

# Mortality Due to Rheumatic Heart Disease in Developing World: A Preventable Problem

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## Abstract

**Background:** Rheumatic heart disease (RHD) has been a major cause of cardiovascular morbidity and mortality in underdeveloped and developing countries, since this disease has been identified. Its prevalence has significantly come down in developed countries but this still remains an important cause of cardiovascular morbidity and mortality of younger age group in underprivileged world. The most important fact associated with this condition is, this is a preventable problem and a lot of morbidity and mortality can be avoided with proper preventive measures.

**Objective:** This study was conducted to know one year mortality with RHD in Indira Gandhi Institute of cardiology Patna, one of the largest referral cardiac centers of northern India, to estimate the disease burden of this preventable problem in this province.

**Methods and Results:** A retrospective study of medical records was done for the patients died during year 2013, with rheumatic heart disease at Indira Gandhi Institute of Cardiology, Patna. This tertiary cardiac center in northern India witnessed a total of 120 deaths with RHD during the year 2013.

**Conclusion:** 120 deaths due to RHD in a year in a referral cardiac center of northern India is significant and points towards the disease burden of this preventable problem in the province.

**Keywords:** Rheumatic heart disease; Mortality; Prevention; Bihar

## Introduction

Rheumatic heart disease (RHD) is the most common acquired heart disease in children in many parts of the world, especially in underprivileged and developing countries. RHD is a chronic heart condition caused by rheumatic fever that can be prevented and controlled. Rheumatic fever is caused by a preceding group A streptococcal infection. Acute rheumatic fever (ARF) primarily affects the heart, joints and central nervous system. The major importance of acute rheumatic fever is its ability to cause fibrosis of heart valves called Rheumatic heart disease which leads to crippling heart disease in its severe form and causes heart failure and death. The decline of rheumatic fever in developed countries is believed to be the result of improved living conditions and availability of antibiotics for treatment of group A streptococcal infection. Overcrowding, poor housing conditions, under nutrition and lack of access to healthcare play a role in the persistence of this disease in developing countries [1]. Besides these, genetic susceptibility of certain individuals has also been implicated in the etiology of acute rheumatic fever [2]. The global burden of disease caused by rheumatic fever and RHD currently falls disproportionately on children and young adults (affected more) living in low-income countries and is responsible for about 233,000 deaths annually [1]. At least 15.6 million people are estimated to be currently affected by RHD with a significant number of them requiring repeated hospitalization and often unaffordable heart surgery in the next five to twenty years. Up to 1 per cent of all school children in Africa, Asia, the Eastern Mediterranean region, and Latin America show signs of the disease [1].

Primary prevention of acute rheumatic fever (the prevention of initial attack) is achieved by treatment of acute throat infections caused by group A streptococcus. This is achieved by up to 10 days of an oral antibiotic (usually penicillin) or a single intramuscular penicillin injection.

People who have had a previous attack of rheumatic fever are at high risk for recurrent attacks. Each attack of rheumatic fever further worsens

the damage to the heart. Therefore this is very important to prevent the further attacks of rheumatic fever who had it earlier. Prevention of recurrent attacks of acute rheumatic fever is known as secondary prevention. This involves regular administration of antibiotics, and has to be continued for many years. Procaine Penicillin is the most commonly used antibiotics for secondary prophylaxis unless the patient is allergic to penicillin. Secondary prevention programmes are currently thought to be more cost effective for prevention of RHD than primary prevention and may be the only feasible option for low to middle-income countries in addition to poverty alleviation efforts [3]. In developing countries there are multiple contributory factors associated with patients of RHD which make them undergo multiple hospital admissions. These factors are poverty, lack of education, severe valvular disease, delayed diagnosis and non-compliance to the treatment & secondary prophylaxis. Most of the patients with severe disease remain unproductive for them and the society. Frequent admissions cause financial burden to the family of RHD patients due the expenses over the treatment and loss of wages. Those who have undergone prosthetic valve surgery need to get their coagulation profile checked at regular interval. Those who do not get it checked regularly or become non-compliant with the anticoagulant drugs, can develop stuck valve which poses a significant mortality [4]. In the areas where the disease burden is high, Rheumatic heart disease

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control programme can intervene in primary prevention, diagnose it at an early stage and ensure regular secondary prevention to the patients of ARF and RHD.

The present study measures one year mortality in Indira Gandhi institute of cardiology Patna, one of the largest referral cardiac centers of northern India. This study points towards the disease burden of RHD in this province.

## Methods

A retrospective medical record audit was conducted for the patients who died during the year 2013 (from 1<sup>st</sup> January to 31<sup>st</sup> December) in Indira Gandhi institute of cardiology, Patna with the diagnosis of rheumatic heart disease. Information's regarding demographics and the diagnosis were collected and data was analysed using statistical methods.

## Results

### All-cause mortality and mortality due to RHD at Indira Gandhi Institute of Cardiology during year 2013.

During the whole year 2013, a total of 972 patients died at Indira Gandhi institute of cardiology, Patna. Out of these, 120 patients were having rheumatic heart disease (Figure 1). Most of the patients were admitted with signs and symptoms of congestive heart failure. None of them were found to have coronary artery disease based on clinical features, ECG and Echocardiography.

### Age and sex distribution of patients died due to RHD

The mean age at death was 41 years. Median age at death was 35 years. Minimum and maximum ages at death were 8 years and 73 years respectively. Maximum number of deaths were noted in females of age group 31-40 years (19) followed by males (18) of the similar age group. Overall females outnumbered (67, 56%) male (53, 44 %) (Figure 2).

### Distribution of different valvular lesions

Isolated Mitral valve affection was most common, found in 91 (75.83%) patients followed by Mitral valve and Aortic valve in combination. Tricuspid regurgitation secondary to pulmonary artery hypertension was not counted in this category (Figure 3).

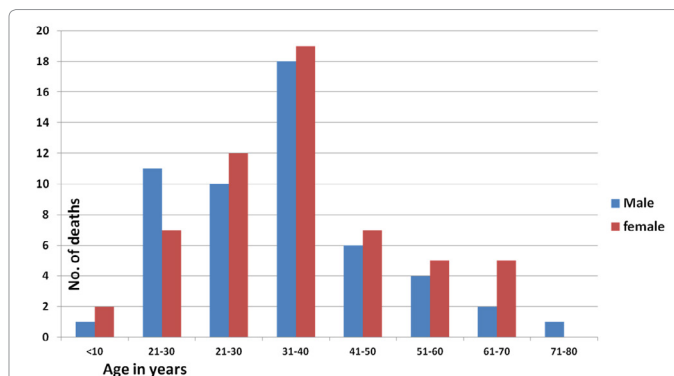


Figure 2: One year mortality due to RHD in different age groups (N=120).

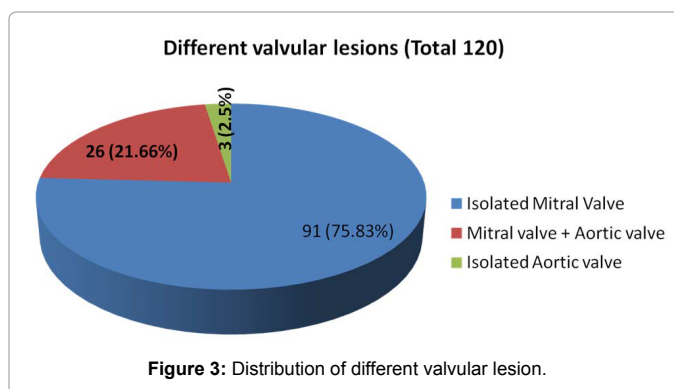


Figure 3: Distribution of different valvular lesion.

Valvular lesion	Number *	percent
Severe MS	41	58.57
Severe MR	11	15.71
Severe MS and Severe MR	11	15.71
Severe AS	2	2.85
Severe MR and severe AR	2	2.85
Severe MS, severe AS and Severe AR	1	1.42
Severe AR, Severe MR	1	1.42
Severe AR	1	1.42
Total	70	100

\*each severe lesion has been counted only once i.e. if any lesion has been counted in "severe MS" category it has not been counted in "Severe MS and Severe MR" category.

Table 1: Patients with severe valvular lesion.

Procedure	No. of patients and their ages at death (in years)
BMV	3(50,35,35)
CMV	1(55)
MVR	8(26,32,30,45,39,31,40,21)
DVR	4(27,33,50,30)

BMV-Ballon Mitral Valvulotomy, CMV-Closed Mitral Valvulotomy, MVR-Mitral Valve Replacement, DVR-Double Valve Replacement

Table 2: Patients who had procedure earlier.

### Patients with severe valvular lesions

Among RHD patients, 70 (58%) had either single severe valvular lesion or severe valvular lesions in combination Table 1.

### Mortality in patients who had cardiac intervention previously

12(10%) patients of RHD had history of cardiac procedure Table 2.

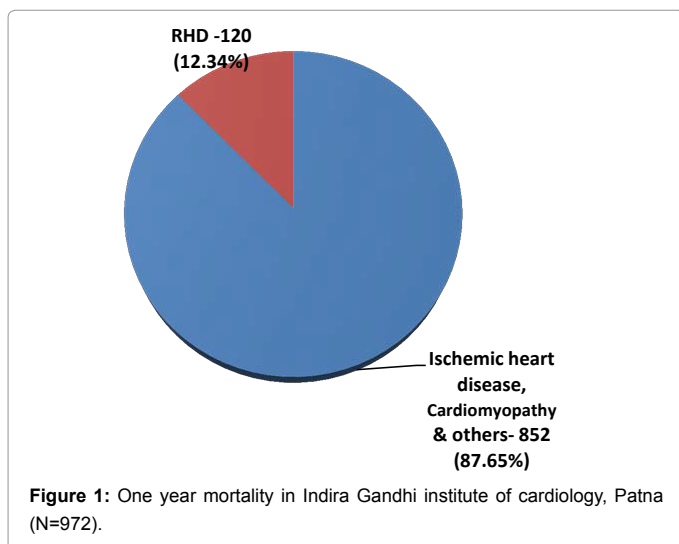


Figure 1: One year mortality in Indira Gandhi institute of cardiology, Patna (N=972).

### Mortality in patient with RHD and stuck valve

Out of total 120 RHD deaths, 4 patients had RHD with stuck valve at admission. Out of these, 3 patients (aged 30, 3, and 21 years) had MVR (Mitral valve replacement) done previously. One patient aged 33 years had DVR (Double Valve Replacement) done previously. Stuck valve is associated with poor compliance with the anticoagulant therapy, hence a good counseling and ensuring follow up is important in reducing this problem.

### Associated clinical conditions in patients with cardiogenic shock

Among RHD group, 32 patients had cardiogenic shock either at admission or during subsequent course in hospital. Out of these 17 (53%) patients had severe valvular lesion. 9 (28%) patients had conduction disorder in the form of AF or AF with fast ventricular rate. Left atrial clot was present in 2 (6%) patients. Similar number of patients 2 (6%) had stuck prosthetic valves.

### Discussion

In our study at Indira Gandhi institute of cardiology Patna, we found that out of 972 deaths during whole year in 2013, 120 (12.34%) patients were having RHD. Out of these 120 RHD patients, 70 (58%) had either single severe valvular lesion or severe valvular lesions in combination. It reflects possibilities of unavailability of healthcare facility to provide secondary prophylaxis or difficulty in accessing it, non-compliance to the treatment and regular prophylaxis, lack of education and unaffordability of costly cardiac procedures of valvotomy/valve replacement. A severe valvular lesion which is preventable by regular prophylaxis has contributed to 53% of patients who had shock.

There are many studies conducted to estimate the disease burden of rheumatic heart disease in different parts of the world. These show that the populations living in underdeveloped province are suffering more from the disease. Findings of any prevalence study related to rheumatic heart disease also depend on the type of population selected like school survey or village study and whether echocardiography was used or not. Findings of the school survey is expected to give lower value as not all the children of any community with the RHD would be attending the school because of their illness, and some of them may not be enrolled in school. Village survey is expected to pick up most of the children of rural population and give better estimate of prevalence. There are

different studies conducted across different parts of Asia which estimate prevalence of rheumatic heart disease ranging from 0.26-6.4 per thousand (Table 3).

The disease burden, morbidity and the mortality can be reduced by applying and strengthening measures for primary and secondary prevention. Soudarssanane et al. suggested that primary prevention is the cost effective in the prevention of rheumatic fever and rheumatic heart disease [5]. This was a study based on the estimated cost of primary prevention, secondary prevention and tertiary prevention considering cost factors of treatment of sore throat, throat culture, hospital admission and surgery (valvotomy, valve replacement) etc. Manji et al. suggested that echocardiographic screening and secondary prophylaxis are the best strategies for the prevention of RHD [6]. A high index of suspicion is required for diagnosing acute rheumatic fever cases who present with features of arthritis mainly. Isolated arthritis is the presenting symptom in 14-42% of patients [7,8]. There may be no history of sore throat and carditis may be silent. The diagnosis may be missed if appropriate investigations are not carried out during the acute illness. These patients are susceptible to recurrent attacks of rheumatic fever and damage to heart valves becomes increasingly severe with each subsequent attack [9,10]. Keeping high index of suspicion in those isolated arthritis cases and investigating those cases with echocardiography will pick up the disease in early stage and with regular secondary prophylaxis the disease burden over the affected person, the society and the healthcare system will be reduced. Secondary prophylaxis may be strengthened by ensuring it with the registry system of acute rheumatic fever and rheumatic heart disease cases in special clinics.

### WHO register based project

A register based project for control of ARF/RHD was launched by WHO in 1972. This had shown a significant reduction in health costs. WHO then embarked upon a global programme and by 1990, ARF registers had been established in 16 countries and over 3000 cases of RHD or prior ARF detected. A later review highlighted improved compliance with secondary prophylaxis. Subsequently only a few countries expanded their programmes. In India also this approach of controlling RHD is lacking. In present scenario this could be very useful in ensuring secondary prophylaxis due the fast development of telecommunication in recent years. Today most of the people, even those residing in the remote villages are having the mobile phones. If a registered RHD patient does not turn up for secondary prophylaxis

Investigator/ Reference	Year of study	Place	Age group (year)	RHD Prevalence/1000	No. screened	No. of cases	Type of of study
Grover et al., [11]	1988-1991	North India	15-May	2.1	31200	66	Community project
Kumar et al., [12]	1988-1990	Rajasthan (India)	3.5-18	3.3	10168	34	School survey
Vashistha et al., [13]	1989-1990	Agra (India)	15-15	1.4	8449	12	School survey
WHO [14]	1986	Islamabad (Pakistan)	15-May	0.26	11700	3	School survey
Avasthi et al., [15]	1987	Ludhiana (India)	16-Jun	1.3	6005	8	School survey
Agarwal et al., [16]	1991-1992	Uttar Pradesh (India)	0-15	6.4	3760	24	School screening
Thakur et al., [17]	1990s	North India	16-May	2.9	15080	44	School survey
Ahmad et al., [18]	1991	Bangladesh (Rural)	15-May	1.3	5923	8	Community survey
Jose and Gomathi [19]	2001-2002	Vellore ( India )	18-Jun	0.68	229829	157	School survey

Table 3: Prevalence of RHD in India and adjoining countries.

he/she can be contacted and reminded through his/her registered phone number to get it done. Thus a higher percentage of secondary prophylaxis can be ensured which will ultimately reduce overall prevalence of RHD and severe form of the disease in the society.

### Health education

Presently there is no any national health programme or health education programme related to control of RHD, in India. The knowledge and awareness regarding RHD may be spread to the community by posters, banners and television shows. Community level health workers may be educated that patients with joint pain or swelling should contact physician as this could lead to valvular heart disease. This approach can help to detect ARF in early stage. When such patients are brought to the physician they should undergo blood investigations and echocardiography as required.

### Conclusion

One year mortality of 120 due to RHD in one of the largest referral cardiac centre of northern India (Indira Gandhi Institute of Cardiology, Patna) is significant and points towards the disease burden of this preventable problem in this province. Out of 120 patients died, 70 (58%) had severe valvular lesion. Preventive measures can reduce the overall number of patients with RHD as well as number of patients with severe valvular lesions in a community. ARF/RHD control programmes, in the form of community education regarding disease, active surveillance and introduction of ARF/RHD registry system with emphasis on ensuring secondary prophylaxis can reduce the problem.

### Key Message

Today preventive cardiology is mainly focused upon the ischemic heart disease globally, but RHD is a significant problem in developing world which causes a lot of morbidity and premature deaths. It can be prevented and controlled with patient education, early case detection and regular secondary prophylaxis through patient registry system.

### Limitations of the Study

This study is lacking the data of total number of patients admitted with RHD.

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### Conflict of Interest

The authors declare that there is no conflict of interest.

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