Research Article

PREVALENCE OF SYPHILIS AND HIV CO-INFECTION, THEIR ASSOCIATED RISK FACTORS IN HIGH RISK GROUP INDIVIDUALS PRESENTING TO A TERTIARY CARE CENTRE IN NORTH INDIA

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ABSTRACT

Background: Many studies showed importance of high risk behaviour in transmission of HIV and syphilis. Commercial sex workers and their buyers, men having sex with men, long distance drivers, intra-venous drug users, sexually transmitted infections/ reproductive tract infection (STI/RTI) patients are important population for HIV/syphilis. However, exact data on seropositivity of HIV/syphilis, their co-infection, proper information on basic characteristics and associated risk factors is unavailable in this population. Therefore this study was designed to assess seroprevalence of syphilis/HIV, their co-infection and associated risk factors among high risk group individuals.

Methods: High risk behaviour individuals attending integrated counselling and testing centre and STI/RTI clinic over one year were included in study. Their socio-demographic data, medical & sexual history, physical examination, VDRL test, *Treponema Pallidum* Haemagglutination (TPHA) test & ELISA for syphilis, EIA for HIV were done and results were analyzed using binary logistic regression methods.

Results: Total of 119 patients were enrolled. Seroprevalence of syphilis, HIV and their co-infection was 26.9%, 18.5% and 6.7% respectively. Prevalence varied largely among different high risk groups. In this study, subjects who started sexual intercourse before age of 16 years, had more than 3 sex partners and never use safer sex practices showed greater risk of infection. Persons who screened regularly for HIV/ STI and know HIV/ STI status of their partners had less chance of transmission of infection.

Conclusions: This study provides important information regarding prevalence, sexual practices and risk factors associated with syphilis/HIV among high risk behaviour individuals in north India.

INTRODUCTION

Good reproductive health is a state of absolute wellbeing in all matters concerning reproductive system, for which people must be educated and empowered to protect themselves from sexually transmitted infections (STIs). In developing countries, high prevalence of STIs results in significant productivity losses for individuals and communities, particularly where mass population is below 40 years of age. STIs have been more widely recognized since advent of Human Immunodeficiency Virus (HIV)/Acquired immunodeficiency syndrome (AIDS) epidemic and there is good evidence that control of STIs can reduce HIV transmission [1].

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Syphilis is a chronic systemic illness caused by spirochete *Treponema pallidum*, typically considered to be a sexually transmitted disease, it can also be transmitted in-utero and rarely by blood transfusion or non sexual contact [2,3]. Probably sexual behaviour that increases the risk for acquiring syphilis also increases the risk for HIV transmission [4]. Furthermore, ulcerations and inflammation caused by syphilis are implicated as the cofactors for acquiring HIV infection [5,6]. Recent data suggest that in presence of STIs, individuals are four to five times more likely to acquire HIV if exposed to the virus through sexual contact [7,8].

Persons with HIV infection acquired through sexual route should be tested for syphilis, as syphilis is a disease with broad range of manifestations and unusual clinical presentations, so specific laboratory diagnosis of syphilis is of great aid to management of these cases [9]. All sexually active persons with syphilis should be tested for HIV for better management

of the patients [10,11]. Life expectancy of patients with HIV has increased after better treatment facilities and the focus has now shifted to the management of concurrent illnesses such as syphilis which have the potential to increase long-term morbidity and mortality.

MATERIAL AND METHODS

A total of 119 patients of high risk group were enrolled in study who attended Integrated counselling and testing centre (ICTC) and STI/RTI clinic of Gandhi Memorial & Associated Hospital, affiliated to King George's Medical University (KGMU), Lucknow, India and gave consent for study over one year period (between August 2016 and July 2017). A preformed questionnaire was used to collect data regarding personal history, sexual history and subjects were clinically examined.

5ml of peripheral venous blood was collected from enrolled individuals under aseptic precautions and transported immediately to the serology laboratory, department of Microbiology, KGMU, Lucknow. In case immediate transportation is not possible, the samples were stored in a refrigerator (2-8ºC) at the site of collection. The blood allowed to clot and then centrifuged at 1500 rpm for 5 minutes.

All serum samples were tested for HIV I/II using EIA kit (supplied by State AIDS Control Society, Uttar Pradesh, India) as per National AIDS Control Organisation (NACO) guidelines. All serum samples, irrespective of HIV positive or negative tested for a VDRL (supplied by reference laboratory, Kolkata, India). TPHA for syphilis was performed on VDRL reactive samples while ELISA was performed on all samples by commercially available kit (OMEGA diagnostics ltd., Scotland, United Kingdom) using as manufacturer's protocol.

Statistical analysis

Data were summarized as Mean ± SD (standard deviation). Association between independent and dependent variables was done by chi-square (χ^2) test. A two-tailed p value less than 0.05 ($p<0.05$) was considered statistically significant. Analysis was performed on SPSS software (Windows version 17.0).

RESULTS

Socio-demographic characteristics

The socio-demographic characteristic showed that the age of patients ranged from 18-56 yrs with mean (± SD) 30.55 ± 8.95 yrs and median 28 yrs. Among patients, mostly 18-30 yrs aged (60.5%), males (81.5%), unmarried (58.8%), urban background (74.8%), educated (above high school) (49.6%), students (39.5%) and middle class socio-economic status (SES) (67.2%).

Risk group type & Sexual life profile- Among patients, the most prevalent risk group type were men having sex with men (MSM) (38.7%) and buyers of commercial sex workers (BCSW) (20.2%) accounting together 58.9%. Further, most of the patients stay away with their spouse/family (70.6%) and mostly had first sexual exposure at age > 16 yrs (58.8%). Moreover, 48.7% patients had ≥3 no. of sex partners.

Associated risk factors

Out of total (n=119), 47.9% patients had habit of alcohol consumption (occasional/ very often), 16.8% were used recreation drugs like amphetamine, ice, ketamine, sildenafil etc.; 14.3% never used safer sex practices (condom), 17.6% had recent history of travel, 45.4% had no hygiene practices, 73.1% never tested for HIV/STI in past and 89.1% did not know about partner's HIV/STI status.

Table 1 Association between socio-demographic profile with syphilis and HIV and their co-infections (n=119)

Characteristics	Syphilis				HIV				Syphilis + HIV			
	Negative (n=87) (%)	Positive (n=32) (%)	χ^2 value	p value	Negative (n=97) (%)	Positive (n=22) (%)	χ^2 value	p value	Negative (n=111) (%)	Positive (n=8) (%)	χ^2 value	p value
Age (yrs):												
18-30	51 (58.6)	21 (65.6)			59 (60.8)	13 (59.1)			67 (60.4)	5 (62.5)		
31-45	32 (36.8)	5 (15.6)	9.13	0.010	31 (32.0)	6 (27.3)	1.02	0.602	37 (33.3)	0 (0.0)	11.31	**0.003**
>45	4 (4.6)	6 (18.8)			7 (7.2)	3 (13.6)			7 (6.3)	3 (37.5)		
Sex:												
Female	13 (14.9)	6 (18.8)			12 (12.4)	7 (31.8)			17 (15.3)	2 (25.0)		
Male	71 (81.6)	26 (81.3)	1.32	0.518	82 (84.5)	15 (68.2)	5.52	0.063	91 (82.0)	6 (75.0)	0.70	0.705
Transgender	3 (3.4)	0 (0.0)			3 (3.1)	0 (0.0)			3 (2.7)	0 (0.0)		
Marital status:												
Married	36 (41.4)	13 (40.6)	0.01	0.941	38 (39.2)	11 (50.0)	0.87	0.352	44 (39.6)	5 (62.5)	1.61	0.204
Unmarried	51 (58.6)	19 (59.4)			59 (60.8)	11 (50.0)			67 (60.4)	3 (37.5)		
Residence:												
Rural	23 (26.4)	7 (21.9)	0.26	0.611	23 (23.7)	7 (31.8)	0.63	0.429	26 (23.4)	4 (50.0)	2.80	0.095
Urban	64 (73.6)	25 (78.1)			74 (76.3)	15 (68.2)			85 (76.6)	4 (50.0)		
Education:												
Illiterate	4 (4.6)	2 (6.3)			4 (4.1)	2 (9.1)			5 (4.5)	1 (12.5)		
Up to high school	37 (42.5)	17 (53.1)	1.41	0.493	43 (44.3)	11 (50.0)	1.41	0.493	49 (44.1)	5 (62.5)	2.55	0.280
Above high school	46 (52.9)	13 (40.6)			50 (51.5)	9 (40.9)			57 (51.4)	2 (25.0)		
Occupation:												
Student	34 (39.1)	13 (40.6)			44 (45.4)	3 (13.6)			46 (41.4)	1 (12.5)		
Unskilled worker	18 (20.7)	9 (28.1)	1.89	0.595	19 (19.6)	8 (36.4)	8.30	0.040	25 (22.5)	2 (25.0)	3.62	0.306
Skilled worker/Professional	15 (17.2)	6 (18.8)			15 (15.5)	6 (27.3)			18 (16.2)	3 (37.5)		
Business	20 (23.0)	4 (12.5)			19 (19.6)	5 (22.7)			22 (19.8)	2 (25.0)		
Socio-economic status:												
Upper/Upper middle	13 (14.9)	3 (9.4)			12 (12.4)	4 (18.2)			15 (13.5)	1 (12.5)		
Middle	62 (71.3)	18 (56.3)	6.45	0.040	70 (72.2)	10 (45.5)	6.41	0.041	77 (69.4)	3 (37.5)	5.31	0.070
Lower/Lower middle	12 (13.8)	11 (34.4)			15 (15.5)	8 (36.4)			19 (17.1)	4 (50.0)		

Chief complaints

Among enrolled patients the chief complaints were headache/muscle pain/joint pain (83.2%), fever (75.6%), rashes (44.5%), cough (22.7%), pain /erythma around genitalia (22.7%), weight loss (17.5%), urinary problem (19.3%), skin eruptions (5.0%), generalized weakness (31.9%) and lymphadenopathy (21.8%). Further, 7.5% had other complaints mostly alopecia (1.7%).

Diagnostic of disease

The VDRL, TPHA and ELISA tests were done for syphilis and TPHA positivity was considered indicative of syphilis. VDRL was reactive in 31.1% patients while 26.9% and 27.7% patients were positive by TPHA and ELISA respectively. HIV was tested by EIA test as recommended by NACO. HIV was positive in 18.5% patients.

The overall prevalence of co-infection (syphilis by TPHA and HIV by EIA) was 6.7%.

Association of Syphilis and HIV

Socio-demographic characteristics

The association between socio-demographic characteristics (or confounding variables) and disease (syphilis and HIV) was summarized in Table 1. On correlating, the χ^2 test showed significant (p<0.05) association of syphilis with age and socio-economic status (SES). HIV correlates significantly (p<0.05) with occupation and SES of patients. Conversely, co-infection of both (i.e. syphilis & HIV) was found associated significantly (p<0.01) to age.

Table 2 Association between risk group type and sexual life profile with syphilis and HIV and their co-infections (n=119)

Characteristics	Syphilis				HIV				Syphilis + HIV			
	Negative (n=87) (%)	Positive (n=32) (%)	χ^2 value	p value	Negative (n=97) (%)	Positive (n=22) (%)	χ^2 value	p value	Negative (n=111) (%)	Positive (n=8) (%)	χ^2 value	p value
Risk group type:												
BCSW	19 (21.8)	5 (15.6)			19 (19.6)	5 (22.7)			21 (18.9)	3 (37.5)		
CSW	10 (11.5)	2 (6.3)			6 (6.2)	6 (27.3)			11 (9.9)	1 (12.5)		
IVDU	11 (12.6)	0 (0.0)	15.07	0.010	6 (6.2)	5 (22.7)	21.88	0.001	11 (9.9)	0 (0.0)	14.08	0.015
LDD	5 (5.7)	5 (15.6)			7 (7.2)	3 (13.6)			7 (6.3)	3 (37.5)		
MSM	35 (40.2)	11 (34.4)			44 (45.4)	2 (9.1)			46 (41.4)	0 (0.0)		
RTI/STI Pt.	7 (8.0)	9 (28.1)			15 (15.5)	1 (4.5)			15 (13.5)	1 (12.5)		
Stay with spouse/family:												
Together	29 (33.3)	6 (18.8)	2.40	0.122	30 (30.9)	5 (22.7)	0.58	0.446	35 (31.5)	0 (0.0)	3.57	0.058
Away	58 (66.7)	26 (81.3)			67 (69.1)	17 (77.3)			76 (68.5)	8 (100.0)		
Age at first sexual exposure (yrs):												
≤16	20 (23.0)	29 (90.6)	44.19	<0.001	29 (29.9)	20 (90.9)	27.56	<0.001	41 (36.9)	8 (100.0)	12.25	<0.001
>16	67 (77.0)	3 (9.4)			68 (70.1)	2 (9.1)			70 (63.1)	0 (0.0)		
No. of sex partners:												
<3	58 (66.7)	3 (9.4)	30.74	<0.001	58 (59.3)	3 (13.6)	15.29	<0.001	61 (55.0)	0 (0.0)	9.02	0.003
≥3	29 (33.3)	29 (90.6)			39 (40.2)	19 (86.4)			50 (45.0)	8 (100.0)		

Table 3 Association between risk factor profile with syphilis and HIV and their co-infections (n=119)

Characteristics	Syphilis				HIV				Syphilis + HIV			
	Negative (n=87) (%)	Positive (n=32) (%)	χ^2 value	p value	Negative (n=97) (%)	Positive (n=22) (%)	χ^2 value	p value	Negative (n=111) (%)	Positive (n=8) (%)	χ^2 value	p value
H/o use of alcohol:												
No	46 (52.9)	16 (50.0)			51 (52.6)	11 (50.0)			59 (53.2)	3 (37.5)		
Occasional	27 (31.0)	10 (31.3)	0.14	0.934	33 (34.0)	4 (18.2)	5.09	0.079	35 (31.5)	2 (25.0)	2.64	0.267
Very often	14 (16.1)	6 (18.8)			13 (13.4)	7 (31.8)			17 (15.3)	3 (37.5)		
H/o use of recreational drugs:												
No	80 (92.0)	19 (59.4)	17.76	<0.001	83 (85.6)	16 (72.7)	2.11	0.146	95 (85.6)	4 (50.0)	6.76	0.009
Yes	7 (8.0)	13 (40.6)			14 (14.4)	6 (27.3)			16 (14.4)	4 (50.0)		
Use of safer sex practices (condom):												
Always	7 (8.0)	0 (0.0)			7 (7.2)	0 (0.0)			7 (6.3)	0 (0.0)		
Never	8 (9.2)	9 (28.1)	8.79	0.012	9 (9.3)	8 (36.4)	11.68	0.003	13 (11.7)	4 (50.0)	9.12	0.010
Sometimes	72 (82.8)	23 (71.9)			81 (83.5)	14 (63.6)			91 (82.0)	4 (50.0)		
Recent H/o travel:												
No	74 (85.1)	24 (75.0)	1.63	0.202	83 (85.6)	15 (68.2)	3.73	0.053	94 (84.7)	4 (50.0)	6.18	0.013
Yes	13 (14.9)	8 (25.0)			14 (14.4)	7 (31.8)			17 (15.3)	4 (50.0)		
Hygiene practices:												
No	38 (43.7)	16 (50.0)	0.38	0.539	39 (40.2)	15 (68.2)	5.66	0.017	48 (43.2)	6 (75.0)	3.04	0.081
Yes	49 (56.3)	16 (50.0)			58 (59.8)	7 (31.8)			63 (56.8)	2 (25.0)		
Tested for HIV/STI in past:												
No	57 (65.5)	30 (93.8)	9.49	0.002	65 (67.0)	22 (100.0)	9.93	0.002	79 (71.2)	8 (100.0)	3.16	0.076
Yes	30 (34.5)	2 (6.3)			32 (33.0)	0 (0.0)			32 (28.8)	0 (0.0)		
Partner's HIV/STI status:												
Known	13 (14.9)	0 (0.0)	5.37	0.021	13 (13.4)	0 (0.0)	3.31	0.069	13 (11.7)	0 (0.0)	1.05	0.305
Unknown	74 (85.1)	32 (100.0)			84 (86.6)	22 (100.0)			98 (88.3)	8 (100.0)		

Table 4 Association between chief complaints with syphilis and HIV and their co-infections (n=119)

Characteristics	Syphilis				HIV				Syphilis + HIV			
	Negative (n=87) (%)	Positive (n=32) (%)	χ^2 value	p value	Negative (n=97) (%)	Positive (n=22) (%)	χ^2 value	p value	Negative (n=111) (%)	Positive (n=8) (%)	χ^2 value	p value
Fever:												
No	21 (24.1)	8 (25.0)	0.01	0.923	23 (23.7)	6 (27.3)	0.12	0.725	28 (25.2)	1 (12.5)	0.66	0.418
Yes	66 (75.9)	24 (75.0)			74 (76.3)	16 (72.7)			83 (74.8)	7 (87.5)		
Headache/Muscle pain/Joint pain:												
No	17 (19.5)	3 (9.4)	1.73	0.189	15 (15.5)	5 (22.7)	0.68	0.411	19 (17.1)	1 (12.5)	0.11	0.736
Yes	70 (80.5)	29 (90.6)			82 (84.5)	17 (77.3)			92 (82.9)	7 (87.5)		
Rashes:												
No	54 (62.1)	12 (37.5)	5.72	0.017	55 (56.7)	11 (50.0)	0.33	0.568	61 (55.0)	5 (62.5)	0.17	0.678
Yes	33 (37.9)	20 (62.5)			42 (43.3)	11 (50.0)			50 (45.0)	3 (37.5)		
Cough:												
No	69 (79.3)	23 (71.9)	0.74	0.391	85 (87.6)	7 (31.8)	31.84	<0.001	89 (80.2)	3 (37.5)	7.75	0.005
Yes	18 (20.7)	9 (28.1)			12 (12.4)	15 (68.2)			22 (19.8)	5 (62.5)		
Pain/Erythema around genitalia:												
No	68 (78.2)	24 (75.0)	0.13	0.715	77 (79.4)	15 (68.2)	1.28	0.257	87 (78.4)	5 (62.5)	1.07	0.300
Yes	19 (21.8)	8 (25.0)			20 (20.6)	7 (31.8)			24 (21.6)	3 (37.5)		
Weight loss:												
No	74 (85.1)	24 (75.0)	1.63	0.202	89 (91.8)	9 (40.9)	31.90	<0.001	93 (83.8)	5 (62.5)	2.33	0.127
Yes	13 (14.9)	8 (25.0)			8 (8.2)	13 (59.1)			18 (16.2)	3 (37.5)		
Urinary problem:												
No	72 (82.8)	24 (75.0)	0.90	0.342	81 (83.5)	15 (68.2)	2.70	0.100	92 (82.9)	4 (50.0)	5.18	0.023
Yes	15 (17.2)	8 (25.0)			16 (16.5)	7 (31.8)			19 (17.1)	4 (50.0)		
Skin eruptions:												
No	87 (100.0)	26 (81.3)	17.18	<0.001	93 (95.9)	20 (90.9)	0.92	0.336	107 (96.4)	6 (75.0)	7.14	0.008
Yes	0 (0.0)	6 (18.8)			4 (4.1)	2 (9.1)			4 (3.6)	2 (25.0)		
Generalized weakness:												
No	60 (69.0)	21 (65.6)	0.12	0.729	67 (69.1)	14 (63.6)	0.24	0.621	77 (69.4)	4 (50.0)	1.29	0.256
Yes	27 (31.0)	11 (34.4)			30 (30.9)	8 (36.4)			34 (30.6)	4 (50.0)		
Lymphadenopathy:												
No	73 (83.9)	20 (62.5)	6.28	0.012	77 (79.4)	16 (72.7)	0.47	0.495	89 (80.2)	4 (50.0)	3.98	0.046
Yes	14 (16.1)	12 (37.5)			20 (20.6)	6 (27.3)			22 (19.8)	4 (50.0)		
Other complaints:												
None	82 (94.3)	28 (87.5)	12.8	0.118	89 (91.8)	21 (95.5)	2.93	0.939	103 (92.8)	7 (87.5)	6.40	0.591
Patchy alopecia	0 (0.0)	1 (3.1)			1 (1.0)	0 (0.0)			1 (0.9)	0 (0.0)		
Alopecia	0 (0.0)	2 (6.3)			1 (1.0)	0 (0.0)			1 (0.9)	1 (12.5)		
Bleeding per rectum	1 (1.1)	0 (0.0)			1 (1.0)	1 (4.5)			1 (0.9)	0 (0.0)		
Dyspnea	0 (0.0)	1 (3.1)			1 (1.0)	0 (0.0)			1 (0.9)	0 (0.0)		
Jaundice	1 (1.1)	0 (0.0)			1 (1.0)	0 (0.0)			1 (0.9)	0 (0.0)		
Nodule formation over scrotal region	1 (1.1)	0 (0.0)			1 (1.0)	0 (0.0)			1 (0.9)	0 (0.0)		
Pain in peri-anal region	1 (1.1)	0 (0.0)			1 (1.0)	0 (0.0)			1 (0.9)	0 (0.0)		
Tear in anus, Jaundice						0 (0.0)			1 (0.9)			

Risk group type & sexual life profile

The association between risk group type and sexual life profile with syphilis and HIV was summarized in Table 2. The χ^2 test showed significant (p<0.05) association of syphilis with risk group type, age at first sexual exposure and number of sex partners.

HIV also showed significant (p<0.05) association with risk group type, age at first sexual exposure and number of sex partners. Moreover, co-infection also showed significant (p<0.05) association with risk group type, age at first sexual exposure and number of sex partners but not (p>0.05) correlate well with stay with spouse/family.

Associated risk factor profile

The association between associated risk factor profile and disease was summarized in Table 3. The χ^2 test showed significant (p<0.05) association of syphilis with h/o use of recreation drugs, use of safer sex practices and partner's HIV/STI status.

A less percentage of HIV patients were found in subjects with use of safer sex practices, hygiene practices and tested for HIV/STI in past (p<0.05).

Conversely, co-infection of both was found significantly (p<0.05) associated to h/o use of recreation drugs, use of safer sex practices and recent h/o travel.

Chief complaints

The association between chief complaints and disease was summarized in Table 4. The χ^2 test showed significant (p<0.05) association of syphilis with rashes, skin eruption and lymphadenopathy. In contrast, HIV showed significant (p<0.001) association with cough and weight loss. Conversely, co-infection of both was found significantly (p<0.05) associated to cough, urinary problem, skin eruption and lymphadenopathy.

Local lesion/ulcer & discharge profile

The association between lesion/ulcer and discharge profile with disease was summarized in Table 5.

Table 5 Association between local lesion/ulcer and discharge profile with syphilis and HIV and their co-infections (n=119)

Characteristics	Syphilis				HIV				Syphilis + HIV			
	Negative (n=87) (%)	Positive (n=32) (%)	χ^2 value	p value	Negative (n=97) (%)	Positive (n=22) (%)	χ^2 value	p value	Negative (n=111) (%)	Positive (n=8) (%)	χ^2 value	p value
H/o genital lesions/ulcers:												
No	66 (75.9)	3 (9.4)	42.45	<0.001	65 (67.0)	4 (18.2)	17.55	<0.001	69 (62.2)	0 (0.0)	11.84	0.001
Yes	21 (24.1)	29 (90.6)			32 (33.0)	18 (81.8)			42 (37.8)	8 (100.0)		
Genital lesions/ulcers on examination:												
No	87 (100.0)	27 (84.4)	14.19	<0.001	95 (97.9)	19 (86.4)	5.97	0.015	108 (97.3)	6 (75.0)	9.22	0.002
Yes	0 (0.0)	5 (15.6)			2 (2.1)	3 (13.6)			3 (2.7)	2 (25.0)		
H/o cervical/urethral discharge:												
No	75 (86.2)	17 (53.1)	14.60	<0.001	80 (82.5)	12 (54.5)	7.97	0.005	87 (78.4)	5 (62.5)	1.07	0.300
Yes	12 (13.8)	15 (46.9)			17 (17.5)	10 (45.5)			24 (21.6)	3 (37.5)		
Discharge on examination:												
No	83 (95.4)	21 (65.6)	18.83	<0.001	85 (87.6)	19 (86.4)	0.03	0.872	98 (88.3)	6 (75.0)	1.20	0.274
Yes	4 (4.6)	11 (34.4)			12 (12.4)	3 (13.6)			13 (11.7)	2 (25.0)		

Abbreviations-

AIDS: Acquired Immunodeficiency Syndrome;BCSW:buyers of commercial Sex worker;

CDC: Centre for disease control and prevention;CSW: Commercial sex workers;

ELISA or EIA: Enzyme-Linked Immuno-Sorbent Assay;FSW: Female sex worker;

GUD: Genital ulcer disease; HIV: Human immunodeficiency virus;IVDU: Intra-venous drug users; LDD :long distance drivers; MSM: Men having sex with men; OPD: Outpatient Department;

RPR: Rapidplasma regain ; RTI: Reproductive tract infections; STI: Sexually Transmitted Infection;

TPHA: Treponema pallidum haemagglutination assay;VDRL: Venereal Diseases Research Laboratory; WHO: World Health Organization,

The χ^2 test showed significant (p<0.001) association of syphilis with all the lesion/ulcer and discharge profile (H/o genital lesions/ulcers, genital lesions/ulcers on examination, H/o cervical/urethral discharge and discharge on examination).

In contrast, HIV did not (p>0.05) showed significant association with lesion/ulcer and discharge profile except discharge on examination. Conversely, co-infection of both showed significant (p<0.01) association with both H/o genital lesions/ulcers and genital lesions/ulcers on examination.

DISCUSSION

There are scattered reports about prevalence of syphilis and HIV in India, which vary in different population groups of different regions of the country. Studies done in various parts of India, revealed a prevalence of syphilis in high risk individuals varying from 9.07 % in STI patients [12] to 21.9 % in long distance truck drivers [13]. Wide variations in prevalence suggest that no single set of estimates could apply in such a large and diverse country as India. Hence, prevalence rates for a particular area and group of patients need to be assessed, to help health administrator in providing better services for their treatment and control.

In present study overall prevalence of syphilis in high risk group individuals is found to be 26.9 %. Among different high risk groups it is highly fluctuating as in buyers of commercial sex workers (BCSW) it is found 20.8 %, among MSM prevalence is 23.9 %, among commercial sex workers(CSW) it is 16.6 % while in RTI/ STI patient prevalence is 56 % as 9 patients are found positive for syphilis out of 16 enrolled RTI/ STI patient.

Prevalence of syphilis in our study in various high risk groups is very close to prevalence (26.92%) found among MSM in New Delhi, India [14] and 29.8 % prevalence found among MSM in Shenzhen, China [15]. In commercial sex workers we found 16% prevalence which is almost same to prevalence (15%) found among female commercial sex workers in a study in china [16]. While in a study among STD clinic attendees in

north India (Aligarh), prevalence of syphilis was found to be 2.3% [17].

Prevalence among STI patients was 9.07% in a study in another place (Himachal Pradesh) of north India [12]. The possible explanation for the difference could be the difference in sub groups of population studies and the diagnostic test employed in addition to the region, gender, socio-economic factors and number of patients enrolled. In our study overall prevalence of HIV was 18.5 %. Prevalence was 20.8 % among BCSW, 45.8 % in IVDU (intra venous drug users) as 5 patients are found positive out of 11 enrolled IVDU patients, 30% in long distance drivers and 4.34 % among MSM while in RTI/ STI patient prevalence was 6.25 %. Prevalence of HIV among MSM in our study was exactly equal to the prevalence recorded by NACO in this group [18]. Prevalence of HIV varies from 0.25 % to 14.3% in different population and different states. As per NACO annual report 2016-2017 national prevalence among female sex workers is 2.2%, among MSM is 4.3%, among IVDU is 9.9% and among trans-genders it is 7.5 %. Our finding in STI group was consistent with the finding of Bhattar S. *et al*, in same group [19]. A study in China among MSM showed 24.2 % prevalence of HIV [15]. Another study showed 30.9 % prevalence of HIV among commercial sex workers (female) who used intra venous drugs, which is less than prevalence of our study [16]. Age is an important influencing factor. Most of the patients in study belonged to age group 18-30 years; which is period of maximal sexual activity and prevalence of syphilis is significantly associated with patient aged between 18 to 30 years. 65.6 % of syphilis positive patients fall in this age group, (p value= 0.010). Some other national and international studies among high risk group patients concluded the same fact[14,20]. Education is another significant characteristic for health improvement; however in our study we were unable to detect significant difference in prevalence of symptoms in patient with higher or lower education or in those who were illiterate. Being illiterate makes patients assailable to poor hygiene practices, unawareness regarding safer sex practices and poor treatment seeking behaviour. On the other hand,

similar prevalence rates in educated patients can be explained by the gap between knowledge and practice, they might be aware of various factors which can prevent STIs but their actual practices could have been different. In our study occupation is significantly associated with HIV (p value< 0.05). Unskilled workers and professionals were at more risk of getting HIV infection; this may be due to reason that commercial sex worker and transgender women were directly involved in selling sex and work as unskilled workers along with intra venous drug users. Professionals with a better economic level are thought to be more involved in buying commercial sex as per their job nature along with truck drivers. A study in Agra, India also showed same findings with high prevalence of HIV in unskilled workers [21]. In this study lower and lower middle class was significantly associated with prevalence of HIV and syphilis both (p value<0.05), as most of the CSWs, MSM belong to this strata and offered themselves in exchange of money or gift.

RTI/STI patients and long distance drivers had 3 times more positive percentage for syphilis (p value= 0.010) in our study though CSWs and IVDUs showed more risk of getting HIV infection (p value= 0.001). Individuals who had first intercourse before age of 16 years were more prone to have syphilis and HIV both (p value=< 0.001). A study in Brazil among MSM and transgender (TG) women also showed significant association of syphilis with patient who had first sexual intercourse on or before 15 years [22]. Individuals who had more than 3 sex partners were at high risk to have syphilis and HIV (p value=< 0.001). Similar results were shown in some other studies done in China and San Francisco among MSM and TG women [20,23].

Individuals who used recreational drugs like amphetamines, Ice, sildenafil/ tadalafil, tramadol showed more chances of getting syphilis (p value= <0.001). Another study in Brazil also showed results similar to our study [22]. Subjects who never use safer sex practices showed 3 times more prevalence of syphilis and 4 times more prevalence of HIV than those who always use safer sex practices (p value<0.005). Two times higher percentage of syphilis is found in MSM and TG women who had condomless intercourse in San Francisco [23]. A study in china also showed 3 times greater chances of syphilis infection among MSM who had unprotected anal intercourse [20].

Hygiene practices like cleaning genital area after intercourse or regularly was not followed by majority of patients in the study. Higher prevalence of STI among these patients indicates a role of life style and personal hygiene in the causation of STIs. Similar finding have been documented in a hospital based study in North India [24].

Persons who tested for HIV/ STI in past or screened regularly had 15 times less chance of getting infection and transmission to others (p value< 0.05). Similarly the individuals who know the HIV/ STI status of their partners showed 6 times less prevalence for both HIV and syphilis (p value< 0.05).

In this study when complaints of enrolled patient were evaluated, we find that rashes (p value= 0.017), skin eruptions (p value=< 0.001), lymph node enlargement (p value= 0.017) were significantly associated with syphilis while cough (p value= <0.001) and weight loss (p value= < 0.001) were significantly associated with HIV. Jain A *et al.* in their study also showed significant association of rashes and lymphadenopathy with syphilis [25]. Mahajan A. *et al.* in their study also showed significant association of weight loss, fever, cough and expectoration with HIV patients [26].

In our study, 50 patients had genital lesion in past, out of these 29 were positive for syphilis and 18 were positive for HIV (p value=< 0.05). A study in Brazil also reported significant association of syphilis with among MSM and TG women who had genital/ anal ulcers in last12 months [22]. In our study 5 patients had genital lesions/ ulcers on examination, all 5 had syphilis and out of these, 3 persons had HIV having almost 60% increased risk involved (p value= <0.05). Patients having history of cervical/ urethral discharge were almost 2 times more prone to have syphilis and HIV both (p value< 0.05). Patients who had discharge on examination, significantly associated with syphilis (p value= <0.05). In our study 15 patients had discharge on examination, out of these, 11 had syphilis and 3 had HIV with almost 20 % more risk. In our study overall prevalence of syphilis-HIV co-infection is 6.7% and 25 % of syphilis positive patients were also HIV positive. Same 6.7 % prevalence of co-infection was reported in a study among HIV patients in South India [27]. Sadia Khan *et al* in her study also showed that 6.5% of diagnosed HIV patients were positive for syphilis [28]. A study in Aligarh, India also reported that 21.5% of sero positive syphilis cases were also HIV infected [17]. Similar 23%, HIV- syphilis co-prevalence rates were seen in a population based study in Andhra Pradesh, India [29]. A study among Bangladeshi HIV positive patients showed 13.55 % prevalence of syphilis infection [30].

Mixed infections were also observed in the study. A number of mechanisms operate in co-infections; infection with one pathogen may increase the probability of acquiring another pathogen as well as alter the natural history of another. Empirical data on prevalence of such co-infections are limited in developing countries like India; conclusively we need to look upon it acutely. In India, high risk group individuals are reluctant to seek investigation and treatment because of lack of privacy and better health care facility, the cost of treatment and their subordinate social status.

CONCLUSION

There is a need to educate these high risk group individuals about the symptoms of syphilis/ HIV, their prevention, and the importance of timely diagnosis and treatment. This study provides information regarding the prevalence of syphilis, HIV and their co-infection with associated risk factors. This prevalence data along with information about other associated risk factors in patients of high risk group for a particular geographical area will be useful for future surveillance studies and diagnosis of the patients to reduce morbidity and their consequences.

Limitations to the study were that only syphilis and HIV were included in study; and it is a hospital based observational study which included only those patients who were referred to our centre, thus the results could not be applied to general population.

Ethics approval and consent to participate

The study protocol was approved by Institutional Ethics Committee of King George's Medical University, Lucknow, India.

All interviews were done with full privacy and confidentiality of the participants and voluntary informed consent was obtained fromparticipants.

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