

EDITOR'S NOTE



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Greetings dear colleagues,

This issue is a milestone for "The Revival". It marks the 1st anniversary of our Newsletter. I thank the President of the Heart Failure Association of India, Professor S Harikrishnan for being the guest author for this issue. Professor S Harikrishnan established the Trivandrum Heart Failure cohort in 2013. This is the first heart failure cohort in India. He also leads the National Heart Failure registry and the PROKERALA registry. We are privileged to have him on board and for contributing his update on the THFR. His findings show that Indian heart failure patients are a decade younger than the Western counterparts, the patients reported a longer stay at index admission and a higher in hospital mortality compared to published data from the western registries. Only 25% of the

patients had Guideline Directed Medical Therapy (ARNI, SGLT_i, Beta Blockers and MRAs) in their discharge prescriptions which contributed to the re admissions and higher mortality. Dr Harikrishnan strongly advocates that physicians and healthcare administrators should initiate quality improvement measures aimed at focused heart failure care and this can improve the outcomes of patients with heart failure in the developing world.

This article encapsulates the Real-World Evidence based scenario of heart failure in India. I wish the readers of "The Revival" a Happy Reading.

- Dr Manoj Durairaj
Editor "The Revival"

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Special thanks to Dr S Harikrishnan for authoring this month's article.

Designed by Maithili Kulkarni

PRESIDENTIAL MESSAGE



Prof. (Dr) V. Nandakumar

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Dear Colleagues,

Greetings from the Society for Heart Failure & Transplantation

February issue of "The Revival" presents Dr.Harikrishnan's article on Trivandrum Heart Failure Registry which deals with epidemiology of heart failure patients and their follow up at 1-5 years. This gives an insight into various aspects of heart failure including its higher incidence in younger age group in this part of the country and the benefits of Guideline based Medical Treatment. Heart failure is one of the major health hazards we are facing now and the registry will be helpful in bringing out the various issues involved and to rectify them in the long term.

- Prof. (Dr) V. Nandakumar
President

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Dr. Talha Meeran

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Dear Colleagues,

Close on the heels of the annual HFAl conference, the February issue of Revival features Dr Harikrishnan's article based on the Trivandrum Heart Failure registry. The THFR was the first National HF registry contributing vital data in understanding the actual burden of HF in India. Now that the THFR has completed 7 yrs of follow-up, this article gives a fresh update on all of its findings. The ever increasing burden of HF and it's impact on mortality and hospital re-admission still underlines the importance of achieving optimal guideline directing medical therapy for such patients.

Sincerely,
Dr Talha Meeran
Sub Editor "The Revival"

TRIVANDRUM HEART FAILURE REGISTRY



Dr S Harikrishnan

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Dr S Harikrishnan is currently Professor at the Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), Trivandrum, Kerala. After Graduation from Medical College, Trivandrum, he completed post-doctoral DM training in cardiology from SCTIMST in 1998. Subsequently he got Commonwealth Fellowship in Interventional Cardiology and had training in Leeds University, UK. He also had training in public health at Emory University, USA through the PH -LEADER program.

Dr Harikrishnan is primarily an interventional cardiologist but his main research interest is in heart failure. After establishing the first heart failure cohort in India, – the Trivandrum HF cohort which has completed 7 years of follow-up, he is now leading the National HF registry which is the largest in the country and has enrolled 10800 patients. He has also lead the largest pulmonary hypertension registry - the PROKERALA registry.

In 2019, Dr Harikrishnan was awarded one of the ten National Centers of Excellence in Clinical Research (CARE), established nationwide by Indian Council of Medical Research (ICMR) which includes the first HF Biobank in India. He has got more than 100 publications in International peer reviewed Journals with high impact with more than 25000 citations and an h-index of 37.

He has edited three books, which includes a unique monograph on Balloon Mitral Valvotomy, and another titled – WA RACE AGAINST TIME – describing the epidemic of cardiovascular diseases in developing economies and Manual of Heart Failure Management. He is also the founder editor of the International peer-reviewed journal - Pulmonary Circulation.

He is the fellow of the National Academy of Medical Sciences, American College of Cardiology, International Academy of Cardiovascular Sciences and Royal college of Physicians, London.

Cardiovascular diseases (CVD) has overtaken communicable diseases as the leading cause of mortality in low-income and middle-income country (LMIC) countries like India towards the fag end of the last millennium itself.

Heart failure (HF), which is the culminating stage of most of the advanced heart diseases is emerging as a major public health problem in LMIC.

HF is a disease with high mortality and also morbidity. With one-year mortality of 30% and 5-year reported mortality of 50%, the outcomes are worse than the estimates for common cancers of breast and the colon.

HF is a condition which requires resource intensive therapy in the acute phase and also will need lifelong therapy in most of the affected people. (1). So it can further compromise the health systems in LMIC which are already stressed.

In this background, we will discuss the epidemiological data of HF from India. The real data on incidence and prevalence of HF from India are scarce(2). There are also a few estimates and projections of burden of heart failure based on risk factor data (3)(4)(5). There is only a small community study on the prevalence(5) of HF from India. The rest of the data are from a few registries(6)(2)(7)(8).

HF Burden is on the rise?

We will try to answer this question first. We know the prevalence of HF increases with age. As the population in India is ageing, naturally the HF burden is likely to rise. (3). The most important reason for rising prevalence of HF is the

increasing prevalence of atherosclerotic vascular diseases and their risk factors (9). The third factor is the persisting burden of conditions like rheumatic heart disease (RHD), chronic obstructive pulmonary disease (COPD) and untreated congenital heart disease (CHD) which add to the HF burden. Based on all these facts which can influence the burden of HF relevant in Indian context, we can predict that the burden likely to increase in India in the next few decades.

The Trivandrum HF registry

The Trivandrum HF registry (THFR) is a prospective heart failure registry set-up in 2013 supported by Indian Council of Medical Research (ICMR), in Trivandrum district, the southern-most part of Kerala. The study had two arms – urban arm, the Trivandrum city area and in a Rural arm - sub-urban rural area called Athiyanloor, about 25 kilometres from the city. The population in this area was nearly 10 lakhs, contributed by Trivandrum city urban area of 9,57,000 (area 215 Sq Km) and 1,66,549 in the rural area of 60 sq. km(2).

All the 12 hospitals in the urban area and the 5 of 5 eligible hospitals in the rural area who were catering to patients with heart failure joined the registry and recruited patients for a period of one year (2013). All the participating hospitals enrolled consecutive patients who were admitted with HF satisfying the ESC 2012 criteria(10).

Optimal treatment was defined by various guidelines as a combination of beta blockers(BB), angiotensin converting enzyme inhibitors (ACEI) or angiotensin receptor blockers (ARB), and aldosterone receptor blockers in HF patients with

reduced ejection fraction (HF_rEF).

The THFR registry was subsequently converted to a cohort with the support of ICMR and now being followed-up at regular intervals. Seven years of follow-up is completed and we have published the five years follow-up data in 2021.

What did we find in THFR?

THFR recruited 1205 patients in the one-year period. Females formed only 30% of the cohort, while the sex ratio is almost equal in the western data. Mean age of the patients in THFR was 61.2 +/- 13.7 years. Indian patients with HF in the Trivandrum HF registry were younger by 10 years compared to the data from US and Europe. (Figure 1). The proportion of patients above 85 years was 4% in THFR while it was 25% in ADHERE registry from US. We can see from the data that in India, HF affects a much younger, predominantly male population.

The most common aetiology of HF in THFR was ischaemic heart disease (IHD) (71%), followed by dilated cardiomyopathy (DCM) contributing to 17%. (Table 2). This was the same among men and women. ADHERE registry data also shows predominance of IHD, but the proportion was slightly less (63% vs 71%).

While rheumatic heart disease (RHD) contributed 8% of the HF burden in THFR, it was not contributing significantly to the burden in the US population. Women reported a higher prevalence of RHD (11.6%) Vs men (6.2%). This shows that even now in India diseases of the ester era like RHD are contributing to the burden of HF.

The patients were classified into different groups based on

ejection fraction (EF). (11) Heart failure with preserved ejection fraction (HF_pEF: defined as EF>50%) constituted 236 (19.6) % of the population. Heart Failure with mid-range Ejection Fraction (HF_mrEF: defined as EF 40%-49%) constituted 217 (18%) of the population and heart failure with reduced ejection fraction (HF_rEF: defined as EF<40%) was the highest proportion, which constituted 752 patients (62.4%).

The median hospital stay was 6 days and the in-hospital mortality was 8.5%. The 90-day mortality was 18%. Compared to the western registries, ADHERE (12) and OPTIMISE-HF (13), THFR showed that hospital stay was longer, and in-hospital and 90-day mortality rates, both were higher. Despite the youngish population, the HF mortality was higher in THFR as compared to data from the west. The possible reasons could be the relatively higher prevalence of comorbidities and comparatively lower ejection fraction in this THFR cohort.

'Guideline-based' medical treatment was defined as the combination of beta-blockers, angiotensin-converting enzyme inhibitors or angiotensin receptor blockers, and aldosterone receptor blockers in patients with HF_rEF. Only a fourth (25%) of the patients with LV systolic dysfunction received optimal treatment at discharge. There were no gender differences in prescription of guideline-directed medical treatment status at discharge (25.3% in men compared with 22.9% in women).

Patients who did not receive guideline-based therapy experienced higher mortality than those who received guideline-based therapy (p < 0.001)(2). Only one-fourth of the total study population received guideline-based medical treatment, which indicates gross underutilisation of evidence based therapies.

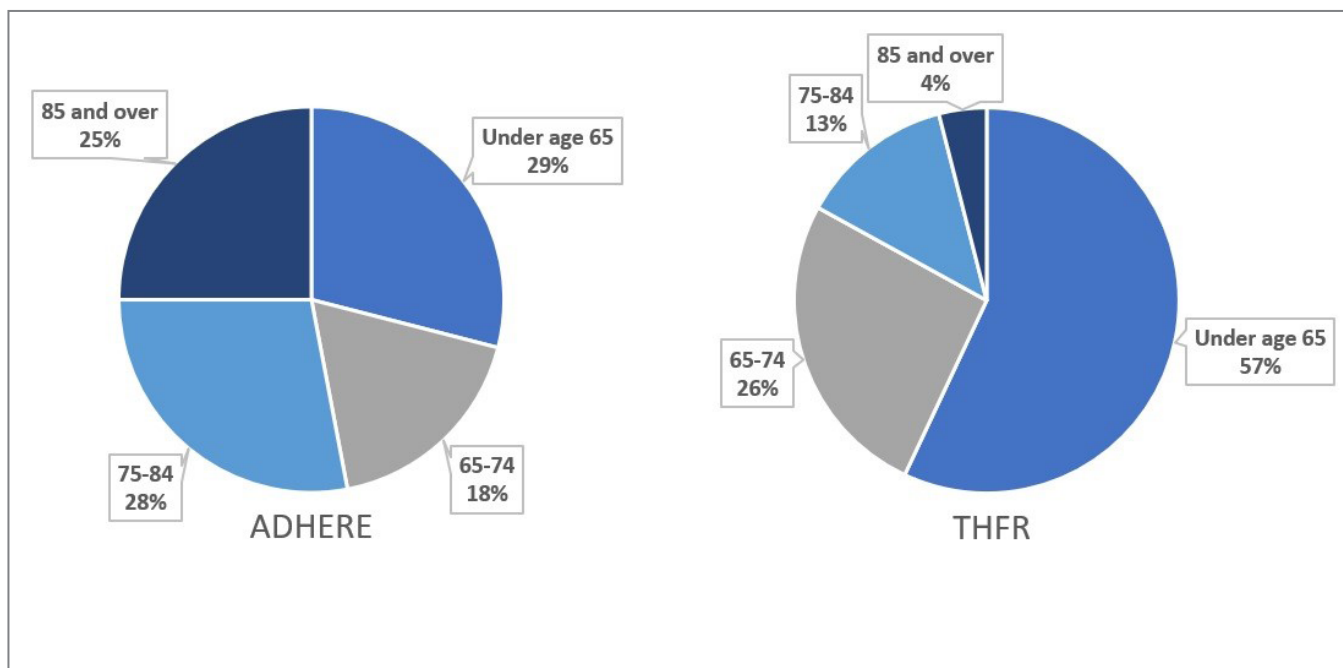


Figure 1: Age distribution – Comparison of Trivandrum Heart Failure Registry (Right) with the ADHERE registry of US (left).

Table 1: Baseline characteristics of patients in THFRy.

Variables	Total (N=1205)
Age mean (SD)	61.23 (13.68)
Women, n (%)	371 (30.79)
Etiology, n (%)	
Coronary heart disease	866 (71.87)
Dilated cardiomyopathy	156 (12.95)
Hypertrophic cardiomyopathy	27 (2.24)
Rheumatic heart disease	95 (7.88)
Diastolic heart failure	11 (0.91)
Miscellaneous	50 (4.15)
Tobacco use, n (%)	
Current use	188 (15.60)
Past use	301 (24.98)
Alcohol use, n (%)	
Current use	234 (19.42)
Past use	21 (1.74)
History of hypertension, n (%)	696 (57.76)
History of diabetes, n (%)	662 (54.94)
Atrial arrhythmia, n (%)	177 (14.69)
History of stroke, n (%)	75 (6.22)
History of COPD, n (%)	186 (15.44)
History of CKD, n (%)	216 (17.93)
Heart rate > 100 beats/minute at admission, n (%)	720 (60.05)
NYHA Class 4 at presentation, n (%)	382 (32.87)
LV ejection fraction < 35, n (%)	544 (45.15)

COPD: chronic obstructive pulmonary disease; CKD: chronic kidney disease; NYHA: New York Heart Association; LV: left ventricular

One year, three-year and five year outcomes

The cumulative all-cause mortality at 1-year was 30.8% (n = 371). The reported all-cause mortality at 1-year of 30.8% is similar to the mortality reported from US and the European data. (14), (15). The cumulative 3 year mortality was 44.8% and 5 year mortality was 58.8%(16) (Table 3). Predictors of higher mortality were lack of GDT, age, serum creatinine, and NYHA functional class IV.

Table 2: Cumulative all-cause mortality in the Trivandrum Heart Failure Registry cohort

Variable	Number (percentage) Total N=1205
In-hospital mortality	102 (8.5)
Cumulative 30-day mortality	151 (12.5)
Cumulative 90-day mortality	218 (18.1)
Cumulative 1-year mortality	371 (30.8)
Cumulative 2-year mortality	492 (40.8)
Cumulative 3-year mortality	540 (44.8)
Cumulative 5-year mortality	58.8 %

Readmissions and outcomes

The 1-year hospital readmission was 30.2% (n = 333) among the 1,103 participants discharged from the index hospitalization with no gender difference. Those patients who had readmissions had higher mortality at one-year. The impact of readmissions on outcomes was evident at the three-year follow-up also with higher mortality rates among those readmitted. Figure 2 (8).

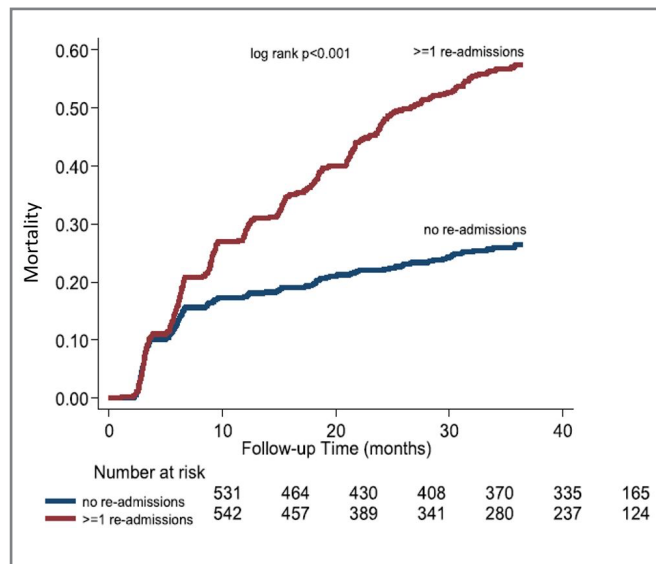


Figure 2: Long-term readmission and mortality rates in the Trivandrum Heart Failure Registry

Key points from the 5-year follow-up of the Trivandrum Heart Failure Registry

1. Higher mortality than the western population for HF patients with both reduced and preserved left ventricular ejection fraction
2. Continuing survival benefit for patients who were initiated on guideline-directed therapy
3. Re-hospitalisations are associated with higher long-term mortality.

In summary, the data from THFR shows that patients hospitalized with HF in India were younger by a decade, more likely to be men and had a higher prevalence of ischemic heart disease. The patients reported longer hospital stay at index admission, and higher in-hospital mortality compared with published data from western registries. Prescription of guideline based therapy was sub-optimal(25%) but found to improve outcomes. Lack of GDT predisposed to readmissions and re-admission was a predictor of mortality.

In view of the suboptimal rates of prescription of guideline-directed therapy, physicians and healthcare administrators should initiate quality improvement measures aimed at focused care which can improve the outcomes of patients with HF in the developing world.

REFERENCES

1. Ambrosy AP, Fonarow GC, Butler J, Chioncel O, Greene SJ, Vaduganathan M, et al. The Global Health and Economic Burden of Hospitalizations for Heart Failure: Lessons Learned From Hospitalized Heart Failure Registries. *J Am Coll Cardiol*. 2014 Apr 1;63(12):1123–33.
2. Harikrishnan S, Sanjay G, Anees T, Viswanathan S, Vijayaraghavan G, Bahuleyan CG, et al. Clinical presentation, management, in-hospital and 90-day outcomes of heart failure patients in Trivandrum, Kerala, India: the Trivandrum Heart Failure Registry. *Eur J Heart Fail*. 2015 Aug;17(8):794–800.
3. Harikrishnan Sivadasan Pillai, Sanjay G. Heart failure in South Asia. *Curr Cardiol Rev*. 2013 May;9(2):102–11.
4. Huffman MD, Prabhakaran D. Heart failure: epidemiology and prevention in India. *Natl Med J India*. 2010 Oct;23(5):283–8.
5. Vivek Chaturvedi et al. HEART FAILURE IN INDIA: The INDUS (INDia Ukieri Study) Study. *JPCS*. 2016;
6. Harikrishnan S, Sanjay G, Agarwal A, Kumar NP, Kumar KK, Bahuleyan CG, et al. One-year mortality outcomes and hospital readmissions of patients admitted with acute heart failure: Data from the Trivandrum Heart Failure Registry in Kerala, India. *Am Heart J*. 2017 Jul;189:193–9.
7. Sanjay G, Jeemon P, Agarwal A, Viswanathan S, Sreedharan M, Vijayaraghavan G, et al. In-Hospital and Three-Year Outcomes of Heart Failure Patients in South India: The Trivandrum Heart Failure Registry. *J Card Fail*. 2018 Dec 1;24(12):842–8.
8. Dokainish H, Teo K, Zhu J, Roy A, AlHabib KF, ElSayed A, et al. Heart Failure in Africa, Asia, the Middle East and South America: The INTER-CHF study. *Int J Cardiol*. 2016 Feb 1;204:133–41.
9. RACE AGAINST TIME - II. Harikrishnan.S, Stephen Leeder, D Prabhakaran, Jeemon P, Mark Huffman. CCDC, New Delhi, India; 2015.
10. McMurray JJV, Adamopoulos S, Anker SD, Auricchio A, Böhm M, Dickstein K, et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. *Eur Heart J*. 2012 Jul;33(14):1787–847.
11. Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JGF, Coats AJS, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur Heart J*. 2016 Jul 14;37(27):2129–200.
12. Adams KF, Fonarow GC, Emerman CL, LeJemtel TH, Costanzo MR, Abraham WT, et al. Characteristics and outcomes of patients hospitalized for heart failure in the United States: rationale, design, and preliminary observations from the first 100,000 cases in the Acute Decompensated Heart Failure National Registry (ADHERE). *Am Heart J*. 2005 Feb;149(2):209–16.
13. Abraham WT, Fonarow GC, Albert NM, Stough WG, Gheorghide M, Greenberg BH, et al. Predictors of in-hospital mortality in patients hospitalized for heart failure: insights from the Organized Program to Initiate Lifesaving Treatment in Hospitalized Patients with Heart Failure (OPTIMIZE-HF). *J Am Coll Cardiol*. 2008 Jul 29;52(5):347–56.
14. Callender T, Woodward M, Roth G, Farzadfar F, Lemarie J-C, Gicquel S, et al. Heart failure care in low- and middle-income countries: a systematic review and meta-analysis. *PLoS Med*. 2014 Aug;11(8):e1001699.
15. Kociol RD, Hammill BG, Fonarow GC, Heidenreich PA, Go AS, Peterson ED, et al. Associations between use of the hospitalist model and quality of care and outcomes of older patients hospitalized for heart failure. *JACC Heart Fail*. 2013 Oct;1(5):445–53.
16. Harikrishnan S, Jeemon P, Ganapathi S, Agarwal A, Viswanathan S, Sreedharan M, et al. Five-year mortality and readmission rates in patients with heart failure in India: Results from the Trivandrum heart failure registry. *Int J Cardiol*. 2021 Mar 1;326:139–43

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