Original article

Increasing trend of multiple resistance and genomic mobility of Neisseria gonorrhoeae to penicillin and quinolone

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ABSTRACT

A significant decline of gonorrhea incidence has been observed during the years 1990-99. However, a slight increase in the number of cases has been reported in 2000. In addition, an increase in resistant strains has been found in Thailand. In this study, 207 isolates of N. gonorrhoeae from patients attending Bangrak hospital (National Centre of Sexually Transmitted Infections), 67 isolates obtained during January-March 2000, 74 isolates obtained during January-March 2002, and 66 isolates obtained during October-December 2002, were tested. All isolates were susceptible to ceftriaxone while 71.5% and 74.4% were resistant to penicillin and quinolone, respectively. The high level of ciprofloxacin resistance (MIC $\geq 4$ mg/L) also increased from 13.4% during January-March 2000 to 25.8% during October-December 2002. Multiple resistance determinants commonly coexisted in a single isolate so that the level of resistance was increased. The incidence of double resistance determinants, penicillin and quinolone resistance, were significantly increased from 34.3% among isolates during January to March 2000 up to 77.3% among isolates during October to December 2002 ($P < 0.001$). In addition, an isolate obtained in 2002 resisted to spectinomycin with a high MIC ($>1.024$ g/L). Several plasmid patterns have been identified and various patterns of the plasmid can be artificially transferred and maintained their expression in Escherichia coli transformants. Such evidences infer the high mobility of resistant genome among microorganisms in the region. Moreover, the significant increase in penicillin and quinolone resistance herein, indicates the selective pressure and the diversity of genomic distribution among N. gonorrhoeae in Thailand. Primers JDA (5’-TAC TCA ATC GGT AAT TGG CTT C-3’) and JDB (5’-CCA TAT CAC CGT CGG TAC TG-3’) have been designed from sequences of the Asia, the Africa, and the Toronto $\beta$-lactamase plasmids. By using the JDA and the JDB as PCR primers, our data reveal the highest prevalence and a significantly increasing trend of the epidemic Africa type of genomic $\beta$-lactamase.

Keywords: Neisseria gonorrhoeae, antimicrobial susceptibility, quinolone resistance, penicillin resistance

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