Original Article

Erythromycin Resistance in *Streptococcus pyogenes* Group A throat isolates in Sukkur city

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Abstract

Objective: To examine and evaluate the predominant and common etiologic agent(s) of pharyngitis in Sukkur city and to determine their current antibiotic susceptibility/resistance trends.

Methods: Out of 257 throat samples, 149 positive for *Streptococcus pyogenes* Group A between November 2001 and May 2003 from adult population of Sukkur city were tested for their susceptibility to erythromycin, clindamycin, azithromycin and clairithromycin. The throat samples (swabs) were examined by Gram-stain, API system, and for presence of β-hemolysis. Samples were further cultured on Muller Hinton agar for determination of antibiotic sensitivity patterns. The sensitivity was performed on only those samples which were positive for *S. pyogenes*.

Results: Of all throat isolates, 95% were predominantly resistant to erythromycin. Their sensitivity towards clindamycin was 30%, azithromycin 44% and clairithromycin 76% respectively.

Conclusion: The current pharyngeal isolates of *S. pyogenes* exhibited frequent and alarmingly high erythromycin resistance which may be due to both intrinsic and acquired mechanisms. (Rawal Med J 2007;32:11-13)

Key Words: Group A Streptococcal fresh throat isolates, Erythromycin, resistance

INTRODUCTION

Streptococcus pyogenes Group A (Group A streptococcus) is one of the most frequently isolated microorganisms found in clinical practices. Group A streptococcus is a major etiological agent causing a variety of human diseases ranging from pharyngitis to severe

and life threatening invasive disease, such as toxic shock-like syndrome (TSLS)[1] and necrotizing fascitis.[2] Most recently, group A streptococcus has gained notoriety as flesh –eating bacterium which invades skin and soft tissues. As pathogens, they have developed complex virulence mechanisms to avoid host defenses.[3] Group A streptococci are the most common cause of pharyngitis and all ages are susceptible to spread of the organism under unhygienic oral or crowded conditions.[4] Pharyngitis represents an important clinical problem both in terms of number of clinical cases and nature of causative agents.[5] Benzyl penicillin has been the drug of choice for treating infections by this organism. Erythromycin and other macrolides have been recommended as alternative treatment for patients allergic to penicillin. Recently, a dramatic increase in macrolide resistanance has been documented in several countries including Japan[6] and United States.[7] While the prevalence of *S. pyogenes* resistance to erythromycin has been reported worldwide, no data is available in our situation. The aim of this study was to assess the prevalence of erythromycin resistant group A streptococcal strains isolated from the adult population with pharyngitis in Sukkur.

MATERIALS AND METHODS

This study was conducted at the Safeway Diagnostic and research Laboratory, Sukkur from November 2001- May 2003. Two hundred fifty seven individuals of both sexes over 15 years age with acute pharyngitis referred by clinician (s) or consultant (s) for throat swab (s) were screened and, 149 (58%) whose throat culture was found to be positive for *S. pyogenes,* were included in this study. Four antibiotics, clindamycin, erythromycin, azithromycin and clairithromycin were used for sensitivity testing. Throat

swabs were inoculated on Mueller Hinton agar (Oxoid) and 5% Sheep Blood Agar Base (Oxoid). Culture plates were incubated at 37^{o}C for overnight before reading and further processing. All streptococcal isolates were identified on the basis of routine and standard colonial characters (Beta haemolysis etc), Gram-stain, Biochemical tests (catalase, Bacitracin sensitivity, Optochin sensitivity test and Bile solubility test) and were further supported by API 20 Strep method (Bio-merieux). Antibiotic susceptibility was determined by Kirby-Bauer disc diffusion method.[8] The presence of erythromycin resistance in throat isolates was primarily determined by Disk Diffusion assay.

RESULTS

Out of 257 samples, 149 (58%) throat cultures were positive for *S. pyogenes.* The results of sensitivity to wards antibiotics to throat isolates showed that only 5% group A streptococcal isolates were sensitive towards erythromycin while 95% emerged as resistant.

Table 1. Percentage of sensitivity of *Streptococcus pyogenes* Group A isolates to antibiotics

Name of antibiotic	*% sensitivity*
Azithromycin	44%
Clairothromycin	76%
Clindamycin	30%
Erythromycin	5%

Azithromycin showed sensitivity of 44%, clairithromycin 76% and clindamycin 30%, respectively (table 1).

DISCUSSION

Our data showed a high resistance (95%) towards erythromycin, which is alarmingly high. The antibiotics such as azithromycin, clindamycin and clairithromycin were not 100% efficient to combat this organism either. These results coincide with the observations reported from various countries. Wide heterogeneity of high level resistance to erythromycin is documented in several countries and the incidence of *S.pyogenes* erythromycin resistance recently reached 17% in Finland, 42% Poland, 24% Portugal, 28% Hong Kong, 27-34% in Spain and 50% in Italy.[9,10]

Current practice guidelines for the management of pharyngitis caused by *Streptococcus pyogenes* include the use of erythromycin as an alternative to penicillin when indicated and clindamycin for persons with multiple recurrent episodes.[11] However, changes in the susceptibility of beta-hemolytic streptococci to erythromycin and clindamycin have been substantial. High level resistance to this antibiotic may be due to both intrinsic and acquired mechanisms. Recently, morphostructural atomic force microscope (AFM) technique has shown that erythromycin (32 mg/l) incubated with *Streptococcus pyogenes* group A for 6 h had no manifestation of structural or morphological changes.[12] The mechanism of acquired resistance to erythromycin may involve a target site modification mediated by a methylase which modifies the 50S ribosomal subunit, leading to the MLS_B

resistance phenotype encoded by *erm* genes.[13] It may be worthwhile to determine the genetic mechanisms of resistance in these isolates.

Streptococcus pyogenes Group A involved in pharyngitis has been widely investigated all over the world, but few studies have been reported in Pakistan.[14] Many of the problems of resistance are due to inappropriate and excessive use of this antibiotic. Multiple resistant strains are causing major problems in hospitals in many parts of the world and particularly in developing countries. Through the strict antibiotic policy, based on the findings of the Microbiology laboratory, it is possible to avoid further resistance development. In conclusion, the high level of resistance towards erythromycin seen in this study strongly suggests a necessity for effective interventions to counter the problem of growing antimicrobial resistance and need for proper and accurate bacteriological management. The current findings raises concerns about the use of erythromycin for the prophylaxis or treatment of streptococcal pharyngitis.

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