RHEUMATIC HEART DISEASES

CHANGING PATTERN OF RHEUMATIC FEVER AND RHEUMATIC HEART DISEASE IN JAPAN

By Yuichi Shiokawa

Recently epidemiology of rheumatic fever and rheumatic heart disease has undergone striking changes in Japan as well as in the world. Changing pattern of both diseases in this country and the possible causes are reviewed in this paper.

Mortality Statistics (Figs. 1 and 2)

According to vital statistics in 1968, death rate in Japan was 0·06 in rheumatic fever and 0·46 in rheumatic heart disease per million population. As a rule, in developing countries patients succumb to active rheumatic fever, while in developed countries they die of established rheumatic heart disease. Japan was reported to have higher mortality rate due to rheumatic fever and lower one due to rheumatic heart disease than the average of all other countries in the world. It is clear that a gradual annual decrease in death due to rheumatic fever and rheumatic heart disease has occurred in Japan with similar tendency to other countries in the world.

Autopsy Statistics

Autopsy statistics of Japan have been published annually from the Japanese Pathological Society. The data indicated that incidence of rheumatic fever has fallen from 13·82 in 1933 to 6·82 in 1944 per 10,000 autopsies. Nevertheless, the number of cases with valvular lesions did not show remarkable changes during the same period. But these figures represent only a fraction of the total autopsied cases, and the data obtained cannot be considered meaningful.

Professor Otaka, a pathologist in Japan, reported that Aschoff bodies, which were formerly common in autopsies of active rheumatic fever, could hardly be detected recently, clearly suggesting diminished severity of rheumatic fever.

National Patient Surveys (Fig. 3)

The National Patient Surveys conducted on the second Wednesday of July every year offer the estimated number of in—and outpatients in Japan. The data indicate that, in 1969, 6,400 people suffered from rheumatic fever and 6,600 from rheumatic heart disease, which formed 1 per cent of all cardiac patients in this country. It must be taken into consideration that rheumatic fever is most common in winter, while the National Patient Surveys are made in July.

The prevalence of rheumatic fever and rheumatic heart disease was higher in female than male; sex ratio was 2:4 and 2:5 each. It is interesting to see that, during the past 10 years, the number of patients suffering from both diseases has gradually increased in the surveys despite downward trend in mortality, whereas number of patients with other heart diseases has gone up more markedly during the same period. There may be an actual increase in the number of patients due to decrease in mortality, but the tendency may reflect also spread of knowledge on rheumatic fever among physicians and patients in Japan.

Mass Surveys (Figs. 4 and 5)

The Committee on the Prevention of Rheumatic Heart Disease of Japan (Chairman: Prof. Shiokawa, Tokyo) first established in 1968, has played a leading role in a nationwide program of case finding of heart disease, which has been carried out among children of primary and secondary schools in Japan. For example, studies, performed by us in Tokyo Metropolis, are consisting of three phases of screening. In the primary phase, each student was examined with three procedures.

1. Answer to certain questions asked to parents of the student on the signs and symptoms of heart disease and rheumatic fever.
2. An X-ray film of the chest, detecting abnormalities of heart size and shape.
3. The results of physical examination by school physicians, particularly on heart murmurs.

Students, suspected of having heart disease by any of the screening procedures were examined in the second phase, using a phonocardiographic instrument specially devised for mass examination, which was reported by us previously. The records of electrocardiograms and phonocardiograms obtained by this instrument were examined by cardiologists, and if necessary, the patients are called to hospitals for detailed examinations in the third phase of screening.

The nationwide program estimates that in 1971 rheumatic heart disease accounted for 0·02 per cent and congenital heart disease for 0·25 per cent among 800,000 school children in Japan. There was no regional difference in the prevalence of heart disease in this country. The surveys also revealed that the decline in number of patients with rheumatic heart disease occurred over the past 10 years. For example, Takashina from Osaka reported that the prevalence of rheumatic heart disease in Osaka City diminished from 0·07 per cent in 1964 to 0·02 per cent in 1971. Nevertheless, during the same period, prevalence of congenital heart disease did not vary, as expected.

Although the accurate number of patients suffering from rheumatic fever is difficult to make among the school children, since the condition is not reportable, the Committee reported that nationwide prevalence rate of children with a history of rheumatic fever was 0·57 per cent in 1971, with slight decrease during the past 5 years.

It must be noted that the ratio of mitral insufficiency and mitral stenosis to all rheumatic heart disease was estimated at 49·0 and 34·7 per cent each in 1964, while that figure in 1971 changed to 80·6 and 2·0 per cent each. The reason for the significant increase in mitral insufficiency and decline in mitral stenosis is not known, at present, because the criteria used for diagnosis are not uniform. But diminished severity of rheumatic fever can contribute to the changing pattern of valvular heart disease.

Clinical Observations (Fig. 6)

Total number of admissions due to rheumatic fever is decreasing in Japan. In this paper clinical manifestations of patients suffering from active rheumatic fever before 1966 were compared with those between 1970 and 1971 at their first visit. All patients presented a clinical syndrome, which fulfils Jones Revised Criteria published in 1965. No notable difference was observed in sex ratio and average age between the two groups.

It was most striking that downward trend occurred in the incidence of carditis. Carditis occurred in 90·5 per cent before 1966, and declined to 60·0 per cent during 1970 and 1971. There was each one patient who had chorea and subcutaneous nodules before 1966, and none of patients showed these manifestations in 1970 and 1971.

Although the difference was not statistically significant because number of patients in the series is too small, certain trend could be detected from the data; the number of patients with carditis, and probably also with chorea and subcutaneous nodules has diminished during 5 years. The evidence is also indicative of diminished severity of rheumatic fever.

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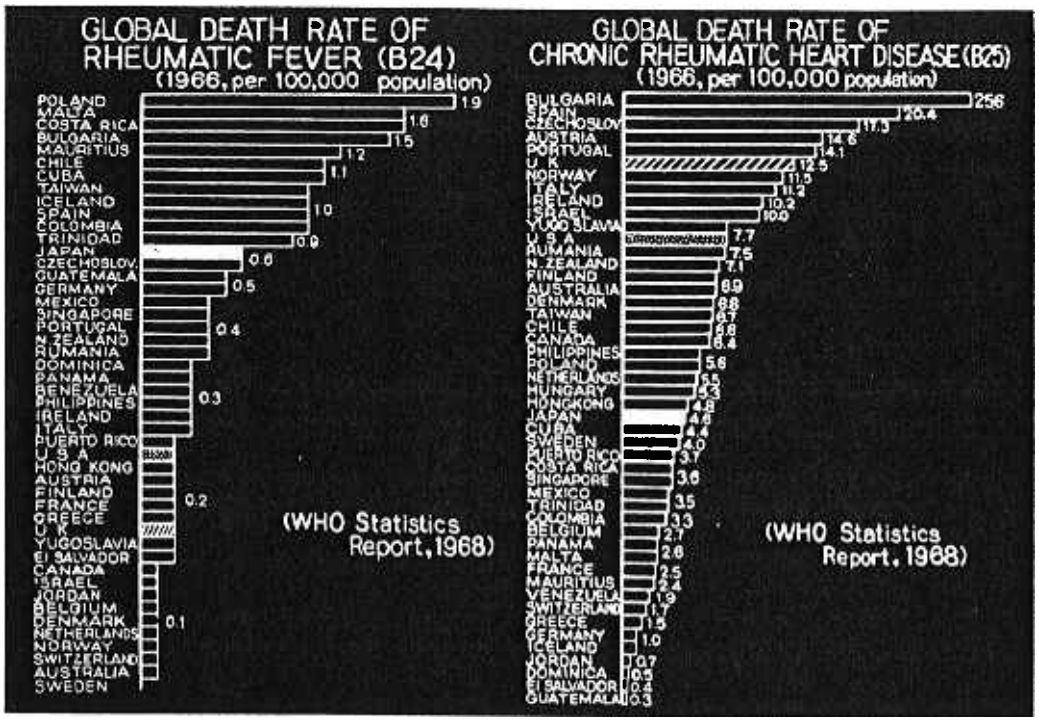

Fig. 1

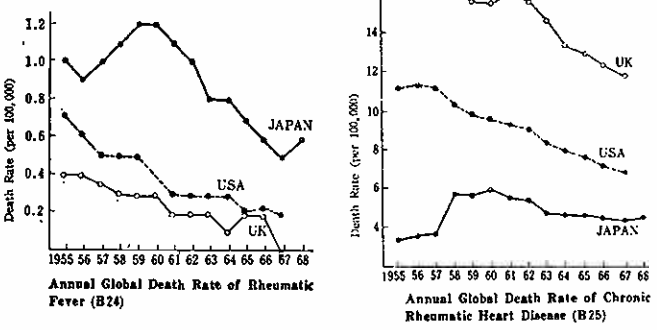

Fig. 2

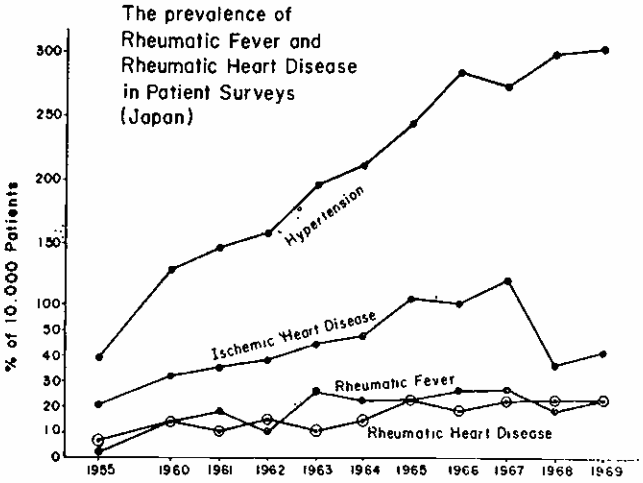

Fig. 3

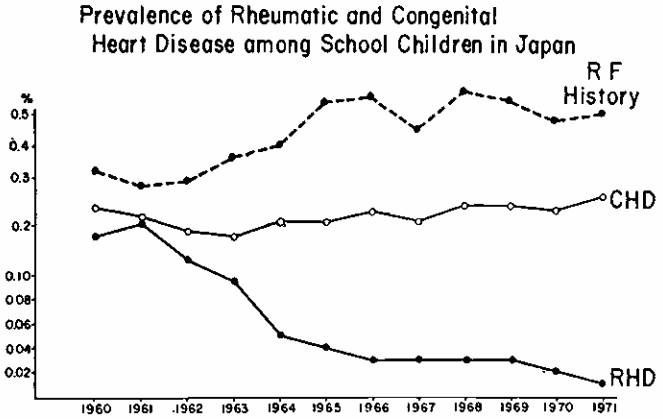

Fig. 4

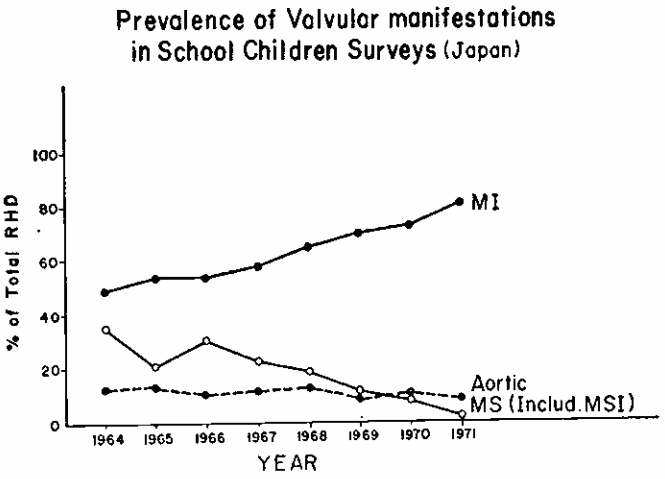

Fig. 5

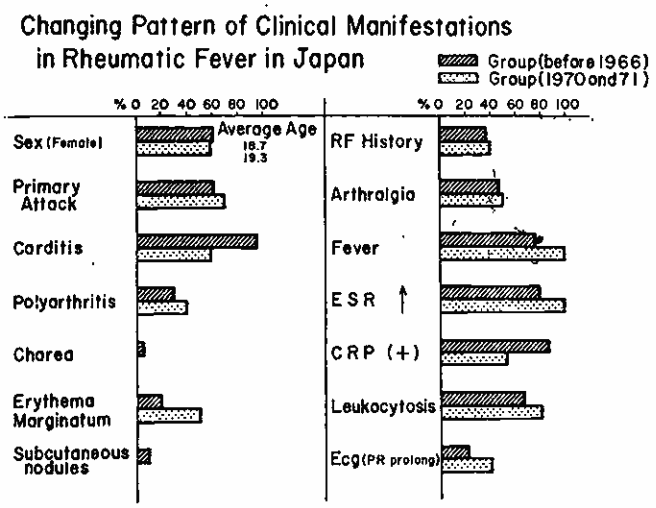

Fig. 6

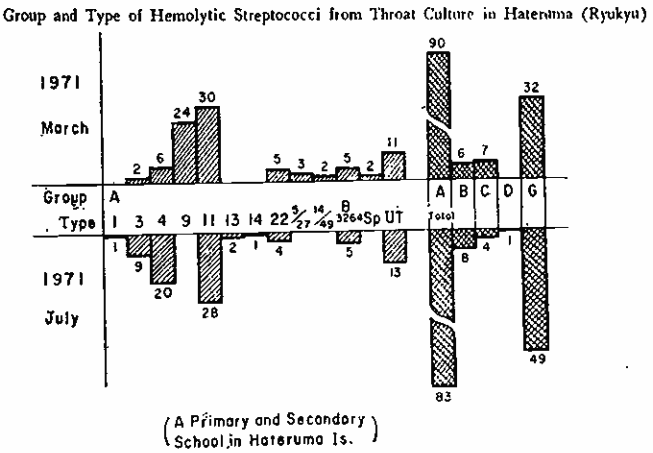

Fig. 8

TABLE I

INCIDENCE OF HEART DISEASE, RHEUMATIC FEVER HISTORY, AND HIGH ASO TITER AMONG PRIMARY AND SECONDARY SCHOOLCHILDREN

	Year	Number Examined	CHD (%)	RHD (%)	RF History (%)	High ASO* (%)
Fuchu (Tokyo)	1969	16·162	50 (0·31)	2 (0·01)	86 (0·53)	14/140 (10·0)
	1970	18·187	47 (0·25)	3 (0·01)	32 (0·18)	9/132 (6·8)
	1971	19·300	44 (0·23)	2 (0·01)	22 (0·11)	25/159 (15·7)
Hateruma (Ryukyu)	1971 July	334	2 (0·6)	0	?	10/273 (3·7)

*over 333 Todd Unit

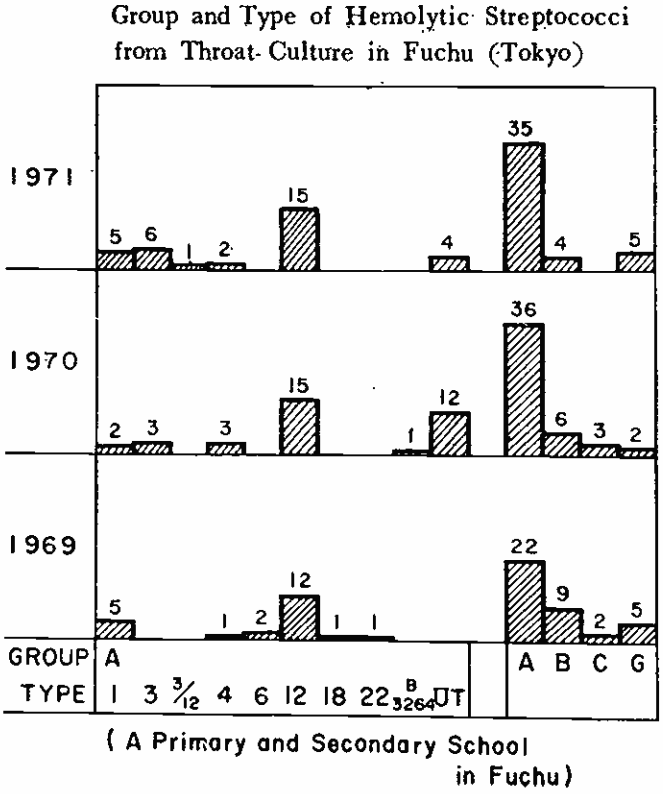

Fig. 7

TABLE II

INCIDENCE OF HEMOLYTIC STREPTOCOCCI FROM THROAT CULTURE AMONG PRIMARY AND SECONDARY SCHOOLCHILDREN

	Year	Number Examined	Group A (%)	Total Str. (%)	Dominant T-Type
Fuchu (Tokyo)	1969	145	22 (15·2)	38 (38·2)	12
	1970	188	36 (19·2)	47 (25·0)	12
	1971	176	35 (19·9)	44 (25·0)	12
Hateruma (Ryukyu)	1971 March	222	90 (40·5)	135 (60·8)	11
	1971 July	332	83 (25·0)	145 (43·7)	11

Streptococcal Infection (Figs. 7, 8 and Tables I and II)

Importance of Group A hemolytic streptococci in the etiology of rheumatic fever has been well discussed, and studies on the changing pattern of rheumatic heart disease must be based on epidemiology of streptococcal infection.

For that reason, a culture of throat for hemolytic streptococci has been carried out among children in primary and secondary schools in Fuchu City of Tokyo Metropolis. The incidence of positive culture among the children was 38·2, 25·0 and 25·0 per cent in 1969, 1970 and 1971 each. In this study 6 to 15 per cent of children had elevated ASO titers. Nakagawa using data obtained from healthy children in Tokyo, estimated that the incidence of hemolytic streptococci in the throat was 9·7 per cent in 1956 and 17·5 per cent in 1957. Despite the data were obtained from different sources, the results suggest that there is a persistant presence of hemolytic streptococci in the throat among school children in Tokyo.

Recently, similar surveys were conducted in an isolated islet Hateruma of Ryukyu Islands. Since there are no medical facilities nor pharmacies, antibiotics are hardly available for inhabitants of this island. The results showed that hemolytic streptococci was isolated in 60·8 per cent among school children in March and 43·7 per cent in July of 1971. The surveys also revealed that none of school children in Hateruma had evidence of rheumatic heart disease nor nephritis, whereas rheumatic heart disease was found in 0·01 per cent of school children at the same period in Fuchu City.

The isolated group A hemolytic streptococci was classified by the T-agglutination method by Miyamoto in Kanagawa Prefectural Public Health Laboratory. It was remarkable that T-11 was the predominant type of strains obtained in Hateruma islet in every examinations. On the other hand, in Japan, including Fuchu City, predominancy of T-12 has become apparent during 1967 and 1971, instead of predominancy of T-4 from 1964 to 1965.

The discrepancy between high incidence of positive culture of streptococci in the throat, and low prevalence of rheumatic heart disease or nephritis and high ASO titer, indicates that the micro-organisms do not infect but only parasitize on the throat in this island. Low toxicity of the organisms obtained in Hateruma in the pathogenesis of rheumatic fever may also explain the difference.

DISCUSSION AND SUMMARY

There is no doubt that during the past 10 years the number of patients with rheumatic fever and rheumatic heart disease has declined steadily in Japan, although diagnosis of the diseases is frequently indefinite and, therefore, statistical data are not entirely reliable. A number of factors may have contributed to the decline in rheumatic fever. In addition to the improvement of socioeconomic conditions, widespread use of antibiotics for streptococcal infection has undoubtly reduced the disease in this country, since antimicrobial agents are easily available all over Japan.

Moreover, the severity of rheumatic fever has diminished. Evidence that the disease has become to affect the heart less frequently than before can contribute to the decline of morbidity and mortality in rheumatic heart disease, although continuous antimicrobial prophylaxis is not carried out strictly in this country.

Despite this encouraging picture, it must be emphasized that rheumatic fever has far from disappeared. Possibility of epidemic streptococcal outbreaks remains, because there is spread of hemolytic streptococci in the throat among school children. The evidence that scarlet fever, also a form streptococcal infection, which is reportable in Japan, reoccurs annually with various prevalence by year, also supports the possibility. Any fundamental change in the toxicity of the organism could occur suddenly. Both rheumatic fever and rheumatic heart disease continues to constitute a serious public health problem today in Japan as well as in the world.