**Background**

- **Neisseria gonorrhoeae** multiantigenic sequence typing (NG-MAST) is a highly discriminatory technique for assessing the genetic diversity of clinical isolates.
- It has also been put forward as a tool for predicting AMR phenotypes.
- The distribution of NG-MAST sequence types (STs) in *N. gonorrhoeae* isolates differs between isolates from different geographical regions.
- Therefore, the present study was undertaken to determine the NG-MAST genotype distribution of isolates in Delhi and to examine if it can be used as a means for predicting AMR.
- This is in compliance with the WHO recommendations that emphasize on research into newer molecular methods for monitoring & detecting AMR in *N. gonorrhoeae*.
- This is first such research performed in our country.

**Methods**

- A total of 100 *N. gonorrhoeae* consecutive isolates (99 from male & 1 from female patients) collected between April 2010 to October 2013 were investigated.
- The age group of infected patients ranged from 17 to 54 years; median age 27 years.
- *N. gonorrhoeae* culture and identification was done as per standard methods.
- The antibiotic susceptibility testing (AST) was performed by the CDS technique with low concentration discs and MICs of penicillin, ciprofloxacin, tetracycline, ceftriaxone, azithromycin & spectinomycin for all isolates was determined by Etest (Biomerieux, France).
- All isolates were tested for β-lactamase production by nitrocefin discs (BD, USA).
- NG-MAST was performed on all isolates as previously described (Martin et al, 2004).
- WHO *N. gonorrhoeae* reference strains F, G, K- P were used as controls.
- Phylogenetic analysis was done by Maximum Likelihood method using MEGA6.
- Association between NG-MAST sequence type & antibiotic phenotypes was probed using chi-square & fisher’s exact tests.
- All statistical analysis were done by using STATA 11.2 and results were considered as significant at p<0.05.

**Results**

- Penicillin: The percentage of resistant isolates varied insignificantly from 2010 to 2013 (χ²=0.16, p=0.164). This includes PPNG (penicillinase producing *N. gonorrhoeae*) & CMRRNG (chromosomally-mediated resistance *N. gonorrhoeae*).
- Tetracycline: Resistance to tetracycline increased significantly from 2010 to 2013 (χ²=14.08, p=0.016). It includes plasmid-mediated tetracycline resistant *N. gonorrhoeae* (TRNG) & chromosomally-mediated resistance (CMR).
- The rate of resistance to ciprofloxacin were overall very high (94%) & showed a significantly increasing trend from 2010 to 2013 (χ²=12.02, p=0.042).
- Overall Decreased susceptibility (DS) to ceftriaxone was demonstrated in 5% of isolates that were restricted to years 2010 & 2011. No isolates demonstrated DS in 2012 & 2013.
- Azithromycin: Overall resistance was seen in 4% of isolates with no significant trends.
- All isolates were susceptible to spectinomycin & No MDR-NG or XDR-NG strains was observed.

**Discussion & Conclusion**

- The rates of resistance to traditional antibiotics were high.
- Although decreased susceptibility (DS) to injectable ceftriaxone was seen in 5% isolates, there was no treatment failure reported.
- There is need to monitor MICs of ceftriaxone as the percentage of strains showing 2 fold increase in modal values increased from 38% in 2010 to 57% in 2013.
- However, our data fully supports the currently recommended combination of ceftriaxone & azithromycin for treatment of gonorrhoea.
- The phylogenetic tree demonstrated a large strain diversity in our gonococcal population.
- Like other authors, we too feel that it is because of local emergence of new STs and import of foreign STs.
- The most common ST was ST6058, seen in 21% of isolates.
- ST1407, the internationally documented multidrug resistant gonococcal clone was not seen.
- Although there was a significant association between resistance to penicillin & tetracycline and ST6058, our results reflect a limited applicability of NG-MAST as a tool for predicting AMR phenotypes in our region.
- There is need to access the value of this technique in a large number of isolates and also to evaluate alternative technologies.

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