

## Original Article

# Prevalence of Sexually Transmitted Diseases and Transmission of HIV in Dhaka, Bangladesh

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### Abstract

The prevalence of sexually transmitted diseases (STDs) among patients attending out patients department of Skin and Venereal diseases of Dhaka Medical College Hospital, Dhaka and Shahid Sohrawardy Hospital, Dhaka was studied. A total of 230 patients were enrolled in the study during the period of July, 2006 to May, 2007. Urethral and endocervical swabs were collected from the participants for detection of *Neisseria gonorrhoeae* (by culture), *Chlamydia trachomatis* (by immunochromatography) and blood samples for the detection of *Treponema pallidum* antibody (by rapid plasma regain and *Treponema pallidum* haemagglutination assay), Herpes simplex virus type 2 antibody (both IgM and IgG by enzyme linked immunosorbent assay) and Human Immunodeficiency virus antibody (by enzyme linked immunosorbent assay). Socio-demographic data and data regarding high-risk sexual behavior were also collected. Out of 230 participants, 199 (86.5%) were positive for STDs pathogens studied, among them, 98 (42.6%) were infected with single pathogen and 101 (43.9%) were suffering from multiple infections. The prevalences of *N. gonorrhoeae*, *C. trachomatis*, *T. pallidum*, and HSV type 2 were 90 (39.1%), 110 (47.8%), 28 (12.2%) and 88 (38.2%) respectively. However, none of them were positive for HIV infection. Use of condom was significantly associated with protection of the participants against STDs.

**Keywords:** Sexually Transmitted Diseases, *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Treponema pallidum*, Herpes simplex virus type-2, Human Immunodeficiency virus

### Introduction

Sexually transmitted diseases (STDs) are becoming a major public health problem because of rapid change in range and patterns of diseases. This is mainly due to emergence of multi-drug resistant microorganisms and Human Immunodeficiency Virus (HIV).<sup>1,2</sup> The worldwide incidence of major bacterial and viral STDs is estimated about 125

million cases per year. In industrialized countries, second generation STDs like *Chlamydia trachomatis* infection, Genital herpes, Human papilloma virus and HIV infection are more prevalent than that of classical bacterial STDs. But both groups create major health problems in most of the developing countries.<sup>3</sup>

The STDs presenting with genital ulceration are more common in developing countries than in developed countries. During 1985, genital ulcer was detected in 5% of STD clinic attendees in North America and 20% to 70% in Africa and Asia.<sup>4</sup> A study showed that the prevalence of Syphilitic infection among commercial sex workers (CSWs) in Gambia

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and Kenya were 71% and 53% respectively.<sup>5,6</sup> Different studies in Bangladesh on prevalence of Syphilis showed that it was 12%, 8.5% and 32.6% among symptomatic patients, hotel-based sex workers, and street-based sex workers respectively.<sup>7-9</sup> Prevalence of genital herpes caused by Herpes simplex virus type 2 in North American and European population ranges from 5 to 24 per 100 people.<sup>10</sup> In Bangladesh, prevalence of HSV-2 infection in hotel and street-based sex workers was 34.5% and 62.5% respectively.<sup>8,9</sup> During 1990s, prevalence of *Neisseria gonorrhoeae* infection among female sex workers in Japan was 32.8%.<sup>11</sup> A study, carried out in Bangladesh among CSWs during 1997 showed 42% infected with *N. gonorrhoeae* and many of the isolates were multi-drug resistant.<sup>2</sup> Other studies observed that the prevalence of *N. gonorrhoeae* infection among hotel- and street-based sex workers was 35.8% and 35.5% respectively.<sup>8,9</sup>

In Sweden, prevalence of Chlamydial infection during 1986 was 37.4% in women aged 20-24 years and in men in the same age group was 18%.<sup>12</sup> A study in Taiwan showed that the overall prevalence of genital *Chlamydia trachomatis* infection among patients attending STD clinics was 18.4%,<sup>13</sup> and in Bangladesh it was 25% and 43% among hotel-based and street-based sex workers respectively.<sup>8,9</sup> By the late 1980s, HIV-1 began to invade Asian Countries one after another. In 1995, there were estimated 2.5 million new HIV infected cases in South-East Asia, from India through Indonesia and the Philippines archipelagoes which surpassed the combined incidence in Sub-Saharan Africa (1.9 million) and rest of the world (0.3 million).<sup>14,15</sup> Survey of HIV infection among sex workers between 1992 and 1994-1995 showed that the rates of infection increased in different countries such as in India (40% to 51%), Vietnam (9% to 38%) and Colombia (2% to 10%). It also showed that in all of these countries, over 2% of pregnant women were infected with HIV infection.<sup>14</sup> However, in Bangladesh, the prevalence of HIV infection was less than 1% among female sex workers but relatively higher in injectable drug users (IDUs) (4%).<sup>16</sup> Another study in Bangladesh showed that 61.54% of IDUs had history of sexual promiscuity.<sup>17</sup>

Different researchers had shown that genital ulcer diseases act as a precipitating factor for HIV seroconversion in high-risk groups.<sup>18-20</sup> Several studies in various populations had revealed a strong association between Syphilitic infection and sexual transmission of HIV.<sup>15,20-24</sup> Genital Herpes type 2

infection increases the risk of acquisition of human immunodeficiency virus type I infection,<sup>24-28</sup> may be due to disrupted mucosal and epithelial layers, which provides portal of entry for HIV, and via recruitment of CD4-positive T lymphocytes during HSV-2 infection.<sup>29</sup> Non-ulcerative STDs, such as gonococcal infection has also been associated with transmission of HIV.<sup>19,20,30,31</sup> This may be due to mucosal inflammation, which provides greater access to HIV than that of normal tissues. It had been proved that release of viruses in semen is significantly higher in persons with gonococcal infection than without gonococcal infection.<sup>32,33</sup> A study in Chennai, India showed a significant association between Chlamydial infection and transmission of HIV among patients attended in STD clinic.<sup>34</sup> According to 5th round technical report of National HIV Serological and Behavioral Surveillance, 2003-2004 in Bangladesh, the prevalence of HIV infection remained low in high-risk groups tested. The prevalence of HIV in female sex workers was less than 1% and it was 4% among IDUs.<sup>16</sup> Though the rate of HIV infection in Bangladesh is still low but this situation might be different because the sex workers have higher number of clients per week and lower consistence condom usage.<sup>16</sup> The ICDDR, B and Government of Bangladesh conducted a survey on awareness of STDs, where 57% of rural women were not aware about transmission of STDs.<sup>35</sup>

However, the previous studies in Bangladesh gave more emphasis on different groups of female sex workers like hotel-based, brothel-based and street-based female sex workers and data regarding STDs among attendees of STD clinics are scarce. So, this study was intended to conduct a cross-sectional study on STD clinic attendees in Dhaka, Bangladesh to determine the prevalence of sexually transmitted diseases in patients attending STDs clinics in Dhaka, Bangladesh.

## Methods

### *Study Population:*

A prospective cross-sectional study was conducted among 230 patients attending Skin and Venereal disease out patient departments in Dhaka Medical College and Shahid Suhrawardy Hospital over a period of July, 2006 to May, 2007.

### *Method of Data Collection:*

Interview was conducted by using preformed questionnaire on socio-demographic information, history of sexual

practices, marital status, urogenital symptoms and treatment of STDs. The study population was informed about the purpose of the study in detail and consent from every individual was taken with assurance of maintenance of secrecy. For each participant, a code number was used both in questionnaire and in the specimen label.

#### Sample Collection:

In case of males, urethral discharges/ swabs and in case of females, endocervical swabs were taken. Three different swabs were collected from each patient (one for Chocolate agar media, one for *C. trachomatis* by using commercially available collection swab stick for detection of Chlamydial antigen and one for Gram staining). Under aseptic condition, 5 ml venous blood was collected from each patient. Sera were separated and stored in aliquots at - 20°C until tested. All the laboratory works were performed in the Department of Clinical Immunology and Microbiology of National Institute of Kidney Diseases and Urology (NIKDU).

#### Isolation and Identification of causative agents:

Two urethral and endocervical swabs were collected for isolation and identification of *N. gonorrhoeae*. One swab was used for Gram staining and another sample was directly inoculated into Chocolate agar media and incubated at 37°C in candle jar. *N. gonorrhoeae* were identified by colony morphology in Chocolate agar media, Gram staining and oxidase test. After isolation of the organism, antimicrobial sensitivity was done by disk diffusion method defined by National Committee for Clinical Laboratory Standards.<sup>36</sup> The Chlamydial antigen was detected from urethral/ endocervical swabs by commercially available immunochromatographic test (Hexagon Chlamydia, Germany).

#### Serological test:

All sera were screened for antibodies to *Treponema pallidum* by the quantitative rapid plasma reagin (RPR) test (Human, Germany) and by the *T. pallidum* Haemagglutination (TPHA) test (Human, Germany). A patient was considered to have Syphilis if both the RPR and TPHA tests were positive. Herpes simplex virus type 2 IgM and IgG antibody were detected by enzyme linked immunosorbant assay (ELISA) (Human, Germany). For the detection of HIV antibody, ELISA (Human, Germany) was used. All test results were reported to the respective hospitals within 2 days for treatment purpose except HIV.

## Results

Age of the patients included ranges from 18 to 50 years. Socio-demographic characteristics shows that around 80% of the participants belonged to 18-33 years age group, more than 90% had formal education and half of them were married. (Table I)

Table I: Socio-demographic characteristic of the participants

Characteristics	Frequency	Percent
<b>Age in years</b>		
18-25	90	39.1
26-33	97	42.2
34-41	29	12.6
>42	14	6.1
<b>Religion</b>		
Muslim	223	97
Non-muslim	07	03
<b>Education</b>		
No education	08	3.5
Below SSC	134	58.3
SSC	40	17.4
HSC	32	13.9
Above HSC	16	6.9
<b>Occupation</b>		
Business	116	50.4
Service	48	20.8
Farmer	28	12.2
Housewife	04	1.7
Student	10	4.3
Unemployed	24	10.4
<b>Monthly income in Taka</b>		
< 3000	94	40.8
3000-5000	116	50.4
> 5000	20	8.7
<b>Marital status</b>		
Married	120	52.2
Unmarried	110	47.8

Among the participants, around 60% never used condom and had one partner per week. (Table II) Among the total of 230 patients included in the study, 199 (86.5%) had different types of STDs. Of them 98 (42.6%) were suffering from single disease and 101 (43.9%) were infected with two or more pathogens. (Figure 1)

Table II: Pattern of high-risk behaviours of the participants

Characteristics	No. of patients	Percent (%)
<b>Frequency per week</b>		
Once	141	61.3
2-3 times	83	36
> 3 times	6	2.6
Total	230	100
<b>No. of partner per week</b>		
1 partner	140	60.9
2-3 partners	84	36.5
> 3 partners	6	2.6
Total	230	100
<b>Use of condom</b>		
Always	5	1.7
Occasional	87	38.3
Never	138	60
Total	230	100

Table III: Pattern of STIs among patients attending in OPD of Skin and Venereal Diseases (VD)

Name of infections	No.	Percentage (%)
<i>N. gonorrhoeae</i>	90	39.1
<i>C. trachomatis</i>	110	47.8
Syphilis	28	12.2
<b>HSV type 2</b>		
HSV type 2 IgM	30	13.0
HSV type 2 IgG	58	25.2
Total	88	38.2

Table IV: Combination of STDs among patients attending in OPD of Skin and Venereal Diseases (VD).

Name of infections	No.	Percentage (%)
Gonorrhoea & Chlamydial infection	54	23.5
Chlamydial infection & HSV type 2 infection	36	15.6
Syphilis & HSV type 2 infection	34	14.8
Gonorrhoea & HSV type 2 infection	22	9.5
Gonorrhoea, HSV type 2 infection & Chlamydial infection	12	5.2
Syphilis & Chlamydial infection	10	4.3
Gonorrhoea & Syphilis	8	3.5
Chlamydial infection, Syphilis & HSV type 2 infection	2	0.8
Gonorrhoea, Syphilis & HSV type 2 infection	1	0.4

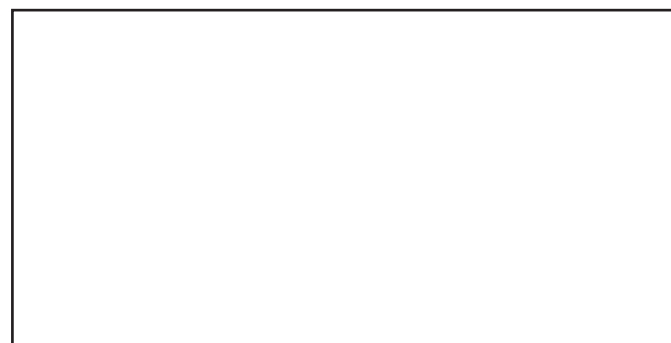


Figure 1: Distribution of STDs among patients attending in OPD of Skin and Venereal Diseases (VD)

The overall prevalence of the STDs among 230 participants was analyzed irrespective of signs and symptoms, and the prevalences of *N. gonorrhoeae*, *C. trachomatis*, *T. pallidum* and HSV type 2 were 90 (39.1%), 110 (47.8%), 28 (12.2%) and 88 (38.2%) respectively. Of the 88 patients, who were positive for HSV type 2 antibody, 30 (13%) were seropositive for IgM and 58 (25.2%) were positive for IgG antibody. None of them was positive for HIV antibody. (Table III) Considering the combination of STDs among the patients, more prevalent combination of infection was found with *N. gonorrhoeae* with *C. trachomatis*. (Table IV)

Antimicrobial sensitivity was performed on *N. gonorrhoeae* isolates. Out of 90 (39.1%) *N. gonorrhoeae* isolates, 91.1% were sensitive to Ceftriaxone, followed by 62.2%, 57.8%, 57.8%, 51.1%, 51.1%, 44.4% sensitive to Erythromycin, Azithromycin, Penicillin, Ciprofloxacin, Ampicillin and Tetracycline respectively. (Table V) Associations of STDs with the some potential risk factors were also analysed, which showed that there was statistically significant association between STDs and use of condom (p value .001). (Table VI)

Table V: Antimicrobial sensitivity pattern of *N gonorrhoeae*

Name of antibiotics	No (%) of isolates		
	Sensitive	Moderately sensitive	Resistance
Ceftriaxone	82 (91.1)	00	08 (8.9)
Erythromycin	56 (62.2)	02 (2.2)	32 (35.6)
Azithromycin	52 (57.8)	04 (4.4)	34 (37.8)
Penicillin	52 (57.8)	06 (6.7)	32 (35.5)
Ciprofloxacin	46 (51.1)	00	44 (48.9)
Ampicillin	46 (51.1)	04 (4.4)	40 (44.5)
Tetracycline	40 (44.4)	02 (2.2)	48 (53.4)

Table VI: Association between potential risk factors and STDs

Risk factors	No. of pts	No. of pts	Total P	Value
	without STDs	with STDs		
<b>Use of condom</b>				
Always	04	01	05	.0001
Never & Occasional	27	198	225	
Total	31	199	230	
<b>No. of partners per week</b>				
One person	24	116	140	.06
More than one person	07	83	90	
Total	31	199	230	
<b>Frequency per week</b>				
Once in a week	24	118	142	
More than one per week	07	81	88	.08
Total	31	199	230	

## Discussion

The threat of HIV epidemic appears dimly over Bangladesh, as STDs and high risk sexual behaviour among the target groups are found significantly higher. Although according to 5th technical report of National HIV Serological and Behavioral Surveillance, 2003-2004, the prevalence of HIV in female sex workers was less than 1% but simultaneously existence of higher client turnover and lower consistent condom usage.<sup>16</sup> The prevalence of HIV infection was 4% among Intravenous Drug Users (IDUs) in 4th and 5th round but it was 1.4%, 1.7% in 2nd and 3rd rounds technical reports respectively.<sup>16</sup> So, it seems to be increasing among the IDUs. A study in Dhaka showed that 61.54% of IDUs had history of

sexual promiscuity.<sup>17</sup> So, it can be assumed that the IDUs with high-risk sexual behavior may play an important role in transmission of HIV infection through different routes.

In the present study, the age of the participants ranges from 15-50 years, which is comparable with another study.<sup>3</sup> Out of 230 patients, attending in Skin and Venereal Disease out patient departments for treatment, 138 (60%) gave history of never using condoms, and 87 (38.3%) used occasionally. So, a consistent condom use was found very low among the study participants. It has been reported in another study that more than 50% of street-based Female Sex Workers (FSWs) never used condom and most of them entertained up to 21 clients per week.<sup>9</sup> Another study showed that inconsistent condom use was an independent risk factor for transmission of genital Chlamydial infection in high-risk groups.<sup>13</sup> In the present study, 199 (86.5%) patients were suffering from at least one sexually transmitted disease, which was 86.8% among hotel-based sex workers.<sup>8</sup> However, 101 (43.9%) of STD clinic attendees were found infected with two or more pathogens. Another study in Bangladesh showed that 51% of street-based sex workers were suffering from more than one infection.<sup>9</sup> Prevalence of *N. gonorrhoeae*, *C. trachomatis*, *T. pallidum* and HSV type 2 among the patients attending STD clinics were 90 (39.1%), 110 (47.8%), 28 (12.2%) in the present study, and similar trend has also been found in other studies.<sup>8,9</sup> Another study observed the prevalence of *N. gonorrhoeae*, *C. trachomatis*, *T. pallidum* and HSV type 2 among 2335 married women reporting 0.5%, 1.9%, 2.9% and 12% respectively.<sup>36</sup> Most of the cases of this study were married women acquiring STDs from their husbands and sometimes might subsequently transmitted to their offspring, which indicates a bad social impact. Among 88 (38.2%) HSV type 2 seropositive patients, 30 (13%) were positive for IgM antibody, indicating acquisition of recent infection.

In the present study, the causative organisms of both ulcerative and non-ulcerative STDs were isolated. Out of 230 participants, 101 (43.9%) were infected with multiple pathogens. Most of the patients (54, 23.5%) were infected with both *N. gonorrhoeae* and *C. trachomatis*, followed by combination of HSV type 2 and *C. trachomatis* (36, 15.6%), HSV type 2 and *T. pallidum* (34, 14.8%). So, many individuals were harboring different types of ulcerative and non-ulcerative pathogens and some of them were found suffering from both ulcerative and non-ulcerative STDs simultaneously.

A study observed that individuals infected with STDs were 5-10 times more prone to acquire or transmit HIV through sexual contact than that of uninfected individuals.<sup>37</sup>



Regarding antibiotic sensitivity pattern of *N. gonorrhoeae*, a study was carried out during 1997 in Bangladesh among CSWs, which showed that only 1% of isolates was resistant to Ceftriaxone, which was 8.9% in the present study. However, the sensitivity pattern of Ciprofloxacin, Tetracycline and Penicillin were improved than that of the previous study.<sup>2</sup> Antimicrobial sensitivity pattern of *N. gonorrhoeae* isolates differing between these two studies might be due to the two different populations or changes in antimicrobial sensitivity patterns over a period of time.

Some potential risk factors were examined, which showed that STDs were significantly associated with inconsistent use of condom. Other studies also suggested that condom is the most effective method of protection against STDs.<sup>37,38</sup> Though none of the patients was seropositive for HIV antibody in the present study, there are several risk factors such as high prevalence of STDs, inconsistent use of condom and frequent turnover of clients per week in high risk groups in Bangladesh, which may create a devastating situation in near future like other neighbour countries such as India, Burma and Thailand. So, public health awareness programs focusing on STDs and AIDS should be undertaken urgently. This might help to reduce the incidence and complication of STDs and subsequently might interfere in transmission of HIV among the people in Bangladesh.

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[ Conflict of Interest: none declared]