Guest Editorial

Novel HIV Prevention Strategies: The Case for Andhra Pradesh
JA Schneider

Review Article

Chikungunya Fever: A Re-emerging Viral Infection
M Chhabra, V Mittal, D Bhattacharya, UVS Rana, S Lal

Special Article

Fabrication and Evaluation of a Sequence-specific Oligonucleotide Miniarray for Molecular Genotyping
J Iqbal, F Hänel, A Ruryk, GV Limmon, A Tretiakov, M Dürst, HP Saluz

Original Articles

A Comparison of PCR Detection of Meca with Oxacillin Disk Susceptibility Testing in Different Media and Sceptor Automated System for both Staphylococcus aureus and Coagulase-negative Staphylococci Isolates
S Ercis, B Sancak, G Hasçelik

Effect of Exposure to Hydrogen Peroxide on the Virulence of Escherichia coli
A Hegde, GK Bhat, S Mallya

A Low Molecular Weight Es-20 Protein Released In Vivo and In Vitro with Diagnostic Potential in Lymph Node Tuberculosis
N Shende, V Upadhye, S Kumar, BC Harinath

Community-based Study on Seroprevalence of Herpes Simplex Virus Type 2 Infection in New Delhi
R Chawla, P Bhalla, K Bhalla, M Meghachandra Singh, S Garg

Changing Patterns of Vibrio cholerae in Sevagram Between 1990 and 2005
P Narang, DK Mendiratta, VS Deotale, R Narang

Rapid Serodiagnosis of Leptospirosis by Latex Agglutination Test and Flow-through Assay
TMA Senthilkumar, M Subathra, M Phil, P Ramadass, V Ramaswamy

High Level Ciprofloxacin Resistance in Salmonella enterica Isolated from Blood
R Raveendran, C Wattal, A Sharma, JK Oberoi, KJ Prasad, S Datta

Role of Enteric Fever in Ileal Perforations: An Overstated Problem in Tropics?
MR Capoor, D Nair, MS Chintamani, J Khanna, P Aggarwal, D Bhatnagar
Brief Communications

Evaluation of a Modified Double-disc Synergy Test for Detection of Extended Spectrum β-lactamases in Ampc β-lactamase-producing Proteus mirabilis
MKR Khan, SS Thukral, R Gaind

Antimicrobial Susceptibility Profile of Neisseria gonorrhoeae at STI Clinic
C Shilpee, VG Ramachandran, S Das, SN Bhattacharya

Detection of Extra-cellular Enzymes of Anaerobic Gram-negative Bacteria from Clinically Diseased and Healthy Sites
JM Nagmoti, CS Patil, MB Nagmoti, MB Mutnal

Haemagglutination and Siderophore Production as the Uroirulence Markers of Uropathogenic Escherichia coli
MA Vagarali, SG Karadesai, CS Patil, SC Metgud, MB Mutnal

The use of Dried Blood Spots on Filter Paper for the Diagnosis of HIV-1 in Infants Born to HIV Seropositive Women
S Mini Jacob, D Anitha, R Vishwanath, S Parameshwari, NM Samuel

Evaluation of the Usefulness of Phage Amplification Technology in the Diagnosis of Patients with Paucibacillary Tuberculosis
D Biswas, A Deb, P Gupta, R Prasad, KS Negi

Case Reports

Cytomegalovirus Oesophagitis in a Patient with Non-hodgkin’s Lymphoma
SS Hingmire, G Biswas, A Bakshi, S Desai, S Dighe, R Nair, S Gupta, PM Parikh

Hydatid Cyst of Mediastinum
S Sehgal, B Mishra, A Thakur, V Dogra, PS Loomba, A Banerjee

Ochrobactrum anthropi Septicaemia
U Arora, S Kaur, P Devi

Intestinal Myiasis Caused by Muscina stabulans
S Shivekar, K Senthil, R Srinivasan, L Sureshbabu, P Chand, J Shanmugam, R Gopal

Pyopericardium Due To Group D Streptococcus
K Karthikeyan, KR Rajesh, H Poornima, R Bharathidasan, KN Brahmadathan, R Indra Priyadarsini

Pleural Effusion: A Rare Complication of Hepatitis A
A Bukulmez, R Koken, H Melek, O Dogru, F Ovali

Correspondence

Prevalence of Inducible AmpC β-lactamase-Producing Pseudomonas aeruginosa in a Tertiary Care Hospital in Northern India
A Bhattacharjee, S Anupurba, A Gaur, MR Sen

Parental History of Ulcer and the Prevalence of Helicobacter pylori Infection in their Offspring
KS Ahmed, AA Khan, JD Ahi, CM Habibullah
Ciprofloxacin Breakpoints in Enteric Fever - Time to Revise our Susceptibility Criteria
C Rodrigues, N Jai Kumar, J Lalwani, A Mehta

West Nile Virus in the Blood Donors in UAE
M Alfaresi, A Elkoush

Estimation of Antibodies To HBsAg in Vaccinated Health Care Workers
TV Rao, IJ Suseela, KA Sathiavathy

Seroprevalence of Rubella Among Urban and Rural Bangladeshi Women Emphasises the Need for Rubella Vaccination of Pre-pubertal Girls
A Nessa, MN Islam, S Tabassum, SU Munshi, M Ahmed, R Karim

Novel Digestion Patterns with Hepatitis B Virus Strains from the Indian Subcontinent Detected using Restriction Fragment Length Polymorphism
P Vivekanandan, HDJ Daniel, S Raghuraman, D Daniel, RV Shaji, G Sridharan, G Chandy, P Abraham

Acute Urticaria Associated with Dicrocoelium dendriticum Infestation
A Sing, K Tybus, I Fackler

Book Reviews

Guidelines to Authors
ANTIMICROBIAL SUSCEPTIBILITY PROFILE OF *NEISSERIA GONORRHOEA* AT STI CLINIC

*C Shilpee, VG Ramachandran, S Das, SN Bhattacharya*

**Abstract**

A total of 100 consecutive patients who attended a sexually transmitted infections clinic were studied. Thirteen had gonococcal urethritis, of which 10 showed growth of *Neisseria gonorrhoeae* on culture. All the isolates were tested for antimicrobial susceptibility by Australian Gonococcal Surveillance Programme (AGSP) method and beta lactamase production by chromogenic cephalosporin test. Four patients were co-infected with each of the following: HIV, HBV and *Chlamydia trachomatis*. Gonococcal urethritis (13%) was found more in male patients. Ten percent gonococcal isolates were penicillinase-producing *N. gonorrhoeae*, and another 10% were tetracycline-resistant *N. gonorrhoeae*.

Key words: *Neisseria gonorrhoeae*, penicillin resistant, tetracycline resistant

Gonorrhoea, a disease well documented from ancient times, continues to defy man’s attempt to control it. Gonococcal infections and their complications are amongst the most frequent communicable diseases in many countries.[1] Gonococci have been adept at developing resistance to several commonly used antimicrobials. The failure to cure a case of gonorrhoea has public health implications due to the potential for continued transmission and rapid emergence of antimicrobial resistance. Moreover, a number of sexually transmitted infections (STIs) have been identified as facilitating the spread of HIV. Presently, more than 5.26 million people in India are HIV seropositive. The present study was done to isolate *Neisseria gonorrhoeae* from the patients attending STI clinic at a large tertiary care hospital in East Delhi, which caters to the semi-urban and migratory population. Antimicrobial susceptibility was assessed to determine the sensitivity pattern of these isolates. The correlation of *N. gonorrhoeae* with other STIs, including HIV and their influence on phenotypic behaviour of *N. gonorrhoeae*, has also been studied.

**Materials and Methods**

Hundred consecutive patients who attended the STI clinic at Guru Teg Bahadur Hospital, Delhi, were included as subjects. The subjects reported one or more of the complaints as enunciated by WHO in the syndromic approach to the diagnosis of STIs. Detailed history, demographical and clinical features were recorded. Urethral and endocervical swabs were collected from males and females, respectively, and subjected to direct examination of Gram staining and culture plate inoculation. A presumptive diagnosis of gonococcal infection was made on observing polymorphonuclear leucocytes (PMNLs) with gram-negative intracellular diplococci (ICDC). If the smear showed four or more PMNLs in the absence of gram-negative ICDC, a presumptive diagnosis of non-gonococcal urethritis (NGU) was made.[2] For the isolation of *N. gonorrhoeae*, the swabs were directly inoculated on chocolate agar plate containing vancomycin, colistin and amphotericin-B and incubated in 5-10% carbon dioxide for 24-48 hours. The isolates were identified as *N. gonorrhoeae* on the basis of colony morphology, Gram staining, oxidase test and rapid carbohydrate utilization test (RCUT).[3]

Antimicrobial susceptibility testing of *N. gonorrhoeae* was done by disc diffusion technique following the AGSP method.[3] The antimicrobial discs used were penicillin (0.5 IU), nalidixic acid (30 µg), ciprofloxacin (1 µg), ceftriaxone (0.5 µg), spectinomycin (100 µg) and tetracycline (10 µg). All the isolates were also tested for beta lactamase production by chromogenic cephalosporin method.[3]

**Results**

A total of 13 patients were found to have gonococcal infection of which 11 were males and 2 females. The ages varied between 15 and 40 years, and a majority were in the age group of 25-30 years. There was a history of promiscuity in all male patients and one female patient. Patients with gonorrhoea (10/13) mainly presented with profuse, thick, yellow discharge. In seven patients, *N. gonorrhoeae* could be detected both by microscopy and culture, whereas three patients were detected positive by microscopy only and rest by culture alone.

In our study, 20% gonococcal isolates were penicillin resistant and 10% produced penicillinase (Table 1). The trends of antimicrobial susceptibility pattern of *N. gonorrhoeae*
as documented in various studies carried out in India are depicted in Table 2.

Concomitant infection was seen in four male patients having gonococcal urethritis. One was seropositive for HIV; two for HBsAg, and in one patient, chlamydial antigen was detected.

**Discussion**

In our study, gonococcal urethritis (13%) was found more in male patients in the age group of 25-30 years with promiscuous behaviour and predominantly presented with profuse, thick, yellow discharge. The importance of Gram stained smear in the diagnosis of gonorrhoea was also well highlighted, with a sensitivity of 77% (10/13). Acquisition of multiple STIs is a widespread problem and has been attributed to behavioural risk factors. Thirty percent (4/13) of patients with gonococcal infections in the present study were found to be co-infected with HIV, Chlamydia and HBV. All these patients had recurrent episodes of gonococcal infections, although clinical manifestation was same as that of patients with gonococcal infection alone. Such recurrence of gonococcal infection in patients with multiple STIs highlights the vulnerability of such population in acquiring STIs and eventually becoming reservoir of drug-resistant organisms.

Our observation also reinforces the emergence of penicillin, quinolone and tetracycline resistance in *N. gonorrhoeae* isolates. In our study population, 10% (1/10) gonococcal isolates were penicillinase-producing *N. gonorrhoeae* (PPNG) as compared to 8-17.8% reported from other parts of India. Ten percent (1/10) isolates were found to be resistant to both ciprofloxacin and nalidixic acid, and another 10% (1/10) were tetracycline-resistant *N. gonorrhoeae* (TRNG). All strains were sensitive to spectinomycin and ceftriaxone. PPNG isolates from Asia are proline auxotrophs and carry a 4.4 MDa plasmid.[10] There is an additional conjugative 24.5 MDa large plasmid associated with it. The presence of the associated conjugative plasmid in Asian strain is responsible for rapid spread of resistance to other gonococci. Tetracycline resistance in gonococci may be mediated by chromosomal or plasmid determinants.

The location of the tet M gene on the transferable plasmid has perhaps served to enhance the transmission efficiency of tetracycline resistance in *N. gonorrhoeae* strains, causing the rapid spread of TRNG. In our study, the percentage resistance of *N. gonorrhoeae* isolates to the panel of antibiotics (Pn, TC, Cip, NA) differs from isolates of the same organism from other part of Delhi (Table 2), suggesting the existence of different clones of gonococcal strain circulating in and around Delhi. The failure to cure a case of gonorrhoea has public health implications due to its potential for continued transmission and rapid emergence of antimicrobial resistance. It is said that regimens for the treatment of gonorrhoea should have efficacies that approach 100%, and treatment with efficacies less than 95% should never be used.[11] Hence, continuous surveillance of antibiotic resistance pattern is necessary for guiding therapy in high-risk population. Moreover, the prevalent trend of gonococcal infection suggests the existence of heterogeneous population depending upon the local pattern of their high-risk behaviour.

Therefore, reduction in the severity of the disease will be possible by adopting preventive measures and continuous education of safer sexual behaviour through health care authorities.

**References**


<table>
<thead>
<tr>
<th>Source</th>
<th>Region</th>
<th>Year</th>
<th>No. tested</th>
<th>Sensitivity %</th>
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<tbody>
<tr>
<td>Jain SK[4]</td>
<td>Mumbai</td>
<td>1994</td>
<td>151</td>
<td>Pn 82.12, Cip 100, PPNG 17.88</td>
</tr>
<tr>
<td>Bhalla P[7]</td>
<td>Delhi</td>
<td>2000</td>
<td>36</td>
<td>Pn 33.3, Cip 8.3, Cro 100, TC 63.9, PPNG 11.1</td>
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<tr>
<td>Bala M[8]</td>
<td>Delhi</td>
<td>2000-2004</td>
<td>301</td>
<td>Pn 10.1, Cip 3, Cro 96.1</td>
</tr>
<tr>
<td>Chowdhary S[9]</td>
<td>Delhi</td>
<td>2002</td>
<td>35</td>
<td>Pn 40, Cip 5.7, TC 65.7, Cro 100</td>
</tr>
<tr>
<td>Present study</td>
<td>Delhi</td>
<td>2005</td>
<td>13</td>
<td>Pn 80, Cip 90, TC 90, Cro 100, NA 90, ST 100, PPNG 10</td>
</tr>
</tbody>
</table>

Pn - Penicillin, Cip - Ciprofloxacin, Cro - Ceftriaxone, TC - Tetracycline, ST - Spectinomycin, NA - Nalidixic acid, PPNG - Penicillinase-producing *N. gonorrhoeae*
3. Laboratory diagnosis of gonorrhoea. WHO regional publication: South-East Asia. New Delhi, India; 1999.

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