

Determinants of HIV sero-conversion among male injection drug users enrolled in a needle exchange programme at Karachi, Pakistan

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Abstract

Objective: To assess the determinants of HIV sero-conversion among male injection drug users enrolled in needle exchange programme at Karachi.

Methods: An unmatched retrospective case control study was conducted among male injection drug users receiving needle exchange services in Karachi.

The cases and controls were identified from one drop in center providing needle exchange services. The data for the study participants was collected retrospectively from the programme. Descriptive statistics, univariate analysis, and multivariate regression analysis for determinants of HIV sero-conversion and Hosmer and Lemeshow goodness of fit test for model adequacy were performed.

Results: Mean age of the study participants was 34.17 ± 10.74 years. Average monthly income of the participants was US\$ 125.15 ± 76.32 . In unconditional multivariate regression analysis being unmarried (AOR: 3.0 95% CI 1.14-7.9, $p=0.02$), not living with family (AOR: 2.8 95% CI 1.18-6.79 $p=0.02$), family history of addiction (AOR: 2.5, 95% CI 1.01-6.49, $p=0.04$), injecting drugs in groups (AOR: 2.8, 95% CI 1.12 7.02 $p=0.02$), not obtaining syringes from the programme (AOR:26.45, 95% CI 2.47-282.8 $p=0.007$), and history of blood transfusion (AOR: 52.9, 95% CI 1.32-2118.416 $p=0.03$) were significantly associated with HIV positive sero-status. Model adequacy was assessed by 'Hosmer and Lemeshow goodness of fit' (J: 4.95, $p=0.7$) indicating that the model was accurate.

Conclusion: Social and drug related risky behaviours are important determinants of HIV among male IDUs in Karachi. The situation calls for programmatic initiatives for addressing the risky behaviours among IDUs for effective control of epidemic in the country.

Keywords: HIV, AIDS, IDU, Epidemic, Needle exchange. (JPMA 63: 90; 2013)

Introduction

The history of HIV/AIDS in Pakistan dates back to 1986 when an African sailor died due to AIDS in Karachi. The next year witnessed the identification of first indigenous case in Lahore.^{1,2} In December 2003, one individual out of 160 IDUs tested was detected HIV positive, confirming a low-level presence of HIV in this group in Pakistan.³ The country experienced first ever outbreak of HIV among IDUs in Larkana, a small town of Sindh province when 9.3% IDUs tested were HIV positive.⁴ Thus the country transitioned from low to concentrated level of the epidemic.⁵

From 2003 to 2007, the HIV epidemic in Pakistan showed dramatic changes and the HIV epidemic among injection drug users in Karachi grew from 0.38% to 23%.⁶ The epidemic in Pakistan follows the global pattern and the injection drug use is the major driving force behind

the HIV epidemic in Pakistan.⁷ The overall, seroprevalence of HIV among IDUs in major cities like Hyderabad, Larkana, Karachi, and Sargodha is 30.5%, 28.5%, 23.1% and 22.8% respectively.⁷

This retrospective case control study was conducted for determinants of HIV sero-conversion at baseline among IDUs enrolled in a needle exchange programme in Karachi, Pakistan.

Methods

A retrospective case control study was conducted among male IDUs enrolled in harm reduction and needle exchange programme in Karachi. HIV seropositive IDUs were taken as cases and those who were seronegative were taken as controls. The study was reviewed and approved by Ethical Review Board of 'Bridge Consultants Foundation'.

The sample size was calculated by using 'Open Epi calculator version 2.3.1 developed by Rollins school of Public Health'. At 95% confidence level (1-alpha), and power (1-beta) of 80%, ratio of cases to control 1:1, we needed at least 57 cases and 57 controls for

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the study purpose.

All cases and controls selected were enrolled in the drop in center by convenient sampling strategy. Take all approach was used at the selected drop in center (DIC) and all available cases and controls were selected in order to get more valid and relatively precise results.

All IDUs enrolled in the selected DIC under needle exchange programme were eligible for the study purpose.

Statistical Analysis:

The data was entered by using Epi Info software and analyzed by Statistical Package for Social Sciences (SPSS) version 17. All data was cleaned for appropriateness and completeness prior to the analysis. Double data entry was done by two separate operators for data errors and data consistency. Descriptive analysis, cross tabulation, univariate and multivariate logistic regression analysis was done. Means and standard deviations for quantitative variables and proportions for categorical variables were calculated. All biologically important variables were included in univariate analysis. Crude odds ratio and 95% CI was calculated for the variables. Multicollinearity was assessed at univariate level for looking at the correlation of different variables. All variables significant at univariate analysis ($p < 0.20$) were considered significant for multivariate logistic regression model for estimation of adjusted odds ratio and 95% confidence intervals and a P value of < 0.05 was considered statistically significant at multivariate regression analysis. Confounding and possible two way interactions were assessed and the model adequacy was assessed by 'Hosmer and Lameshow goodness of fit'.

Results

A total of 140 IDUs were enrolled in the study. The mean age of the study participants was 34.17 ± 10.74 years. Majority of the participants 128 (91.4%) belonged to Islam. Mean monthly income of the participants was US\$ 125.15 ± 76.32 . Most of the participants 81 (58%) were illiterate and 91 (65%) were unmarried. Pakistan as the birth place was reported by 129 (92.1%) while 11 (7.9%) reported non Pakistani by birth. Majority of the participants 93 (66.4%) belonged to Sindh province followed by Punjab 20 (14.3%), Northern areas 11 (7.9%), North West frontier province 9 (6.4%), and Baluchistan 7 (5%). One hundred and twenty four (88.6%) participants were employed, while 16 (11.4%) were not employed. Family history of addiction was

reported by 44 (31.4%). History of jail and arrest was reported by 80 (57.1%). Eight (5.7%) participants had a history of blood selling, while 20 (14.3%) had history of blood transfusion (Table-1).

Univariate Analysis:

Cross tabulation was performed prior to the univariate analysis in order to handle zero cell count and sparse data problem. All variables with p -value < 0.20 in univariate analysis were considered significant for multivariable

Table-1: Descriptive Statistics (n=140).

Characteristic	Cases % (n=60)	Controls % (n=80)
Age (years)	34.28±11	34.09±10.5
Marital Status		
Married	45 (75.0)	46 (57.5)
Unmarried	15 (25.0)	34 (42.5)
Religion		
Muslim	56 (93.3)	72 (90.0)
Non Muslim	04 (6.7%)	08 (10.0)
Country of birth		
Pakistan	57 (95.0)	72 (90.0)
Other country	03 (5.0)	08 (10.0)
Province		
Sindh	39 (65.0)	54 (67.5)
Punjab	12 (20.0)	08 (10.0)
N.W.F.P	04 (6.7)	05 (6.3)
Baluchistan	02 (3.3)	05 (6.3)
Northern Areas	03 (5.0)	08 (10.0)
Education		
Literate	28 (46.7)	31 (38.8)
Illiterate	32 (53.3)	49 (61.3)
Employment status		
Employed	55 (91.7)	69 (86.3)
Unemployed	05 (8.3)	11 (13.8)
Living status		
With family	28 (46.7)	57 (71.3)
Alone	32 (53.3)	23 (28.8)
Family history of addiction		
Yes	22 (36.7)	22 (27.5)
No	38 (63.3)	58 (72.5)
Injecting drugs in groups		
Yes	12 (20.0)	38 (47.5)
No	48 (80.0)	42 (52.5)
History of jail		
Yes	37 (61.7)	43 (53.8)
No	23 (38.3)	37 (46.3)
History of blood selling		
Yes	07 (11.7)	01 (1.3)
No	53 (88.3)	79 (98.8)
History of blood transfusion		
Yes	09 (15.0)	11 (13.8)
No	51 (85.0)	69 (86.2)
Monthly income	US\$ 124.15±76	US\$ 125±85

Table-2: Univariate Logistic Regression analysis.

Variable	OR	95% CI	p-value
Religion			
Muslim	1		
Non Muslim	0.6	0.18-2.24	0.48
Place of Birth			
Pakistan	0.5	0.12-1.86	0.26
Non Pakistani	1		
Age (years)			
<33	1		
>33	1.6	0.83-3.19	0.15
Marital Status			
Married	1		
Unmarried	2.2	1.06-4.62	0.03
Employment			
Employed	1		
Unemployed	0.6	0.18-1.74	0.31
Living Status			
Alone	2.8	1.39-5.70	<0.01
Family	1		
Family history of addiction			
Yes	1.7	0.83-3.60	0.13
No	1		
Injecting Drugs in Groups			
Yes	3.6	1.67-7.81	<0.01
No	1		
Sharing of syringes			
Yes	2.3	1.12-4.68	0.02
No	1		
DIC provides Syringes for drugs			
Yes	0.10	0.01-0.84	0.03
No	1		
History of Blood Transfusion			
Yes	10.4	1.24-87.27	<0.01
No	1		

logistic regression model. Crude odds ratio and 95% CIs were calculated. At univariate level age ($p=0.15$), marital Status ($p= 0.03$), living alone ($p= 0.01$), family History of Addiction ($p= 0.13$), injecting drugs in groups ($p= <0.01$), sharing needles in groups ($p= 0.02$), obtaining syringes from DIC ($p= 0.03$), and history of blood transfusion ($p= <0.01$) were significant for multivariate regression model as per cut off set for significance at univariate level (Table-2).

Multivariate Regression Analysis:

Multivariate regression analysis was done by 'Enter Method'. All variables ($p<0.25$) in univariate analysis were included in a multiple logistic regression model for estimation of adjusted odds ration and 95% confidence interval (Table-3). All variables insignificant in multivariate logistic regression were assessed for confounding. A change of $>10\%$ in the value of ?

Table-3: Multivariable Logistic Regression Model.

Variable	AOR	95% CI	p-value
Age (years)			
<33	1		
>33	2.1	0.84-5.42	0.11
Marital Status			
Married	1		
Unmarried	3.0	1.14-7.89	0.03
Living Status			
Alone	2.8	1.18-6.79	0.02
Family	1		
Family history of addiction			
Yes	2.6	1.01-6.49	0.05
No	1		
Sharing of syringes			
Yes	2.8	1.12-7.02	0.03
No	1		
Injecting Drugs in Groups			
Yes	1.8	0.72-4.23	0.21
No	1		
DIC provides Syringes for drugs			
Yes	0.03	0.04-0.40	0.01
No	1		
History of Blood Transfusion			
Yes	52.9	1.32-2118.40	0.04
No	1		

coefficient of any other independent variable was considered significant for confounding. Variables involved in confounding were retained in the model.

Although age (AOR: 2.1, 95% CI 0.84-5.42, $p=0.11$) was insignificant in univariate as well as multivariate regression model, yet it was retained in the model due to its biological importance. 'Sharing syringes' was the possible confounder in the multivariate model. Therefore it was retained in the model.

In multivariate logistic regression analysis being unmarried (AOR: 3.0, 95%CI 1.14-7.89, $p=0.03$), living alone (AOR: 2.8, 95% CI 1.18, 6.79, $p=0.02$), family history of addiction (AOR: 2.5, 95% CI 1.016, 6.49, $p=0.05$), sharing of syringes (AOR: 2.8, 95% CI 1.12-7.02, $p=0.03$), obtaining syringes from DIC (AOR: 0.03, 95% CI 0.04-0.40, $p=0.01$), history of blood transfusion (AOR: 52.9, 95% CI 1.32, 2118.41, $p=0.04$) were significant determinants of HIV sero-conversion among injection drug users after adjusting for other variables in the model. The final model in the logit form was as under:

Assessment of Model Adequacy:

The model adequacy was assessed by Hosmer and Lameshow goodness of fit. The unique profiles (J) were calculated which were approximately equal to N (J~N).

Hosmer and Lameshow goodness of fit test indicates that the model fit accurately (Chi Sq. 4.96, d.f 7, $p=0.66$).

Discussion

The HIV epidemic in Pakistan is mainly driven by injection drug use. The epidemic has transitioned from low level to concentrated level in IDUs in 2004.^{5,8} Karachi, the mega city of Pakistan experiences the highest HIV prevalence (23%) in IDUs. Various factors such as social, behavioural, and drug related might be responsible for HIV sero-conversion among this high risk group. Our study reports the baseline risk factors associated with HIV sero-conversion among injection drug users enrolled in a needle exchange programme in the metropolitan city of Karachi. Our study findings suggest that socio-economic and behavioural risk factors are important determinants of HIV sero-positive status among male injection drug users enrolled in needle exchange programme in Karachi.

$$g(X) = \beta_0 + \beta_1 (\text{Age} > 33) + \beta_2 (\text{Never married}) + \beta_3 (\text{Living alone}) + \beta_4 (\text{Family history of addiction}) + \beta_5 (\text{Injecting drugs in groups}) + \beta_6 (\text{Sharing injections}) + \beta_7 (\text{Getting syringes from DIC}) + \beta_8 (\text{History of blood transfusion}).$$

Our study findings suggest three times higher risk of HIV among those who are unmarried and those who are not living with the family. These two factors play an important role in constructing behaviours and shaping the way of life. The people who are not married and those who are not living with family are exposed to social, environmental and sexual hazards. These factors along with addiction or injection drug use catalyze their risk to acquire various infections including HIV due to indulgence in risky behaviours. Our study findings for association of being unmarried with HIV sero-conversion are consistent with the Indian study reporting the higher risk of HIV among those who were never married.⁹

Family history of addiction was significantly associated with HIV sero-status in our study sample. This might be due to the exposure to intoxicants at early age and later on adopting it at very young age. This factor might influence the people especially at teenage when the behaviours are shaped at home in particular and society in general. The people exposed to drug use in their families might have the higher risk of indulgence in drugs at early age which might progress to injection drug use at a young age. This pattern might prone such people to enhanced risk of HIV infection due to sharing and risky behaviours.

The study findings indicate sharing of the syringes and

needles with group and friends as an important determinant of HIV sero-conversion. The risk of HIV was three times higher among those IDUs who share needles and exchange syringes in groups as compared to those who do not share the syringes. Our study findings are consistent with a Vietnam study indicating that IDUs who share injection equipment have 7.3 times higher risk of HIV than those who do not share.¹⁰

The role of drop in centers established in the country has an important role in risk reduction of HIV among IDUs. These centers provide needle exchange and other health related services to the IDUs for minimizing the risk of HIV. Our study findings demonstrate that those IDUs who were getting syringes from drop in center had protective effect (AOR: 0.03, 95% CI 0.04-0.40, p -value 0.007) in terms of HIV transmission. This finding indicates that getting a new syringe every time and not using the used syringe reduces the risk of HIV transmission. The similar study findings were reported in a study indicating that obtaining syringes from needle exchange programme had a protective effect (OR 0.39, p -value <0.001).¹¹

History of blood transfusion was another important baseline determinant of HIV sero-positive sero-status (AOR: 52.9, 95% CI 1.32-2118.40, p -value 0.035). This was an important risk factor for HIV in the early stages of HIV epidemic in resource limited setting of Pakistan. But later on initiatives were taken by the government for screened and safe blood transfusions. Our study finding suggests a wide confidence interval for blood transfusion as the baseline determinant of HIV sero-positives status among male IDUs indicating the imprecise result; might be due to the small sample size.

Strengths and Limitations:

This is the first case control study for estimation of risk factors associated with HIV sero-conversion among male injection drug users enrolled in needle exchange programme in Sindh province. The study has some limitations also. First the selection bias might be induced due to convenient sampling from one drop in center only. Secondly the sample size was very small. Third, the information obtained at baseline was self reported, which might induce information bias. Fourth, the results of the study cannot be generalized due to limitations of sample size and methodology adopted.

Public Health Implications:

Our study findings are important from research and public health point of view. The findings of the study has a great public health and programmematic importance

indicating a need for educating IDUs for risk behaviours in order to mitigate the magnitude of the HIV epidemic in the resource limited setting. From research point of view it calls for conducting similar studies with a large sample size for statistically significant results. The situation also calls for conducting longitudinal studies for estimation of incidence and risk factors associated with HIV sero-conversion.

Conclusion

The socio-economic factors are important determinants of HIV sero-status in injection drug users enrolled in needle exchange programme at Karachi. Effective programmatic initiatives are needed to reduce the risk of HIV transmission among IDUs through harm reduction and education of the IDUs regarding the disease and its mode of transmission. Appropriate and timely efforts will minimize the risk of growing magnitude of the disease at national level.

Recommendations:

Effective programmatic initiatives are needed to reduce the risk of HIV transmission among IDUs through harm reduction and education of the IDUs regarding the disease and its mode of transmission. Appropriate and timely efforts will minimize the risk of growing magnitude of the disease at national level.

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