Rheumatic Fever in Children—A Statistical Report in Japan

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A statistical observation was made over 184 cases of rheumatic fever in children at the Pediatric Clinic of Tokyo University Hospital. The number of patients with rheumatic fever has been increased recently in Japan. The disease occurs most often in spring and autumn, and the first attack is most commonly encountered between the age of 5 and 12 years. Nineteen per cent of the patients with rheumatic carditis had insidious onset. This type of carditis has a clinical importance because of its high incidence of residual cardiac damage.

RHEUMATIC fever is one of the most important diseases in children because of its serious complication, i.e. carditis. The number of the patients with rheumatic fever has been reported to be decreasing in the United States and Europe in recent years, but contrarily in Japan its incidence has been increasing. In order to make a statistical analysis of this disease the present study was undertaken.

MATERIALS AND METHODS

One hundred and eighty four cases of rheumatic fever were observed from Jan. 1949 to Dec. 1957 at the Pediatric Clinic of Tokyo University Hospital. All cases had diagnostic criteria of rheumatic fever by Jones.

RESULTS

Incidence—

The number of cases, which were observed at the Pediatric Clinic of Tokyo University Hospital, appeared to be increasing year after year since 1949. The ratio between rheumatic cases and the total number of patients admitted to the hospital has also been increased (Fig. 1).

Seasonal Incidence :

The monthly incidence of rheumatic patients was as in Fig. 2. Greater number of rheumatic cases were observed in October, November, December and March, April and May, and the prevalence in autumn and spring was shown.

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Fig. 1. Annual incidence of rheumatic fever.

Fig. 2. Seasonal incidence of rheumatic fever.

Ages at Onset and Sexual Incidence :

The first attack commonly occurred between the age of 5 and 12, with the peak at 7 years of age. The second attack was between 9 and 11 years of age (Fig. 3). A total of 101 cases was male (54.9%) and 83 cases female (45.1%).

Fig. 3. Age at the onset and sexual incidence of rheumatic fever.

*Symptoms—**Incidence of each major manifestation :*

The incidence of each major manifestation is seen in Table I. Carditis was found in 99 cases (54.7%), and polyarthrititis was encountered in 125 cases (82.7%).

Carditis :

Of all 99 cases with rheumatic carditis, 7 cases were accompanied by pericarditis, and 33 cases (33%) by congestive failure. In 19 cases, carditis occurred insidiously, without any acute manifestations such as high fever and/or polyarthrititis. In these cases, however, some abnormal laboratory findings,

Table I. Incidence of Rheumatic Manifestations

Major manifestation			
Carditis	54.7%	Subcutaneous nodules	8.9%
Polyarthrititis	82.3%	Erythema marginatum	7.7%
Chorea minor	10.3%		
Minor manifestations and other symptoms			
Fever	84.9%		{69.1% 15.8%
{high degree			
{low grade			
Elevated ASL-O value	70.3%	Abdominal pain	15.0%
Positive culture of strept. hem.	25.8%	Changes in ECG	59.8%
Increased ESR	90.9%	History of rheumatic fever	25.0%
Epistaxis	15.5%		

such as increased erythrocyte sedimentation rate, elevated ASL-O value and slight degree of arthralgia etc., were present. In such cases, the occurrence of carditis was often overlooked for a long time, and the delayed administration of steroid hormone often resulted in a residual valvular disease. The results of laboratory examinations in such a case were shown in Table II. High clinical significance was considered in these cases because of a greater incidence of residual cardiac damage.

Table II. Laboratory Findings in Rheumatic Carditis with Insidious Onset

	Positive cases	Total cases	per cent
Increased ESR	13	13	100
Elevated ASL-O	4	5	80
Changes in ECG	5	7	71
Slight arthralgia	9	16	56
Epistaxis	5	14	36
Low grade fever	2	19	10

Polyarthrititis:

The incidence of arthritis in each joint is seen in Table III. Most frequently the knee joint was involved, and the arthralgia was often migratory type. Swelling of the affected joint was found in 44.3% of all the cases with polyarthrititis.

Table III. Incidence of Arthritis in Each Joint (73 cases)

Neck	5.5%	Finger	5.5%
Shoulder	8.2%	Hip	16.4%
Elbow	23.3%	Knee	60.3%
Wrist	33.0%	Ankle	52.0%

Chorea:

Only in the cases with chorea, the diagnostic criteria of Jones was fulfilled. The occurrence of other rheumatic manifestations in chorea is presented in Table IV, such as carditis, polyarthrititis and fever. In general, they

occurred less frequently in comparison to those in rheumatic fever.

Table IV. Incidence of Rheumatic Symptoms Accompanied by Chorea (19 cases)

Carditis	42.1%	Fever	72.2%
Nodules	5.6%	Increased ESR	43.8%
Polyarthrititis	61.1%		

Incidence of each minor manifestation:

As shown in Table I, increased erythrocyte sedimentation rate and fever were most commonly observed.

Fever:

The remittent type of fever was most prevalent and 53.6% of cases had temperature over 39°C (Table V). Though the duration of fever was variable, almost all cases showed abrupt fall of high temperature to the normal level in a few days after the start of the hormone therapy.

Table V. Duration and Degree of Fever in Rheumatic Fever (84 cases)

Degree of fever	No. of cases	per cent	Duration	
below 37.5°C	12	14.3		
37.5°~37.9°C	4	4.8	within 2 weeks	2
			2~6 weeks	0
			more than 6 weeks	2
38°~38.9°C	23	27.4	within 2 weeks	18
			2~6 weeks	5
			more than 6 weeks	0
over 39°C	45	53.6	within 2 weeks	30
			2~6 weeks	12
			more than 6 weeks	3

ASL-O level:

In a total of 184 cases studied, 70.3% showed an elevation of ASL-O level.

Erythrocyte sedimentation rate:

The majority of the cases showed an elevated erythrocyte sedimentation rate more than 60 mm. per hour, and 22% of the cases over 100 mm. Fifteen cases, in which erythrocyte sedimentation rate was not increased, consisted of 7 cases of chorea minor and 7 with congestive failure.

White blood cell count:

The majority (58.3%) of the cases showed leucocytosis more than 10,000/mm³. The correlation between the leucocyte count and the shift to the left is as in Table VI.

Red blood cell count:

Table VI. White Blood Cell Count and Shift to the Left in Rheumatic Fever (108 cases)

		White blood cell count						Total	%
		~ 6,000	6,001 ~8,000	8,001 ~10,000	10,001 ~12,000	12,001 ~15,000	15,000 ~		
% of band cell	0~9	5	11	15	14	13	7	65	60.2
	10~15	1	5	2	4	2	5	19	17.6
	16~20	1	2	2	2	3	1	11	10.2
	21~	0	1	0	3	2	7	13	12.0
Total		7	19	19	23	20	20	108	
%		6.5	17.6	17.6	21.3	18.5	18.5		100.0

While the appearance of rheumatic patient is pale, only 17.3% of all cases showed the true anemia under 3.5 millions per mm.³ The cases which showed the anemia under 2 millions per mm.³ had episodes of severe epistaxis.

Prognosis—

Only the cases with more than a year follow up and those without prophylactic measure of rheumatic fever were subjected to the present study. Since most of these patients were studied before 1955, they had not received sufficient hormone therapy. These cases were divided into two groups according to the presence or absence of carditis. Among a total of 83 cases studied, there were 62 cases with carditis and 21 without carditis. A total mortality rate was 16.9% (14 cases), and the mortality rate of the group without carditis was zero. Overall recurrence rate was 55.3% (43 cases), and each recurrence rate was 58.9% in the cases with carditis and 47.6% in the group without carditis at the initial attack, and this difference between both groups was not statistically significant.

DISCUSSION

It has been known that rheumatic fever was the most important cause of the valvular disease of the heart, and the majority of acquired valvular heart disease in childhood was due to rheumatic in origin. It is said that in the United States and Europe rheumatic fever has been decreasing in number recently, however, the result of the present study indicated the increasing incidence of rheumatic fever in Japan.

Since the introduction of steroid hormone in the treatment of rheumatic fever, rheumatic carditis has become curable. Needless to say, the early diagnosis and the early treatment with hormone are essential for a successful treatment of rheumatic fever and this leaves no residual cardiac damages. Therefore, the recognition of signs of rheumatic fever is necessary for the early diagnosis of rheumatic fever, and it is not difficult to make a diagnosis of rheumatic fever when it is fullblown cases.

On the other hand, the insidious onset of rheumatic carditis has a great

clinical importance, since such a carditis is apt to be overlooked at the onset of the disease with vague symptoms. This causes the delay in the introduction of hormone therapy, and the residual cardiac damage is often persistent. In such a case, however, abnormal laboratory findings such as ASL-O and erythrocyte sedimentation rate will be of great value in suspecting rheumatic carditis.

Then, it is concluded that when rheumatic carditis is suspected a prompt and a massive hormone therapy should be considered in diminishing the degree of the residual cardiac damage or even in bringing a permanent cure. The emphasis should be given to an early diagnosis and early treatment of such an insidious type of rheumatic carditis, and it is one of the important problems in the field of pediatric medicine.

As for the prognosis of rheumatic fever, there were reports by Bland and Jones,¹⁾ McCue,²⁾ Wilson³⁾ and Ash.⁴⁾ Their studies have been done before the so-called steroid era, and the course of rheumatic fever in their cases was considered as natural and unmodified by the hormone therapy. Bland and Jones reported the results of their observation of 1,000 rheumatic cases over 20 years period. According to their reports, one fifth of the cases were dead within 10 years after the initial attack, and 30% of the cases were dead within 20 years, and one third of total death occurred in the first five years. The rate of recurrence of rheumatic fever is about one fifth in the first 5 years, one tenth in the subsequent 5 years, and one fifteenth in following each 5 years. Wilson reported that the total mortality rate of rheumatic patients was 147 per one thousand. McCue observed one recurrence or more in 61% of their 504 cases of rheumatic fever, and cardiac involvement in 83% and death in 7.1%. The results of the present study are in accordance with these reports.

Although the majority of cases in this study was observed between 1949 and 1957, the prognosis and the recurrence rate were studied mainly in cases of between 1949 and 1955. Before 1955, therapy with massive doses of steroid hormone and the prophylaxis of recurrence of rheumatic fever were not prevailed in Japan. Therefore, the authors' results are considered to show a natural course of rheumatic fever in Japan.

SUMMARY

During the year of 1949 till 1957, a total of 199 attacks in 184 cases of rheumatic fever in children were observed at the Pediatric Clinic of Tokyo University Hospital. It appeared that recent increase of rheumatic patients was observed in Japan. According to the statistical analysis of the disease, it occurred particularly in March, April and October, November and December. The first attack was most common between the age of 5 and 12, and 80% of the total cases were fallen in this age group.

Carditis was observed in 54.7%, and polyarthritis in 82.3% of the total cases. As to the minor manifestations, high fever was found in 69.1% and increased erythrocyte sedimentation rate in 90.9%. Among the cases of rheumatic

carditis, 19% of the cases showed an insidious or latent onset. Even in such cases, elevated antistreptolysin-O titer and increased erythrocyte sedimentation rate were found. Such a form of carditis was considered to have a great clinical significance because of its high incidence of residual cardiac damage.

A total of 83 cases of rheumatic fever was observed for more than 1 year without prophylactic measures for the recurrence of rheumatic fever. Among these, 14 cases (16.9%) died in the observation period. All these cases had carditis at their first attack. Recurrence rate during observation period was 22.6%, and one half of the recurrences occurred within the first year after the initial attack.

Importance of an early diagnosis of the disease and a prompt therapy was emphasized.

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