



ORIGINAL ARTICLE

Incidence of Infective Endocarditis among Haemodialysis Patients: Experience at a Single Centre in Bangladesh

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Abstract

Background: Infection in hemodialysis is a very dangerous condition for the patients. **Objective:** The purpose of the present study was to find out the incidence of infective endocarditis among hemodialysis patients. **Methodology:** This was a cross sectional study which was conducted in the Department of Nephrology at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh during the periods of July 2010 and June 2012. Hemodialysis patients who were attending in the Department of Nephrology at BSMMU, Dhaka were taken as study population. **Results:** A total number of 50 patients presented with hemodialysis. Out of 50 patients 34(68.0%) cases were male and 16(32.0%) cases were female. The mean with SD of age of the patients was 38.44±13.0 years with a range of 18 to 68 years. Out of 50 patients 6(12.0%) cases had positive blood culture of which 3 cases had shown *Staphylococcus aureus*, 1 case had *Escherichia coli*, 1 case had *Enterococci* species and 1 case had *Salmonella typhi*. Among the 50 patients 5 (10.0%) had vegetation on cardiac valve. The patients frequency of dialysis 2 times per week showed 01 (2.43%) positive blood C/S and 5 positive in 3 times per week showed 05 (55.55%) positive blood C/S (p>0.001). **Conclusion:** In conclusion infective endocarditis causes infection with high mortality among the patients of CKD undergoing hemodialysis. [*Journal of Current and Advance Medical Research, January 2021;8(1):54-58*]

Keywords: Hemodialysis; infective endocarditis; incidence

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Introduction

Infection is the most common cause of death in hemodialysis patients with cardiovascular disease¹⁻². The number of patients with end-stage renal disease (ESRD) has risen dramatically over the last decade. There are 300,000 patients in the United States with ESRD who are receiving hemodialysis (HD), and the incidence is increasing at a rate of 6.0% to 8.0% per year³⁻⁵.

Infective endocarditis (IE) is at least 10 to 18-times more frequent in hemodialysis patients than in the general population. Its annual incidence is estimated to be between 5 and 13 in 10,000, while the number of new cases of IE in the general population per year is estimated to be between 15,000 and 20,000 in the United States and 1500-2000 in France⁵.

The incidence of bacteremia in hemodialysis patients has been reported as ranging from 0.7 to 1.2 episodes per 100 patient months⁶. Bacteremia is a prerequisite for infective endocarditis (IE) and it occurs at a rate of 0.7 to 1.4 episodes per 100 patient-care months. IE occurs in approximately 2.0% to 6.0% of patients receiving HD. This patient population is predisposed to infection secondary to transient bacteremia due to repetitive vascular access for hemodialysis through an arteriovenous fistula or indwelling catheter. Furthermore, these patients have relatively poor immune function secondary to uremia. The incidence of bacteremia is dependent on the type of vascular access and ranges from 1.6 to 7.7 per 1,000 catheter-days for indwelling catheters and from 0.2 to 0.5 per 1,000 catheter-days for native arteriovenous fistulas^{1,8}.

The most common pathogen is *Staphylococcus aureus* and the mitral valve is the most common site. *Staphylococcus aureus* infective endocarditis is commonly associated with specific clinical features⁵. A high index of suspicion is critical in the early recognition and management of infective endocarditis. However, prevention of bacteremia is undoubtedly the best strategy with the early placement of arteriovenous fistulae for hemodialysis⁹.

In the case of temporary catheterization, the use of topical mupirocin or polysporin and gentamicin and/or citrate locking is beneficial. Although catheter salvage has not been studied in randomized trials, catheter removal and tip culture remains standard therapy during bacteremia⁷.

Among patients on HD, IE due to by *Staphylococcus aureus* affecting the mitral valve caused by dual lumen catheter is the most common⁵. The purpose of the present study was to find out the incidence of infective endocarditis among hemodialysis patients.

Methodology

This was a cross-sectional study. The study was conducted in the Department of Nephrology at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. The study was conducted between the periods of July 2010 and June 2012. Study population were Hemodialysis patients attending in the Department of Nephrology at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. Purposive sampling technique was applied to collect the patients. Patients with fever, irrespective of age and sex getting hemodialysis were included in this study. Study procedure was followed by the variability in clinical presentation of IE requires a diagnostic strategy that is both sensitive for disease detection and specific for its exclusion across all forms of the disease. All patients underwent through clinical examination. All relevant laboratory investigations were done for the diagnosis and transthoracic echocardiogram and transoesophageal echocardiogram done in same centre and machinery by same cardiologist. Data were recorded in a pre-designed questionnaire. Data were collected by face to face interview and a checklist.

All the data were checked and edited after collection. Then the data were entered into computer and statistical analysis of the results being obtained by using windows based computer software devised with Statistical Packages for Social Sciences (SPSS-13) (SPSS Inc, Chicago, IL, USA). The results were presented in tables and figures. The statistical terms were included in this study are mean, standard deviation, percentage. Statistical significance was set at $p < 0.05$ and confidence interval set at 95% level.

Results

Out of 50 patients 34 (68.0%) were male and 16 (32.0%) were female. Mean \pm SD of age of the patients was 38.44 \pm 13.0 with a range of 18-68 years. Among the patients 17 (34.0%) were in the age group of less than 30 years, 15 (30.0%) were in the age group of 31 to 40 years, 08 (16.0%) were in the age group of 41 to 50 years and rest 10 (20.0%)

were in the age group of more than 50 years (Table 1).

Table 1: Distribution of age and sex of the patients (n=50)

Age Group	Frequency	Percent
<30 Years	17	34.0
31 to 40 Years	15	30.0
41-50 Years	08	16.0
>50 Years	10	20.0
Mean±SD (Range)	38.44±13.0(18-68)	

Out of 50 patients 6(12.0%) cases had positive blood culture (Figure I).

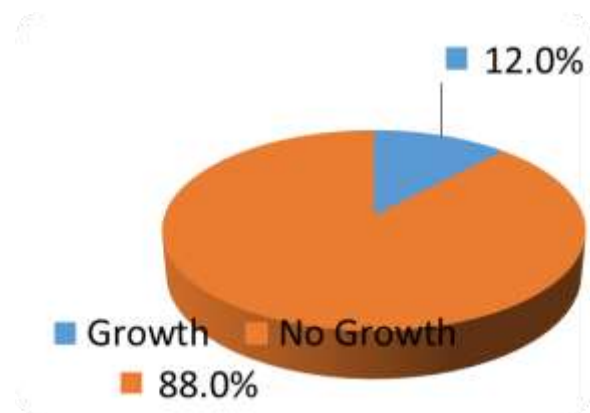


Figure I: Pie chart of blood culture growth result

Out of 6 culture positive cases 3 cases had *Staphylococcus aureus*, one had *Escherichia coli*, 1 case had *Enterococci* and 1 case had *Salmonella Typhi* (Figure II).

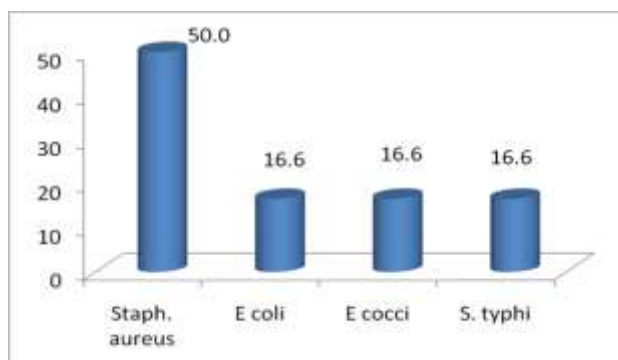


Figure II: Bar diagram of Bacterial growth in blood culture cases

Distribution of vegetation site on cardiac valve of the patients was recorded. Out of 5 patient 1 (20.0%) had vegetation on Aortic valve, 2 (40.0%) had vegetation on Mitral valve and another 2

(40.0%) had vegetation on both Mitral and Aortic valves (Figure IV).

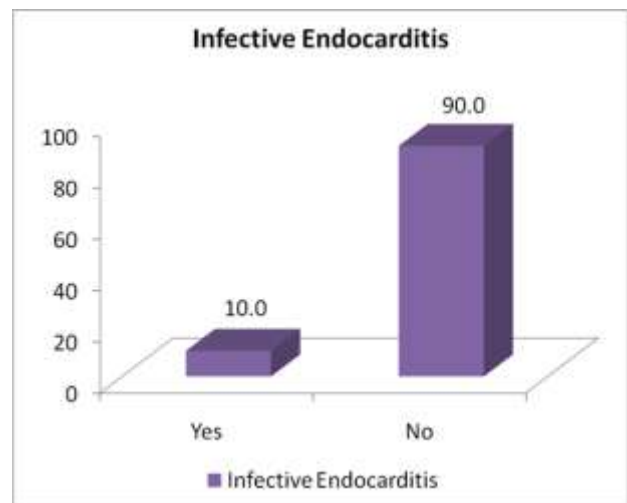


Figure III: Bar Diagram of Infective Endocarditis of the Hemodialysis Population

The relationship between frequency of dialysis and growth of organism in blood culture were recorded. The frequency of dialysis 2 times per week showed 01(2.43%) positive blood culture and 5 cases positive in 3 times per week showed 5(55.55%) positive blood culture. There was statistically significant difference between frequency of dialysis and growth in blood culture (p>0.001) (Table 2).

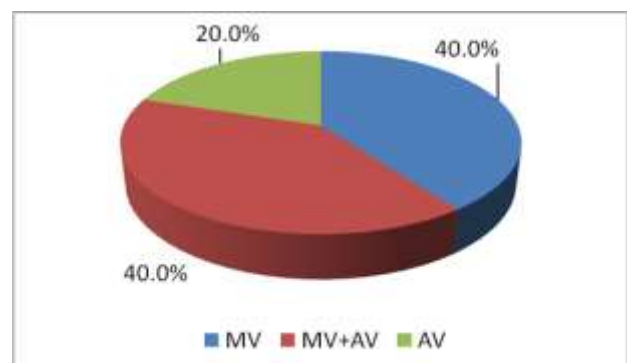


Figure IV: Pie Chart of Vegetation Site on Cardiac Valve of the Patients

Table 2: Relationship between Frequency of Dialysis and Growth of Organism in Blood C/S

Frequency of Dialysis	Blood C/S	
	Positive	Negative
2 times	1(2.43%)	40
3 times	5(55.55%)	04
Total	6	44

*Chi square test was done to measure the level of significance; p value=0.001

Discussion

In the present study out of 50 patients 34 (68.0%) were male and 16 (32.0%) were female. Mean±SD of age of the patients was 38.44±13.0 with a range of 18 to 68 years. Among the patients 17 (34.0%) were in the age group of less than 30 years, 15 (30.0%) were in the age group of 31 to 40 years, 08 (16.0%) were in the age group of 41 to 50 years and rest 10 (20.0%) were in the age group of more than 50 years. Jones et al⁹ in a study reported the mean patient age was 55.2 years (IQR: 43-69), and mean duration of HD prior to IE was 57.4 months. Tsai et al¹⁰ studied to describe the characteristics and outcomes of infective endocarditis in hemodialysis patients. They reported the mean age of 66.5±12.0 years. Doulton et al¹¹ in their study showed the mean age was 54.1 years.

Among the patients 6(12.0%) had positive blood culture and sensitivity. Of them 3 had Staph aureus, 1 had *Escherichia coli* and 1 had *Enterococcus* species. Maraj et al¹² reported that IE occurs in approximately 2.0% to 6.0% patients receiving HD. Baroudi et al¹³ have reported that the causative organisms are methicillin resistant *Staphylococcus aureus* (MRSA) in 15(25%) cases, methicillin sensitive *Staphylococcus aureus* (MSSA) in 12(20%) cases, *Staphylococcus epidermidis* in 10(17%) cases, *Enterococci* 8(14.0%) cases, multi-organism in 6(10%) cases, gram negative in 2(3.0%) cases and vancomycin resistant *Enterococci* (VRE) in 1(2%) case.

Among the 50 patients 5(10.0%) cases had vegetation on cardiac valve. Among the patients 1(20.0%) case had vegetation on aortic valve; 2(40.0%) cases had vegetation on Mitral valve and another 2 (40.0%) had vegetation on both Mitral and Aortic valves. Jones et al⁹ in a study have showed that aortic valve is affected in 42.8% of the patients (18/42), the mitral valve in 30.9% (13/42), and both valves in 9.5% (4/42). About 33.3% patients have an abnormal valve before the episode of infective endocarditis. Baroudi et al¹³ in their study reported valves involved were mitral valve in 37(63%) cases, aortic valve in 10(17%) cases, tricuspid valve in 3(5%) cases and multiple valves in 8(13%) cases. Patient mortality was 28.8% cases during hospitalization, 37.9% ($n = 22$) at 30 days and 63.1% ($n = 36$) at 1 year.

Kamalakaran et al¹ in their study reported that the most frequently infected valve was mitral (49.3%), followed by aortic (21.7%) and tricuspid (10.1%) valves. Nori et al¹⁴ in their study reported that the mitral valve (50.0%) is the commonest valve

involved. Tariq et al¹⁵ in their study reported that the mitral valve was affected in 29(73%) cases; aortic and mitral valve endocarditis was seen in 20% cases.

In the present study all the patients had frequency of dialysis 2 times per week showed 1(2.4%) positive blood C/S and 3 times per week showed 5(55.6%) positive blood culture. There was statistically significant difference between frequency of dialysis and growth in blood culture ($p>0.001$). Among the patients with positive blood culture, 5 cases had FC+RC vascular access and 1 had FC as vascular access. There is no statistically significant difference between vascular access site and growth in blood C/S ($p>0.05$). Baroudi et al¹³ in their study reported the mortality 3.6-fold higher in those with IE and arterio-venous grafts ($P=0.04$, 95% CI 1.04–12.27) compared to other forms of dialysis access.

Infective endocarditis is a serious infection with high mortality amongst hemodialysis patients¹⁰. Among the patients with positive blood culture, 2 cases are cured from IE and 4 died (66% mortality). There is statistically significant difference between growth in blood C/S and outcome ($p<0.001$). Nori et al¹⁴ in their study reported high (37%) in-hospital mortality of Infective endocarditis in hemodialysis patients. Kamalakannan et al¹ reported the overall in-hospital mortality 49.3% (34 of 69). Mylonakis and Calderwood¹⁶ reported the overall in-hospital mortality was 52% (21/40).

Conclusion

Infective endocarditis serious infection with high mortality among the patients of CKD undergoing hemodialysis. Blood culture is found positive among the dialysis patients. Most of the bacteria are *Staphylococcus aureus*, *Escherichia coli*, *Enterococci* and *Salmonella Typhi*. The vegetation site on cardiac valve of the patients is found on aortic valve and mitral valve. Furthermore, there is statistically significant difference between frequency of dialysis and growth in blood culture among the CKD patients. However, a large scale study should be carried out to see the real scenario.

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