

Extremely High Prevalence of Erythromycin Resistance of Group A Beta Hemolytic Streptococci in Mashhad (Iran)

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Erythromycin has been the classic drug of choice for Streptococcal pharyngitis in case of allergy to penicillin.

To determine the resistance rate of Group A beta hemolytic Streptococci (GABHS) to erythromycin in Mashhad (population 2,500,000), we performed a biphasic research, composed of two retrospective (April 1998- March 1999 and April 2003-March 2005) and a prospective studies. In the first part, we collected GABHS positive cultures and their (disk diffusion) antibiograms from three medical diagnosis laboratories in Mashhad. In the second phase, in April 2005, throat cultures were taken from 204 elementary, high school and college students; antibiograms were done by both disk diffusion and E-test.

In the retrospective study, during 1998-1999, thirty-seven of 62 (59.67%) GABHS isolated samples and during 2003-2005, thirty-six of 44 (81.87%) GABHS isolates were resistant to erythromycin. The mean age of the 2003-2005 group was 25.5 years. The resistance rate in children less than 10 years old was 71.42% and in the older ones 88.23% ($P=0.07$).

In the prospective study, 76 of 204 (37.3%) throat samples were positive for GABHS and both the E-test and disk diffusion method showed that 73.7% (56 of 76) of the isolates were resistant to

erythromycin. The mean age for this group was 14.63 years. Although the rate of erythromycin resistance was higher in the high school students, the difference was not statistically significant ($P=0.07$)(Fig. 1).

The highest rate of erythromycin resistance for GABHS (98.8%) has been reported from China^[1], before that Japan had the first place of resistance (>60% in 1979)^[2]. Japan decreased the rate of erythromycin resistance at early 1990s to the lowest ever reported rate of 0.49%^[3]. In the United States, according to the report of CDC, the rate of erythromycin resistance of GABHS is not high (8%-9%). In Iran, the most recent report (2005) has shown the resistance rate of 40% for throat culture samples from middle school students in Kerman^[4].

In our study there was 100% concordance in the erythromycin resistance of GABHS by disc diffusion and E-test methods. Other studies have also shown such a close identity between the two methods^[5], although in some studies disc diffusion has been reported to be more sensitive^[6].

What is the cause of this high grade of erythromycin resistance? The rate of macrolide resistance is closely related to the extent at which these agents are used; at the time of our study (2005) macrolides were not among the most common antibiotics that were being used in Iran. According to the report of the food and drug organization of the Ministry of Health of Iran (www.fdo.ir), in 2005 erythromycin was the third among suspensions and the fourth among

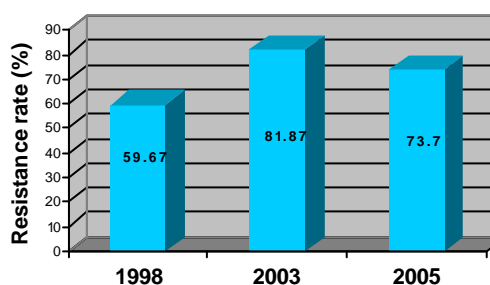


Fig. 1: The rate of Erythromycin resistance among GABHS in Mashhad between 1998 and 2005

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among suspensions and the fourth among capsules in antibiotic production of the country. Amoxicillin possessed the first place, the production of which was more than ten times of erythromycin. The question was, can food industry have a role in this problem? According to the report of Iranian Veterinary Organization (www.ivo.org.ir), lincomycin and erythromycin are the only macrolides used in our meat and dairy industry and none of them is frequently used, erythromycin is the seventh antibiotic (and the only macrolide) used in poultry (Neomycin has the first place). Lincomycin is the 4th drug (and the only macrolide) in cows and sheep husbandary (Penicillin has the first place with a large distance).

Age is an important factor in the rate of antibiotic resistance. Significant negative correlation has been found between the age of patients and the erythromycin-resistance^[7]. Our study however did not show such a relationship between age and erythromycin resistance, we think the reason is that infants and young children (<5 years old) which have the highest resistance rate are not included in this study.

We conclude that GABHS has a high rate of resistance to erythromycin in Mashhad, and although we couldn't find a reasonable explanation for this high degree of resistance, erythromycin can no longer be used for empirical treatment of streptococcal pharyngitis in this city. This project was funded by the Research Vice Chancellor of Mashhad University of Medical Sciences.

Key words: Streptococcus; Drug resistance; Pharyngitis; Erythromycin

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