Changing trends in sexually transmitted infections at a Regional STD Centre in north India

Krishna Ray, Manju Bala, S.M. Gupta, Niti Khunger, Poonam Puri, S. Muralidhar & Joginder Kumar

Regional STD Teaching, Training & Research Centre, Vardhaman Mahavir Medical College & Safdarjang Hospital, New Delhi, India

Received January 6, 2006

Background & objectives: Sexually transmitted infections (STIs) a major public health problem in India show various trends in different parts of the country. However, there are limited data on the changing profile of laboratory proven STIs in the same clinic over the years. The present study was thus aimed to determine the changing trends of the profile of STIs and HIV seropositivity in STD clinic attendees over a 15 yr period, and also to detect change, if any, in the antimicrobial resistance pattern of Neisseria gonorrhoeae.

Methods: The STIs were diagnosed clinically and confirmed by standard laboratory techniques. Socio-demographic data were collected through pre-designed proformae. The STI profile and HIV seropositivity were compared between 1990-1993 (A), 1994-1997 (B), 1998-2001 (C) and 2002-2004 (D). Antimicrobial resistance pattern of N. gonorrhoeae was determined by standard techniques and compared between the last three periods.

Results: Of the 78,617 STD attendees, 12,709 (16.2%) had STIs. During period A, genital discharges and during B, C and D, genital ulcerative diseases were predominant. Syphilis was the commonest STI. There was significant rise in the cases of syphilis, herpes genitalis and genital warts and reduction in that of chancroid, lymphogranulomavenerem (LGV), donovanosis, candidiasis, trichomoniasis and bacterial vaginosis cases. The number of cases with primary syphilis diminished significantly (P<0.001), with a concomitant rise in secondary and early latent syphilis. A rising trend was observed in the HIV seropositivity during the different periods. The association of HIV seropositivity was consistently more in patients presenting with genital ulcers specially syphilis, and rose significantly from A (0.6%) to C (8.8%), but became stationary during D. A drastic change in the antimicrobial resistance of N. gonorrhoeae from B to C and C to D and the emergence of less sensitive isolates to ceftriaxone during the later part of the study were observed.

Interpretation & conclusion: Our study showed a definite changing trend in the profile of STIs in the clinic attendees of a major STD centre during a 15 yr period. However, the significant rise in the cases of viral STIs and syphilis contrasted with reduction in the rest.

Key words Antimicrobial resistance - changing trends - HIV seropositivity - Neisseria gonorrhoeae - STIs
World Health Organization (WHO) estimated that approximately 340 million new cases of the four main curable sexually transmitted infections (STIs) viz., gonorrhoea, chlamydial infection, syphilis and trichomoniasis occur every year, 75-85 per cent of them in developing countries\(^1\). Moreover, the interest in STIs and their management have increased tremendously because of their proven role in facilitation of HIV infection\(^2\), which, in turn, also increases susceptibility to other STIs. Most of the STIs, both ulcerative and non ulcerative, are prevalent in India and constitute one of the major public health problems. The profile of the various diseases is variable, depending upon the socio-economic, cultural, geographic and environmental factors prevalent in different parts of the country\(^3\)\(^-\)\(^7\). However, because of lack of adequate laboratory infrastructure in the country, data available from all the regions are usually based on syndromic diagnosis. Limited data are available regarding the changing profile of laboratory proven STIs in the same clinic over the years, except a few\(^8\)\(^-\)\(^{10}\) with minimum laboratory facilities. Increasing trend in HIV seropositivity has been observed in STD patients in a number of STD clinics in different parts of the country including ours\(^3\)\(^,\)\(^5\)\(^-\)\(^7\),\(^11\). It is important to have baseline information on the epidemiology of STIs, the proportion of symptomatic and asymptomatic infections and other associated risk behaviours for the designing, implementation and monitoring of successful targeted interventions\(^12\)\(^,\)\(^13\).

The Regional Sexually Transmitted Diseases (STD) Teaching, Training and Research Centre, recognized by National AIDS Control Organization (NACO), New Delhi, functioning at Vardhaman Mahavir Medical College (VMMC) and Safdarjung Hospital, New Delhi, for the last four decades, has been monitoring the trends of STIs (hospital and community based) by clinical and laboratory methods\(^11\),\(^14\),\(^15\). This retrospective study was carried out to determine the profile of STIs including HIV seropositivity in a Regional STD Centre during 1990-2004, and to detect any changing trend in the STI profile and HIV seropositivity during this period, and in the antimicrobial susceptibility of *Neisseria gonorrhoeae*.

### Material & Methods

This retrospective study included a total of 78,617 new male and female patients, attending a major Regional STD Centre at VMMC and Safdarjung Hospital, New Delhi, from January 1990 to December 2004. The females were either the spouses of male patients or referral from gynaecology clinic of the hospital.

The data on socio-demographic status and high risk behaviour were collected in pre-designed proformae. In the present study, high risk behaviour was defined as practice of unprotected penetrative sex (anal, vaginal or oral) with multiple partners/ exposure to commercial sex workers (CSW)/or with individuals with STIs/needle sharing. Though every effort was undertaken to elicit history of high risk sexual behaviour from the patients and confidentiality was ensured by the counselors/health educators, at some occasions, full cooperation was not obtained and chances of false response cannot be ruled out.

Detailed clinical examination, including speculum examination in the female patients, was carried out in patients of both sexes, with complaints of STIs. STIs were diagnosed by clinical features and laboratory confirmation by standard laboratory techniques, using appropriately collected specimens, according to clinical presentations\(^16\), except that VDRL testing was carried out for all attendees. For syphilis, dark field examination, VDRL (antigen from Serologist to Govt. of India, Kolkata), *Treponema pallidum* haemagglutination assay (Plasmatec TPHA test kit, Hansard Diagnostics, United Kingdom) in VDRL reactive cases and fluorescent treponemal antibody absorption (FTA-ABS) test (Viro-Immun Labor-Diagnostika GmbH, Oberursel) in sera giving discrepant results in the above two tests, were carried out. Examination of Gram stained smear and culture from specimens from ulcer base for chancroid, ulcer smear stained with giemsa and
herpes simplex virus-2 (HSV-2)- IgM ELISA (Herichson Diagnostics, USA) for herpes progenitalis and giemsa stained tissue smears for donovanosis, were carried out. For diagnosis of herpes, more reliance was given to clinical examination, laboratory tests being used as complimentary tools. Direct urethral/cervical smear and culture on chocolate agar and saponin-lysed blood agar with vancomycin, colistin, nystatin, trimethoprim (VCNT) supplement were carried out to diagnose gonorrhoea and the isolates were confirmed by standard methods\textsuperscript{17}. For chlamydial infections, antigen detection ELISA (Bio-Rad Laboratories, USA) was carried out. For diagnosis of trichomoniass, a direct wet mount examination and culture on Whittington media, for candidiasis, direct Gram stained smear examination and culture on Saboraud’s dextrose agar, followed by culture confirmation by germ tube test, and for bacterial vaginosis (BV), interpretation of vaginal Gram stained smear following Nugent’s criteria\textsuperscript{18} were performed. Genital warts were clinically diagnosed. Besides these tests, presence of HIV 1 and 2 antibodies were determined in 48,191 patients out of the total by ELISA/Rapid tests, using WHO approved kits, following NACO guidelines\textsuperscript{19}, after pretest counseling and written informed consent, followed by post-test counseling.

The STI profile and HIV seropositivity in the last 15 yr were compared in three four-year periods, 1990-1993 (A), 1994-1997 (B) and 1998-2001 (C), followed by the current period of 2002 to 2004 (D).

Antimicrobial susceptibility of \textit{N. gonorrhoeae} was conducted routinely from 1996 onwards against penicillin, tetracycline, ciprofloxacin and ceftriaxone following standard methods\textsuperscript{17}. The pattern was compared between B, C and D.

Management of STIs was according to standard NACO guidelines\textsuperscript{20} and as far as possible, patients were managed following aetiology based diagnosis. Sexual partners of individuals with STI/HIV infections were notified, informed of their exposure and offered management and support services.

The differences in percentages were compared and tested for significance by using Chi square test.

**Results**

During the fifteen years period, a total of 78,617 new patients/subjects attended the STD centre, including the Voluntary Counseling and Testing Centre (VCTC) with complaints suggestive of STIs or psychosexual disorders, for HIV testing or with suspected AIDS indicator conditions (Table I). During period B, the number of attendees reduced by 14.4 per cent, increasing to almost 34.7 per cent during period C and showing a marginal reduction during D. During A and B periods, the percentage of new STI cases was observed to be 21.2 and 20.6 per cent, which was almost static. However, during C, it significantly dropped to 13.9 per cent (\(P<0.001\)), with a further reduction to 10.1 per cent (\(P<0.001\)) during D as compared to C.

Most of the STI cases were in the 21-30 yr age group ranging from 65.2 to 68.5 per cent during A to D, followed by 31-40 yr (26.5 to 28.1%), without any significant difference in the percentage of STI cases in the above two age groups amongst the four study periods. Comparison of the M : F ratio of the STI cases, showed change from 1.4 : 1 during A to 2.3 : 1 during B, 3.8 : 1 during C and 2.3 : 1 during D, showing less number of females with STIs reporting to the clinic than males. However, considering only the classical STIs, including genital herpes and genital warts [omitting the non gonococcal urethritis (NGU) and vaginitis cases having sex predilection], the trend of M : F ratio reduced from

\begin{table}
\centering
\begin{tabular}{|l|c|c|c|}
\hline
Period & Total no. of attendees (New) & Total no. of new STI cases & Percentage of STI cases \\
\hline
A (1990-1993) & 19,462 & 4,126 & 21.2 \\
Total & 78,617 & 12,709 & 16.2 \\
\hline
\end{tabular}
\caption{Changing pattern of STIs at Regional STD Centre, Vardhman Mahavir Medical College (VMMC) & Safdarjung Hospital, New Delhi}
\end{table}

RAY et al: CHANGING TRENDS OF STIs 561
10.2 : 1 to 5.7 : 1, to 5.5 : 1 and to 3.7 : 1 from period A to B, C and D gradually. Similar trends were observed in the laboratory proven syphilis cases, wherein the M : F ratio changed from 3.1 : 1 to 2.8 : 1 to 2.4 : 1 to 1.8 : 1 during the four consecutive periods. In the HIV seropositive cases, no obvious change was observed.

In males, married: single ratio changed from 2.2 : 1 during A to 2.5 : 1, 3.8 : 1 and 4 : 1 during B, C and D, respectively. In females, the ratio varied from 4.1 : 1 to 4.5 : 1 during the whole period. The patients were mostly (49.7-54.9%) from the low socio-economic status, without any significant difference being observed in the status during the four periods. The patients/subjects reported mostly from urban areas of Delhi from A to D (74.8-80.2%), again with no significant difference, the rest being from urban slums/rural areas from the outskirts of Delhi and other neighbouring States. A total of 23.1 per cent of the male patients had primary level of education during A, which reduced to 19.3, 14.5 and 13.9 per cent during B, C and D, with a rise in the level of patients with secondary education from 35.2 during A to 46.5 per cent during D. The proportion of educated females was very low and frequency of primary level of education significantly changed from 19.2 to 30.5 per cent from A to D (P<0.001).

The STIs were mostly acquired by males through pre/extra marital exposure. The proportion of individuals practising high risk behaviour varied between 98.5 to 95.3 per cent from A to D. During A, about 70.2 per cent of the STIs were acquired by males from CSWs, who were brothel based, whereas a drop was observed during D to 58.5 per cent, the difference being statistically significant (P<0.001). There was increasing prevalence of exposure to casual acquaintances and call girls during C (34.2%) and D (38.1%) from 28.1 per cent during A. The high risk groups observed in the recent period, in addition to CSWs were street children, truck drivers and some hotel workers. A total of 95.5 to 93.4 per cent of the females reportedly acquired the infection from their spouses during the consecutive periods and the rest volunteered information regarding pre/extra marital exposure. The patients, on the whole, were heterosexual, the proportion being 98.5 to 97.2 per cent from A to D. The rest were homo/bisexuals.

The male patients were mainly labourers and factory workers (65.7 to 66.2%), followed by businessmen, agriculture workers and servicemen. The females were mostly housewives, the proportion varying from 94.7 to 85.8 per cent from A to D.

During A, genital discharge (GD) cases were significantly higher (52.8%) than the genital ulcerative diseases (GUDs) (41.4%) (P<0.001). However, during the consecutive periods, the incidence of GUDs dominated the scene, reaching...
54.0, 57.3 and 52.4 per cent during B, C and D respectively. The rise in GUD cases (Fig. 1) from A to B, A to C, and A to D and the reduction from C to D were highly significant ($P<0.001$). The reduction in GD cases (Fig. 2) during B (45.9%), C (42.7%) and D (47.6%) from A was also highly significant ($P<0.001$). A significant rise in the percentage of genital warts (GW) cases was observed from A to B, A to C, A to D and C to D ($P<0.001$).

The profile of GUDs amongst all the new STI cases in different periods varied considerably (Table II). All the GUDs were predominantly observed in males except in case of syphilis. Syphilis comprised of 15.8 per cent of all STI cases during A. There was a significant rise to 24.0 per cent during B ($P<0.001$) and to 26.8 per cent during C ($P<0.01$). It subsequently fell to 24.2 per cent during D ($P<0.05$ as compared to C). Although in the period A, the percentage of syphilis cases in males were significantly higher than in females ($P<0.001$), the trend changed during consecutive periods and females were having significantly more per cent of cases than males especially during C and D ($P<0.001$).

The occurrence of primary syphilis was observed to fall continuously from A (52.5%) to D (26.7%) ($P<0.001$). In contrast, secondary syphilis showed an increasing trend from A (39.8%) to C (46.4%) ($P<0.05$), with an insignificant reduction from C (46.4%) to D (43.4%). Early latent syphilis rose significantly from A (7.5%) to D (29.4%) ($P<0.001$). Late latent syphilis was not observed during A. However, a significant rise from B (3.1%) to C (5.9%) ($P<0.02$), followed by a diminishing trend from C (5.9%) to D (0.4%) ($P<0.001$) was observed. Congenital syphilis was also observed in one child during A and three during B. A lone case of primary syphilis was observed during B. There was a sharp and significant rise in the cases of herpes progenitis from 5.7 during A to 14.6 per cent during B ($P<0.001$) and further to 19.4 per cent during C ($P<0.001$) and to 22.4 per cent during D ($P<0.02$). The rise was also significant ($P<0.001$) in both the sexes between A to D. In contrast, the occurrence of chancroid, from A to D dropped significantly ($P<0.001$), more prominent in males, and that of lympho granuloma venereum (LGV) and donovanosis also showed a decreasing trend.

Among non ulcerative STIs (Table III), the occurrence of gonorrhoea was around 13 per cent up to B, followed by a statistically significant rise during C to 19.4 per cent ($P<0.001$) and a significant reduction, thereafter, to 15.4 per cent during D ($P<0.001$). In males, the occurrence fluctuated, reducing from A to B ($P<0.001$) and rising from B to C ($P<0.001$). A prominent finding in this study was the sharp and significant reduction ($P<0.001$) in laboratory proven vaginal discharge cases reporting to the STD clinic, from A to D. However, during D,
### Table II. Changing profile of genital ulcers during the study periods

<table>
<thead>
<tr>
<th>Disease</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M(%)</td>
<td>F(%)</td>
<td>T(%)</td>
<td>M(%)</td>
</tr>
<tr>
<td>Syphilis</td>
<td>492(20.5)</td>
<td>159(9.2)</td>
<td>651(15.8)</td>
<td>606(25.3)</td>
</tr>
<tr>
<td>Chancroid</td>
<td>511(21.3)</td>
<td>9(0.5)</td>
<td>520(12.6)</td>
<td>378(15.8)</td>
</tr>
<tr>
<td>Herpes</td>
<td>229(9.6)</td>
<td>6(0.3)</td>
<td>235(5.7)</td>
<td>457(19.0)</td>
</tr>
<tr>
<td>proventalis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LGV</td>
<td>136(5.7)</td>
<td>5(0.3)</td>
<td>141(3.4)</td>
<td>43(1.8)</td>
</tr>
<tr>
<td>Donovanosis</td>
<td>150(6.3)</td>
<td>11(0.6)</td>
<td>161(3.9)</td>
<td>77(3.2)</td>
</tr>
<tr>
<td>Total ulcerative</td>
<td>1518(63.3)</td>
<td>190(11.0)</td>
<td>1708(41.4)</td>
<td>1561(65.1)</td>
</tr>
<tr>
<td>cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total STI cases</td>
<td>2397</td>
<td>1729</td>
<td>4126</td>
<td>2399</td>
</tr>
</tbody>
</table>

LGV, lympho-granuloma-venereum; M, male; F, female; T, total

### Table III. Changing profile of non-ulcerative STIs during the study period

<table>
<thead>
<tr>
<th>Disease</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M(%)</td>
<td>F(%)</td>
<td>T(%)</td>
<td>M(%)</td>
</tr>
<tr>
<td>Gonorrhoea</td>
<td>545(22.7)</td>
<td>201(1.2)</td>
<td>565(13.7)</td>
<td>444(18.5)</td>
</tr>
<tr>
<td>Non gonococcal urethritis</td>
<td>110(4.6)</td>
<td>81(4.7)</td>
<td>191(4.6)</td>
<td>104(4.3)</td>
</tr>
<tr>
<td>Vaginal discharge cases</td>
<td>0(0)</td>
<td>1423(82.3)</td>
<td>1423(34.5)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Candidiasis</td>
<td>0(0)</td>
<td>897(51.9)</td>
<td>897(21.7)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Trichomoniasis</td>
<td>0(0)</td>
<td>292(16.9)</td>
<td>292(7.1)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Bacterial vaginosis</td>
<td>0(0)</td>
<td>234(13.5)</td>
<td>234(5.7)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Genital warts</td>
<td>224(9.3)</td>
<td>159(9.2)</td>
<td>239(5.8)</td>
<td>290(12.1)</td>
</tr>
<tr>
<td>Total non-ulcerative</td>
<td>879(36.7)</td>
<td>1539(89.0)</td>
<td>2418(58.6)</td>
<td>838(34.9)</td>
</tr>
<tr>
<td>Total STI cases</td>
<td>2397</td>
<td>1729</td>
<td>4126</td>
<td>2399</td>
</tr>
</tbody>
</table>
a rise was observed as compared to C ($P<0.02$). The decrease in the occurrence was observed in all the three aetiological agents of vaginitis from A to D. During A, the occurrence of candidiasis was the highest, followed by trichomoniasis and bacterial vaginosis (BV). *Candida albicans* as well as other *Candida* species were isolated throughout the periods.

A drastic change in the profile of antimicrobial resistance of *N. gonorrhoeae* from B to C and C to D was observed. The resistance to penicillin was 7.1 per cent during B which rose to 36.5 per cent ($P<0.001$) during C and subsequently to 56.8 per cent ($P<0.001$) during D. There was a concomitant rise in the isolation of penicillinase producing *N. gonorrhoeae* (PPNG) from 3.9 per cent during B to 21.8 per cent during D ($P<0.001$). Isolation of tetracycline resistant *N. gonorrhoeae* (TRNG) also increased from C (1.8%) to D (10.5%) and ciprofloxacin resistance rose significantly from 7.8 to 86.8 per cent ($P<0.001$) from B to D. All the strains were sensitive to ceftriaxone throughout the study period, except 1 and 4 less sensitive isolates respectively during C and D.

HIV seropositivity was 0.2 per cent of all STD clinic attendees during A, which consistently rose to 5.5 per cent ($P<0.001$) during D (Table IV). However, association of HIV seropositivity in laboratory proven STI cases showed a faster increase from 0.6 per cent during A to 8.8 per cent during C. The rise was significant between A to B ($P<0.001$) and B to C ($P<0.001$). However, the co-infection had a highly significant reduction to 6.0 per cent during D ($P<0.001$). The association of HIV seropositivity was consistently more in patients presenting with genital ulcers specially syphilis. In other STIs, *e.g.* genital warts, the association showed an increasing trend from A to D.

**Discussion**

There was a gradual decline in the occurrence of new STI cases, a common observation in all government health facilities. The patients probably reported more to the private practitioners, expecting more confidentiality in dealing with these diseases. In the present study, most of the STI cases belonged to 21-30 yr age group. This is the sexually active group and at a high risk of being behaviourally more vulnerable to STI acquisition, as they generally have higher number of sexual partners and more concurrent partnerships and change partners more often than older age groups. Being the economically productive group, there is a great loss of manpower at work due to STD morbidity, measured as disability adjusted life years (DALYs) lost. This is also the predominant age group observed to be having STI cases in other Indian studies. Although the teenagers were not spared, we did not have very high percent of STI cases in this group as reported by Kavina *et al.* The data support earlier consensus that young adults and adolescents should constitute priority target group in STD control programme.

The attendance of female patients in the STD clinic mainly depended on referral from the gynaecology clinic of this hospital or they were the spouses of the male cases, detected through partner notification. They usually reported to the clinic late when the condition was usually serious. Attendance

<table>
<thead>
<tr>
<th>Period</th>
<th>Total screened</th>
<th>Total positive</th>
<th>% seropositive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STI cases</td>
<td>STD clinic attendees</td>
<td>STI cases</td>
</tr>
<tr>
<td>A</td>
<td>2582</td>
<td>11,991</td>
<td>16</td>
</tr>
<tr>
<td>B</td>
<td>2430</td>
<td>8,510</td>
<td>53</td>
</tr>
<tr>
<td>C</td>
<td>2209</td>
<td>17,794</td>
<td>195</td>
</tr>
<tr>
<td>D</td>
<td>2424</td>
<td>9,896</td>
<td>146</td>
</tr>
<tr>
<td>Total</td>
<td>9645</td>
<td>48,191</td>
<td>410</td>
</tr>
</tbody>
</table>
of females in low numbers in the STD clinic is due to several social, economic and cultural barriers, leaving their RTI/STI problems uncared for\(^2\)\(^4\). In the present study, overall, male STI cases reported in higher number than the females, as in previous studies\(^8\).

During period A, genital discharge cases were more common. GUDs were predominantly seen from B onwards, confirming earlier studies\(^4\)\(^8\). Syphilis was the commonest STI observed, followed by gonorrhoea, chancroid, candidiasis and herpes progenitalis and this was comparable with a report from Ahmedabad\(^2\)\(^5\) showing syphilis as the commonest STI (28.9%), followed by herpes progenitalis. The significant rise observed in the incidence of syphilis confirms earlier reports\(^8\). The increasing trend of latent syphilis cases in the present study could be because of increasing use of antibiotics. Khanna from Delhi\(^2\)\(^4\) reported that chancroid and genital herpes continued to be most common between 1981-1992, but since 1995, herpes was commonest followed by genital warts and syphilis. In the present study, syphilis was the commonest STI observed, followed by gonorrhoea, herpes progenitalis, candidiasis and chancroid and this is comparable with other reports showing high prevalence in men\(^1\)\(^3\) and women with genital ulcer\(^2\)\(^5\). In contrast, Kumar et al\(^2\)\(^6\) reported genital warts as the predominant infection followed by gonorrhoea, chancroid, genital herpes, syphilis and HIV. However, in another study\(^2\)\(^7\), trichomoniasis was found as the commonest STI, followed by candidiasis and syphilis. O’farrell\(^2\)\(^8\) showed that while GUD attributable to HSV-2 infection was increasing, that caused by bacteria was decreasing. Marked decline in bacterial STIs, resulting in an apparent increase of the viral STIs over ten years has been reported from Kottayam, Kerala\(^8\). Our study confirmed a similar pattern and showed an increasing trend of syphilis, herpes and genital warts over the years. An earlier study from north India also showed two-fold increase in the incidence of herpes progenitalis, overtaking those of chancroid, gonorrhoea and donovanosis\(^9\). Prospective studies have highlighted that antecedent HSV-2 infection markedly increases the rate of HIV acquisition\(^2\)\(^9\) and therefore this rise in HSV-2 cases is a cause for alarm.

In the present study, Candida albicans and Candida species were found as the commonest aetiological agents of vaginal discharge. A study in the gynaecology clinic attendees of the same hospital\(^1\)\(^4\) reported an overall low prevalence of N. gonorrhoeae, T. vaginalis, C. albicans, BV and VDRL positivity in asymptomatic and symptomatic women. BV was found to be the commonest infection, followed by C. trachomatis infection, trichomoniasis and syphilis, in women with vaginal discharge in Delhi\(^1\)\(^0\). BV was also found in 33.3 per cent of vaginal discharge cases in Nagpur\(^1\)\(^1\). In another study in women in the community, it was reported that 41.5 per cent of the women had BV, 18.6 per cent candidiasis and 4.3 per cent trichomaniasis, 28.7 per cent chlamydia\(^3\)\(^2\). In a recent study\(^3\)\(^3\) in women attending a tertiary care hospital in Shimla, chlamydia IgM antibody positivity was found in 45.5 per cent cases, followed by BV (21.7%) and candidiasis (12%). Presence of BV has a role in the acquisition of HIV and thus, requires prompt treatment\(^4\)\(^4\). The above figures appear to be an underestimate as most of the infections remain asymptomatic and thus care and treatment are not sought\(^3\)\(^5\). Even in symptomatic cases in women, specially in regions with limited access to health care facilities, it is technically difficult and expensive to diagnose and treat STIs, as there is social stigma attached to these infections.

An increase in the resistance to commonly used antimicrobials for gonorrhoea in our study, indicates the need for prudence in their use by the STD treatment providers, as well as the importance of laboratory based surveillance\(^3\)\(^6\)-\(^3\)\(^8\), for guidance to modify the STD management guidelines of the country from time to time.

The significant increase in HIV seropositivity in laboratory proven STI cases indicated the close association of STIs with HIV and the importance of early diagnosis of these curable diseases\(^3\)\(^9\). Previous studies from different parts of the country also have supported these observations\(^3\)\(^5\)-\(^8\). Association of
syphilis with HIV seropositivity was highest as in earlier studies\(^8,40\), although herpes was also found to be the commonest associate in one study\(^7\). A review of multiple studies\(^41\) indicated that both ulcerative and non ulcerative STIs promote HIV transmission via a variety of biological mechanisms, and the treatment of these conditions reduces an individual’s ability to transmit HIV by decreasing the amount and frequency of HIV shedding.

The present aetiology based study from a major STD centre concludes, that although male STI cases reported in higher number than the females, the M : F ratio showed a significant changing trend over the years. The change in M : F ratio from period A to C, observed in the classical STIs, specially syphilis, indicated that more number of females with these conditions have started reporting now, probably with increased knowledge, acquired through mass media. Syphilis, comprising of symptomatic and asymptomatic stages, was found to be the commonest STI. A definite changing trend in the profile of STIs was observed, and a significant rise in the cases of viral STIs and secondary and early latent syphilis contrasted with reduction in the rest, indicating the need for periodic laboratory based surveillance of these infections for identifying priorities for clinical intervention.

Acknowledgment

The authors acknowledge the National AIDS Control Organisation (NACO), Ministry of Health & Family Welfare, Government of India, New Delhi for financial support.

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Reprint requests: Dr Krishna Ray, Sector C, Pocket 2, 2240, Vasant Kunj, New Delhi 110070, India