

A study of rheumatic heart disease and rheumatic fever in a defined population in Sri Lanka

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Abstract

Objective

To investigate the epidemiology of rheumatic heart disease (RHD) and rheumatic fever (RF) in children in a defined population.

Methods

The study was conducted in 1995/1996 in two stages, comprising an initial screening clinical interview and examination, followed by echocardiography of children with cardiac murmurs. The sample consisted of all children 5-18 years of age in 16 villages in the Hanguranketha divisional secretariat area in the Nuwara Eliya district. The participation rate was 90.7% in the first stage of the study and 89% in the second stage.

Results

The incidence of RF polyarthritis was 162/100,000 (95% CL 33.5-473.7). The prevalence of RHD was 6.5 per 1000 (95% CL 3.5-11.0) and the maximum prevalence was in the 15-18 group [prevalence 11.2 per 1000 (95% CL 3.9-26.8)]. Mitral regurgitation was the commonest lesion and was seen in 11 children (92%). Four of the affected children (33%) had mitral regurgitation only and the other 7 children (58%) had mixed valve lesions. Mitral stenosis was detected in 67% of the affected children but pure mitral stenosis was present only in one child. Aortic regurgitation was seen in one affected child as a mixed lesion. More females than males were affected by RHD (F/M = 3). The mean number of siblings in families of children with a past history of rheumatic arthritis or RHD was significantly

higher (4.2 SD 1.88, 4.8 SD 1.8 respectively) compared to those who had no history of rheumatic arthritis or RHD (3.7 SD 1.5, 3.7 SD 1.5 respectively, $p < 0.05$). Of children with RHD, 75% were undiagnosed. Only 25% of the RHD patients and 12% of children with past history of rheumatic arthritis were receiving RF prophylaxis.

Conclusion

The prevalence of RHD in this population is high and is comparable to those reported in other developing countries. The majority of those suffering from RHD in the community are undiagnosed. Only a fraction of those suffering from RHD and RF are receiving secondary prophylaxis.

Introduction

With the exception of several recent outbreaks in the United States rheumatic fever (RF) and rheumatic heart disease (RHD) have declined dramatically in the developed world (1). However these diseases remain significant health problems in most developing countries, affecting an estimated 12 million people and causing more than 400,000 deaths annually (2).

According to the data obtained from the Registrar General's Department the mortality rate in Sri Lanka for RHD has shown a gradual decline from 3.6 per 100,000 in 1971, to 1.6 per 100,000 in 1977 to 0.4 per 100,000 in 1984 (3). For RF it has declined from 0.5 per 100,000 in 1977, to 0.2 per 100,000 in 1984 (3). These mortality data may be underestimates as some deaths due to RF and RHD may be classified under the categories "other forms of heart disease" and "deaths due

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to ill defined causes". Although mortality from RF and RHD is reported to be on the decline morbidity from these diseases still remains substantial. Admissions to all Government Hospitals due to RF and RHD has been reported to be about 9000 in 1973 and 7800 in 1974 (3).

Although these diseases contribute significantly to morbidity and mortality, particularly in lower socioeconomic strata of our population, available information on RF and RHD are based on hospital studies (4, 5). There have been no community studies on the prevalence of RF and RHD in Sri Lanka. As such information is useful for the successful formulation and implementation of preventive programmes aimed at controlling RF, we carried out this community based pilot study of RF and RHD in a lower socioeconomic and underprivileged community.

Population and methods

In 1995 the Norwegian REDD BARN (save the children) organization (a Non Governmental Organization) had identified 101 villages in 7 districts in Sri Lanka as target villages for social welfare work based on the following criteria.

- i. Poverty rate more than 65%
- ii. Insufficient health and educational facilities
- iii. Insufficient government extension services

We conducted this study in 1995/1996 in the target villages (sixteen) in the Nuwara Eliya district. These villages belong to the Hanguranketha/Udahewaheta divisional secretariat division. The Hanguranketha divisional secretariat division has a total of 129 villages. Baseline demographic data were available for the population in these 16 villages as a result of preliminary surveys conducted by REDD BARN.

All the children 5-18 years of age (2039) in these 16 villages were invited for the study. The study was conducted in two stages comprising an initial screening clinical interview and examination, followed by echocardiography of children with murmurs, clicks and/or

cardiomegaly. The participation rate was 90.7% in the first stage of the study. Nine hundred and fourteen of them were males. There were 1836 Sinhalese and 12 Tamil children. The age and sex distribution of the sample is shown in Table 1. Table 2 compares the monthly family income of the study sample with that of the general population. Out of 1848 children, 1737 or 94% were attending school.

Table 1

The age and sex distribution of the sample

Age group	M	F	Total
5-9	390	368	758
10-14	361	373	734
15-18	163	193	356
Total	914	934	1848

Table 2

Comparison of monthly income of the study sample and the general population

Monthly income (Rupees)	General population	Study sample
<1000	50.9%	80.6%
1000-2499	38.0%	12.9%
2500-4999	8.7%	4.3%
>5000	2.4%	0.2%

During the initial screening interview children and a parent were personally interviewed using a structured questionnaire. The following information were collected by personal interview of parents.

1. Information about parents, siblings, income and living conditions
2. Past history of frequent attacks of sore throat (more than three attacks a year),

arthralgia, arthritis, chest pain and the age at which they occurred.

3. Past history of benzathine penicillin prophylaxis and rheumatic heart disease.

All children were subjected to a full general examination and an examination of the cardiovascular system by two of us. Children detected as having murmurs were subsequently re-examined by echocardiography.

After the preliminary interview and examination in the field 280 patients were referred for echocardiography and echocardiography was performed on 89% of them. Rheumatic fever polyarthritis was diagnosed retrospectively in those who gave a history of flitting polyarthritis of large joints. The criteria for the diagnosis of definite RHD were as follows:

Unequivocal mitral stenosis

Unequivocal aortic regurgitation

Significant mitral regurgitation (grade 3 systolic murmur with cardiac enlargement on chest radiography or echocardiography and/or unequivocal history of RF)

Aortic systolic murmur with a palpable systolic thrill (and history of RF)

Any combination of the above

Results

Prevalence and incidence of RF and RHD

In this sample of children, 22.7 per 1000 (95% CL 16.6-30.8) gave a past history of polyarthritis compatible with RF arthritis. There were 3 new cases (6 years, 11 years and 16 years of age) of RF polyarthritis in this community during 1995 giving an incidence of 162/1000,000 (95% CL 33.5-473.7).

The overall prevalence of definite RHD was 6.5 per 1000 (95% CL 3.5-11.0). The maximum prevalence of RHD was in the 15-18 age group (Table 3).

More females than males were affected by RF polyarthritis (F/M 1.6) and RHD (F/M 3) (Table 4).

Table 3

The prevalence of RHD in different age groups

Age group	No. of children	Prevalence/1000 (95% CL)
5-9 years	01	1.3 (0.1-4.9)
10-14 years	07	9.5 (4.2-18.7)
15-18 years	04	11.2 (3.9-26.8)
5-18 years	12	6.5 (3.5-11.0)

Table 4

Sex distribution of history of rheumatic fever polyarthritis (RFP) and rheumatic heart disease (RHD)

	Female	Male	F:M ratio
RFP	26	16	1.6:1
RHD	09	03	3:1

Sorethroat as a preceding symptom of rheumatic arthritis

In the total sample 427 (23%) children have a history of frequent attacks of sorethroat. Twenty-one out of 42 children (50%) with a positive history of rheumatic arthritis also gave a history of a sorethroat preceding the attacks of rheumatic arthritis. Among children with RHD, 25% gave a history of frequent attacks of sore throat in the past.

Family size and rheumatic fever

The mean number of siblings in families of children with a past history of rheumatic arthritis was significantly higher (4.2 SD 1.88) compared to those who had no history of rheumatic arthritis (3.7 SD 1.5, $P < 0.05$). The

mean number of siblings in families of children with RHD was also significantly higher (4.8 SD 1.8) compared to those who had no evidence of RHD (3.7 SD 1.5, $P < 0.05$). There was no significant difference in the number of people sharing the bedroom in children with and without RHD.

Rheumatic Heart Disease

Among the 12 children with definite RHD there was a history of previous rheumatic arthritis in 5 (42%). Two (16%) had symptoms such as arthralgia and fever compatible with previous rheumatic activity. Half of the children with RHD had complained of nonspecific chest pain in the past.

In 9 children (75%) with RHD a cardiac lesion was detected for the first time during the survey. Mitral regurgitation was the commonest lesion and was seen in 11 (92%). Four of the affected children (33%) had mitral regurgitation only and the other 7 (58%) had mixed valve lesions. Mitral stenosis was detected in 8 (67%) of the affected children but pure mitral stenosis was present in only one of them. Aortic regurgitation was seen in one affected male child as a mixed lesion. None of them had surgery for their valve lesions. One child (12 years) with severe mitral stenosis was referred for mitral valvotomy and one child (10 years) with mixed aortic and mitral valve disease was referred for valve replacement after the study.

Rheumatic fever prophylaxis

Three children (25%) who had been diagnosed as having RHD were receiving penicillin prophylaxis for rheumatic fever. Only 12% of children with past history of rheumatic arthritis were receiving RF prophylaxis.

Discussion

The prevalence of RHD in this community is 6.5 per 1000 and this rate is comparable to those reported in other developing countries such as India (7) (Table 5).

Table 5
The prevalence of RHD in different populations

Source (year)	Country	Rate per 1000
Present study	Sri Lanka	6.5
Colto/TRS 764, 1988 ⁷	India	6-11
Colto/TRS 764, 1988 ⁷	Vietnam	3.2 - 9.3
Hallali P 1986 ⁸	Japan	4.6
WHO/TRS 764 1988 ⁷	Algeria	15.0
WHO/Bure 1992 ⁹	Zambia	12.5
Coin RW 1989 ¹⁰	USA (Missouri)	8.7
Oli K 1992 ¹¹	Ethiopia	4.6
WHO/TRS 764 1988 ⁷	Mexico	8.5

Among these 1848 children there were 37 with a past history of rheumatic polyarthritis alone, and 12 with RHD (5 with RHD also gave a past history of polyarthritis). The prevalence rates reported in this study may be overestimates as it is sometimes impossible to definitely determine whether large joint polyarthritis was of rheumatic or non-rheumatic in origin, particularly when the diagnosis is retrospective.

Only 25 % of those diagnosed as having RHD and only 12% of children with past history of rheumatic arthritis were receiving penicillin prophylaxis for rheumatic fever. This rate of prophylaxis is undesirably low and should be a matter of grave concern for those responsible for preventive medical services. Due to lack of awareness majority of parents do not seek proper medical treatment when children develop arthritis. This may be partly due to the mistaken belief that systems of medical treatment other than Western Medicine is better for arthritic conditions. Since 94% of the children were attending school, those requiring rheumatic fever prophylaxis would have been detected, had there been an effective medical examination programme in schools. Children in

large urban and rural schools often have their medical needs attended to within the framework of services available outside schools. Therefore when assigning school medical officers to schools, small urban and rural schools serving underprivileged communities should receive priority.

This study was conducted in a low socioeconomic underprivileged community which is not representative of the general population in Sri Lanka. However in Sri Lanka at least 40% have income levels and other basic living facilities comparable to that of the community screened in this study (4). These data give an indication of the magnitude of the problem and the scope for prevention in comparable communities. It is such communities that need preventive care most and limited resources available for prevention should therefore be targeted to them.

The WHO community control of RF/RHD (7) confirms the effectiveness and feasibility of secondary prevention of rheumatic fever. It also demonstrates its cost effectiveness through the reduction of health care expenditure by limiting, the number of days spent in the hospital, the worsening of the disease, the incapacity and early death. Secondary prophylaxis has been shown to be useful even if not given according to a completely regular schedule though its efficacy declines as fewer injections are given.

As expected family size was associated with RF and RHD. Although there were 49 children who were eligible for secondary prophylaxis of RF consisting of 12 children with RHD and 37 children with a probable diagnosis of RF (on the basis of a past history of rheumatic polyarthritis) only 3 with RHD and 4 with rheumatic fever polyarthritis had been diagnosed as suffering from RF and were receiving benzathine penicillin prophylaxis. These data indicate that RF and RHD are underdiagnosed in the community. Therefore surveillance of susceptible communities should be improved for better detection of cases.

At least half the cases of RF appear to occur in the absence of a previous symptomatic sore throat. In the present study only 25% of children

with RHD and 50% of children with RF arthritis had a positive history of sore throat. So if primary prophylaxis is to be effective symptomatic and asymptomatic streptococcal throat infections have to be actively sought and prevented. In a study which investigated the pharyngeal carrier rate of beta haemolytic streptococcus in 655 school children 18% yielded Group A, β -haemolytic streptococci (12). Performing routine throat cultures in children in similar communities will not be feasible with the infrastructure, resources and health facilities available at present. Therefore it is important to educate the community, particularly parents, regarding the importance of obtaining proper medical treatment for sore throats.

Mitral regurgitation was the commonest valve lesion in this population. If infective endocarditis does not supervene and recurrences of rheumatic fever are prevented the rheumatic process may be arrested and may even regress. Secondary prophylaxis requires the routine examination of primary and secondary school children to detect the large number of undiagnosed cases of RHD particularly in underprivileged communities. Existing health services should also be expanded for the adequate surveillance of children detected as suffering from RF. The cost of instituting and maintaining an effective preventive programme is far outweighed by that of admitting patients with established RHD to hospital and treating them medically and/or surgically.

These data indicate that a comprehensive preventive campaign directed both at primary and secondary prophylaxis of RF is urgently needed. As resources are limited preventive programmes for RF need to be targeted to lower socioeconomic sections of the population such as the ones studied here.

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