeficiency syndrome (AIDS) and hepatitis, injection drug use continues to contribute to new infections, both directly through the sharing of injection equipment, and indirectly through sexual transmission from injection drug use (IDU) to non-IDU sex partners [6-9]. The exchange of sex for drugs or money, another risk factor for HIV infection, is common among those who abuse drugs [5]. Risky sexual behaviours (RSBs) are highly prevalent among people with SRDs because being under the influence of a substance can disrupt the judgment of the individual, resulting in involvement in risky behaviours, particularly RSBs [10-12], and it often leads to adverse health outcomes [13] such as reduced or no condom use, an increased number of sexual partners – particularly when combined with illicit drugs and alcohol use – and sex with high-risk sexual partners, as well as exchanging sex for drugs or money, resulting in an increased risk of HIV and hepatitis B virus (HBV) infection [5, 10, 12-14].

Health systems have a history of using peers to achieve the aims of preventing the onset of disease, thereby reducing the severity or duration, or adverse consequences associated with disease [15]. The peer group function is defined as the facilitation of behavioural change through the provisioning of information, training, and/or peer-to-peer support services [16]. Peers are familiar with the risks and concerns of local people and can help those who do not have healthcare facilities to establish such services. Peer group programs aim to empower both the instructor group and target group by enhancing solidarity and collective activity [17]. These programs mainly focus on information pertaining to reducing damage, prevention, and early intervention [18]. Furthermore, as an essential component, these programs have also been defined as preventing HIV by using peers as educational resources, changing practice, and delivering care [19, 20]. Although peer education has been implemented successfully among drug-abusing populations in a variety of settings, this approach was usually utilised among individuals already seeking treatment or other services, rather than among street-based drug users who have not initiated service contact, as represented by our sample [21].

Women are more vulnerable to being exposed to HIV and HBV infection [22]; the reasons for this include being biologically susceptible, working as sex workers, and being victims of rape. Additionally, women may not be able to ask or convince their partner to wear a condom [23, 24]. This is particularly the case for women with substance-use disorders [25]. Failure to identify infected individuals, particularly those engaging in risky sexual behaviour, can lead to the spread of disease in society and irrevocable complications. According to the World Health Organisation, women with SRDs should be a special target in the prevention and treatment programs, because they use health services much less than men with SRDs [26]. In the present study, we explore the effect of peer education on the risk behaviours of women with SRDs.

Material and methods

This cluster randomised controlled study was conducted in 10 drop-in centres in Tehran, the capital of Iran, between March and October 2017. The centres were randomly assigned into two groups by random allocation: control and intervention, by a research assistant who had no knowledge of the centres. The research assistant also performed the sample size calculation. In Tehran, there are approximately 25 centres in which there is a possibility of research, but we only obtained permission for 10 of them, so allocation was conducted in the centres via cluster randomisation into five intervention and five control groups. This method was chosen because drug-using women were in close relationship with one another, and there was the possibility of information contamination. The target population was entered into the study using convenience sampling. All eligible women in both centres (control and intervention), who had the inclusion criteria and consent to enrol in research, were asked to participate in the study. Inclusion criteria were: being female; 18 years of age or older; being conscious to respond to conversations at the time of participating in the class, and able to completing the questionnaire; having the ability to read and write in Persian; being sexually active; and having an absence of HIV and HBV (based on self-report or recorded in their personal care notes). Exclusion criteria were: reporting a positive diagnosis of current HIV and HBV and being absent from the class for more than one session. Signed consent was obtained for all participants included site managers, individual participants, and peer educators.

Peer educator training [27]

The goals of the peer educator training (PET) program were: (1) to increase knowledge of HIV and HBV; (2) to develop presentation skills; and (3) to implement the intervention. At first, two volunteer persons who had quit using drugs were selected from each intervention centre as peer educators. The eligibility criteria were being female, aged 18 to 40 years,

having a history of using drugs, having reading and writing skills in Persian, and being sexually active. Candidates had to demonstrate the basic social and presentation skills necessary to become a peer educator. Also, they were made familiar with the assessment skills, the concept of peer education, and educational needs. They received a training course totalling 30 hours, which was conducted by the first author. The course material included information about interpersonal skills, counselling skills, interviewing techniques, HIV and HBV definitions, HIV and HBV transmission methods, sexually transmitted infections, HIV and HBV prevention techniques, and discourse skills for negotiating with a sexual partner. Group activities included games, role-playing, storytelling, and condom demonstrations.

Peer education [18]

Peer education (PE) delivered to the intervention group consisted of six sessions, each of which lasted approximately one hour. The time was dependent on the proposed subjects and the type of provided services within each session. Sessions were held in group form, and in each session the peer educator trained between eight and 10 women with a substance-use disorder, who had been referred to one of the centres [28]. The control group received 'usual care', which included access to all of the basic services (e.g. food, hygiene), case management, and programs that were available at the drop-in centre at the time of the study. We maintained contact with participants in the control group by giving them some gifts and filling the questionnaire before, and one and three months after intervention. The peer educators followed a structured education plan with supervision from the corresponding author. In the first session, researchers explained the method and purpose of the study to all eligible women who wished to participate, collected written consent, and completed the questionnaire within 30 minutes. After a short break, the peer educator provided information regarding genital anatomy and physiology. The second session: at the beginning of the session, the previous session was reviewed in 15 minutes, then the transmission and prevention methods of HIV and HBV were explained. The third session: topics included the identification of high-risk situations and safe-sex behaviours; the use of a male and a female condom on penis and vaginal models were shown to participants, and they were given the opportunity to practice these once. The fourth session: this session included discourse, negotiation, and problem-solving skills. This session was designed to increase participants' self-efficacy perceptions. The fifth and sixth sessions: these included questions and answers about the topics of the previous sessions at the start of the session, role-playing, telling stories, and effecting scenarios.

Participants received a personalised feedback form at the start of each session, which was populated with their responses to certain baseline survey questions, relevant to that session's content. This personalised feedback was intended to: (1) strengthen engagement in the program by increasing its personal relevance; (2) help youths assess their current situation and identify potential changes they can make to be safer in the future if they were interested in doing so; (3) maximise the time devoted to curriculum delivery by collecting important information for group discussions ahead of time; and (4) provide participants with additional information, such as online resources and skills training tips for making healthier choices. One and three months after the sessions, the questionnaire was distributed among participants, and their performance in the prevention of HIV and HBV was assessed.

At the end of each session, the participants were given the opportunity to ask questions and discuss the given information as a group or individually. The techniques applied in the sessions were slide shows, lectures, question-and-answer sessions, brainstorming, role-playing, and training videos. A pamphlet consisting of six pages of summary information about HIV and HBV was given to participants after the intervention so they could review the session material.

Measures

The data-gathering tool consisted of three parts: a demographic characteristics questionnaire, history of substance use, and sexual behaviours; it was created by Jamshidimanesh [29], who reported its reliability and validity ($\alpha = 0.87$). The demographic section comprised 12 items (age, education, marital status, number of casual partners, having permanent partners, marriage age, previous residence, number of children, place of accommodation, occupation, knowing someone who is HIV positive, and their relationship with someone who is HIV positive). The questions in the second part (13-24) related to substance use information including drug type, drug history, drug use interval, years of drug use, alcohol use, injection history, and partner's drug history. In the third part (25-59) information about sexual behaviours and performance was assessed. The questions in the third part included: age at first sexual intercourse, having anal intercourse, having oral intercourse, having vaginal intercourse, number of sexual partners, drug use before sexual intercourse, alcohol use before sexual intercourse, condom use, and status of HIV and HBV tests (Figure 1).

Statistical analysis

SPSS (version 24) was used to analyse the data. The differences between the demographics of the intervention and control groups were assessed using chi-square tests because this was categorical data. Independent *t*-tests and paired *t*-tests were used to compare the differences between the baseline and end-of-follow-up scores within the groups and between each group. A repeated measures ANOVA was used to compare the pre- and post-intervention scores within and between groups.

Ethical consideration

Ethical approval and permission were given by Iran University of Medical Sciences, Tehran, Iran, and the State Wel-

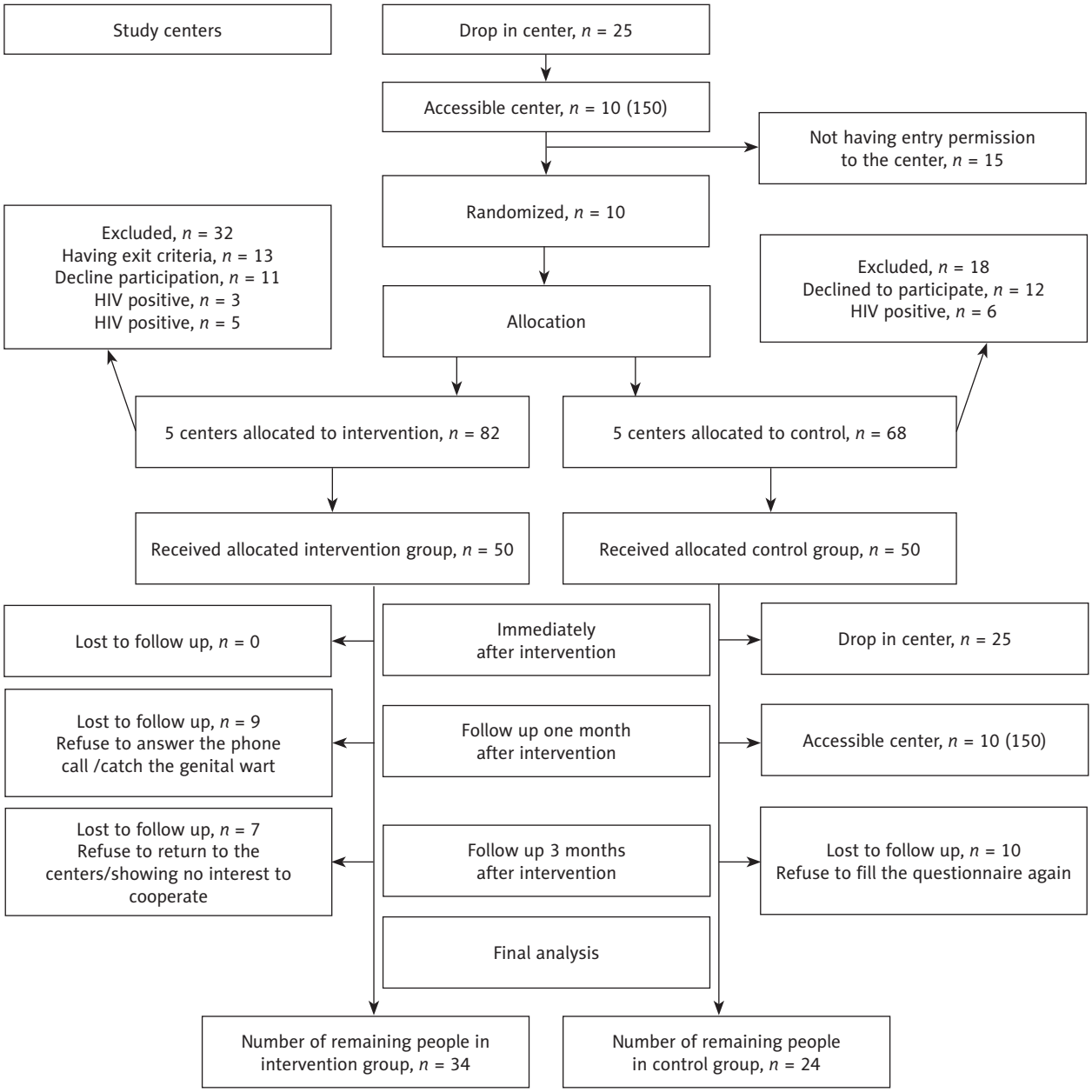

Figure 1. Flowchart of the participant's progress through the phases of trial

fare Organisation of Iran (IR.IUMS.REC.1395.9311373001). The trial was also registered in the Iranian trial registry system (IRCT201612113034N17). All participants signed an informed consent form and were assured that their information would remain confidential.

Results

General characteristics of the participants

One hundred women with SRDs were enrolled in this randomised-controlled trial. The number of participants at one-month follow-up were 45 and 39 in the intervention and control groups, respectively. At the three-month follow-up, 34 women in the intervention group and 24 in the control group completed the study questionnaires (Figure 1).

The mean age of the participants involved in the study was 28.57 ± 6.56 years. The majority had some formal education and were single and unemployed. The participants' mean age at first sexual intercourse was 16.39 ± 3.077 years. The most common sexual activity in both intervention and control groups was vaginal intercourse. The results showed that more than half of the participants in both the inter-

vention and control group had three or more sexual partners. Findings indicate that more than half of the participants had sexual partners with a prison history. Only 20.8% of the intervention group and 20% of the control group used the condom during sexual intercourse. Most of the study participants reported the main reason for not using a condom to be their own and their partner's unwillingness to do so. The primary characteristics were similar in both groups (Table 1).

In this study, methamphetamine was the most used substance in both the intervention and control groups. Eight per cent of intervention group participants and 12% in the control group had a history of injection. The women in both the intervention (46%) and control (48%) groups always used substances prior to sexual activity, and 32% of the intervention group, as well as 34% of the control group, sometimes used substances prior to sexual activity. Alcohol use prior to sexual activity in the intervention group was 32%, and 38% in the control group. Moreover, the independent t-test showed that these two groups rated similarly in terms of daily use and consumption years ($p > 0.05$). Prior to the intervention, the two groups were similar in terms of measured variables and showed no significant statistical difference ($p > 0.05$).

The effect of peer education program on sexual risk behaviour, and HIV and HBV prevention

The percentage of drug (96%, 75.55%, 73.52%, $p = 0.001$) and alcohol use (32%, 13.33%, 2.9%, $p = 0.000$) before sexual intercourse declined significantly in the intervention arm, but in the control arm there was no significant difference (98%, 94.87%, 100%, $p = 0.368$) (Table 2). Also, the number of sex acts performed under the influence of drugs and alcohol decrease significantly in the intervention group ($p = 0.000$) while it was unchanged in the control group. The mean number of sexual partners before the intervention was 3.866 ± 2.767 and 3.35 ± 2.443 in the intervention and control group, respectively. The intervention was effective in reducing the number of sexual partners at one- and three-month follow-ups in the intervention group ($p = 0.000$). The mean number of sexual partners in the control group showed a slight reduction that was not significant. The intervention group showed a significant increase in condom use in the last and last 10 sexual intercourses ($p = 0.000$). In the control group, no significant difference was seen in the follow-ups. The prevalence of HIV and HBV testing was (40%, 64.2%, 45.8%, $p = 1.000$) and (38%, 60%, 82.8%, $p = 0.000$) in the control and intervention groups, respectively. HIV and HBV testing improved significantly in the intervention arm. In the control group at one-month follow-up the testing rate was improved. The HIV and HBV testing rates were slightly higher in the intervention group (Table 3).

Table 1. General characteristics of the intervention and control groups ($N = 100$)

Variable	Intervention $n = 50$ (%)	Control $n = 50$ (%)	Statistical analysis p value
Age group (in years)			
Less than 20	6 (12)	3 (6)	$p = 0.643$ *
20-29	22 (44)	22 (44)	
30-39	20 (40)	24 (48)	
More than 40	2 (4)	1 (2)	
Education			
Primary	3 (6)	4 (8)	$p = 0.925$*
Middle school	18 (36)	16 (32)	
High school	24 (48)	26 (52)	
Academic	5 (10)	4 (8)	
Job			
Unemployed	39 (78)	35 (70)	$p = 0.756$*
Employee	4 (8)	4 (8)	
Manual worker	4 (8)	5 (10)	
Free job	3 (6)	6 (12)	
Marital status			
Married	17 (34)	18 (36)	$p = 0.692$ $X^2 = 1.452$** df = 3
Single	14 (28)	17 (34)	
Widow	3 (6)	1 (2)	
Divorced	16 (32)	14 (28)	
Age at first sex			
Less than 15	19 (38)	21 (42)	$p = 0.569$*
16-25	29 (58)	29 (58)	
More than 26	2 (4)	0 (0)	
Sexual partner			
Yes	47 (94)	46 (92)	$p = 1$*
No	3 (6)	4 (8)	
Sexual type			
Vaginal	42 (84)	45 (90)	$p = 0/372$
Anal	41 (82)	27 (54)	$p = 0.003$
Oral	41 (82)	36 (72)	$p = 0.235$
Vaginal, anal, oral	29 (58)	22 (44)	$p = 0.161$
Multiple partner			
1 partner	10 (20)	9 (18)	$p = 0.824$ $X^2 = 0.387$ df = 2
2 partners	12 (24)	10 (20)	
3 or more	28 (56)	31 (62)	
Condom use			
Yes	5 (10)	8 (16)	$p = 0.611$ $X^2 = 0.986$ df = 2
No	34 (68)	30 (60)	
Sometimes	11 (22)	12 (24)	

Table 1. Cont.

Variable	Intervention *n* = 50 (%)	Control *n* = 50 (%)	Statistical analysis *p* value
Drug use before sex			
Yes	23 (46)	9 (18)	*p* = 0.882 X^2 = 0.252 df = 2
No	11 (22)	24 (48)	
Sometimes	16 (32)	17 (34)	
Alcohol use before sex			
Yes	16 (32)	19 (38)	*p* = 0.52 X^2 = 0.396 df = 1
No	34 (68)	31 (62)	
Drug type			
Give up less than 3 months	9 (18)	8 (16)	*p* = 0.829 X^2 = 2.144 df = 5
Crystal	14 (28)	10 (20)	
Heroin	4 (8)	7 (14)	
Opium	3 (6)	5 (10)	
Crystal and heroin	9 (18)	10 (20)	
Multi drug	11 (22)	10 (20)	

**Fisher's exact test*
***Chi-square test*

Discussion

The findings from this study show that young women with SRDs are at high-risk of getting and transmitting HIV and HBV, as demonstrated by their reported sexual risk behaviours. The results showed that the peer's intervention led to the reduction of high-risk sexual behaviours in women with SRDs. Condom use, as an outcome in the last sexual intercourse, especially with sex partner who has a prison history, and frequency of condom use in 10 sexual intercourse episodes showed a significant increase one and three months after the intervention. While the control group did not show significant change (Tables 2 and 3). These results show that peer education has been effective in condom use. Developing condom use is mainly because one of the most important interventions in HIV, HBV, and STD prevention is increasing condom use [30-33]. In spite of all attempt of health programs to extend protected sexual intercourse among high-risk individuals, many studies show that the majority of women with SRDs do not use condoms [34, 35]. Accordingly, the positive impact of PE, as a serious program in drop-in centres, camps, and dormitories, could be used to enhance condom use in women with SRDs. Besides that, education of men should be taken into consideration because most women remarked that the reason for not using a condom is because of their partner's unwillingness; hence, male education might be accompanied by more effective and sustainable results. The aim of the intervention by Xiushi Yang and Guomei Xia was to reduce HIV high-risk behaviours, and this was done in two groups: one group educated by their peers and the other group given professional training, although in three-month follow up the professionally educated group had lowered their risk behaviours. But in six- and 12-month follow-ups, the peer-educated group had been using the condom and reducing their high-risk behaviours sustainably more [36]. Hence, peer education can be more successful and longer lasting.

In the current study drug and alcohol use before sexual intercourse was another outcome that was assessed. The results show that the amount of drug and alcohol use before sexual intercourse and the number of sex acts under the influence of drugs and alcohol in the intervention group significantly declined compared to the control group (Tables 2 and 3). Many studies have shown that SRDs, by disrupting the power of judgment and inhibitive behaviour, lead to increasing involvement in high-risk behaviours, especially high-risk sexual behaviours [10, 13, 15, 37-39], particularly if the substance use occurs immediately before the sexual activity [11]. As a result, improving these consequences is important because this reduction can play a great role in preventing high-risk sexual intercourse, thus preventing HIV and HBV infection [40]. In the present study, multi-drug using was in the second place of drugs use. Various studies have shown that multi-drug use relates to multiple sexual partners, trade sex for drugs and money, and other high-risk sexual behaviours [41-43]. No research was found regarding the effect of peer education on the reduction of sex under the influence of drugs and alcohol. Along with the results of the present study, the intervention results of Calsyn *et al.* have shown that the frequency of sex acts under the influence of drugs and alcohol was reduced in three-month follow-up, although in six-month follow-up no difference was observed between the two groups [44]. It seems that PE due to the continuity of communication of peers, has better long-term efficacy and leads to a change in behaviour. Some other studies have successfully reduced the consumption of alcohol and drugs in participants with SRDs [45, 46]. Many studies have been done in an attempt to reduce alcohol and drug use before sex acts and to reduce sexual risk behaviours. Interventions that had more sessions and in the form of a group, such as the those by Rotheram-Borus *et al.*, Slesnick and Kang, Slesnick *et al.*, were more effective than those that had a single, brief, and individual consulting session like that of Thompson *et al.* [47-52]. Reducing sexual intercourse influenced by drugs has a direct impact on increasing general health, and its relationship with high-risk sexual behaviours determine the extent of these benefits [53].

In the current study, 56% of participants in the intervention group and 62% in the control group had multiple sexual partners during the previous three months. Our data indicate that the intervention arm showed a significant decrease in the mean number of sexual partners at one- and three-month follow-ups, compared to the control group.

Table 2. Means and comparisons for sexual behaviours between intervention and control groups at baseline, 1-, and 3-month follow-ups

Variable	Baseline (M ± SD), *n* = 50		One month (M ± SD)		*p value	*T*	Three months (M ± SD)		*p* value	*T*	Repeated measure ANOVA
	Intervention	Control	Intervention *n* = 45	Control *n* = 39			Intervention *n* = 34	Control *n* = 24			
Number of sex acts under the influence of drugs in last 10 episodes of sexual intercourse	6.04 ± 4.01	6.02 ± 3.36	3.8 ± 2.98	6.66 ± 3.36	0.000	4.13	3.2 ± 2.87	6.95 ± 2.95	0.000	4.83	F(1,56) = 8.33 *p* = 0.006
Number of sex act under the influence of alcohol in last 10 episodes of sexual intercourse	1.00 ± 1.73	1.2 ± 1.69	0.33 ± 0.92	1.46 ± 1.69	0.000	3.84	0.05 ± 0.34	1.83 ± 2.01	0.000	5.05	F(1,56) = 13.73 *p* = 0.000
Multiple partners	3.86 ± 2.67	3.35 ± 2.44	2.06 ± 0.93	3.00 ± 1.02	0.000	4.35	1.94 ± 0.91	2.91 ± 0.77	0.000	3.23	F(1,56) = 7.801 *p* = 0.007
Condom used in last 10 sexual intercourse episodes	1.86 ± 3.08	1.97 ± 2.86	5.6 ± 1.33	2.17 ± 2.76	0/000	–7.37	5.97 ± 1.38	2.37 ± 2.58	0.000	–6.85	F(1,56) = 34.77 *p* = 0.000

*M – mean, SD – standard deviation, *Independent T-test*

Table 3. Percentage scores and comparison of variables between intervention and control groups at baseline, 1, and 3-month follow-ups

Variable	Baseline, *n* = 50		One month, *n* (%)		*p value	χ^2	Three months, *n* (%)		*p* value	χ^2	Cochran's Q test	
	Intervention *n* (%)	Control *n* (%)	Intervention *n* = 45	Control *n* = 39			Intervention *n* = 34	Control *n* = 24			Intervention	Control
Condom used in last sexual intercourse	9 (18)	12 (24)	33 (73.33)	6 (15.38)	0.000	28.2	33 (97.05)	5 (20.83)	0.000	36.18	*p* = 0.000	*p* = 0.368
Condom used with sex partners who had prison history	10 (20)	8 (16)	39 (86.7)	11 (28.2)	0.000	29.63	28 (84.8)	6 (25)	0.000	20.67	*p* = 0.000	*p* = 0.072
Alcohol use before sexual intercourse	16 (32)	19 (39)	6 (13.33)	18 (46.15)	0.001	11.02	1 (2.9)	14 (58.33)	0.000	22.51	*p* = 0.000	*p* = 0.069
Drug use before sexual intercourse	48 (96)	49 (98)	34 (75.55)	37 (94.87)	0.015	5.95	25 (73.52)	24 (100)	0.006	7.52	*p* = 0.001	*p* = 0.368
HIV and HBV testing	19 (38)	20 (40)	27 (60)	18 (64.2)	0.204	1.61	28 (82.8)	11 (45.8)	0.004	8.51	*p* = 0.000	*p* = 1
Partner HIV and HIB testing	12 (24)	8 (16)	23 (51.1)	2 (5.1)	0.000	21.13	17 (50)	1 (4.1)	0.000	13.80	*p* = 0.02	*p* = 0.097

χ^2 test

While the control group did not demonstrate any significant difference. Along with this study, a study was conducted by Surratt *et al*. in two groups: one group educated by their peers and the other group given professional education, in three- and six-month follow-ups the two groups showed a significant decrease in the mean number of sexual partners ($p < 0.01$) and a significant increase in HIV testing ($p < 0.01$) [21]. Reducing sexual partners is an important consequence in the prevention of HIV and HBV infection because multiple sex partners increases the risk of HIV and HBV infections [27]. This risk increases especially in persons with SRDs [10]. The results of the studies are different in relation to the impact of the intervention on the number of sexual partners. For instance, some results [21, 46, 54] show a decrease in the number of sexual partners but in other [28, 55] no significant difference was observed in the number of sexual partners. Probably these differences are due to the type and focus of intervention and also the difference in the research community. Because some of the studies were on sex workers and women frequently enter sex work because of financial pressures and these financial incentives may be due to having multiple sexual partners.

Our findings indicate that the percentage of HIV and HBV testing significantly increased in both groups, and in one-month follow-up the two groups showed no significant difference, but in three-month follow-up most of the participants in the trial arm tested for HIV in the previous month and a significant increase was seen compared to control group. This increase is very important because HIV and HBV testing play a serious role in understanding epidemics and health planning. The results of Blas *et al*. show that most of the participants gave the reason for not testing for HIV and HBV as fear about a positive test result and lack of knowledge about testing centres [56]. Before the intervention, most of the women said that awareness of their HIV and HBV state is not helpful in preventing high-risk behaviours. Also, studies show that it is more likely that women inform their permanent sexual partners compared to casual or temporary sexual partners [57, 58]. In a qualitative study with the aim of identifying the perceptions of drug-abusing women toward HIV status in Iran, it was shown that HIV-positive and sex working women were more likely to keep their HIV status hidden, and their reason was financial support. Overall, most women preferred to inform their sexual partners about their HIV status as the first person [59].

Several limitations of this study should be noted. As with most research of this nature, we relied on self-reported behaviour, the limitations of which are well-known. The existing evidence for the validity of self-reported health service utilisation is mixed; some studies indicate high levels of correspondence between self-report and medical record data, while others document large discrepancies [60, 61]. Recruitment was limited to drug-involved women. Another limitation is the three-month follow-up period; further research is needed to determine whether the short-term effects that we found are sustained over a longer period of time. Behavioural interventions, especially education type, need more follow-up, to obtain real results about changed risk behaviours. Another limitation was the participants' place of residence. Many of the participants were homeless and residents of shelters; as a result, we lost some of them in the follow-ups, which reduces the statistical power and generalisability of the results.

The results of the current study showed the importance of pursuing HIV and HBV intervention initiatives among SRDs. We found that peer education intervention is an acceptable and engaging method in a street-based population of SRDs, and also produced significant effects on risk behaviours for HIV and HBV infection and transmission. From a public health perspective, reducing HIV and HBV transmission in an SRD context may have a considerable impact on the prevalence of these diseases. Nevertheless, interventions for SRDs going forward should address structural level challenges, in addition to individual-level barriers. Successful approaches in the longer-term must include intervention models, but inroads must also be made to improve the viability of connections to the health service system. Peer education programs are more beneficial and easy to implement, and the government can take advantage of them for harm-reduction policies.

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Conflict of interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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