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Original Research Article

Blood borne viral infections in adolescents of East Sikkim, Northeast India: serological prevalence and risk behaviour correlation

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ABSTRACT

Background: There is a high prevalence of HIV infection in adolescents of India, especially the north eastern states but awareness on blood borne viral infections among them is poor.
Methods: Four hundred and ninety students aged thirteen to nineteen from seven schools and seven colleges of East Sikkim were interviewed on behavior related to transmission of blood borne viral infections and their blood was tested for Hepatitis B surface antigen, anti-Human Immunodeficiency virus and Hepatitis C virus antibodies.
Results: None of the students tested positive for anti-Human Immunodeficiency virus and Hepatitis C virus antibodies and only one tested positive for Hepatitis B surface antigen. 6.7% of students gave history of heterosexual relationship.
Conclusions: Despite the presence of behaviors associated with risk of acquiring blood borne viral infections in our adolescents we found a low prevalence of these infections, hence there is a need to do similar studies involving more and different cohort of adolescents.

Keywords: Adolescents, Blood borne viral infections, Risky behaviours, Seroprevalence

INTRODUCTION

Adolescents constitute about one fifth of India's population and plays a major role in determining the future growth pattern of India's population and economy.[1] The social taboos often surrounding puberty in India, lack of sex education, poor adolescent support system and health services especially in the difficult terrains of India increases the vulnerability of adolescents of this region to blood borne viral infections like Human immunodeficiency Viruses (HIV), Hepatitis B and C viruses (HBV and HCV).[2] Sikkim, an erstwhile monarchy, situated in the Himalayas annexed to India in 1975 shares international boundaries with China, Nepal, and Bhutan and has four administrative districts East, West, North, and South. Sikkim is situated in the North eastern region of India where there is HIV epidemic strongly linked to Injecting Drug Users (IDU).[3] There are limited scientific studies from Sikkim on blood borne viral infections in adolescents and their determinants. Therefore a behavioural survey and cross-sectional HIV, HBV and HCV seroprevalence analysis of adolescents in the most populous region of Sikkim was carried out.

METHODS

This study was a prospective, descriptive study conducted in seven schools and seven colleges of East district of Sikkim. As per the Census 2011, the population of Sikkim was 607,688 and that of East district with the population of 281,293 (46%) was the highest, hence East district was selected.[4] The study was conducted during

the period of August 2012 to August 2013. Adolescents belonging to age group of thirteen and nineteen years studying in the seventh to twelfth standard and first year of college were included in this study. Seven schools with classes till twelve and seven colleges were selected randomly from the official list of schools and colleges in the East district of Sikkim. Ten students from each standard and first year of college were included so as to have an adequate representative of the target age group children of East Sikkim. After taking approval from Human Resource Development Department, Health Human Services, and Family Welfare Department, Government of Sikkim and Research protocol evaluation committee, Institute Ethics committee, Sikkim Manipal Institute of Medical Sciences, the study was commenced. The study was conducted in three phases with three visits to the selected schools and colleges. In the first phase the head of the institutions, the faculty and the concerned students were explained the nature and importance of the study in simple language. A copy of the attendance registers of the concerned standards were taken from the office of the institutions for preparing a randomized list of students. After which a list of students was drawn from the attendance register using table of random numbers. During the second phase we visited the concerned classes, explained to the students that they would be taking part in the study voluntarily and the researchers would not force any of the students to take part in the study. The students were reassured that they would be assigned with a code number and their identity would be kept confidential and the report generated would be used only for research work. The students as per the randomization list were inquired about their willingness to participate. If a student included in the randomization list refused to take part in the study, the next student in the list was included. The age of the students were verified from the school documents. Those eligible students who were given an informed written consent forms to get consent from their guardians were called from their classes. After an informal introduction, each of them was assigned with a code number for identification. All the participating students were interviewed by counsellors trained and authorized by the Sikkim State AIDS Control Society (SSACS), a state level body of the National AIDS Control Organization (NACO). Pre-test counselling was performed for every individual wherein the option to go through a test for HIV was explained to the student and informed written consent was obtained. Specific information about personal risks, details about risk behavior, and modalities for prevention, HIV testing procedures, their limitations, and the interpretation were discussed in length. The students were then handed over a questionnaire on behavioral patterns pertaining to risk of acquiring blood borne viral infections. The questionnaire was explained in simple language to the students and they were allowed to clarify their doubts. While filling the questionnaire, they were asked to refrain from filling their name and personal data. The students were provided help if needed while answering it and then collected after completion. After which five milliliter of blood from the participants were collected using sterile disposable needle and syringes taking universal precautions. The used needles were immediately destroyed. All the used needles were discarded in a puncture proof container treated with one per cent sodium hypochlorite solution and then were disposed in sharp pits which were well covered and not accessible to rag pickers for re-use. The serum was separated from the blood samples and tested for anti-HIV antibodies, HbsAg and anti-HCV antibody. Anti-HIV antibodies in the serum sample was tested by a rapid test based on the principle of immunochromatography (SDHIV-1/2 Test), if any of the sample were reactive by rapid HIV test (immunochromatography), the samples were tested further by Coombs AIDS test and ELISA. Presence of HbsAg in the serum sample was tested by a rapid test based on the principle of immunochromatography (SDHBsAg Test). Presence of anti-HCV antibody in the serum sample was detected by a fourth generation ELISA kit. The data so generated was maintained in a register according to code number, age, sex and results of the serological tests.

The results and data were entered into Microsoft Excel 2010 and analyzed using descriptive statistics as mean, standard deviation, frequency distribution tables, and percentages.

RESULTS

Four hundred and ninety adolescent students aged thirteen to nineteen years participated in the study. The mean age of the students was 16.96 years with standard deviation of 4.9. Out of the 490 participating students 275(56.12%) were females (Table 1).

Table 1: Age and sex distribution of students.

Age (in years)	Male	Female	Total no of students (%)
13	8	23	31(6.33%)
14	16	19	35(7.14%)
15	16	35	51(10.41%)
16	26	41	67(13.67%)
17	30	39	69(14.08%)
18	50	48	98(20.00%)
19	69	70	139(28.37%)
Total	215(43.88%)	275 (56.12 %)	490

Out of these students, hundred students (20.4%) consisting of seventy eight boys and twenty two girls had consumed alcohol but none of them gave history of sexual contact under the influence of alcohol intoxication. None of the students had used addictive drugs both in oral and intravenous forms. In this group of students, twelve students had received blood transfusion and ninety two students had performed tattoos or body piercing in an unsterile setting.

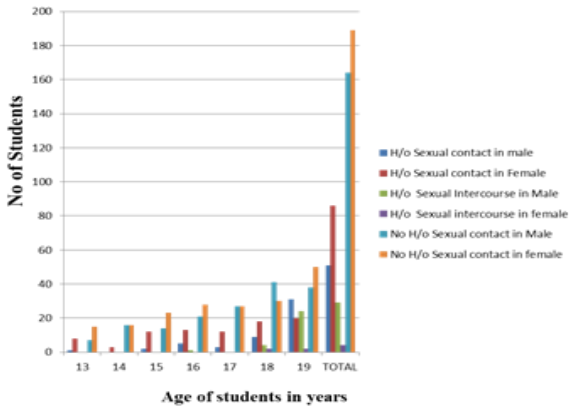

Figure 1: Sexual contact pattern of students in relation to age and sex.

Sexual contact in our study was defined as history of either having had touched private parts, kissed, oral sex or sexual intercourse with the opposite or same gender. One hundred and twenty-seven students (25.91%) gave history of sexual contact, out of which eighty-four were females. Thirty-three students (6.7%) gave history of sexual intercourse, out of which twenty-nine were boys (Figure 1).

Thirteen students gave history of multiple sexual partners at different periods of life but none had multiple sexual partners during any given period. All students with multiple sexual partners were eighteen or nineteen years of age and majority of them were males. The mean age at first sexual intercourse was 16.27 years with standard deviation of 2.11 with a range of 11 to 19 year (Figure 2).

Table 2: Knowledge pattern of students regarding HIV and STD infections in relation to age and sex.

Age (in years)	Male knowing only about HIV	Female Knowing only about HIV	Male knowing about both HIV and STDs	Female knowing about both HIV and STDs	Male not knowing about both HIV and STDs	Female not knowing about both HIV and STDs
13	3	13	0	0	5	10
14	11	13	0	2	5	4
15	8	27	0	5	7	4
16	15	27	7	8	4	6
17	22	34	5	5	3	0
18	45	35	6	8	0	4
19	48	51	20	17	1	2
Total	**152(70.7%)**	**200(72.73%)**	**38(17.67%)**	**45(16.36%)**	**25(11.63%)**	**30(10.91%)**

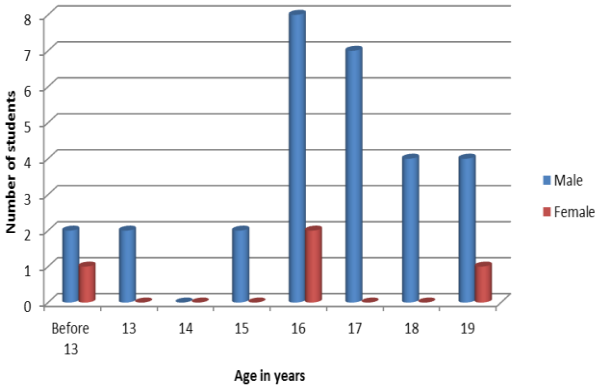

Figure 2: Age of students at their first sexual intercourse.

Out of the thirty-three students who had sexual intercourse only sixteen of them had taken protective measures. All the four girls took no protective measures while having sexual intercourse. Three hundred and fifty-two students (71.84%) had knowledge of HIV infection only and eighty-three students (16.94%) had knowledge of both sexually transmitted HIV infections both (Table 2).

None of the students tested positive for anti-HIV and anti-HCV antibodies. Only one student tested positive for Hepatitis B surface antigen.

DISCUSSION

This study is a cross-sectional analysis of seroprevalence of blood borne viral infection and associated behavioral risk factors among thirteen to nineteen years aged adolescents of East Sikkim. As per the National Youth Policy of India adolescents are defined as those aged between thirteen and nineteen years.[5] According to a study of 2006 in US, only 5% of AIDS cases were adolescents although 15% of newly diagnosed HIV cases were adolescents. It was also estimated considering the mean incubation period of AIDS as eight to twelve years that15 to 20% of cases were acquired between thirteen and nineteen years.[6] Around 46000 girls and 49000 boys in India in the age group of 10- 19 years are infected with

HIV making it the tenth most affected countries with HIV in this age group according to United Nations International Children's Emergency Fund report.[7] As per the 2012 data given by Sikkim State AIDS Control Society (SSACS), out of 240 HIV cases ninety nine were in the age group of 20 to 29.[8] Adolescents are highly vulnerable for acquiring blood borne viral infections due to their risky behaviors.

In our study, none of the adolescents tested positive for HIV and Hepatitis C antibodies. One student tested positive for Hepatitis B surface antigen and the mode of transmission was found to be parent to child transmission. A community based study on prevalence of sexually transmitted diseases showed the highest prevalence of Hepatitis B surface antigen positivity of 32.7% in the fifteen to twenty year age group.[9] In a retrospective study done on 979 adolescents accessing the Integrated Counselling and Testing Centre (ICTC) at a premier tertiary institution of national importance in Delhi, 84 (8.6%) of them had tested positive for HIV.[10] As per most Indian studies in adolescents the most common risk behavior associated with HIV seropositivity was heterosexual promiscuous behavior followed by blood transmission and parent to child transmission.

In our study twelve students (2.4%) gave history of blood transfusion. A retrospective analysis of adolescents accessing the ICTC at a tertiary institution in Delhi revealed similar figures of 2.15% of adolescents having received blood products.[10] 18.78% of the participating adolescents had tattoos and body piercing done in an unsterile manner. According to United Nations Office on Drug and Crime (UNODC 2002) forty per cent of adolescents in India start taking drugs and fall victim to substance abuse between fifteen to twenty years.[11] The northeastern states of Manipur, Nagaland and Mizoram are now in a generalized HIV epidemic with a strong HIV and injecting drug user's link. Although Sikkim has recently reported 600 injecting drug users mostly in and around capital town of Gangtok situated in the East district of Sikkim, our study area.[3] None of our students gave history of injecting drug use although four students reported having seen their friends injecting drugs of abuse.

During adolescence sexual maturation leads to intimate physical relationships, unsafe sexual debut and experimentation especially in developing countries due to lack of sex education, increasing the risk of acquiring blood borne viral infections. In India, premarital sex is still considered a taboo socially but there is an increasing trend of sexual activities amongst unmarried adolescents. In our study, 13.48% of the boys and 1.5% of the girls had premarital sexual intercourse. Thirteen students out of the thirty-three had sexual partners at different periods but not at the same time. The sexual partners of our participating students were either their school friends or acquaintances. The results of some Indian studies on adolescent sexual behavior are given below for comparative analysis although the cohort of adolescents and the methodologies used in these studies were different from our study. In a study conducted among adolescents of college in Mumbai city 26% of male participants and 3% female participants had premarital sexual intercourse.[12] A study among adolescents in Pune by Sathe and Sathe reported 22% of boys and less than 5% of girls having had sexual intercourse and 13.9% of adolescent had engaged in sexual intercourse with commercial sex workers.[13] In another study among classes nine to twelve students of two schools in Pune. 6.31% males and 1.31% females reported having had experienced sexual intercourse and friends constituted the main sexual partners.[14] The mean age at first intercourse in above mentioned study was 15.25 years for boys and 16.66 years for girls which is similar to the mean age at first intercourse of 16.27 years in our study. An intervention study among adolescent boys of slums of Lucknow, a city in the largest state of India revealed 15 to 17% of youths having had premarital sexual activity, 3% of them having had intercourse with commercial sex workers, and 3% reported oral or anal sex with another male.[15] In our study none of our students had paid sex or casual sex with unknown partners. None of our students gave history of homosexual relationship or having had oral sex. In our study one hundred and fifty-two boys (70%) and two hundred girl students (72.7%) had knowledge about HIV and forty five girls (16.4%) and thirty eight boys (17.6%) had knowledge about both sexually transmitted diseases (STDs). Data collected by United Nations Children's Fund (UNICEF) in the year 2003 -2008 shows that only 36% of adolescent males and 20% females have accurate knowledge of HIV infection.[16] In our study we did not assess the comprehensiveness of the student's knowledge regarding HIV and STDs which may account for the difference in our findings. Out of the 490 students, 65% of the adolescents knew about protective measures against STDs and HIV but only sixteen of the thirty-three students (48%) who had sexual experiences took protective measures. This is similar to findings in a National Behavioral Surveillance Survey 2001 conducted among fifteen to twenty four years aged people only half of them report using condom in the last casual sex and consistent condom use is much lower.[17] The UNICEF study (2003-2008) revealed lower usage with only 37% of males and 22% of females using condoms.[16] It has been seen a higher level of knowledge about contraception do not always translate into a high level of contraceptive use. In India and Nepal, despite knowledge of contraception of more than 90%, only 10% of adolescents were found to be using any form of contraceptives similar to our study.[18]

CONCLUSION

Our study revealed a low seroprevalence of blood borne viral infections despite risky behaviours like unprotected sexual activity, multiple sexual partners, unsterile body piercings and tattooing in our adolescents. Hence there is

a need to educate our adolescents on mode of transmission of these infections and protective measures against acquiring these infections.

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