

Review Article

Prevalence of rheumatic heart disease: Has it declined in India?

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ABSTRACT

Rheumatic heart disease continues to be a major health problem in many parts of the world. The epidemiology of rheumatic heart disease in India is of special interest as it may help to understand the effects of economic transition on this enigmatic disease. Critical appraisal of the published literature suggests the possibility of a real decline in the occurrence of the disease in some parts of the country, but a continuing onslaught in several other regions. The rate of decline seems to correlate more with improved public health facilities than with economic development alone. However, the cumulative burden of the disease remains high, and sustained efforts for the prevention of rheumatic heart disease are warranted.

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INTRODUCTION

Rheumatic heart disease (RHD) remains a major public health problem in many parts of the world.^{1,2} Globally, India contributes nearly 25%–50% of newly diagnosed cases, deaths, hospitalizations and burden of RHD.¹ It is widely perceived that with the economic transformation in India there is a burgeoning epidemic of lifestyle diseases such as coronary artery disease, diabetes and hypertension, whereas the prevalence of RHD is declining. We review the available epidemiological data from India to assess whether RHD has actually declined. Such an analysis assumes importance in view of the mysterious and incompletely understood epidemiology of rheumatic fever (RF).

EVIDENCE FOR A DECLINE

The earliest report of RHD in India dates back to 1910.³ Even during the 1980s, hospital admission data suggested that RF and RHD accounted for nearly one-half to one-third of the total cardiac admissions at various teaching hospitals in India.⁴ A more recent survey across various tertiary care hospitals found that hospital admission rates of RHD had declined (5%–26% of cardiac admissions).⁵ Population-based epidemiological data to ascertain the prevalence of RHD in India are lacking.⁴ A properly planned population study in 1993 reported a prevalence of 0.09% for RHD.⁶

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Most of the epidemiological studies are school-based surveys (Table I). The reported prevalence of RHD varied from 1.8 to 11/1000 schoolchildren (average 6/1000) during the 1970s and 1980s, and 1–3.9/1000 during the 1990s.^{8,16} Studies using echocardiographic validation of clinical diagnoses show a much lower prevalence of RHD. The prevalence estimates range from 0.5/1000 in Gorakhpur¹⁴ to 0.67/1000 in Vellore and Bikaner.^{12,15} The surveys conducted by the Indian Council of Medical Research (ICMR) also indicate a decline in the prevalence of RHD over decades^{7,8,13} (Fig. 1).

IS THIS A TRUE DECLINE?

It is debatable whether the generally perceived decline in the prevalence of RHD is a true decline throughout India. Inadequacy of hospital admission statistics and varying individual hospital admission policies greatly influence the prevalence data derived from hospital sources. The proportion of RHD-related admissions to hospitals depends mostly upon the socioeconomic status of the population which they serve. The decline in RHD cases at tertiary care centres may also reflect a relative shift of attention from RHD to the increased demands of patients with coronary artery disease and congenital heart disease at these advanced facilities. A survey of secondary care hospitals shows that nearly 30% of cardiac cases are related to RHD.¹⁶ Trends in hospitalization reported from a single hospital could prove to be more useful. Such a report

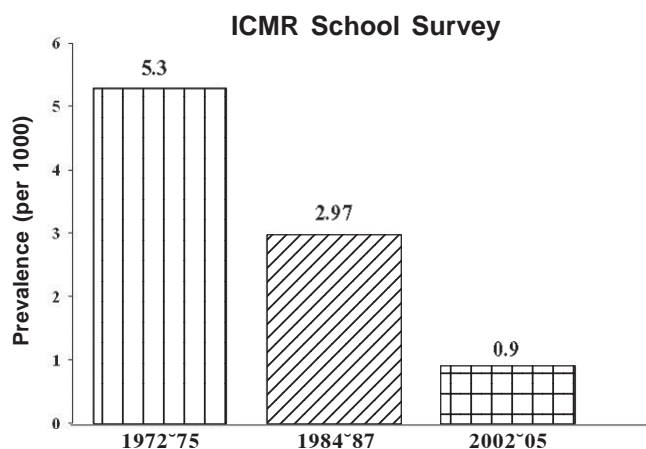


Fig 1. The average reported prevalence of rheumatic heart disease based on surveys conducted by the Indian Council of Medical Research over the years^{7,8,13}

Table I. Prevalence of rheumatic heart disease (RHD) in Indian school surveys

Author	Period	Region	Population	Age (years)	Prevalence (per 1000)
ICMR ⁷	1972–75	Agra, Alleppy, Bombay, Delhi, Hyderabad	133 000	–	0.8–11
ICMR ⁸	1982–90	Delhi	13 509	5–15	2.9
ICMR ⁸	1984–94	Delhi (urban)	40 000	5–10	3.9
ICMR ⁸	1984–87	Delhi, Varanasi, Vellore	52 793	–	1.0–5.7
Patel <i>et al.</i> ⁹	1986	Anand	11 346	8–18	2.03
Avasthi <i>et al.</i> ¹⁰	1987	Ludhiana	6005	6–16	1.3
Thakur <i>et al.</i> ¹¹	1992–93	Shimla-Kasumpti-Suni	15 080	5–16	4.8* 1.98†
Jose <i>et al.</i> ¹²	2001–02	Vellore	229 829	6–18	0.68
ICMR ¹³	2002–05	Kochi, Vellore, Chandigarh, Indore	100 269	–	0.43–1.47
Misra <i>et al.</i> ¹⁴	2003–06	Gorakhpur	118 212	4–18	0.5
Periwal <i>et al.</i> ¹⁵	2006	Bikaner	3292	5–14	0.67

* rural schools † urban schools ICMR Indian Council of Medical Research

from Cuttack in Orissa suggested that the number and proportion of RF/RHD did not decline significantly over a 20-year period. RF and RHD cases accounted for 45% of total cardiac cases even during 1991–2000.¹⁷ Similarly, a population survey done in the year 2000 in 4326 villages in northern India reported a high prevalence of RHD (4.58/1000). The incidence of RF was 0.4/1000 among a population >15 years of age.¹⁸ A contemporary autopsy series from Mumbai failed to find a decline in the frequency of RHD.¹⁹ The proportion of RHD cases to overall cardiac autopsies was the same when compared with autopsy data of 25 years earlier from the same institute. This may reflect residual RHD despite a decline, or a persistent problem.

While school surveys have been regarded as ideal, a clear conclusion about the prevalence of RHD is difficult to tease out from the available information. There are confounders such as methodological issues of the surveys, the modality used for diagnosis, type of population surveyed, rate of absentees, etc. The modality used to diagnose RHD in school surveys has changed over the decades from clinical examination to clinical screening followed by echocardiography. The sole reliance on clinical diagnosis may have been responsible for a higher RHD prevalence reported in some early studies. All the surveys in the past decade have utilized echocardiography to classify patients with murmurs. In one of the studies, the prevalence of RHD based on clinical screening was as high as 16.7/1000,¹⁵ which decreased to 0.67/1000 with the use of echocardiography. School surveys from Vellore¹² and Gorakhpur¹⁴ also confirm that many children who were examined clinically would have been labelled as RHD if not for the echocardiogram. On the other hand, routine screening of all schoolchildren with clinical and echocardiographic examination has reported an unexpectedly high prevalence of RHD in Africa (21.5 to 30.4/1000 schoolchildren).²⁰ A recent echocardiographic screening survey from India has also suggested a very high prevalence rate (52.4/1000 schoolchildren).²¹ However, the lack of acceptable and reproducible echocardiographic criteria for RHD is a major drawback.

It should be noted that there is a lack of studies from most of the underdeveloped states of India (Fig. 2), where the prevalence of RHD is likely to be high. Tribal populations in Chhattisgarh, Maharashtra and even in pockets of Kerala have a very high burden of RHD and continuing presence of RF.²² The tertiary care, government-funded hospitals in New Delhi and Mumbai that cater to a large number of the underprivileged population referred from neighbouring regions encounter a substantial number of patients with RF. For instance, RHD remains the number one

cause of heart failure at our institution.²³ It is clear that the results of the few studies from states with declining trends of RHD cannot be extrapolated to the entire country.

DETERMINANTS OF THE DECLINE

It appears that RHD in India has actually declined in some parts of the country and continues unabated in some other regions. The reasons for this duality in the epidemiology of RHD in India are



Fig 2. Map of India showing states with lower per capita state domestic product (<Rs 25 000). The other states have a per capita state domestic product ranging from Rs 30 000 to Rs 90 000. (Data from State Series—Statement: per capita NSDP [state income] at current prices as on 31 August 2007, Central Statistical Organization). Places where school/ population surveys on prevalence of rheumatic heart disease are conducted are shown. All the recent school surveys have been done in urban and semiurban areas.

apparent. Improved public hygiene and living standards could have contributed substantially to the reported decline. A closer look at the per capita domestic product of the individual states indicates that in most of the developed states, there has been a decline in the prevalence of RHD. This may also be related to improved healthcare delivery for throat infections. Antibiotics are frequently used for treating throat infections even in rural India. On the other hand, growth and development in India is not uniform across the country. Elementary education and basic health amenities are not universally available. Despite rapid economic growth, income inequalities, overcrowding and poverty may have increased in some parts of India. Further, economic growth alone may not improve the public health situation. The rate of decline of RHD among developed states seems to vary with the access to quality medical care at the primary healthcare level, as is the case with the infant mortality rate. The states that have performed best at reducing infant mortality rates in India still have relatively low per capita income levels, but have achieved relatively good results for those levels. A similar phenomenon may explain the better-than-expected decline of RHD reported from states such as Kerala and Tamil Nadu, and the relative non-decline reported from other economically well developed states.

WILL THE BURDEN OF THE DISEASE DECLINE?

In 1994, it was estimated that 12 million individuals suffered from RF and RHD worldwide. As per WHO estimates, nearly 0.133 million deaths annually were attributable to RF/RHD in the Southeast Asia region which includes India, compared with the 10 000 and 30 000 deaths in the Americas and Europe, respectively.¹ Sobering estimates of RHD have been projected by various researchers over decades (Table II).^{4,24} Considering a median incidence of 0.5/1000, approximately 131 000 children suffer from RF every year in India.¹⁶ At least one-third of them develop chronic valvular heart disease, i.e. nearly 44 000 patients are added every year. Considering the lowest and the highest reported prevalence of RHD in the population/schoolchildren, the number of RHD cases in India could range from 0.44 to 3.37 million.

In conclusion, the decline in RHD in India is not uniform. RHD continues to remain a major cardiac illness with an enormous disease burden that translates into huge economic and social losses. RHD is not gone, but forgotten. The decline in the incidence of RF/RHD in the developed world has unfortunately resulted in a parallel decline in the research interest in this disease.

Table II. Estimated number of patients with rheumatic heart disease in India

Variables	1981 ⁴	1991	2001 ²⁴	2008
Total population (in millions)	685	846	1027	1130
% population 5–40 years of age	–	64.9	65.2	65.0
Population at risk (in millions)	–	549	670	734
Prevalence (%)	1.52	0.29	0.21	0.06–0.46*
No. of cases (in millions)	1.04	1.59	1.4	0.44–3.37*

* based on highest and lowest estimates

The developed world has forgotten RHD with a waning of the disease burden among the <20% of the world's population living in high income countries.² Similarly, a reduction in the RHD burden among the 20% privileged population in India should not make us lose focus from this enigmatic illness.

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