

Etiology Of Infective Endocarditis

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Summary:

Blood cultures were taken from suspected cases of infective endocarditis admitted in Jinnah Postgraduate Medical Centre and NICVD, Karachi. A total of 71 cultures were collected from these patients. Eighteen patients gave positive results. On these 18 patients 53 blood cultures were done. No gram negative organism was isolated in this study. Of the 18 patients with positive results 13 patients were infected by gamma hemolytic *Streptococcus viridans*, staphylococci were isolated in 4 patients and *Streptococcus faecalis* in one patient.

Introduction:

Almost any species of bacteria is capable of producing infective endocarditis. However streptococci and staphylococci account for the vast majority of cases in which the infecting organism can be identified (Kaye¹, 1979).

The most common causative organism, identified in blood cultures of patients with bacterial endocarditis, is streptococci of the viridans group including both the alpha hemolytic and gamma non-hemolytic varieties. Together they may be from 75 to 85 per cent of the positive cases. Staphylococci which include strains of the staphylococcus aureus and also to a less extent staphylococcus albus have been gaining in prominence as a cause of bacterial endocarditis in recent years.

The prime importance in cases of infective endocarditis is the isolation of the etiologic agent and determination of the antibiotic sensitivity pattern for proper management of the disease.

The blood samples were collected from each patient with an interval of at least 2 hours between each collection over a period of 48 hours (Werner³ et al 1967, Crowley⁴ 1966, Fried Berg^{2,6} 1950 and Washington⁵ 1975).

Results:

Table I shows the percentage of bacterial species in the positive patients.

TABLE: I

Percentage of positive and negative specimens cultured in bacteriologically proven cases of infective endocarditis.

Total Number of blood cultures = 53				
CULTURES	POSITIVE	%	STERILE	%
First blood specimen	12	22.64	6	11.32
Second blood specimen	5	9.43	13	24.52
Third blood specimen	12	22.64	5	9.4
TOTAL:	29	54.71	24	47.16

No gram negative organism was isolated in this study. Of the 18 patients with positive results 13 patients were infected by gamma hemolytic streptococcus viridans the percentage being 72.22%. Staphylococci were isolated in 4 patients (22.22%) and *Streptococcus faecalis* in 1(5.55%).

Table II shows the nature of bacterial species isolated from blood culture.

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TABLE II

Nature of bacterial species isolated from blood culture

Total No. of positive cases:	= 18			
Total No. of positive blood cultures.	= 29			
Total No. of blood cultures taken from positive cases.	= 53			
PURE CULTURE				
Organism	No. of patients in which causative Orgs. isolated.	First blood culture specimen	Second blood culture specimen	Third blood culture specimen
<i>Streptococcus viridans</i> .	13	8	4	9
<i>Streptococcus faecalis</i> .	1	1	-	-
<i>Staphylococcus aureus</i> .	3	2	1	2
<i>Staphylococcus albus</i> .	1	1	-	1
TOTAL:	18	12	5	12

The total number of positive cases were 18. The total number of blood cultures taken from positive cases was 53. Total number of positive blood cultures were 29. Of the 29 blood cultures that were positive, 12 were seen to be positive from first blood specimen, 5 were positive from second blood specimen and 12 were positive from the third specimen collected.

Table II shows the percentage of positive and negative blood culture specimens in bacteriologically proven cases of infective endocarditis. It was found that of the first, second and third blood specimens taken, both the first and the third blood culture specimen gave the highest percentage of positive results (22.64%) in each case, the lowest positive results were seen in the second blood culture (9.43%). It is also seen that of the 18 patients that were proved by bacteriology as having infective endocarditis, the total number of

times the blood was drawn for culturing from these patients was 53. Of these 53 blood culture samples 29 (54.71%) were seen to be positive.

Table III shows the percentage of bacterial species in the positive patients:

TABLE: III

Percentage of bacterial species in the positive patients

Organisms	No. of Patients	%
<i>Streptococcus viridans</i> .	13	72.22
<i>Staphylococci</i> .	4	22.22
<i>Streptococcus faecalis</i> .	1	5.55
Total patients positive:	18	69.23%

No gram negative organism was isolated in this study. Of the 18 patients with positive results 13 patients were infected by gamma hemolytic *streptococcus viridans* giving a percentage of 72.22%. *Staphylococci* were isolated in 4 patients (22.22%) and *Streptococcus faecalis* in 1 (5.55%).

Discussion:

There were 18 cases (Table III) in which the etiological agent was isolated. *Streptococci* were isolated in 13 cases (72.22%) with *Streptococcus viridans* as the predominant causative agent. Followed by *Staphylococci* in 22.22% cases and *streptococcus faecalis* in 5.55% cases.

This data is parallel to the studies done by Fried Berg et al., (1961). He reports non-hemolytic *streptococcus viridans* incidence to be 80%, *Streptococcus faecalis* prevalence in 9% of the cases and 13% of the cases were due to *Staphylococci*.

Fried Berg (1950) studied 148 cases at Sinai Hospital, New York and found bacteriological recoveries in 66.2% of cases. The present study undertaken has similar results, the percentage being 69.93%.

Kelson⁷ and White (1945) have reported a 74% incidence of positive blood culture of streptococcal endocarditis in which the patient had at least one positive blood culture. This reports lower incidence of positive blood cultures than those reported by Kelson and White (1945) because this study did not exclude the patients who had undergone antimicrobial therapy before the blood was drawn.

Belli⁸ and Waisburn (1956) found 53 per cent positive blood cultures in cases of endocarditis. Which is comparable to our study in which 54.71% positive blood culture were present.

The results of this study indicate that 77.77% of endocarditis cases were due to streptococci, this is in accordance with the studies done by Kelson and White (1945) in which he found that 74% cases were due to streptococci.

The ratio of Streptococcal endocarditis to Staphylococcal endocarditis was seen to be 3.5:1 in the present study. Dowlings in 1952 (cited by Pankey,⁹ 1962) reported a rate of Streptococcal endocarditis to Staphylococcal endocarditis as 2.6:1. The ratio is high because the cases taken had usually rheumatic or congenital heart disease which predisposes them more to staphylococcal infection since there are more chances of their invasion into the blood stream. Moreover in acute infective endocarditis the chances of staphylococcal is more but the incidence is relatively low. Moreover why streptococci choose to infect already diseased heart and staphylococci normal heart depends upon the organotropism reflecting micro environmental preferences. (Robbins¹⁰ and Cotran, 1979).

A comparison of the cases since 1924 shows a continual and steady decline in the proportions of cases caused by alpha hemolytic streptococci. This decrease has been balanced by an increase in the

number of cases resulting from non-hemolytic streptococci as reported by Rabinovich et al., 1963. This correlates with the present study as well, where gamma hemolytic *Streptococcus viridans* predominance was seen.

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