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Epidemiology and clinical features of infective endocarditis: A retrospective study of 57 patients in a tertiary university hospital in Iran

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Abstract

***Background & Aims*:** Infective endocarditis is a life-threatening infectious disease. In order to define the epidemiologic characteristics of infective endocarditis in our region, we studied infective endocarditis cases over a 7-year period in tertiary teaching and referral hospitals.

***Materials and Methods*:** Medical records of all hospitalized patients diagnosed with IE at teaching hospitals of Urmia University of Medical Sciences, Iran, from 2009 to 2016, were retrospectively reviewed. Patients who met the modified Duke criteria for definite or possible IE were included.

Results: The study included 57 patients (35 males, 22 females; mean age 40 years) who were diagnosed as having definite IE, according to the modified Duke criteria. 15 cases (26.31%) had Rheumatic heart diseases, 12 cases (21.06%) had End Stage Renal Disease, 6 cases (10.53%) had Congenital Heart Disease, 10 cases (17.54%) had Injection Drug User and 14 cases (24.57%) had no significant cardiac disease. The primary clinical manifestations that were observed included 48 cases with fever (84.2%), 35 cases with anemia (61.4%) and 6 cases (11.1%) with altered mental status. Of the total 57 patients, blood cultures were positive in 52 (64.91%) of cases. the leading causative microorganism were Staphylococcus aureus, isolated in 19 cases (51.35%), followed by Gram negative bacilli in 6 cases (16.22%) and Streptococcus spp. in 12 cases (32.43%). In-hospital death 0ccurred in 9 patients (16.7%).

Conclusion: Changes in IE profile required continuous epidemiological updates. In this study, IE were most common in men. Staphylococcus aureus and streptococcus spp. Remain the most common etiologic agents. ESRD and IDU was important predisposing factors for IE.

***Keywords*:** Infective endocarditis, epidemiology, risk factors

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Introduction

Infective endocarditis is a rare but life-threatening disease that characterized by infection of the endocardial surface of the heart. (1) Infective endocarditis (IE) is an important disease due to the variation in clinical presentation, complications, diagnosis, treatment and the high morbidity and mortality rates. (2,3) Although incidence of rheumatic fever and rheumatic heart disease have been trending down over the last decades, the epidemiology of IE has experienced changes especially in causative organisms and drug-resistance organisms and risk factors and underlying disease. This could be a part of an increasing elderly population and emerging of new risk factors including intra-cardiac or intravenous devices, immunosuppressive conditions such as diabetes, hemodialysis, and intravenous drug use. (2,4) the diagnosis of IE is traditionally based on the modified Duke criteria and clinical features and laboratory finding, microbiological assessment and cardiovascular imaging. If IE is not treated correctly, mortality rate is high. (3,5,6) With developing of medical technology and pharmacotherapy, the clinical characteristics of IE have changed in recent years, and the epidemiology clearly demonstrates geographical differences. (7,8) This study aimed to present IE epidemiology, causative organisms, clinical features and outcome in our region, with a retrospective analysis of clinical data from patient's medical records for the past seven years.

Materials and methods

A retrospective analysis was performed of clinical data collected from 57 cases clinically diagnosed as IE at tertiary and referral hospitals of Urmia university of medical sciences in Iran from 2009-2016. Collected data included general information, underlying heart disease, clinical manifestation, pathogenic organisms and mortality in our hospitals. IE was defined according to the modified Duke criteria, by transthoracic echocardiogram (TTE) or trans esophageal echocardiogram (TEE) and blood culture according to modified Duke criteria for definite IE (two major criteria or one major criteria and three minor criteria or five minor criteria). The major criteria of IE were as follows: (1) two positive blood cultures for same pathogen; and (2) echocardiography demonstrating endocardial involvement. Minor criteria included the following: (1) risk factors; (2) fever> 38 ^{0}C; (3) vascular phenomena; (4) immune phenomena and (5) positive blood cultures that do not satisfy major criteria or serological diagnosis as an IE bacterial infection. All data were analyzed using the SPSS 16.0 software.

Results

A total of 57 adult IE cases occurred between 2009-2016. Baseline characteristics, predisposing conditions, clinically and laboratory finding on admission for 57 case are shown in table 1.

The mean age of patients was 40 years and 28 (51.9%) patients aged more than 40 years. positive blood cultures were detected in 64.91% (52/57). the leading causative microorganism was Staphylococcus aureus, isolated in 19 cases (51.35%), followed by Gram negative bacilli in 6 cases (16.22%) and Streptococcus spp. in 12 cases (32.43%). Transthoracic echocardiography and/or Trans-esophageal echocardiography were positive in 91.22% (52/57). Mitral valve involvement in 32.69% (17 case), aortic valve in 36.84% (21 case), tricuspid valve in 21.05% (12 case), and mitral/aortic valve in 3.50% (2 cases) was detected by echocardiography. The mean length of hospital stay was 16.66 days (4-32 days). In hospital mortality occurred in 9 patients (16.7%).

Table 1: Characteristics, clinical finding, predisposing factors and microbiological finding of 57 cases with infective endocarditis

sex	no	percent
male	35	
female	22	
Clinical manifestation		
Fever	48	84.2%
Anemia	35	61.4%
Alter mental status	6	11.1%
Predisposing condition		
Rheumatic heart disease	15	26.3%
Congenital heart disease	6	10.53%
Intravenous drug user	10	17.5%
ESRD/Hemodialysis	12	21.6%
No underlying cardiac condition	14	24.57%
Microbiologic finding		
Staphylococcus spp	19	51.35%
Streptococcus spp	12	32.43%
Gram negative bacilli	6	16.22%

Discussion

Infective endocarditis remains to be an uncommon disease with sporadic incidence, yet a serious entity in modern medicine, and its diagnosis requires a high clinical suspicion and treatment involves a holistic approach. Characteristics of infective endocarditis are changing all over the world. (1,3,5,7) We reviewed 57 episode of infective endocarditis over 7 years to evaluate the possible changing in the epidemiology and characteristics of IE in Iran including the changes in demographic, microbiologic, predisposing factors and outcome of disease. In the present study, the mean age of patients were 40 years and male to female ratio was 1.6:1. Incidence of IE is higher among the age group of 4th and more decade of life. This is attributed to the fact that in Iran, Rheumatic heart diseases (RHD) is still the most prevalent risk factors for IE. (9,10,11) in this study, the overall prevalence of Rheumatic heart disease (RHD) and Congenital Heart Disease (CHD) as a predisposing heart condition was 26.31% and 10.51% respectively. in other studies, in Iran, prevalence of RHD was 29%, 38.9% and 22.5% and CHD were 8.7%, 6.8% and 11.3% respectively. (9,10) in our study, End Stage Renal Disease (ESRD) with hemodialysis and intravenous drug users (IDU) were one of the most common risk factors for IE. (22.2% and 14.8% respectively). in other study in Iran, (1995-2010) and (2004-2010), IDU reported in 27.3% and 16.06% among patients with infective endocarditis. (10) regarding the physical examination, fever, dyspnea, and palpitation are the commonest symptoms, and pallor, clubbing, presence of regurgitation murmur, and evidence of heart failure were the frequent sign encountered. positive blood cultures were detected in 37 case (64.91%). Another studies, reported that 86% and 76.2% of their patients had culture positive endocarditis. (11,12) the leading causative microorganism was Staphylococcus aureus, isolated in 19 cases (51.35%), followed by Gram negative bacilli in 6 cases (16.22%) and Streptococcus spp. in 12 cases (32.43%). we observed an increasing trend for IE episodes caused by staphylococcus aureus and gram negative bacilli. Many previous studies from

both developed and developing countries reported the same changing pattern. (6,8,9,11) this could be attributed to the increasing in patients with history of intravenous drug injection and hemodialysis and nosocomial infection. Unfortunately, blood culture negative endocarditis (BCNE) in present study was high (35.09%). Culture negative endocarditis are now less prevalent, since a myriad of fastidious organisms are identified with the help of serological and molecular diagnostic advancements. (12,13,15) in our study, echocardiographic finding compatible with infective endocarditis observed in 91.22% of cases. among the patients in study, aortic valve was involved in 21(36.84%) patients, followed by mitral valve involvement in 17(32.69%) patients. In same studies, aortic valve involvement was observed in 59 (36.4%) and 49 (39.5%) patients respectively. (14,15,18) most frequent laboratory finding in our study; anemia (10.26+/- 2.38 mg/dl), CRP (34.78+/- 24.85) and ESR (51.15+/- 32.76) were reported. The mean length of hospital stay was 16.66 days (4-32 days). In hospital mortality occurred in 9 patients (16.7%). In other study in Iran and other developed and developing countries, mortality rate reported in 20.7%, 22.9% and 15.3% patients respectively. (10,17) finally in our study, the most important changing characteristics of infective endocarditis which influences the outcome of the disease seems to be predisposing cardiac conditions and causative organisms especially staphylococcus Spp, and gram negative bacilli. Clinicians must be careful attention in differential diagnosis of infective endocarditis in specially host with predisposing factor such as hemodialysis and intravenous drug users.

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