

Original Research Article

Epidemiology of infective endocarditis in patients referred to Ardabil city hospital, 2010-2015

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ABSTRACT

Background: Infectious endocarditis is caused by bacterial or fungal infections of the endocardial surface of the heart, with high morbidity and mortality. Information on infective endocarditis is low in a developing country, and in Iran, the situation is similar, and so far no accurate research on the epidemiology of endocarditis has been carried out. The aim of study is to epidemiological evaluation of Infective endocarditis.

Methods: This cross-sectional study was done on 32 patients with infectious endocarditis who referred during 2011-2016 in Ardabil city Hospital. Data from blood culture, urine test, and other diagnostic procedures were extracted from the records. Information on age, sex, the most common cause of referral, culture and positive culture, mitral valve, tricuspid and pulmonary valve involvement, underlying condition of injecting drug addiction, duration of hospitalization, clinical symptoms, type of treatment, response to Treatment, status of hospital discharge and mortality rate of patients were collected and then analyzed.

Results: Of all patients, 14 (43.75%) were male and 18 (56.25%) were female. The mean age of patients was 55.6±9.4 years with a range of 21-72 years old. Patients were treated at an average of 2.2±1.4 weeks. 9 patients (28.12%) had skeletal-muscular manifestations. 26 patients (81.25%) had fever. The most prevalent microorganism was klebsiella with 71.87% that was sensitive in 13 patients (56.5%) to methicillin.

Conclusions: Fever with musculoskeletal manifestations in young men with a history of injectable addiction is a common manifestation of infectious endocarditis.

Keywords: Epidemiology, Infectious Endocarditis, Ardabil

INTRODUCTION

Infective endocarditis is caused by bacterial or fungal infection of the endocardial surface of the heart and has high morbidity and mortality. Risk factors for this infection include: the presence of an artificial heart valve, structural or congenital heart disease, intravenous injection of drugs, and a history of recent invasive interventions. The presence of fever, night sweats or symptoms of unexplained systemic disease in patients

should raise the suspicion of endocarditis.¹⁻² Infective endocarditis (IE) is an acute infection that affects the linings and valves of the heart, while the disease is often an infection of the heart valves, but septal defects may also be present. Infection is also seen in patients with mechanical and artificial devices such as artificial heart valves or intravenous drug users (IVDUs). Bacteria are the number one cause of IE. Fungi and atypical organisms can also be responsible for disease. In general, IE is classified into two classes, acute or sub-acute. The

difference between the two is based on the spread and severity of the disease. Acute disease is more progressive and is characterized by high fever, elevated white blood cell (WBC) count, and systemic toxicity. Death occurs within days to weeks. This type of IE is often caused by more invasive organisms, especially *Staphylococcus aureus*. Sub-acute disease is primarily caused by milder organisms, such as *Streptococcus viridans*, which cause milder and less severe symptoms. The characteristic symptoms of this form of the disease are weakness, fatigue, mild fever, night sweats, weight loss and other non-specific symptoms, and death occurs within a few months. Successful management of patients with IE is based on correct diagnosis, appropriate and adequate treatment, and monitoring of disease complications or resistance.

Proper treatment and management of IE is possible through identification of the causative organism. IE has variable clinical symptoms and therefore patients with this infection can be found in any part of the hospital (such as surgery, emergency room, etc).³⁻⁴ The diagnosis of this disease is based on Duke criteria, which includes clinical, laboratory and echocardiography findings. Antibiotic treatment of infective endocarditis is determined according to whether the involved valve is natural or artificial, the cause of infection and its antibiotic sensitivity. The results of blood culture of patients mainly include *staphylococcus aureus*, *streptococcus viridans*, *enterococci* and *coagulase negative staphylococci*. The structural and functional health of the valves is disrupted in infective endocarditis, and sometimes surgical consultation is necessary in patients with invasive or prolonged infections, embolism, and destruction or rupture of the valve. After completing the course of antibiotic treatment, patients should be taught about the importance of maintaining proper oral and dental hygiene, regular visits to the dentist, and the need for antibiotic prophylaxis before performing some interventions.⁵ In developed countries, the epidemiological factors causing endocarditis have changed compared to the past decades due to factors such as increased life expectancy, a large increase in hospital infections, increased cases of degenerative valvular sclerosis or mitral valve prolapse.⁶ However, the information about the status of infective endocarditis is scarce in developing countries and the situation is similar in Iran, and so far, many and detailed studies have not been done on the epidemiology of viral endocarditis, which groups are involved and which are more common in endocarditis.⁷ The aim of this study was the epidemiology of infective endocarditis in patients referred to Ardabil city hospital during 2010-15.

METHODS

This descriptive-cross-sectional study was conducted in Ardabil city hospital on 32 patients with definitive diagnosis of infective endocarditis during 2011-16.

Inclusion and exclusion criteria

Patients hospitalized in Ardabil hospital during five years age and patients with endocarditis diagnosis were entered in the study and patients with doubt in their diagnosis and with lack of information in their files were excluded from study.

Data collection and statistical analysis

The data obtained from 3 consecutive blood cultures, urine tests and other diagnostic procedures performed along with information on age, gender, the most common reason for referral, performed cultures and presence of positive cultures, the degree of mitral, tricuspid and pulmonary valve involvement, underlying disease injecting drug addiction, length of hospitalization, clinical symptoms, type of treatment, response to treatment, condition upon discharge from the hospital, and the death rate of patients were collected and then analyzed in SPSS software using descriptive statistics and analytical statistics like t-test and chi-square were analyzed for quantitative and qualitative data. A p value less than 0.05 is considered significant.

RESULTS

A total of 32 patients with definite diagnosis of infective endocarditis were investigated. The average age of the patients was 55.6 ± 9.4 years with a range of 21-72 years. 8 people were in the age range of 20-40 years (25%), 37.5% were illiterate and 56.3% were female. 26 patients (81.25%) mentioned fever, which was the most common clinical symptom of the patients (Table 1).

Table 1: Demographic information of the studied samples.

Variables	N	%
Gender	Male	14 43.75
	female	18 56.25
Age category (years)	20-40	8 25
	40-60	13 40.6
	60-80	11 34.4
Education	illiterate	12 37.5
	Elementary literacy	5 15.6
	Middle school and high school	11 34.4
	Academic literacy	4 12.5

Patients were treated for an average of 10.2 ± 1.4 weeks. The most common clinical symptoms at the time of presentation in patients were fever with 81.25% followed by heart murmur with 53.12% (Figure 1). Among patients with a history of heart disease, 31.25% had congenital heart disease (CHD), 31.25% had artificial valve, and 37.5% had RHD, and the most common valve involved

among them was the mitral valve with 37.5%. Blood culture were positive in 25.31% of the patients under

study and also 56.25% of the patients had injection addiction.

Table 2: Antibigram frequency distribution of the studied patients.

Antibiotics used		<i>Staphylococcus aureus</i>		<i>Enterococcus</i>		<i>Streptococcus pyogenes</i>		<i>Klebsiella</i>	
		N	%	N	%	N	%	N	%
1st generation cephalosporins	Sensitive	17	85	1	100	1	100	1	100
	Resistant	3	15	0	0	0	0	0	0
3rd generation cephalosporins	Sensitive	19	86.36	1	100	1	100	2	100
	Resistant	3	13.63	0	0	0	0	0	0
Vancomycin	Sensitive	21	100	1	100	2	100	0	0
	Resistant	0	0	0	0	0	0	0	0
Tetracycline	Sensitive	12	52.17	0	0	0	0	1	50
	Resistant	11	47.82	1	100	0	0	1	50
Ampicillin	Sensitive	3	15.78	0	0	0	0	0	0
	Resistant	16	84.21	2	100	0	0	2	100
Gentamicin	Sensitive	14	66.66	0	0	2	100	1	50
	Resistant	7	33.34	2	100	0	0	1	50
Cotrimoxazole	Sensitive	13	61.9	1	50	2	100	0	0
	Resistant	8	38.1	1	50	0	0	2	100
Ciprofloxacin	Sensitive	12	70.58	0	0	0	0	2	100
	Resistant	0	29.42	0	0	0	0	0	0

Among the underlying causes of endocarditis are valvular problems (mostly the mitral valve with 37.5%), IV Drug abuser (mostly tricuspid valve with 34.37%), rheumatology (mostly tricuspid valve with 34.37%). Of all patients, 23 patients had anemia (71.87%), 7 patients had leukocytosis (21.87%), and 12 patients (37.5%) had microscopic hematuria.

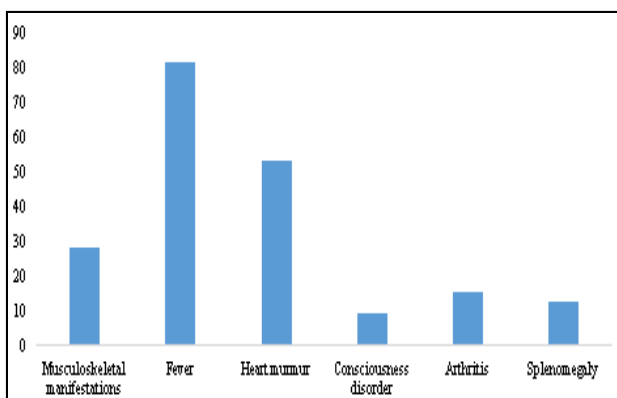


Figure 1: Frequency distribution of clinical symptoms of the studied patients.

21 patients had increased ESR (65.62%), 30 patients had increased CRP (93.75%), and 17 patients had positive rheumatoid factors. In 53.12%, leukocytosis and ESR of patients were decreased during hospitalization. Among the people who had a positive culture based on the result

of the culture, the most common organism was *Staphylococcus aureus* in 23 cases (71.87%) (Figure 2). Also, *Staphylococcus aureus* cultured in 21 cases (100%) were resistant to vancomycin and 16 cases (84.21%) to

ampicillin. (Table 2). The treatment regimen of most patients with 62.5% was a combination of ceftriaxone and vancomycin. The most important antibiotics used were: aminoglycoside 87.46%, third generation cephalosporins 37.84%, and vancomycin 62.65%. Of all the patients, 21 (65.62%) had recovered completely (Figure 3).

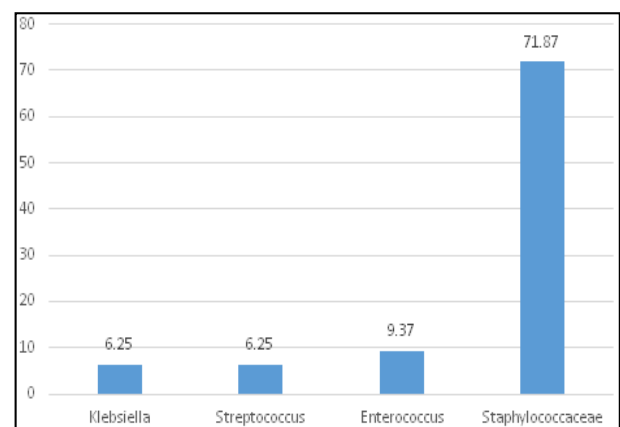


Figure 2: Frequency distribution of cultured organisms of patients.

DISCUSSION

In this study, 32 patients with definite diagnosis of infective endocarditis were examined. In Riyahin et al.'s study, 74 patients diagnosed with infective endocarditis were studied, whose average age was 47.75 ± 28 years. The most common cause of referral was fever with 80%, the contribution of tricuspid valve involvement was 67.5%, and the most common underlying disease was heart disease at the rate of 44.5%. Among the people who had a positive culture, 85.7% of *Staphylococcus aureus* and 14.2% of *Klebsiella* were reported.

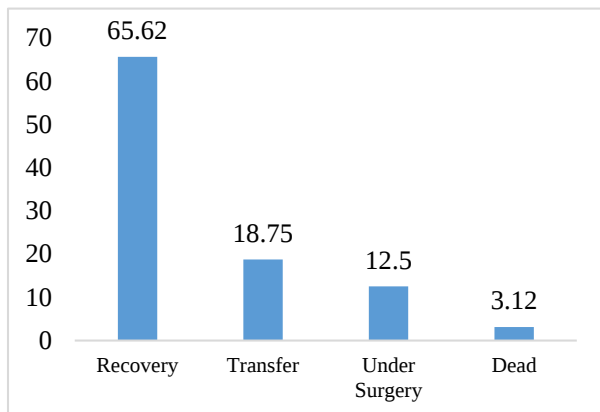


Figure 3: Distribution of frequency of recovery and mortality of patients.

The mortality rate was 7.5%, and it was concluded that when symptoms such as fever occur, if it is accompanied by cardiac involvement, wheezing, or a history of injection addiction, it strongly raises the suspicion of endocarditis. The above study is consistent and in the same direction with our study in terms of the reason for the referral of most patients with fever. But unlike the above study, the mitral valve was more involved in our study.⁸ In the study of paraclinical and clinical symptoms of infective endocarditis in injection drug addicts, which was conducted by Heydari and his colleagues on 33 injection drug addict patients, it was found that 82% of the patients were in the age range of 20 to 40 years, and fever was present in 91% of the patients. Blood culture was reported positive in 9 people and negative in 14 people. The tricuspid valve was most involved and 52% of the patients died. The above study is in line with our study in terms of blood culture ratio. But in terms of the average age of the disease and the involved valve, it is not in line with our study results.⁹ In a study conducted by Movahedi and his colleagues on 20 patients with endocarditis who presented with pulmonary manifestations, it was found that the average age of the patients was 51 ± 34.8 years and the most common clinical manifestation was fever (95%) and the most common symptom was heart murmur (65%) and 60% of the patients were injection drug addicts and 25% were infected with HIV. Also, the most common valve involved was the tricuspid (50%). The above study is in line with our study. But in terms of the involved valve, it

is not in line with our study results.¹⁰ In a population based study on the cause of infective endocarditis based on 15 studies in 7 developed countries by Tlegjeh and his colleagues between 1999 and 2000, it was found that there was no orientation towards a specific organism. The results of the studies suggest the reduction of infective endocarditis caused by rheumatic fever and the increase of infective endocarditis following surgical procedures on heart valves. The above study is in line with our study.¹¹ In a study entitled "investigating the incidence of mortality due to infective endocarditis" which conducted by Fedeli and his colleagues between 2000 and 2008 in southwestern Italy, it was found that the average of patients was 68 years old and mortality increased with age. Also, it was clear that despite the progress of health care, the incidence of infective endocarditis has not decreased, which is due to the increase in injecting drug addicts, sclerotic valve patients, and the use of artificial valves in the elderly and the above study is in line with our study.¹²

Limitations

Due to sending a number of patients to treatment centers in different cities of the country for treatment measures, it was not possible to complete the information and this is the potential limitation of this study.

CONCLUSION

Fever with skeletal-muscular manifestations in young men with a history of injection addiction is a common manifestation of infective endocarditis. Considering the results of this study and the importance of the subject, it is suggested to conduct prospective studies with a larger statistical population. Also, it is suggested to start the antibiogram system using the MIC method in Ardabil city hospital.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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