JAIL POPULATION;
A SURVEY FOR HBV, HCV AND HIV INFECTIONS

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ABSTRACT…Objective: The infections with hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) are common among prisoners but such data are sparse from Pakistan; hence in this study, we evaluated the sero-prevalence of these three infections among Jail inmates. **Design:** Cross-sectional survey. **Setting:** Central Jail, Lahore**. Period:** May to November 2009. **Methodology:** Investigate the seroprevalence of HBV, HCV and HIV infections among the random population of sentenced inmates of Central Jail, Lahore. We examined 3062 jail inmates, 396 of them were females and 2666 males. Majority of the inmates were Pakistani national (97.06 %). All collected blood samples were tested for HIV antibodies, HBsAg, and anti-HCV antibodies with one step chromatographic immunoassay. **Results:** Sero-prevalence rate of HCV, HBV and HIV infections was 15.31%, 3.46 % and 1.79 % respectively. Overall prevalence of these infections in the jail inmates was 20.57 % and 18.77 % of them were positive for markers of viral hepatitis B/C. **Conclusions:** We evaluated that jail inmates in Pakistan had a high incidence of HCV, HBV and HIV infections. Regular testing is required to identify infected prisoners and refer them for appropriate treatment. In addition, general disease prevention efforts are needed to minimize transmission of these viral infections in this sub-population, before and after release.

Key words: Inmates, Central Jail, Lahore, Pakistan, Survey, HBV, HCV, HIV

INTRODUCTION

High prevalence of blood-borne viral infections - hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) in the prison system has been well documented globally[1-4]. The reported high prevalence of these three infections in jail inmates is largely attributed to sex and substance (drug) related risk behaviors practiced outside the jails, although transmission of these infections has also been documented inside jails[1-6]. Concerns exist that jails could serve as reservoirs that could amplify transmission of these viral infections in the general community as infected prisoners are released from jails[1,3,5]. Earlier studies of prisoners released from prison indicate that incarceration represents a sentinel event and that on release, relapse to risky behaviors occurs rapidly, increasing risk in the general community[1-6].

It is estimated that in US, about 2 million persons incarcerated in incarceration centers were disproportionately infected by HBV, HCV and HIV with prevalence of infection rate two to ten times higher than in the general population[1,3,6]. Injectable substance users in the general community have elevated rates of these three infections compared with the general population[6-8]. Injecting illegal substance, a known risk factor for these infections, has been reported in some studies to be present in as much as one third of convicts entering prison[1-6]. Of these infections identified in jails, about 80-90 % have been associated with pre-incarceration behaviors[3,6,9].

The purpose of this study was to estimate the prevalence of HBV, HCV and HIV infections among inmates of 'Central Jail' of Pakistan located in Lahore'. Estimating the prevalence of infection among jail inmates provides insight into burden of disease in jails and opportunities for preventing infection and disease.

SUBJECTS AND METHODS

Cross Sectional Survey

We conducted a cross-sectional study (screening and survey) of prisoners in Central Jail of Lahore, Pakistan; Fieldwork for the study was carried out between May 2009 and November 2009. The study was part of screening of inmates of different jails of Lahore for HBV, HCV and HIV infections as per direction of Government of the Punjab.

Study Population
The study was undertaken at Central Jail, Kot Lakhpat, Lahore, and study population comprised of 3062 randomly selected jail inmates (including new intake and continuously incarcerated). The exclusion criteria included violent, high risk and political prisoners.

PROCEDURES
Laboratory testing for HIV 1 and 2
Each serum sample was screened for HIV-1 and 2 using commercially available one step ICT test devices following the manufacturer's instructions. Reactive samples for HIV antibodies were rechecked with the rapid method of another manufacturer.

Laboratory tests for HBsAg and anti- HCV antibodies
All blood samples were tested for HBsAg and anti-HCV antibodies using commercially available one step chromatographic immunoassay system. All reactive sera were retested by ELISA for the presence of HBsAg and anti-HCV antibodies. MONOLISA HBsAg Ultra (Bio-Rad, France) kit was used for HBsAg. Similarly, antibodies to HCV were detected using Ortho HCV 3.0- ELISA Test System Enhanced SAVE (sample addition verification), according to the manufacturer's instructions.

Initially reactive sera for HIV, HBV and HCV markers were retested and only those repeatedly positive were included in the study.

All testing was performed by trained laboratory personnel at the Pathology department of Services Hospital, Lahore; a tertiary care teaching hospital affiliated with the Services Institute of Medical Sciences, Lahore.

Statistical analysis
Comparisons of age and sex were based on the t-test for continuous data and chi-square (X^2) test with Yates correction for categorical data. Analysis was conducted using SPSS version 15. Significance level was accepted at $p < 0.05$.

RESULTS
A total of 3062 jail inmates including 396 females and 2666 males were tested (Table I). The youngest jail inmate screened was a 12 years old female and the oldest one was 85 years old male. The median age was 29 ± 12.06 years. In relation to age, inmates were divided in six groups as shown in Table II.

Nationality: Among jail inmates, 97.06 % (2972/3062) were Pakistani national and rest (90/3062) were foreigners including Afghans, Africans, Indians and others.

Altogether 20.57 % (630/3062) jail inmates had positive results for one or more of the pathogens and 18.77 % (575/3062) of them were positive for some markers for viral hepatitis. Prevalence of antibodies to HBV, HCV and HIV are summarized in Table I and 2. Prevalence of antibodies to HCV was the highest (15. 31 %), followed by HBsAg (3.46 %) and HIV (1.79 %).

Male inmate population was highly positive for all of these infections as compared to women prisoners- $p < 0.001$. (Table I) Three female inmates were found HIV positive; two of them belonged to one of the African country. The most affected age groups were 21- 30 and 31- 40 years. However, maximum prevalence of HBV, HCV and HIV infections was noted in the age group 21-

Table-I. Sex distribution and their association with HBV, HCV and HIV sero-positivity among jail inmates of Central Jail, Lahore.

Sex	Total (n=3062)		HBV +ve		HCV +ve		HIV +ve	
	N	%	N	%	N	%	N	%
Male	2666	87.06	94	3.06	422	13.78	52	1.69
Female	396	12.93	12	0.39	47	1.53	03	0.09
Total	3062	100	106	3.46	469	15.31	55	1.79

Table-II. Age group distribution of jail inmates and their association with HBV, HCV and HIV sero-positivity

Age groups (years)	Total (n=3062)		HBV +ve		HCV +ve		HIV +ve	
	N	%	N	%	N	%	N	%
≤ 20	301	9.83	11	0.35	22	0.71	01	0.03
21-30	1510	49.31	49	1.60	216	7.05	33	1.07
31-40	738	24.10	23	0.75	129	4.21	15	0.48
41-50	323	10.54	13	0.42	72	2.35	05	0.16
51-60	125	4.08	07	0.22	20	0.65	01	0.03
≥61	65	2.12	03	0.09	10	0.32	-	-
Total	3062	100	106	3.46	469	15.31	55	1.79

30 years as compared to other groups- $p < 0.001$. (Table II)

DISCUSSION

High prevalence's of HCV infection (15.31 %), HBV infection (3.46 %), and HIV infection (1.79 %) were estimated in the inmates of Lahore central jail. We observed that the prevalence of HBV infection in the inmates was higher than the blood donors and general population[10-12] but lower than the IDU's and other jail inmates in Pakistan[13-14]. Whereas HCV infection rate was variably comparable to those of the general population,[10-11] but higher than the blood donors and prisoners[12-13] and lower than that reported in the IDUs in Pakistan[14]. However, both of these infections were significantly lower than those reported from other incarceration centers of the world[15-17]. HIV infection in our study population was significantly higher than that reported in selected groups (blood donors, health workers) and prisoners[18-20] but much lower than those observed in the IDU's in Pakistan and other prisons of the world[14-17,20]. Limited prevalence data for blood born infections and sexually transmitted diseases exist for prisoners in Pakistan.

The high prevalence of HIV, HCV and HBV infections among prisoners has been reported from many developed and under developed countries including: USA 1.8- 6.6 % for HIV, 20.2- 25.2 % for HBV, and 23.1-29.7 % for HCV,[8,15] Canada: HIV infection was 2.3 % and 8.8 % among male and female inmates and prevalence of HCV infection was 16.6 % and 29.2 %, respectively[2]. Italy (HIV 7.5 %, HCV 38.0 %, anti-HBc 52.7 % & HBsAg 6.7 %),[16] Ghana (Africa)- HIV 19.2 %, HBsAg 17.4 %, and HCV 19.2 %,[17]. Mexico (HBcAb, HBsAg, HCV and HIV were 4.4, 0.0, 10.0 and 0.6 % respectively),[21] and in Ireland 37 % of prisoners had antibodies to HCV, 9 % to anti- HBc, and 2 % to HIV[22]. The prevalence of HBV infection is lowest in Mexico,[21] and highest in Italy and USA[15,16]. The lowest prevalence rate of HCV infection has been reported from Mexico and highest from many countries including USA, Canada and Italy[2,9,15-17,21-22]. Similarly, HIV prevalence is lowest in Mexico and highest in USA and Ghana[9,15,17,21]. The data indicate a higher prevalence of these infections in incarceration centers, suggesting their probable transmission in prison through injectable substance use and un-natural/un-protected sex[15-17,21-22].

The higher HBV, HCV and HIV sero-positivity in inmates than among the general population was probably due to the higher proportion of individuals with a prior history of injectable substance use and high-risk sexual behaviors amongst the former group[2,9,23-25]. This has important implications for the monitoring and control of these infections in the rest of the society, as most persons sent to jail remain in prison for relatively short periods then become part of the general population again and might be 'potential reservoirs' for the dissemination of these infections[1-3]. The lower socioeconomic and educational

status of the prisoners and the poor conditions prevailing at the jail, may have also contributed to the higher prevalence in the prisoners for most of the infections[1,3,5,17,21].

This survey was not designed to provide direct evidence of transmission of infectious diseases in prison, but its results suggest that greater provision of measures to reduce harm in jails are needed. The significantly higher seroprevalence of these infections seen in the 'Central Jail of Lahore' may be attributable to the fact that this jail has a much larger prisoner population (over 5000), with more overcrowding. The restrictive nature of the jail environment, the non-availability of clean/sterilized syringes and un-natural sex among men probably heightens the hazards associated with high-risk activities. Jail inmates, therefore, constitute a high-risk group for HBV, HCV and HIV infections and routine screening, counseling, HBV vaccination and treatment are recommended.

Some limitations of our study should be considered. Firstly, the study dealt with only one prison having prisoners from all over the country but our results cannot be extended to the entire incarcerated population, in particular those with shorter sentences. Rates of injectable substance use and sex within jail are difficult to estimate. Religious beliefs and security problems of the jail are a hindrance for prisoners to respond correctly to the questions about injection substance used and sex behavior patterns. Therefore we excluded these risk factors from our statistical analysis. Furthermore, financial constraints did not permit confirmation of reactive blood samples by Western blot and PCR system.

The major finding of this study was the high frequency of blood borne viral infections – HCV, HBV and HIV- among inmates. This is a cause for continuing public health concern because the incarcerated represent an extremely important segment of the community, especially with regard to communicable diseases. It is further observed that there are inadequate medical facilities and staff in the Lahore Jail and access to appropriate health care outside the prison system is very difficult for the inmates. Health care facilities must include screening programs in jails. Coupling education with testing will increase the effectiveness of counseling, regardless of the HIV, HCV and HBV test results and will help to limit further transmission of these infections, within and outside the jail[1,6,9,23].

CONCLUSIONS

The findings of our study indicate a high prevalence rate of HCV, HBV and HIV infections and that about a fifth of population of Lahore Central jail has been infected with either of these infections. In view of the observed high prevalence, regular testing for HIV, HBV and HCV antibodies in jails is recommended to identify those already infected and in need of specific health care. Preventing interventions will help to limit further transmission of these infections, within and outside the jail. Ignoring the problem will simply cause it to worsen exponentially.

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