A Study of Changing Trends of Infective Endocarditis In An Indian Set Up

*Prajit Mazumdar[1], Malyaban Das[2], Prabin Shrivastava[3] ,Vidyapati[4]

Department of Medicine ,Rajendra Institute of Medical Sciences,Ranchi ,India
Department of Medicine ,Rajendra Institute of Medical Sciences,Ranchi ,India
Department of Cardiology ,Rajendra Institute of Medical Sciences,Ranchi ,India
Department of Medicine ,Rajendra Institute of Medical Sciences,Ranchi ,India
Corresponding Author: Prajit Mazumdar

Abstract: *From multiple studies conducted previously, it is quite evident that Infective Endocarditis(IE) is changing in terms of its clinical presentations, causative organisms and other factors creating challenges in diagnosis and treatment. To evaluate the recent changes in different factors associated with this entity we conducted a descriptive cross-sectional study in an Indian set up. Age, sex, presenting features, treatment history, complication, echocardiographic findings were examined in definite cases of Infective Endocarditis(IE). Total 70 patients were examined, among them 61 patients had mono valvular Infective Endocarditis(IE) and 9 patients had multi valvular Infective Endocarditis(IE). There was an overall female preponderance. Mean age of the patients was 41 years. Rheumatic heart disease was the most common predisposing factor and fever was the most common symptom overall. Most of the patients were culture negative and among culture-positive patients, streptococcus and staphylococcus had the same frequency. We noticed some recent changes in the epidemiology of Infective Endocarditis(IE) like an increase in the mean age of the patients, an increased proportion of staphylococcal Infective Endocarditis(IE) and increase in Infective Endocarditis(IE) with degenerative heart disease. These changes point to the fact that the profile of Infective Endocarditis has started to change in India.*

Keywords*: culture positive, echocardiography,, Infective Endocarditis, multi valvular and mono valvular, rheumatic heart disease*

I. Introduction

Infective Endocarditis is a potentially fatal disease in spite of significant improvement in diagnostic technique, antimicrobial chemotherapy, and surgical facilities. Continues variability in clinical profile, in the causative organism produces a significant challenge for management of IE [1,2,3]. Our aim was to assess the clinical and microbiological profile, treatment and outcome of Infective Endocarditis in an Indian tertiary care center.

II. Materials And Methods

We chose a descriptive cross-sectional study design that included 70 patients admitted between MAY 2016 and JULY 2017 (total period of 1 year 2 months) who were diagnosed with Infective Endocarditis by using Modified Duke's Criteria[4]. We included only definite cases.
We divided the patients into two groups.
Group 1: multi valvular Infective Endocarditis
Group 2: mono valvular Infective Endocarditis   From these cases following information were collected: age, sex, presenting features, treatment history, complication, echocardiographic findings. Data were collected from medical record database of our hospital.   Data were organized using Microsoft Excel. Statistical analysis was conducted using SPSS for windows version 13. Fischer test and chi-square test were applied for comparison of categorical variable and t-test was applied for comparison of mean values. P<0.05 was considered statistically significant.

III. Results

Of 70 patients with Infective Endocarditis, as diagnosed by Modified Duke's Criteria, 61 (87.14%) patients had mono valvular IE and 9 (12.86%) patients had multivalvular Infective Endocarditis. Demography(Table 1) showed that overall 25 patients were male and 45 patients were female. Male to female ratio was 0.55.

On the other hand among mono valvular Infective Endocarditis 22 (36.1%)patients were male and 39 (63.9%) patients were female (Sex Ratio 0.56). Among multivalvular Infective Endocarditis 3 (33.3%)patients were male and 6 (66.7%) patients were female. So in both the groups and overall, there is a female preponderance.

Valvularity		Frequency	Percent
Monovalvular	Female	39	63.9
	Male	22	36.1
	Total	61	100.0
Multivalvular	Female	6	66.7
	Male	3	33.3
	Total	9	100.0

Table 1-Sex distribution in patients of mono valvular and multivalvular Infective Endocarditis

Mean age (Table 2)in monovalvular Infective Endocarditis was 40 years, multivalvular Infective Endocarditis was 43 years and overall mean age was 41years

	N	Minimum age in years	Maximum age in years	Mean age	Std. Deviation
Monovalvular	61	19	70	40.64	15.218
Multivalvular	9	22	65	43.56	15.573

	N	Minimum	Maximum	Mean	Std. Deviation
Age in years	70	19	70	41.01	15.182

Table 2- Age distribution in patients of monovalvular and mulivalvular Infective Endocarditis

Among predisposing factor (Table 3), 23 (37.7%) patients out of 61 patients with mono valvular Infective Endocarditis had rheumatic heart disease, 13 (19.4%) patients had congenital heart disease as a predisposing factor.In the multivalvular group, 7 (77.8%) patients out of 9 patients had rheumatic heart disease, 2 patient had congenital heart disease as a predisposing factor.In no group, there was no case of recent dental surgery and intravenous drug abuse.

RHEUMATIC_HEART_DISEASE N(%)	CONGENITAL_HEART_DISEASE N(%)	PREVIOUS_CARDIAC_SURGERY N(%)	PROSTHETIC_VALVE N(%)	DEGENERATIVE HEART DISEASE
30(42.85)	15(21.42)	16(22.85)	18(25.17)	3(4.2)

VALVULARITY		RHEUMATIC_HEART_DISEASE N(%)	CONGENITAL_HEART_DISEASE N(%)	PREVIOUS_CARDIAC_SURGERY N(%)	PROSTHETIC_VALVE N(%)	DEGENERATIVE HEART DISEASE
MONO	N	23(37.7)	13(19.4)	16(26.2)	17(27.8)	2(3.3)
MULTI	N	7(77.8)	2(22.2)	0	1(11.1)	1(11)

Table 3-Predisposing Factrs In Patients Of Mono Valvular And Multi Valvular Infective Endocarditis

Causative organism (Table 4) was determined by blood culture. Out of 70 patients, 16 (22.9%) patients were culture positive (15 patients from the mono valvular group and 1 patient from the multivalvular group). Culture-negative cases were diagnosed as Infective Endocarditis by other components of Modified Duke's Criteria[4]. 12 patients out of 15 culture positive patients from the mono valvular group, 0 patients out of 9 patients from the multivalvular group and overall 12 patients out of 70 patients who had culture-positive Infective Endocarditis had taken a prior antibiotic.

	Frequency	Percent
POSITIVE	16	22.9
NEGATIVE	54	77.1
Total	70	100.0

Table 4-culture positive patients

Valvularity	Prior_antibiotic_therapy		Frequency	Percent
Monovalvular	Yes	Culture positive	12	25.0
		Culture negative	36	75.0
		Total	48	100.0
	No	Culture positive	3	23.1
		Culture negative	10	76.9
		Total	13	100.0
Multivalvular	Yes	Culture negative	2	100.0
	No	Positive	1	14.3
		Culture negative	6	85.7
		Total	7	100.0

Table 6-Causative organism in culture positive cases of mono valvular and multi valvular Infective Endocarditis

The most common organism (Table 6)obtained after culture was streptococcus and staphylococcus(15.7% both).

	Frequency	Percent
Streptococcus species	11	15.7
Staphylococcus species	11	15.7
Candida species	4	5.7
E. coli	5	7.1
Klebsiella specie	2	2.9
pseudomonas	2	2.9
Gm -ve bacilli	1	1.4
Total	36	51.4
System	34	48.6
Total	70	100.0

Table 7-Presenting symptoms in patients of mono valvular and multi valvular Infective Endocarditis
In presenting symptoms (Table 7), fever was the most common presenting symptom(91.4%).

SYMPTOMS	NUMNER	PERCENTAGE
FEVER	64	91.4
WEIGHTLOSS	40	51.7
ANOREXIA	6	8.6
PALPITATION	16	21.9
DYSPNOEA	44	62.9
GENERALISED WEAKNESS	11	5.7
COUGH	9	12.9
ARTHRALGIA	18	25.7

Table 8-Echocardiography findings in patients of mono valvular and multi vavular Infective Endocarditis

When we were analyzing the echocardiographic findings(Table 8), it was found that all patients had Transthoracic echocardiography (TTE) but only 12 patients had Trans Esophageal echocardiography (TEE), but the findings did not differ in both. Infective Endocarditis involving multiple valves is uncommon, the majority of Infective Endocarditis showed mono valvular involvement. Vegetation was the most common finding(90%) echocardiography.

	VEGETATION	LARGE_VEGETATION	NEW_OR_WORSENING_REGURGITATION	CARDIAC_ABSCESS	CHORDAE_RUPTURE	MITRAL VALVE PROLAPSE
N	63	22	18	7	3	3
%	90	31	25	10	4	4

Now considering treatment and outcome, empirically Inj ceftriaxone, Inj vancomycin, and Inj gentamycin was started in all patients. After receiving blood culture reports, they were treated a/t AHA(American heart Association) guidelines. Out of 70, 60 (85.7%) patients were treated successfully, 2 patients left against medical advise, 8 (11.4%) patients died. None of them underwent surgery.The mortality was more in multi valvular group (22.2%) as compared to mono valvular group(9.8%)

2) Treatment outcome

	OVERAL		MULTI		MONO	
TREATED SUCCESSFULLY	60	**85.7**	7	**77.8**	53	**86.9**
DEATH	8	**11.4**	2	**22.2**	6	**9.8**
MORTALITY	11.4%		22.2%		9.8%	
LAMA	2	**2.9**			2	**3.3**
Total	70	**100.0**	9	**100.0**	61	**100.0**

IV. Discussion

Majority of cases with multivalvular Infective Endocarditis presented in 4th decade and in case of mono valvular Infective Endocarditis also presentation was maximum in the 4th decade. This is higher than other Indian studies (mean age 27 years)[5,6]. This may be explained by the fact that the incidence of rheumatic heart disease is decreasing.

We saw that male: female ratio is very low in both male and female group, though Infective Endocarditis is known to be more common in females[5,6,7]. This can be also explained by the fact that the incidence of IE disease is still high in this part of our country. When analyzing the predisposing condition, rheumatic heart disease was the most common predisposing factor both in the mono valvular group and

multivalvular group in contrary to western reports[5,6,7]. This can be explained by the fact that incidence of rheumatic heart disease is decreasing in western countries. Even though rheumatic heart disease was the most common predisposing factor for Infective Endocarditis in our study, there was a significant rise in the degenerative heart disease as an underlying cause of Infective Endocarditis[5,6,7], this signifies the fact that we are gradually entering in the era of an aging population. Before discussing causative organisms of Infective Endocarditis in our study it should be understood that Infective Endocarditis is a prolonged illness. So most of the patients had taken antimicrobial chemotherapy before undergoing proper laboratory work up. So culture positive Infective Endocarditis was found only in 22.9 % patients as compared to western data which is about 69- 97%[5,6,8,9]. Quality of sampling and technical aspects are also questionable. Different studies also support the association between prior antibiotic intake and low culture positivity. In our study mortality among the patients with the prior antibiotic, intake is low, but it has no statistical significance(p=0.512). Also important was that the mortality rate was more in multivalvular group (22.2%) as compared to mono valvular group(9.8%) Traditionally Streptococcus is the most important cause of Infective Endocarditis but now staphylococcus is also emerging as an important causative organism. This may be attributed to the fact that there is an increase in intravenous drug abuse, surgery, prosthetic valve, aging population. In our study data, there is also a rise in Staphylococcus as the most important causative organism and our study show an equal incidence of Streptococcus and Staphylococcus as causative organisms For diagnosing Infective Endocarditis higher sensitivity of Trans Esophageal echocardiography (TEE) over Trans Thoracic Echocardiography is well documented but due to lack of manpower and the higher patient burden, it is not always possible to go for Trans Esophageal echocardiography (TEE) in our set up. Nevertheless in a country like India where culture positivity is significant low Trans Esophageal echocardiography (TEE) becomes an important investigation especially where pre-test possibility is high.

V. Conclusion

Our patients show many of the characteristics of classical developing country Infective Endocarditis, still, we recorded some recent changes like increase in the mean age of the patients, an increased proportion of staphylococcal Infective Endocarditis, increase in Infective Endocarditis with degenerative heart disease In a country like India where the proportion of culture-negative IE is high, more and more patient should undergo Trans Esophageal echocardiography (TEE). For this infrastructure should be improved.We should follow standard protocol for blood culture sampling. Though the proportion of streptococcal Infective Endocarditis is still high, there is a significant rise in Staphylococcal Infective Endocarditis, numbers of Infective Endocarditis caused by the atypical organism are also showing increasing trend. Awareness among people regarding should be improved to avoid unnecessary delay in diagnosis and treatment. Infective Endocarditis.

Reference

[1]. Habib G, Hoen B, Tornos P, Thuny F, Prendergast B, Vilacosta I, et al. Guidelines on the prevention, diagnosis, and treatment of infective endocarditis. Eur Heart J 2009;30:2369-413.
[2]. [PUBMED] Nishimura RA, Carabello BA, Faxon DP, Freed MD, Lytle BW, O'Gara PT, et al. ACC/AHA 2008 Guideline Update on Valvular Heart Disease: Focused Update on Infective Endocarditis. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Circulation 2008;118:887-96.
[3]. [PUBMED] Horstkotte D, Follath F, Gutschik E, Lengyel M, Oto A, Pavie A, et al. Guidelines on prevention, diagnosis and treatment of infective endocarditis executive summary; the task force on infective endocarditis of the European society of cardiology. Eur Heart J 2004;25:267-76.
[4]. Li JS, Sexton DJ, Mick N, Nettles R, Fowler VG Jr, Ryan T, et al. Proposed modifications to the Duke criteria for the diagnosis of infective endocarditis. Clin Infect Dis 2000;30:633-8.
[5]. Choudhury R, Grover A, Varma J, Khattri HN, Anand IS, Bidwai PS, et al. Active infective endocarditis observed in an Indian hospital 1981-1991. Am J Cardiol 1992;70:1453-8.
[6]. Garg N, Kandpal B, Garg N, Tewari S, Kapoor A, Goel P, et al. Characteristics of infective endocarditis in a developing country: Clinical profile and outcome in 192 Indian patients, 1992-2001. Int J Cardiol 2005;98:253-60.
[7]. Tariq M, Siddiqui BK, Jadoon A, Alam M, Khan SA, Atiq M, et al. Clinical profile and outcome of infective endocarditis at the Aga Khan University Hospital.Int J Collab Res Internal Med Public Health 2009;1:84-99.
[8]. Piper C, Körfer R, Horstkotte D. Prosthetic valve endocarditis. Heart 2001;85:590-3.
[9]. Strom BL, Abrutyn E, Berlin JA, Kinman JL, Feldman RS, Stolley PD, et al. Dental and cardiac risk factors for infective endocarditis: A population-based, case-control study. Ann Intern Med 1998;129:761-9.