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Geographical variation in the clinical presentation of endomyocardial fibrosis in India?

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ABSTRACT

Objectives: To compare the clinical presentation, clinical profile and survival of two groups of endomyocardial fibrosis patients.

Methods: The study was a prospective cohort study, or a prospective case series, comparing all consecutive echocardiographically proven patients with endomyocardial fibrosis seen in Medical College Trivandrum with the patients seen in Medical College Hospital, Alappuzha (Alleppey) (or TD Medical College). In all patients the clinical details like age, sex, type of endomyocardial fibrosis, the presence of anaemia, eosinophilia, neutrophilia and type of rhythm (Sinus or atrial fibrillation) etc were compared by both simple X2 and by Kaplan Meier survival curves.

Results: The mean age and the sex distribution was same in both places. Briefly the incidence of biventricular endomyocardial fibrosis was more from Trivandrum than Alleppey, 64.9% vs 14.3% ($p < 0.0001$), the incidence of atrial fibrillation was more in Trivandrum 44.2% vs 16.3%. ($p < 0.0001$) The overall survival of Trivandrum patients was poorer ($p < 0.0001$). The six year survival was 61% in the Trivandrum population whereas it was 91.5% in the Alleppey population.

Conclusions: These differences may have been due to the better nutrition of the Alleppey patients due to a higher exposure to fish compared to the Trivandrum population. Better nutrition would protect against Magnesium deficiency and prevent the absorption of Cerium in the patients from Alleppey, compared to those from Trivandrum.

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1. Introduction

Previous workers have postulated a geochemical basis for endomyocardial fibrosis¹. Endomyocardial fibrosis of tropical origin is a disease where the endocardium of either the right or the left ventricle, or both gets progressively thickened and the ventricles get obliterated. The fibrosis of the endocardium also extends into the subendocardial myocardium and hence the name tropical endomyocardial fibrosis². Various aetiologies³ have been postulated for endomyocardial fibrosis including rheumatic fever, toxic damage due to eosinophils (degranulated eosinophils), or due to cyanides in tubers, as the histological picture is similar to that

seen in hypereosinophilic syndrome, Löffler's endocarditis and in eosinophilic leukaemia^{3,4}.

Other researchers have demonstrated an increased interstitial cellularity and lymphocytic infiltration in tropical endomyocardial autopsy specimens in the heart, the myocardium⁵. This led to the belief that any toxin spread by the blood stream could cause endomyocardial fibrosis. A search for a pathogen included looking at filariasis, tuber consumption, implicating cyanides, eosinophil mediated damage, and finally damage due to heavy metals like Thorium^{1,6}. Thorium was found to be increased in endomyocardial fibrosis autopsy specimens compared to its content in normal hearts. Subsequently further studies showed that increased levels of Cerium was more prevalent in the myocardium of endomyocardial fibrosis hearts^{6,7}. On experimental studies it was found that cerium and thorium did not enter the tissues of normal animals, or normal tubers grown in tissue culture^{8,9}. When magnesium deficiency was created an excess of cerium and thorium entered the hearts of the experimental animals, and tubers grown in tissue

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culture media. It was also found that magnesium deficient soils grew magnesium deficient tubers. Laterite soil is the type of soil found in the high rain fall regions of Kerala, here excessive rainfall washes away all the magnesium in the soil. (unlike the forests where the retained leaves preserve the magnesium in the soil.) Laterite soil is deficient in magnesium. Researchers have compared the serum magnesium levels in school children to find out whether children from the lower socioeconomic groups had lower serum magnesium levels. This was found to be so¹⁰. The workers from Trivandrum found that the world over endomyocardial fibrosis occurs more between 15° north latitude and 15° south latitude. Kerala lies between 8 and 12° north latitude¹¹.

In Kerala most of the endomyocardial fibrosis patients have been found to be situated in certain areas, these areas, or Taluks have been found to be rich in monazite soils that are rich in Cerium and thorium¹¹. Ramankutty et al studied the distribution of 340 patients with endomyocardial fibrosis that had presented to the Sri Chitra Tirunal Institute of Medical Sciences and Technology, Trivandrum. They classified taluks, or areas as regions of high endemic endomyocardial fibrosis(4/100,000)population,Medium endemic areas(2-4/100,000 population) and those with less than 2/100,000 population as low endemic areas. They found that endomyocardial fibrosis had a strong spacial distribution,high endemic areas were all coastal in location. Trivandrum is a coastal area.17.0% of patients in the above series were from Trivandrum.

18% were from Quilon district and 20% were from Alleppey.

Valiathan and Eapen have found higher cerium levels in the blood of patients with endomyocardial fibrosis¹².

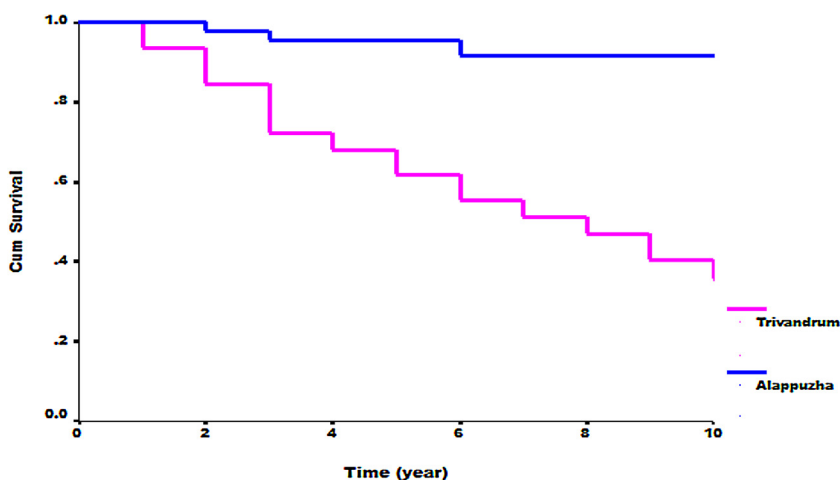
On analysis the endomyocardial fibrosis hearts were also deficient in magnesium. So it is logical to think that if a population eats a diet more deficient in magnesium,with higher levels of toxic minerals like cerium or thorium, they would have more severe endomyocardial fibrosis. This would probably mean involvement of more than one ventricle. Logically involvement of two ventricles should be considered to be a more severe disease/involvement when compared to involvement of only one ventricle. (This is only a hypothesis,it is not proven.)

Endomyocardial fibrosis was reported from the early 1970s from Kerala¹³. Two regions were commonly in the news, Trivandrum and Alleppey^{13,14}. Trivandrum is a coastal town with more government offices and no industry, and a relatively more backward lower socioeconomic class. Nearly every one had small pockets of land. They would cultivate tapioca, a tuber, or yam or sweet potatoes that they would eat with fish or a chutney, when they could not afford rice. Long ago pulses were not easily available and were not eaten as much as they are eaten now. So the average Kerala population would not eat much protein. They would not starve but ate low protein diets, the protein deficiency was aggravated by frequent illnesses like diarrhoea or lower respiratory infections. This would further aggravate any possible magnesium deficiency. Workers from Kerala found that there are two age peaks for the incidence of endomyocardial fibrosis. One peak was in the younger age group in males below the age of 15 years and another peak was in females of the reproductive age group. This was found by independent workers even before the geochemical basis was postulated. It was believed that physiological demands and frequent infections would aggravate any magnesium deficiency.

Trivandrum has more laterite soil and a more city based life. Alleppey is a coastal town with both access to the sea as well as to a large back water sea salt containing lake making access to fish easy. The two geographies are different. Alleppey is often water logged, and it is claimed that nothing like rice or simple crops like tapioca, or bananas can grow there. So of necessity the major food of most of the common man contains an amount of fish.

So it would be interesting to compare whether the pattern of endomyocardial fibrosis is different in the two parts of Kerala. That was the main aim of this study.

Trivandrum and Alleppey (Alappuzha) are two localities in Kerala from where endomyocardial fibrosis has been reported in the 1970s to 1980s¹³. Workers have earlier reported the survival in Endomyocardial fibrosis from another large tertiary care centre in Trivandrum¹⁴.We sought to discover whether the clinical features of endomyocardial fibrosis were different in Trivandrum and Alleppey.



P_value: 0.0001

Fig. 1. showing the survival of both Alleppey patients and Trivandrum patients with endomyocardial fibrosis.

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