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Risk factors associated with HIV seroconversion among homeless people who inject drugs in urban slums of Karachi, Pakistan: a nested case-control study

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Abstract

Introduction: The human immunodeficiency virus (HIV) epidemic in Pakistan has transitioned from low to concentrated levels among people who inject drugs (PWIDs). Although HIV prevalence in the general population is still low (< 0.1%), the prevalence in some high-risk groups is > 5%. Although second-generation surveillance has tracked HIV-prevalence since 2004, to the best of the authors' knowledge, no study evaluating risk factors associated with HIV seroconversion among homeless PWIDs has been conducted in the country. Therefore, we assessed the risk factors associated with HIV seroconversion among homeless PWIDs.

Material and methods: A nested case-control study in a cohort was conducted to estimate the incidence rate of HIV among individuals receiving harm reduction services in the megacity of Karachi. Only homeless PWIDs were selected for analysis. HIV-seroconverted homeless PWIDs (n = 82) were considered cases, while homeless HIV-negative PWIDs (n = 189) were enrolled as controls.

Results: In multivariable regression analysis, five factors, including being non-Muslim (AOR = 2.5; 95% CI: 1.1-5.6; p = 0.02), sharing of syringes (AOR = 3.9; 95% CI: 2.0-7.6; p < 0.000), source of syringes other than DIC and MSU (AOR = 2.0; 95% CI: 1.1-3.9; p = 0.03), lack of knowledge that HIV spreads through sex (AOR = 2.5; 95% CI: 1.0-6.1; p = 0.04), and frequency of daily injecting drugs (AOR = 1.3; 95% CI: 1.2-1.7; p = 0.002) were significantly associated with HIV seroconversion.

Conclusions: Programmatic improvements in homeless injecting drug users, focused on risk reduction and public health outreach, are needed to control the HIV epidemic among PWIDs in Pakistan.

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Key words: HIV, AIDS, PWIDs, incidence, homeless.

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Introduction

The first ever case of acquired immune deficiency syndrome (AIDS) in Pakistan was reported in 1986, when an African sailor died due to AIDS in Karachi. The following year, the first indigenous case of AIDS was reported in Lahore, the capital of Punjab province [1, 2]. In 2003, a study conducted in Karachi reported the prevalence of human immunodeficiency virus (HIV) among people who inject drugs (PWIDs) as 0.6% [3]. The first outbreak of HIV among PWIDs was documented in June 2004 in Larkana, a small town in Sindh province, when 17 out of 183 (9.3%) PWIDs were reported as HIV-positive [4]. From 2003 to 2007, the HIV epidemic showed a dramatic change, with HIV prevalence among PWIDs in Karachi increasing from 0.3% to 23% [5]. Therefore, the HIV epidemic in Pakistan transitioned from low-level to a concentrated epidemic [6, 7].

In avenues throughout the world, the incidence of HIV among PWIDs has fallen, likely due to successful risk reduction programs. However, our cohort study [8] of PWIDs enrolled in a risk reduction program in Karachi, Pakistan, demonstrated an expansion of HIV, which began in 2009. The incidence rate of HIV among people who inject drugs receiving risk reduction services in Karachi between 2009 and 2011 was high (12.4 per 100 person years) [8].

Even though the prevalence of HIV among PWIDs is well-documented in Pakistan, the risk factors associated with HIV seroconversion among homeless PWIDs are still unknown. Therefore, the current study investigated the risk factors associated with HIV seroconversion among homeless PWIDs receiving risk reduction services in the megacity of Karachi.

Material and methods

This was the second analysis from our cohort of PWIDs enrolled for incidence rates [8], followed up for two years (2009-2011). A nested case-control study was conducted for the estimation of risk factors associated with HIV seroconversion among homeless PWIDs. A total of 82 homeless HIV-positive cases and 189 homeless HIV-negative controls were enrolled in the study.

Data collection

Data were collected through a structured questionnaire containing questions regarding demographics, history and pattern of drug use, injection-related information, health-seeking and sexual behaviors, and knowledge about HIV/AIDS. The questionnaire was developed in English and translated into the local Urdu language.

Ethical considerations

The ethical approval for the study was obtained from the ethical review board of Aga Khan University, Karachi, and formal permission was taken from the implementers of the risk reduction program. Study participants' data were kept confidential, accessed by the principal investigator only.

Statistical analysis

Data were entered into Epi info 6.0 (Centers for Disease Control, Atlanta, Georgia, USA) by two separate data entry operators to ensure consistency and detection of data errors. Data were analyzed by Statistical Package for Social Sciences (SPSS) version 17 (SPSS Inc.). Summary measures (mean and standard deviation) for continuous variables and proportions for categorical variables were calculated. Cross-tabulation was performed for zero cell count and sparse data problems at univariate level. Univariate analysis was done for the estimation of crude odds ratio and 95% confidence interval (95% CI). For multivariable modeling and estimation of adjusted odds ratios, all important variables significant at p-value of ≤ 0.20 in univariate analysis were selected for multivariable regression analysis. In multivariable regression analysis, a p-value of < 0.05 was considered significant for the interpretation of results.

Results

Descriptive analysis

The mean age of the study participants was 30.0 ± 9.0. A total of 189 (69.7%) were HIV-negative, while 82 (30.3%) were HIV-seropositive PWIDs at the end of the study period. Formal education was reported by 74 (27.3%) respondents. In the study sample, Islam was the religion declared by majority of participants (n = 234, 86.3%), while Sindhi was the main ethnic group (n = 157, 57.9%). Sharing of syringes was practiced by 55 (20.3%) individuals. The majority of participants (n = 181, 66.8%) were obtaining syringes from other sources (hospital garbage, friends, pharmacies etc.) than drop-in centers (DIC) and mobile service units (MSU). 251 (92.6%) persons reported that they used the last syringe that was previously utilized by others. The majority of PWIDs (n = 243, 89.7%) were unaware that HIV spreads through unprotected sex, while 172 (63.5%) respondents reported peer pressure as the major reason for drug use (Table 1).

Univariate analysis

In the univariate analysis, being a non-Muslim (p = 0.07), having no formal education (p = 0.1), sharing of syringes and needles (p = 0.000), income of < Rs. 5,000 (p = 0.04), source of syringes other than DIC and MSU (p = 0.02), employment (p = 0.2), not knowing that HIV spreads through sex (p = 0.2), and frequency of daily injecting drugs (p = 0.01), were significantly associated with HIV seropositivity among PWIDs (Table 2).

Table 1. Descriptive characteristics of 271 homeless people who inject drugs to assess risk factors associated with HIV seroconversion in Karachi, Pakistan

Characteristic	*n* (%)
Age (mean in years ± SD)	30.0 ± 9.0
Homeless HIV seroconversion	
Homeless HIV-negative	189 (69.7)
Homeless HIV-positive	82 (30.3)
Education	
Formal education	74 (27.3)
No formal education	197 (72.7)
Religion	
Islam	234 (86.3)
Non-Muslim*	37 (13.7)
Ethnicity	
Sindhi	157 (57.9)
Non-Sindhi	114 (42.1)
Sharing of syringes/needles	
Yes	55 (20.3)
No	216 (79.7)
Source of syringes	
DIC and MSU	90 (33.2)
Others**	181 (66.8)
Professional skills	
No	170 (62.7)
Yes	101 (37.3)
Last syringe used	
New	20 (7.4)
Used	251 (92.6)
Monthly income in rupees***	
> 5,000	148 (54.6)
< 5,000	123 (45.4)
Frequency of daily drug use	
< 4	165 (60.9)
> 4	106 (39.1)
Family history of drug use	
Yes	42 (15.5)
No	229 (84.5)
Reasons for recent drug use	
Curiosity	8 (3.0)
Emotional pain relief	24 (8.9)
Sex	23 (8.5)
Escape	5 (1.8)
Peer pressure	172 (63.5)
Physical pain relief	19 (7.0)
Pleasure	20 (7.4)
Employment	
Yes	144 (53.1)
No	127 (46.9)
Knowing that HIV spreads through unprotected sex	
Yes	28 (10.3)
No	243 (89.7)
Ever been arrested	
No	139 (51.3)
Yes	132 (48.7)
Physical disability	
No	264 (97.4)
Yes	7 (2.6)

**Christians and Hindus.*
***Pharmacy, friends, and hospital garbage.*
****Approximately 90 rupees per US dollar at the time of study, i.e., 5,000 rupees ≈ US$ 56.*
DIC – drop-in center, MSU – mobile service unit

Multivariable regression analysis

In the multivariable regression analysis, religion (non-Muslim) (AOR = 2.5; 95% CI: 1.1-5.6; $p = 0.02$), sharing of syringes and needles (AOR = 3.9; 95% CI: 2.0-7.6; $p \leq 0.000$), source of syringes other than DIC and MSU (AOR = 2.0; 95% CI: 1.1-3.9; $p = 0.03$), not knowing that HIV spreads through sex (AOR = 2.5; 95% CI: 1.0-6.1; $p = 0.04$), and frequency of daily injecting drugs (#/day) (AOR = 1.3; 95% CI: 1.2-1.7; $p = 0.002$), were significantly associated with recent cases of HIV seroconversion (Table 3).

Discussion

The HIV epidemic in Pakistan is one of the major public health problems in Pakistan. The epidemic has shown ever increasing trend since 1986, when the first foreign case was diagnosed. Low literacy rate and low economic setting in the country could not yield optimal results in mitigating the burden of the disease. Our incidence study [8] demonstrated a 12.4 per hundred-person year incidence rate among PWIDs who were receiving the risk reduction services in Karachi, an economic hub of Pakistan.

Our study findings suggest that taking drugs in groups and sharing syringes/needles are important risk factors associated with HIV seroconversion in homeless PWIDs. The PWIDs with the practice of sharing syringes and needles with groups and friends, are at higher risk for acquiring HIV. The group dimensions of injecting drugs and exchanging syringes within the group were the decisive factors for HIV seroconversion. The study results are in line with a study conducted in Vancouver, showing that borrowing syringes and their sharing is an important risk factor for HIV sero-

Table 2. Univariate regression analysis of factors associated with seroconversion among 271 homeless people who inject drugs

Variable	OR	95% CI	*p*-value
Religion			
Islam	1		
Non-Muslim*	1.9	0.9-3.9	0.070
Education			
Formal education	1		
No formal education	1.6	0.9-3.0	0.100
Sharing of syringes/needles			
No	1		
Yes	3.6	2.0-7.1	0.000
Last syringe used			
New	1		
Used	1.3	0.5-3.8	0.600
Professional skills			
Yes	1		
No	0.8	0.5-1.4	0.500
Income in rupees**			
< 5,000	1.7	1.0-2.9	0.040
> 5,000			
Sexually abused			
No	1		
Yes	1.3	0.4-4.7	0.700
History of arrest			
No	1		
Yes	1.2	0.7-2.0	0.400
Source of syringes			
DIC and MSU	1		
Others***	1.9	1.1-3.6	0.020
Employment			
Yes	1		
No	1.4	0.8-2.3	0.200
Knowing HIV/AIDS			
Yes	1		
No	1.1	0.3-3.5	0.800
Knowing that HIV spreads through sex			
Yes	1		
No	1.1	0.3-1.4	0.200
Daily frequency of injecting drugs (#/day)	1.4	1.1-1.6	0.001

**Non-Muslim included 54 Christians and 2 Hindus vs. 418 Muslims.*
***Approximately 90 rupees per US dollar at the time of study, i.e., 5,000 rupees ≈ US$ 56.*
****Pharmacy, friends, and hospital garbage.*
DIC – drop-in center, MSU – mobile service unit

Table 3. Multivariable regression analysis for associations with HIV seroconversion among homeless people who inject drugs in Karachi, Pakistan (n = 271)

Variable	Adjusted odds ratio	95% CI	*p*-value
Religion			
Islam	1		
Non-Muslim*	2.5	1.1-5.6	0.020
Education			
Formal education	1		
No formal education	1.7	0.9-3.4	0.100
Sharing of syringes/needles			
Yes	3.9	2.0-7.6	< 0.000
No	1		
Source of syringes			
DIC and MSU	1		
Others**	2.0	1.1-3.9	0.030
Employment			
Yes	1		
No	1.5	0.8-2.6	0.500
Knowing that HIV spreads through sex			
Yes	1		
No	2.5	1.0-6.1	0.040
Income in rupees***			
< 5,000	1.7	0.9-3.0	0.070
> 5,000	1		
Daily frequency of injecting drugs (#/day)	1.3	1.2-1.7	0.002

**Christians and Hindus.*
***Pharmacy, friends, and hospital garbage.*
****Approximately 90 rupees per US dollar at the time of study this time period, i.e., 5,000 rupees ≈ US$ 56.*
DIC – drop-in center, MSU – mobile service unit

conversion among PWIDs [9, 10]. The importance of needle/syringe sharing is well-documented around the world [11, 12]. People who both inject drugs and are homeless, are prone to health and sexual hazards as compared with those who are living in homes. Many homeless PWIDs in Karachi stay near garbage dumps that provide food and used syringes. The experience of our stakeholders with risk reduction services suggests that homeless PWIDs are engaged in selling sex in lieu of drugs and money.

Daily frequency of injecting drugs is also an important risk factor for HIV seroconversion. Our study findings suggest that as the number of injecting drugs on a daily basis increases, so does the risk of HIV seroconversion. This might happen because increasing the frequency of drug injection might escalate the chances of being in groups and sharing needles and syringes with friends and strangers. Similar results are found in studies from China and Vancouver, indi-

cating that as the frequency of drug injection increases, so does the risk of HIV [9, 11].

The role of sex and HIV/AIDS education is well-documented in preventing the risk of HIV transmission [13-15]. Unprotected sex and unsafe anal sex have potential for acquiring HIV [16-21]. Some studies have reported that more than 90% of new adult HIV infections are associated with sexual activity [22]. Our study findings suggest that the risk of HIV was 2.5-fold among PWIDs, who did not know that HIV spreads through sex. Our experience demonstrates that PWIDs in Karachi engage in risky sexual behaviors. They sell sex and participate in receptive sexual activity. They even exchange sex in their groups for drugs. These sexual behaviors in PWIDs in Karachi put this population at risk of HIV and other sexually transmitted diseases. There have been several programmatic initiatives to educate PWIDs on unprotected sex, providing them with condoms at drop-in centers, to minimize the risk of sexual HIV transmission; however, there is still a need for more innovative strategies to mitigate the transmission.

At baseline, religion (non-Muslim) predicted the HIV seroconversion. The results of the study indicate that the risk of HIV transmission is higher in minority groups. Several factors might predict this situation. PWIDs, being a minority group, might face challenges in accessing and utilization of the program services. They might be discriminated in society, with difficulties in social interactions. Also, they might inject drugs in a closed group with similar sociocultural characteristics. Due to sharing of syringes and needles, the risk of HIV can increase if someone is infected with HIV, causing the potential to spread the infection to the members of the whole group. Our experience shows that PWIDs as a minority are not discriminated in the program, and all persons are treated equally regardless of race, social background, color, or belief. Therefore, this finding needs to be further explored in order to draw appropriate conclusions.

Strengths and limitations

This was the first-ever study from Pakistan reporting the risk factors associated with HIV seroconversion among homeless PWIDs receiving harm reduction services in Karachi, Pakistan. Since the PWIDs from only three DICs were included in the study, the study results cannot be generalized to the whole PWIDs population in Pakistan. There is a need to conduct further studies with a representative sample across the country.

Conclusions

High-risk behaviors and poor knowledge of modes of transmission are important determinants of HIV seroconversion among PWIDs enrolled in harm reduction program in Karachi. There is need for expanding change in communication behaviors among PWIDs in order to mitigate the disease burden at the national level.

Disclosures

1. Institutional review board statement: Not applicable.
2. Assistance with the article: We are thankful to the Enhanced HIV Control Program, Sindh and Pakistan Society for their support in logistics and conducting of the study.
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