

Original Article

Human immunodeficiency virus prevalence and risk determinants among people who inject drugs in the Republic of Georgia

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Abstract

Introduction: In Georgia as in most Eastern European countries, injecting drug use remains one of the leading transmission modes of HIV infection. This paper aims to identify HIV prevalence and risk determinants among people who inject drugs (PWID).

Methodology: A cross-sectional, anonymous bio-behavioral survey of PWID was conducted in seven cities of Georgia in 2014-2015. Overall 2,022 PWID were investigated. Bivariate and multivariate regression analyses were performed to identify association of HIV positivity with other factors.

Results: HIV prevalence among PWID was (2.2%, 95% CI 1.53-2.99). Significant associations were found between HIV positivity and history of drug injection (OR 1.03, $p < 0.05$), older age at first drug injection (OR 3.94, $p < 0.01$), safe sex behavior last year (OR 5.32, $p < 0.01$) and preventive program coverage (OR 2.0, $p < 0.05$).

Conclusions: HIV prevalence among PWID is stable and remains at low level. Our study shows that preventive interventions influence the sexual behavior of HIV positive PWID, however, the majority of injecting drug users are still not reached with these interventions. A changing environment may present additional challenges for harm reduction and current safe practices may change unless continuously supported by innovative HIV prevention programming.

Key words: PWID; HIV; Georgia; risk determinants.

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Introduction

Georgia, a former Soviet country, is located in the Caucasus region and borders with Russia, Armenia, Azerbaijan and Turkey. The first Human immunodeficiency virus (HIV) case was reported in 1989 and by June 2016, 5,732 HIV cases were registered through the national reporting system. Of these about one fifth (1,127) died [1]. It is likely that about 4,000-5,000 or so additional cases were not captured by the reporting system and according to the latest estimates between 7,700 – 12,000 adults are living with HIV in Georgia, which is 0.4% of the adult population (15 - 49 years of age) [2]. The national reporting system shows an annual increase of newly registered HIV cases of 15% in 2014, reaching 27% in 2015. Reported cases remain highly concentrated in the capital city [1].

As in most Eastern European countries, injecting drug use has been the major transmission mode of HIV infection in Georgia. This trend was observed from the beginning of the broad epidemic, however in recent years cases attributed to heterosexual transmission exceeded those attributed to injecting drug use. Heterosexual transmission was accountable for 45.1%

while drug use for 35.7% among newly registered HIV cases in 2014 [3].

Prevalence of HIV infection among key populations has been measured in Georgia through serosurveys and integrated bio-behavioral surveillance surveys (IBBS). The IBBS studies have been conducted in the country since 2002 in different populations and different geographic areas with external financial assistance such as the US Government and the Global Fund.

This paper reports on IBBS findings from seven cities in Georgia conducted in 2014-15 as part of a Global Fund-supported project [4]. Considering key populations' behavior influence on HIV/AIDS spread, the paper aims to identify HIV prevalence and risk determinants among people who inject drugs (PWID). The evidence generated can be applied in decision making on preventive strategies to decrease or preserve low HIV prevalence.

Methodology

Surveys

Cross-sectional, anonymous surveys of PWID were conducted by Curatio International Foundation and Public Union Bemoni in seven different locations

of Georgia: Tbilisi, Gori, Telavi, Zugdidi, Batumi, Kutaisi and Rustavi in 2014-15. Participants were recruited through respondent-driven sampling (RDS) that represents a modified form of snowball sampling. RDS is a widely used method applied hard to reach populations [5]. The scientific literature suggests that RDS methodology allows the recruitment of study participants as close to a representative sample as possible [6]. RDS is based on the premise that peers are better able to recruit other members of hidden populations within their own group than outreach workers or researchers. The system uses mathematical weighting to compensate for non-random sampling [7]. The researchers select a small number of “seeds” who represent the target population and are the first participants in the study. These seeds then recruit a restricted number of individuals from their network who in turn invite their peers to the study in the same way, recruiting continues until the desired sample size is reached [6].

Inclusion criteria and ethics

Inclusion criteria for the study were: age 18 years and older; drug injection in the month prior the survey; being a resident of a selected location and the ability to complete an interview in Georgian. The desired sample sizes were reached in all seven locations. The study protocol and questionnaires were approved by the Ethical Committee of the HIV/AIDS Patients Support Foundation (certificate 762/863 of 31.10.2014). The survey instrument was based on a standardized behavior questionnaire for PWID provided in the Guidelines for Repeated Behavior Surveys in Populations at Risk for HIV [8]. The participants were informed that their participation in the study was completely voluntary. Face-to-face individual anonymous interviews were conducted by trained interviewers.

Detection of biomarkers

The biomarker component of the study involved analysis of blood specimens for HIV at the Infectious Diseases, AIDS and Clinical Immunology Research Center. Genscreen Ultra HIV (BIO-RAD, Marnes-la-Coquette, France) test system was used for HIV screening. HIV positive samples were tested with Western Blot (Western Blot HIV Blot 2.2, MP Biomedicals Asia Pacific Pte. Ltd. Singapore, Malaysia) confirmatory test.

Statistical methods

The main variable of interest was HIV positivity. The factors included in the bivariate analysis were

grouped in the following categories: a) socio-demographic; b) history of injecting drug use c) sex behavior and d) other factors. Socio-demographic characteristics included age, gender, city of residence and education level of PWID. A history of injecting drug use included the following variables: median years of drug use, age at first drug injection, frequency of injection last month, membership of a regular injecting group, last safe injection (defined below), sharing of a needle or syringe during last month, type of drugs injected last month, injection practice in another city or country during last year, sharing practice in another city or country. Last safe injection was defined as - no use of a needle/syringe previously used by somebody else, no use of a needle/syringe left at a place of gathering, no use of a syringe prefilled by somebody else without his presence, no use of shared equipment, no use of drug solution from shared container prepared without his/her presence. Type of drugs included heroin, desomorphine, and homemade amphetamine-type stimulants (Vint and Jeff) injected solely or in combination with other drugs. Selected drugs included those most frequently mentioned among the drug injectors. Sexual behavior included safe sex practice at last intercourse with any type of partner (regular, occasional or paid) and safe sex behavior last year defined as consistent condom use with any type of partner. History of imprisonment or detainment last year, preventive program basic coverage (defined below), HIV testing practice last year and knowing the result were grouped under other factors. Preventive program basic coverage was defined as awareness about HIV testing possibilities and receipt at least one of the following: a sterile injecting equipment, a condom, a brochure/ pamphlet/ booklet, a qualified educational information during last 12 months.

Analysis was done for the combined sample from all seven study locations in SPSS (19.0) and $p < 0.05$ was taken as statistically significant. Chi-squared tests were used to identify statistically significant differences between groups. Unadjusted associations were determined by bivariate logistic regression and the factors found to be statistically significant in the bivariate analysis were further included in the multivariate logistic regression model.

Safe sex behavior at last intercourse and safe sex practice last year showed positive correlation, (Pearson correlation between these two variables was 0.79; $p < 0.001$), therefore the former variable was dropped from the multivariate regression model as consistent condom use with any type of partner last year better represented overall sex behavior.

Table 1. Characteristics of PWID in seven cities in the republic of Georgia 2015.

Characteristics		N = 2022	
HIV prevalence	HIV positive		2.2%
	Age (years)	Median	39.0
	Gender	Male	98%
Socio-demographic	Education	None or Primary 1-4 class or Secondary or vocational school	59.9%
		Higher or incomplete higher	40.1%
	City of residence	Tbilisi	17.7%
		Gori	14.2%
		Telavi	14.1%
		Zugdidi	14.1%
		Batumi	13.7%
		Kutaisi	14.0%
		Rustavi	12.2%
		History of injecting drug use	History of injecting drug use (years)
	<=19		54.6%
Age at first injecting drug use (years)	20-24		32.3%
	25+		13.0%
	Heroin only		31.9%
Heroin injection last month	Heroin+ any other drugs		26.3%
	Any other drugs		41.8%
	Desomorphine only		6.9%
Desomorphine injection last month	Desomorphine + any other drugs		10.4%
	Any other drugs		82.6%
	Amphetamine only		4.4%
Amphetamine injection last month	Amphetamine+ any other drugs		8.4%
	Any other drugs		87.2%
	Member of a regular injecting group		yes
Frequency of injection last month	Once a week or less		75.0%
	Several times a week or more		25.0%
Last safe injection	Yes		80.4%
Ever shared needle or syringe that had been used by anybody else before last month	No		81.9%
Injected in another city during last year	Yes		50.9%
Injected in another country last year	Yes		42.5%
Sharing practice in another city last year	Yes	2.5%	
	No	48.4%	
	Didn't inject in other cities	49.1%	
	Yes	6.1%	
Sharing practice abroad last year	No	36.4%	
	Didn't inject in other countries	57.5%	
	Yes	14.6%	
Sex behavior	Safe sex behavior last year	No	79.0%
		Didn't have sex	6.4%
		Yes	78.4%
	Sexual regular partners last year	Yes	76.0%
	Sexual paid partners last year	Yes	52.6%
	Sexual occasional partners last year	Yes	33.4%
	Safe sex practice at last intercourse	No	60.2%
		Didn't have sex	6.4%
Yes		0.4%	
Homosexual contacts last year*	Yes	0.4%	
Other	History of imprisonment or detainment last year	Yes	20.5%
	Received HIV test last year and know their results	Yes	25.4%
	Preventive program basic coverage	Yes- covered	32.2%

Denominator -1982 male respondents.

Results

Sample Characteristics

The study in all seven locations recruited overall 2,037 eligible PWID. As we were analyzing factors associated with increased risk of HIV our analysis included 2,022 PWID who were tested for HIV. Table 1 below presents characteristics of the sample of 2,022 participants out of the total sample of 2,037 PWID who completed biomarker component. HIV prevalence among injecting drug users in all seven cities in the Republic of Georgia was 2.2%. Median age of the participants was 39 years with 20 years of median drug injection history. Vast majority of the respondents were male. Majority (54.6%) started intravenous drug use at age less than 19 years, about one third (32.3%) at age of 20-24 years and 13% started injecting at age 25 years or over. Only one fourth of the study participants were injecting drugs frequently - several times a week or more and more than half, 58.4% were member of a regular injecting group. The proportion of PWID who reported heroin only injections last month was 31.9%, only desomorphine was injected by 6.9% and only homemade amphetamine-type stimulants (Vint or Jeff) was reported by 4.4% of participants; all other 43.2% of PWID were injecting either more than one type of drugs from above list, or any other injecting drugs. The majority of PWID had safe injection practices at last injection or last month (80.4% and 81.9%, respectively), while safe sex behavior with any type of partner was quite low both at last intercourse (33.4%) and last year (14.6%). The survey investigated that 32.2% of the study participants were reached by a preventive program (basic coverage) and awareness rate of their HIV status was 25.4%. About half (50.9%) of PWID involved in the survey were injecting drugs out of their city of residence and 42.5% out of the Republic of Georgia last year, and only 2.5% had sharing practice in other cities, and 6.1% abroad consequently. Our study also revealed that about one fifth (20.5%) of the participants were detained under an administrative sentence, or imprisoned because of their drug use, at least once in the past 12 months in all seven cities.

Bivariate analysis

Bivariate correlations are presented in the Table 2. Analysis revealed factors associated with increased risk of HIV such as age, city of residence, duration and age at first injecting drug use, heroin injection, membership of a regular injecting group, safe sex behavior last year and safe sex practice at last intercourse, knowledge of their last year HIV status and basic coverage with

preventive program. Age increase in years increases risk of HIV infection (OR 1.04, $p = 0.01$). City of residence also was found to be associated with HIV risk, but not for all seven cities. Only Batumi residents had higher odds of being HIV infected compared to those who were living in Rustavi OR 6.01 ($p < 0.05$).

PWID, who injected drugs longer OR 1.03 ($p = 0.05$) were more likely to be HIV positive, although the association was not significant. Those who first injected drugs at age of 25 years or over had almost three times higher risk of HIV positivity ($p = 0.01$) compared to those who first injected at age of 19 years or less. The type of drugs injected during last month was not found to be associated with HIV infection. The frequency of drug injection or safe injection practice during last month was not found to be associated with HIV infection. A significant association was observed between HIV positivity and having regular needle partners (OR 1.87, $p < 0.05$)

Being HIV positive was associated with safe sex practice. PWID who used a condom at last intercourse were more likely to be HIV infected (OR 4.02, $p < 0.01$) than those who did not use a condom. Likewise, PWID who always used a condom last year were almost five times more at risk of being HIV positive (OR 4.61, $p < 0.01$) compared to those who reported unsafe sexual practice. In addition, those who did not have sex last year were 3.63 times more likely to be HIV positive ($p = 0.01$). We also analyzed condom use practice with regular partners and found, that HIV positive PWIDs tend to use a condom 2.5 times more often than those with HIV negative status ($p < 0.001$, data not shown in the table).

Regression analysis demonstrated that knowledge of personal HIV status was a predictor of HIV infection. Significant association was found between HIV positivity and receiving an HIV test result in the last year (OR 2.07, $p < 0.05$). Those PWID who were aware about HIV testing possibilities and received sterile injecting equipment or condom or brochure/ pamphlet/ booklet or qualified educational information last 12 months were more at risk of HIV infection compared to those, who did not benefit from the preventive program (OR 2.14, $p=0.01$).

Multivariate logistic regression

In the multivariate regression analysis we used a stepwise method (5 steps in total). The results are presented in the Table 2. Significant association was found between HIV positivity and city of residence, history of drug injection, age at first injecting drug use, safe sex behavior last year and program basic coverage.

Table 2. Bivariate and multivariate regression predicting of HIV positivity among PWID in seven cities in the Republic of Georgia 2015.

Confounders	References		Bivariate regression		Multivariate regression (method-stepwise)	
			Odds Ratio (95% CI)	pvalue	Odds Ratio (95% CI)	p value
Age (years)	Continuous		1.04(1.01:1.07)	0.01		
Education	Higher or incomplete higher	None or Primary 1-4 class or Secondary or vocational school	1.45(0.76:2.74)	0.26		
		Rustavi	Tbilisi	1.73(0.33:9.00)	0.51	1.93(0.36:10.27)
City of residence		Gori	2.16(0.42:11.25)	0.36	2.14(0.41:11.32)	0.37
		Telavi	2.18(0.42:11.33)	0.35	2.11(0.40:11.18)	0.38
		Zugdidi	2.61(0.52:13.07)	0.24	2.77(0.54:14.13)	0.22
		Batumi	6.01(1.34:26.89)	0.02	7.24(1.58:33.1)	0.01
		Kutaisi	3.54(0.74:16.81)	0.11	3.62(0.75:17.56)	0.11
History of injecting drug use (median years)	Continuous		1.03(1.00:1.06)	0.05	1.03(1.00:1.07)	0.04
Age at first injecting drug use	<=19	20-24	1.42(0.71:2.83)	0.32	1.85(0.90:3.82)	0.10
		25+	2.64(1.23:5.65)	0.01	3.94(1.73:8.98)	0.00
Heroin injections last month	Any other drugs	Heroin+ any other drugs	2.11(1.02:4.37)	0.05		
		Heroin only	1.74(0.79:3.84)	0.17		
Desomorphine injections last month	Any other drugs	Desomorphine only	0.31(0.04:2.27)	0.25		
		Desomorphine + any other drugs	1.04(0.41:2.68)	0.93		
Amphetamine injections last month	Any other drugs	Amphetamine only	0.97(0.23:4.06)	0.96		
		Amphetamine+ any other drugs	0.25(0.03:1.82)	0.17		
Member of a regular injecting group	Yes	No	1.87(1.02:3.42)	0.04		
Frequency of injection last month	Once a week or less	Several times a week or more	1.00(0.50:2.00)	1.00		
Last safe injection	Safe	Unsafe	0.64(0.27:1.53)	0.32		
Ever shared needle or syringe that had been used by anybody else before last month	Safe- never shared	Unsafe-shared	1.52(0.76:3.04)	0.23		
Injected in another city during last year	No	Yes	0.73(0.40:1.33)	0.30		
Injected in another country last year	No	Yes	0.94(0.51:1.72)	0.83		
Sharing practice in another city last year	No	Yes	2.36(0.53:10.50)	0.26		
		Did not inject in other cities	1.46(0.78:2.72)	0.23		
Sharing practice abroad last year	No	Yes	0.74(0.17:3.28)	0.70		
		Did not inject in other countries	1.03(0.55:1.93)	0.93		
Safe sex behavior last year	No	Yes	4.61(2.4:8.85)	0.00	5.32(2.71:10.47)	0.00
		Didn't have sex	3.63(1.44:9.17)	0.01	2.69(1:7.28)	0.05
Safe sex practice at last intercourse	No	Yes	4.02(2.02:8.85)	0.00	Not used in the model	
		Didn't have sex	4.86(1.79:13.17)	0.00		
History of imprisonment or detainment last year	Yes	No	1.65(0.69:3.93)	0.26		
Received HIV test last year and know their results	No	Yes	2.07(1.12:3.81)	0.02		
Preventive program basic coverage	No	Yes	2.14(1.18:3.89)	0.01	2.00(1.07:3.73)	0.03

All other significant variables from the bivariate analysis dropped out at the different steps of the model.

PWID who were Batumi residents were around seven times more likely to be HIV positive compared to the residents of Rustavi (OR 7.24, $p = 0.01$). A longer duration of injecting drug use carried a statistically significant risk of HIV positive status (OR 1.03, $p < 0.05$). Also, those survey participants who first injected drugs after 24 years of age had a four times higher odds of being HIV positive (OR 3.94, $p < 0.01$).

The injecting drug users who reported consistent use of condoms last year were more likely to be HIV infected compared to those who reported unsafe sexual behavior with any type of partner (OR 5.32, $p < 0.01$). A high, but not significant, association was found for PWID who did not practice sex last year (OR 2.69, $p = 0.05$) and HIV positive status.

The participants of the survey who were covered by HIV preventive program had also two times higher odds being HIV positive (OR 2.0, $p < 0.05$).

Discussion

The estimated number of PWID in Central and Eastern Europe and Central Asia is more than 3 million and about one million are estimated to be HIV infected [9] but HIV prevalence across the region varies widely. The latest national prevalence estimate of HIV infection among PWID in the Republic of Georgia is based on the IBBS conducted in seven major cities in the Republic of Georgia in 2015. HIV prevalence varies across the seven cities from 0.9% in Rustavi to 4.8% in Zugdidi. The most representative estimate, at the country level, for the prevalence of HIV in the Republic of Georgia (2.2%, 95% CI 1.53-2.99) is based on analysis of a combined non weighted sample. There is no change observed from the previous national estimate of 3.0% (95% CI 2.20-4.04) defined by the 2012 IBBS study in six major cities in the Republic of Georgia [4].

The countries neighboring the Republic of Georgia report variable HIV prevalence rates among PWID. Turkey report a lower prevalence than the Republic of Georgia - 1.5% (2007) [10], although the latest data are almost a decade old and the data source was difficult to obtain. Armenia, Azerbaijan and Russia, data based on sero-surveillance studies, have higher prevalence estimates than the Republic of Georgia: Armenia 4%, (2014) [11], Azerbaijan 9.5%, (2011) [12], Russia 15.6%, (2009) [13]. Other Eastern European and Central Asian countries also report higher prevalence rates. Only Lithuania has low HIV prevalence - 3.2% (2014) [14]. The Central Asian countries Kyrgyzstan and Tajikistan report more than 10% among this key

population (2014) [15,16]. High HIV prevalence rates are reported by Ukraine about 20% (2014) [17], Belarus 25.1% (2015) [18] and Latvia 25.7% (2014) [19]. Sero-surveillance studies among PWID in Estonia report stable but very high prevalence estimates at around 50% (2010-2014) [20].

Based on a systematic review of Central and Eastern Europe and Central Asia literature, heroin is reported as the main drug in Central Europe [21]. Russia [22], Ukraine [23] and Moldova [24] report injection of homemade opioids alongside heroin. In the Republic of Georgia heroin is also a common drug among intravenous drug users. In our survey, 58.2% were injecting heroin, among those 26.3% were injecting heroin alongside other drugs. Another frequently used drug is desomorphine. This drug, known under the name “krokodil”, is a homemade opiate based drug and shows a high potential to cause dependence. It is used as a cheaper alternative to heroin. “Krokodil” is now widely spread in Russia, Ukraine and this drug is seen in European countries and USA [25,26]. Desomorphine was first captured by IBBS studies in 2009 and in 2012 and was mentioned as a most widespread injected drug [27]. The drug scene has changed dramatically in the Republic of Georgia over recent years in response to policy interventions such as legislative changes and enforcement measures against specific drugs. These interventions do not lead to the reduction of consumption but rather development of new sources of supply and increase use of other drugs [28] as a result of a switch from one drug to another by PWID. As expected in our analysis we did not observe any association between HIV infection and the type of drug, nor with the frequency of drug injection.

Duration of drug injection is a predictor of HIV infection possibly because the history of injecting drugs increases risk of potentially unsafe injections. In our study we looked at recent injection behavior and found that vast majority of PWID did not share needles or syringes last month (81.9%) or during their last injection (80.4%). Risky injection behavior was not a significant predictor of HIV infection; this can be explained by PWID shifting to safe injection behavior, and is also supported by the trend observed from the IBBS rounds since 2008 [4]. The recent evidence suggests that HIV risk is socially produced as individual HIV risk practices are shaped by the social context and environment [29]. In the Republic of Georgia the structural environment such as availability of needles and syringes in pharmacies is supportive of safe injection practice. Since the IBBS studies in 2002 and 2015 it has been reported that more than 90% of PWID

obtain injecting equipment from a drugstore when needed [30,31,4]. Moreover, there is an increased coverage of PWID by Needle and Syringe Programs – the number of syringes distributed per injecting drug user per year in the Republic of Georgia increased from 22.7 in 2012 to 80.3 in 2015 [32].

Published evidence suggests drug injection initiation at older age is associated with safer behavior [33,34] but our analysis shows that PWID who started injection at later age, are more at risk of HIV infection. This phenomenon is difficult to explain and requires further research.

Preventive program basic coverage is associated with HIV infection. We determine that program basic coverage has been achieved if a person is aware about HIV testing possibilities and has received at least one of the following: a condom, an injecting equipment, an informational material or qualified information on HIV/AIDS during last year. As it is not possible to determine when an HIV infection was acquired and considering that reach with preventive programs has increased during last year [4], we argue that persons, most likely, were infected prior to contact with the preventive program. Alarming is that about 70% of injecting drug users are still not reached by preventive interventions. Interestingly, in both bivariate and multivariate analyses PWID who were using condom consistently last month, or did not have sex were more at risk of HIV. The explanation for this could be that infected injecting drug users are more likely to be aware of their status and practice safe sex to protect their sexual partners. This is supported by association between knowledge about HIV status during last year and HIV positivity shown by bivariate analysis. The literature shows that the PWID are unlikely to use condoms in steady relationships [35,36]. In our study HIV positive PWID practice more safe sex than their negative counterparts, indicating that HIV infected individuals underwent effective counseling leading to protective sexual behavior. Such a pattern has been described in the literature [37].

The findings should be viewed in light of several limitations. The analyzed data were collected using the RDS methodology in only seven cities in the Republic of Georgia and thus its findings should be generalized with caution. The study did not include 15-17 year-olds, due to age restriction. In addition female injecting drug users were not adequately enrolled due to social stigma. PWID with high economic status were not represented in the study. Recall and reporting bias might exist, as these biases are common to all face-to-face interviews, although the survey anonymity should

have minimized reporting bias. Given the cross-sectional nature of the study design we are not able to determine the causality between phenomena.

Conclusion

It is very important to keep HIV prevalence at a very low level and prevent any increase in transmission. Our study has shown that HIV positive PWID are more likely to have protected sex with their partners which reflects effective preventive interventions. While increase in the coverage of harm reduction programs was observed, the majority of injecting drug users are still not reached with these interventions. Changing environment may present additional challenges for harm reduction and current safe practices may change if not continuously supported by innovative HIV prevention programming.

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Authors' contribution

NSh and ICh conceptualized the research and drafted the manuscript. NSh conducted statistical analysis and contributed to the paper. LS conducted a literature review. ICh and LS both reviewed the draft manuscript and contributed to finalization. All authors have read and approved the final manuscript.

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