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Antimicrobial Susceptibility Trends among Viridan Streptococci Isolates from Cases of Endocarditis from 2007– 2009

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Abstract

To determine the changes found in antimicrobial resistant character occurred among viridans groups of streptococci, this study examined 30 viridans group streptococci isolated from infective endocarditis patients. The isolation pattern revealed based on biochemical identification as four viridans streptococcal species groups–*mitis*, *mutans*, *salivarius* and *sanguinis*. Resistance rates of the isolates were as follows, Penicillin–2; Clindamycin–2; Erythromycin–5; Azithromycin–10; Vancomycin–4; Levofloxacin–1 and Ciprofloxacin–2.

Keywords: Viridans streptococci, endocarditis, antibiogram

Introduction

The observation of Bacteremia episodes due to viridans group of streptococci found 20 – 40% in neutropenic patients [1-4] and 30 – 40% of infective endocarditis cases. In hematologic patients, fluoroquinolones are used as antibacterial prophylaxis agents during the neutropenic period after haematopoietic stem cell transplantation or chemotherapy alone [5]. Many case studies highlighted the episodes of bacteriemia with fluoroquinolone resistant viridans group streptococci during fluoroquinolone prophylaxis [6,7]. Previous study reported 16% rate of this problem with fluoroquinolone resistant viridans group streptococci during Levofloxacin prophylaxis in hematology patients undergoing autologous stem cell transplantation. In recent years, several case reports of infective endocarditis due to penicillin resistant viridans group streptococci have been published [8-12]. By taking the research of above said as reference, we retrospectively examined antimicrobial susceptibility trends, including fluoroquinolone susceptibility, in a collection of viridans group streptococcal isolates spanning 5 years, to see if changes found in antimicrobial resistance had occurred.

Materials and Methods

The selected blood samples from bacterial endocarditis patients have been collected from Kovai Medical Center and Hospital, Coimbatore, India and processed bacteriologically. The cultural patterns were biochemically identified and classified according to the criteria set forth by Focklam [13]. 30 isolates collected from September 2005 – April 2008 were included in this study. These isolated organisms have clinically relevance from the antimicrobial susceptibility perspective because they are of proven pathogenic potential in immuno competent hosts, MICs were determined by broth micro dilution in cation adjusted Mueller Hinton broth supplemented with 2.5% lysed horse blood and interpreted according to NCCLS guidelines. The concentration ranges tested were 0.125 to 128 g/ml (in doubling dilutions) for Penicillin, Clindamycin, Erythromycin, Azithromycin, Vancomycin, Levofloxacin, and Ciprofloxacin. Till now NCCLS has not published susceptibility break points for quinolone – Ciprofloxacin included in this study.

Results and Discussion

Due to the initial identification data of many of the isolated, they were biochemically identified and classified into 4 viridans streptococcal species groups like *S. mitis, S. mutans, S. salivarius and S. sanguinis*. The confirmation of eh analysis is mainly through the performance tests on commonly used reagents. *Streptococcus mitis* is confirmed by optocin negative (resistant) on blood agar whereas *S. mutans* is optocin positive (susceptible).

Among the isolates from 2001 – 2005, monobacterial isolation found in 12 cases (n=30) and polybacterial found in 19 cases and one found to be lost. In monobacterial analysis, *S. mitis* place top in 7 cases followed by *S. mutans*, *S. salivarius* and *S. sanguinis* in 2,1 and 2 cases respectively. Among polybacterial studies (n=19), *S. mitis* and *S. mutans* mixture is in top of 10 cases followed by *S. mitis*, *S. mutans* and *S. salivarius* mixture; *S. mitis* and *S sanguinis* mixture and *S. mitis*, *S. mutans* and *S. sanguinis* in 4; 2 and 3 respectively (Table 1).

Table 1: The distribution of monomicrobial bacteremia (MMB) and polymicrobial bacteremia (PMB) among cases of endocarditis (n=30)

Organism	No. of isolates
Monobacterial n = 12 (40)	
Streptococcus mitis	7 (58.3)
S. mutans	2 (16.7)
S. salivarius	1 (8.3)
S. Sanguinis	2 (16.7)
Polybacterial n = 17 (56.7)	
S. mitis and *S. mutans*	8 (47.1)
S. mitis, *S. mutans* and *S. salivarius*	4 (23.5)
S. mitis and *S. sanguinis*	2 (11.8)
S. mitis, *S. mutans* and *S. sanguinis*	3 (17.6)

Figures in parentheses indicate percentages

Table 2: Susceptibility pattern of viridans group of streptococci isolated from clinical samples

Antibiotics	MIC_{90}S range	No. of isolates included	Sensitive	Resistant
Azithromycin	8 (0.125 – 32)	30	28 (93.3)	2 (6.7)
Ciprofloxacin	8 (0.5 – 16)	30	28 (93.3)	2 (6.7)
Clindamycin	0.125 (0.125 – 128)	30	28 (93.3)	2 (6.7)
Erythromycin	4 (0.125 – 8)	30	25 (83.3)	5 (16.7)
Levofloxacin	4 (0.125 – 8)	30	29 (96.7)	1 (3.3)
Penicillin	0.125 (0.125 – 4)	30	28 (93.3)	2 (6.7)
Vancomycin	0.125 (0.125 – 4)	30	26 (86.6)	4 (13.4)

Figures in parentheses indicate percentages

In isolates from 2001 – 2005, high rates of resistance were measured to Azithromycin (33%), Erythromycin (17%) and Vancomycin (13%). The lowest rates of non susceptibility were those to Ciprofloxacin (7%), Clindamycin (7%), Levofloxacin (3%) and Penicillin (7%). The susceptibility patterns of viridans group of streptococci were depicted in the Table 2. In this study, higher MIC were found for Ciprofloxacin (8 g/ml) and Levofloxacin (8 g/ml) supported some other studies [14]. In contrast, the level of penicillin non susceptibility among the isolates (3%) was lower than the report in recent surveillance blood culture studies. Two of our isolates (one of *S. mitis* and one of *S. sanguinis* were penicillin non susceptible. The level of Azithromycin (33%) and Erythromycin (17%) resistance among isolates in our study was comparable to previous studies [14-16].

For the four vancomycin resistance viridans group streptococci isolates in the present investigation, the MICs were 2 g/ml and within the margin of the assay. There have been previous reports of viridans group streptococci for which vancomycin MICs were slightly elevated [17,18]. There are some limitations in our study,

1. Sample size is small, so did not provide the power to detect statistical significance differences.
2. Viridans group of streptococci isolates were from tertiary care centre also may not be reflective of endocarditis isolates seen in community hospital.
3. The isolates from patients population include in this study are recovered may influence antimicrobial susceptibility patterns, isolated from endocarditis patients may not reflect the fluoroquinonoe – ciprofloxacin susceptible pattern. Diekema *et al*., 2001 studied the trend to reducing susceptibility to ciprofloxacin in patients with a diagnosis of cancer verses those without such diagnosis [14].
4. The antimicrobial therapeutical history of these patients was unknown, a needful factor which may have influenced antimicrobial susceptibility.
5. Not all viridans group streptococcal strains were achieved from endocarditis patients diagnosed during the time period of this study resulting in the level of non susceptibility reported in the context of these limitations.

6. Larger prospective surveillance studies are needed to monitor antimicrobial resistance in viridans group streptococci from defined patient populations such as neutropenic hematology and endocarditis patients.

This is one of the novel studies of reporting antimicrobial susceptibility patterns of viridans group of streptococci based on clinical diagnosis. From this study, we come to conclusion that increasing levels of antimicrobial resistance could impact the rate of bacteremia with viridans group streptococci in neutropenic patients receiving fluoroquinone prophylaxis and may not influence antimicrobial prevention and management of infective endocarditis.

References

[1] Bochud PY, Eggiman P, Calandra T, Ven Melle G, Saghafi L, Francioli P, *Clin. Infect. Dis.*, **1994**, 18: 25.
[2] Brown ER, Wheat JL, Kneebone PH, Sundbland K, Hromas RA, Tricot G, *Antimicrob. Agents. Chemother*., **1994,** 8: 576.
[3] Donnelly JP, Dompelling EC, Meis JF, de Pauw BE, *Clin. Infect. Dis*., **1995,** 20: 469.
[4] Haahr V, Peterslund NA, Moller JK, *Scand. J. Infect. Dis*., **1997**, 29: 623.
[5] Razonable RR, Litzow MR, Khaliq Y, Piper KE, Rouse MS, Patel R, *Clin. Infect. Dis.*, **2002**, 34: 1469.
[6] Classen DC, Burke JP, Ford CD, Evershed S, Aloia MR, Wilfahrt JK, Elliott JA, *Am. J. Med*., **1990**, 89: 441.
[7] Elting LS, Bodey GP, Keefe BH, *Clin. Infect. Dis*., **1992**, 14: 1201.
[8] Hall GE, Baddour LM, *Am. J. Med. Sci*., **2002,** 324: 51.
[9] Levitz RE, *N. Engl. J. Med*., **1999,** 340: 1843.
[10] Levy CS, Kogulan P, Gill VJ, Croxton MB, Kane JG, Lucey DR. *Clin. Infect. Dis*., **2001,** 33: 577.
[11] Lonks JR, Dickinson BP, Runarsdottis V, *N. Engl. J. Med*., **1999**, 341: 1239.
[12] Sabeela, C, Murphy D, Drummond- Webb J, *JAMA*., **2001**, 285: 2195.
[13] Falklam R, *Clin. Microbiol. Rev*., **2002**, 15: 613.
[14] Diekema DJ, Beach ML, Pfaller MA, Jones RN, Sentry participants group, *Clin. Microbiol. Infect.*, **2001**, 7: 152.
[15] de Azavedo JC, Trpeski L, Pong-Porter S, Matsumura S and Low DE, *Antimicrob. Agents. Chemother*., **1999**, 43: 2299.
[16] Doern GV, Ferraro MJ, Brueggemann AB, Ruoff KL, *Antimicrob. Agents. Chemother.*, **1996,** 40: 891.
[17] Rolston KV, Elting LS, Bodey GP, *Am. J. Med*., **1995,** 99: 450.
[18] Spanik S, Trupl J, Kunova A, Botck R, Sorkovska D, Grey E, Srudena M, Lacka J, Oravcova E, Krchnakova A, Svec J, Krupova I, Grausova S, Stopkova K, Koren P, Kremery V, *Scan. J. Infect. Dis*., **1997**, 29: 245.