Tetracycline-resistant Haemolytic Streptococci in Kuala Lumpur

by S.D. Ampalam
and
S.C. Cheng

Department of Bacteriology,
Faculty of Medicine,
University of Malaya.

Introduction

RESISTANCE OF PATHOGENIC BACTERIA to antibiotics is becoming an ever increasing problem. Over the past several years, there have been a number of reports which point to the existence of an appreciable proportion of tetracycline-resistant strains among any large group of beta-haemolytic streptococci.

Reports from Britain show an increasing incidence of tetracycline-resistant streptococci. Parker, Maxted and Fraser (1962) found that 12% of 921 streptococci of Lancefield's group A, submitted to the Streptococcus and Staphylococcus Reference Laboratory at Colindale, were tetracycline-resistant. Mitchell and Baber (1965) found that 32% of 640 group A strains isolated in the Bristol area were tetracycline-resistant. Dadswell (1967) found an increase in the tetracycline-resistant group A streptococci from 1% in 1958 to 44% in 1965. Robertson (1968) found that the overall percentage of tetracycline-resistant streptococci (groups A, B, C, G and D) had remained almost stationary, varying from 28% in 1963 through 35% in 1965 to 27% in 1967.

In the United States of America, Kuharic, Roberts and Kirby (1960) found 20% of group A streptococci from clinical sources to be tetracycline-resistant.

In Australia, Lane (1962) found that 19.4% of 98 streptococci to be fully resistant to tetracycline. strains of naturally occurring group A haemolytic

There is, at present, no information in Malaysia on the antibiotic sensitivity pattern of the haemolytic streptococci. The present study was undertaken to establish a base line of the in vitro antibiotic sensitivity pattern, and to observe if there is any significant proportion of resistant strains amongst the streptococci isolated from clinical material.

MATERIALS AND METHODS

Routine specimens were submitted from June 1967 – March 1970 to the Bacteriology Department of the University Hospital which has busy out-patient departments and about 700 acute beds. Specimens were taken on sterile cotton wool swabs.

The table shows their sources and the numbers isolated from each site:–

Principle Sources of Haemolytic streptococci

Throat	356
Wounds and Abscesses	98
High Vaginal Swabs	10
Blood Culture	6
Ear	6
Sputum	4
Urine	3
Eye	2
Total	485

In the laboratory, the swabs were cultured on 10% layered ox-blood agar plates. All plates were inoculated on a 2 x 2 cm. area and streaked out with 3 successive series of streakings, flaming the loop between each. The plates were incubated overnight at 37°C., both aerobically and anaerobically.

All colonies showing beta-haemolysis were picked and subcultured to obtain pure growth. Sensitivity to antibiotics was tested by streaking blood agar plates with the strain, on which were then placed filter paper discs impregnated with antibiotics (MAST). The concentration of the antibiotic in each disc was penicillin 4 units, tetracycline 25 ug, ampicillin 5 ug, cephaloridine 5 ug and erythromycin 5 ug. A strain was considered resistant only if it grew right up to the edge of the disc.

The Lancefield grouping of the streptococci was determined by sensitivity to bacitracin (discs of 0.1 units – Mast), and by the precipitin reaction (Lancefield 1933) using sera of groups A, B, C and G (Burroughs Wellcome).

RESULTS

A total number of 485 strains of haemolytic streptococci of all groups were isolated, of which 126 (25.98%) were tetracycline-resistant.

Lancefield grouping on 315 strains showed 180 (57.1%) belonged to group A, 8(2.5%) to B, 40 (12.7%) to C, 51 (16.2%) to G and 36 (11.6%) to none of these groups. These figures compare closely with those of Robertson (1968).

Of a total of 180 group A strains, 29 were tetracycline-resistant giving the figure of 16.1% as tetracycline-resistant group A strains.

Erythromycin-resistance was noted in 5 strains (1.0%) of which only 2 belonged to group A.

All the strains were fully sensitive to all the other antibiotics i.e. penicillin G, ampicillin, orbenin and cephaloridine.

DISCUSSION

The overall tetracycline-resistance of 26% is lower than published figures for U.K. – (28-35% Robertson, 1968). Similarly, the figure of 16.1% for tetracycline-resistant group A streptococci is very much lower than the 32% of Mitchell and Baber (1965) or the 44% of Dadswell (1967). But the figure of 16% resistant group A strains is not very far from the 20% reported by Kuharic and Kirby (1960) in the U.S.A., and the 19% reported by Lane (1962) in Australia.

The concentration of the tetracycline in the disc used for the sensitivity testing was 25 ug which is higher than that used by Robertson (10 ug) and Dadswell (10 ug), but Mitchell and Baber used 25 ug per disc. It is possible, in fact very likely, that had we used a tetracycline disc of 10 ug, the figures would have been higher than that obtained using the 25 ug disc.

Resistance to erythromycin has been reported by Lowbury and Hurst (1959) of haemolytic streptococci isolated from 4 patients with burns. Lowbury and Kidson (1968) have also described erythromycin-resistant strains isolated from patients suffering from burns but they were also resistant to lincomycin. Dixon (1968) described a group A haemolytic streptococci isolated from a throat swab which was resistant to both erythromycin and lincomycin.

One of our erythromycin-resistant strains was isolated from a wound swab and was a group G, 2 were from throat swabs and were group A and the other 2 were also from throat swabs but not group A, B, C or G. It appears that our 1% erythromycin-resistant streptococci is fairly high.

The implication of the above findings are important. Firstly, we have established a base line for the tetracycline and erythromycin-resistant haemolytic streptococci in Kuala Lumpur. It would be interesting to see whether these figures increase or decrease in the future. This would depend on the policy of antibiotic treatment adopted in the case of streptococcal infections.

It is difficult to assess how widely tetracycline is used for the treatment of streptococcal infections, especially sore throats. Tetracycline resistance may be responsible for failure to cure the streptococcal carrier state or to halt the progress of established infection with streptococci. But clinical improvement with tetracycline treatment may be due to mixed infections and elimination of sensitive strains before the emergence of resistant strains.

McCormack et al (1962) considered that the hospital might provide an environment for the selection and dissemination of tetracycline-resistant streptococci very similar to the hospital staphylococci. This may be true. From our own experience, haemolytic streptococci isolated from the throats of normal schoolchildren aged 7 years, showed only about 5% tetracycline resistance (unpublished data).

The problem of the tetracycline-resistant haemolytic streptococci can be very largely circumvented, but, unless the present magnitude of this problem is appreciated, it may become even greater as tetracycline becomes cheaper.

It is, therefore, important that tetracycline should

not be used in the treatment of streptococcal infections unless the sensitivity of the infecting organism has been previously determined.

It is probable that by refraining from the use of tetracycline at present, that most of the haemolytic streptococci in the distant future would once more revert and become sensitive to tetracycline.

SUMMARY

Antibiotic sensitivity was done on 485 strains of haemolytic streptococci. Overall tetracycline resistance was found to be 26% and that of group A was 16.1%. The importance of this is discussed.

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