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**Autor:** Gharagozloo, R.A. / Daneshpajoo, M. / Ghavamian, P.  
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## Rheumatic Fever and Rheumatic Heart Disease among 56 800 Inhabitants in Southeast Teheran from 1972–1974<sup>1</sup>

GHARAGOZLOO, R. A. <sup>2</sup>, DANESHPAJOOH, M. <sup>3</sup> and GHAVAMIAN, P. <sup>2</sup>

### *Abstract*

A study of the incidence of R. fever in an area in southeast Teheran during the period 1972–1974 revealed 92 cases. The crude annual incidence of R. fever ranged from a high of 58 cases to a low of 51 cases per 100,000 population. The age and sex specific rates revealed the incidence to be strikingly higher in the 5–19 year age group, reaching roughly 80/100,000. There was an approximately similar number of males and females with R. fever. Among the R. fever patients, there were 6 cases of chorea, 5 girls and 1 boy. From 92 R. fever cases, 49 (53%) developed carditis. Among these patients, 35 (71%) were female in contrast to 14 (29%) male cases. Overall there were 59 cases (62%) which were initial attacks and 33 cases (38%) which were recurrences. During the trial there were also 7 recurrences of R fever and 4 deaths. The seasonal pattern showed that the majority of cases occurred during the winter and spring months. From the R. fever/R. H. D. patients, 63 (70%) and from cases with carditis alone, 24 (40%) were hospitalized.

### **Introduction**

Rheumatic fever and its sequelae may be assumed to be a problem in Iran if one studies the R. fever admission rates at the Government and other free hospitals, where the low socioeconomic population are hospitalized (1, 2, 3, 4, 5, 6). On the other hand, a different view of these diseases may be obtained by reviewing the figures from private and more expensive hospitals which serve the high socioeconomic group. Even among this group, the high hospital expenses will discourage the R. fever and R. H. D. patients to be treated at the hospitals. Therefore the hospital data, apart from inherent fault of not representing a definite population, have this extra disadvantages in Iran. In order to obtain more realistic idea such studies should be carried out among the general but defined population group. On this basis a study was organized in a district in southeast of Teheran among 56,800 workers and their families. The purpose was to detect and follow up known cases of R. fever and R.H.D., to determine the

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<sup>1</sup> Rheumatic fever hereafter referred to as R. fever and rheumatic heart disease as R. H. D.

<sup>2</sup> Department of Pathobiology, School of Public Health and Institute of Public Health Research.

<sup>3</sup> Cardiovascular Department, National University

incidence of these diseases and to evaluate a more practical prophylaxis method at a community level and to become familiar with local difficulties when tackling control programmes of this nature.

## **Materials and Methods**

Teheran is a city with an estimated population of 4,240,000. The climate is subtropical and the altitude is 1191 meter above sea level. The normal average temperature is 24 °C with a January minimum of 10 °C and July maximum of 41 °C. Normal annual rain fall is about 24 mm. Approximately 1,850,000 individuals are registered for their medical care under Social Insurance Organization. This study concerns 15,352 workers and their families in a district in southeast Teheran with an estimated total population of 56,800 on the basis of 3.7 per family for a period of three years i.e. 1972–1974. The patients in this area refer to a day clinic for their ailments and those with or suspected of R. fever and R.H.D. were referred to the project group at the Khazaneh general hospital. Here in order to confirm the present or past diagnosis of R. fever and R.H.D., a chest X-ray and ECG of these patients were taken and carefully assessed by our cardiologist. Further laboratory investigations including WBC, ESR, CRP, ADNaseB, ASOT, cultures of throat, nose and skin lesion if present were performed for each patient by the Section of Streptococcal Studies at the School of Public Health, University of Teheran (7, 8, 9). The patients were then classified as non rheumatic, doubtful or definite R. fever or/and R.H.D. Definite cases were those who fulfilled the Jones criteria. Doubtful were those who did not fulfill the Jones criteria, but had some symptoms. They usually had three minor criteria. None of the patients had skin infections, but 64% of the patients were reported to have soar throat by history. Throat cultures were positive only in three of our patients yielding group A hemolytic streptococci. There was no case of glomerulonephritis among these patients. The 1st group were excluded from the project but 2nd and 3rd groups were included in the project and were placed on monthly injections of 1.2 million units of benzathin penicillin. All patients were examined again within a month and the tests were repeated. Among the probable cases of R. fever, if the diagnosis could not still be confirmed the patients were followed for another six months. The patients who failed to report for their monthly injections were visited by our Public Health nurse to ensure the patients fidelity to the prophylactic regiments. On the whole the methods proposed by the World Health Organization for a joint cooperative protocol for the control of R. fever were followed as closely as possible throughout this study (10).

## **Results**

A total of 390 patients were referred to us during the 3 year study for verification of the accuracy of diagnosis. 92 patients among these suffered from R. fever or R. fever plus R. H. D. 56 patients had only R. H. D. and the other 242 cases were erroneously diagnosed and were non rheumatics. They were therefore not included in the project

Table 1. Yearly incidence of R. fever among 56,802 inhabitants. Teheran 1972-74

Year	Cases found by study			Cases/100,000 inhabitants
	First attacks	Recurrences	Total	
1971	22	11	33	58·/....
1972	18	12	30	52.8·/....
1973	19	10	29	51·/....

Table 2. Cases of R. fever and R.H.D. by sex and age. Teheran 1972-74

Age (years)	R. fever			R. fever and R.H.D.			R.H.D.		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4	0	0	0	0	0	0	0	0	0
5-9	4	7	11	2	7	9	5	2	7
10-14	6	9	15	4	11	15	4	4	8
15-19	6	0	6	3	5	8	2	6	8
20-24	0	2	2	4	8	12	3	2	5
25-29	2	1	3	0	1	1	1	7	8
30-34	1	2	3	0	0	0	3	5	8
> 35	2	1	3	1	3	4	2	10	12
Total	21	22	43	14	35	49	20	36	56

and were sent to other departments. Here is an indication of the danger of over diagnosis, particularly in circumstances similar to our's, where at the day clinic approximately 1,000 patients were seen by a team of 10-12 physicians during a period of 6 hours. All our cases of R. fever patients met the modified Jones diagnostic criteria as stated in a report of a WHO expert committee (11). Table 1 presents the number of cases by year with the corresponding annual incidence rates. The crude incidence rate per 100,000 population varied from a high of 58 in 1972 to a low of 51 in 1974. There were 92 R. fever patients, 59 with first attack. Among these there were 6 cases of chorea, 5 female and 1 male.

The distribution of cases by age and sex is given in table 2. The pattern of cases by age with a predominance of cases among school age youth is familiar. The incidence of R. fever for the population at risk i.e. 5-19 years of age can be estimated to be roughly 80/100,000. This is on the basis of a report indicating that this age group comprises 43 percent of the total urban population in Iran (12). There were similar number of male and female with R. fever, but carditis was seen

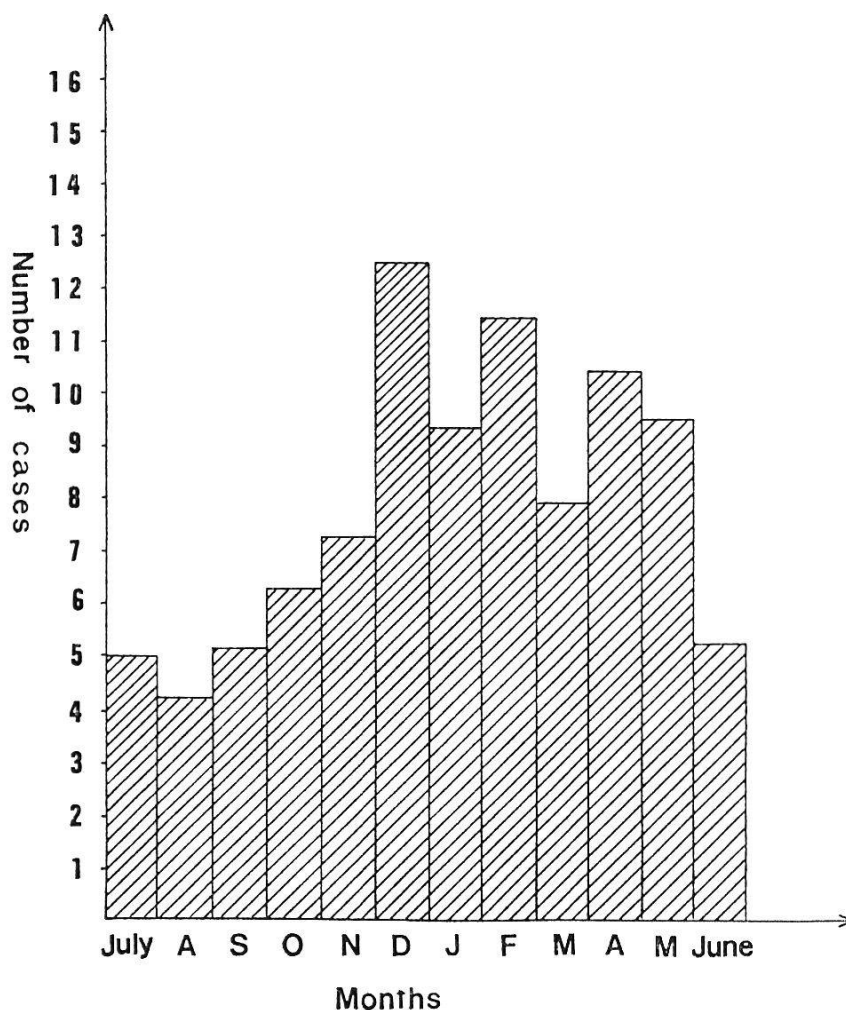


Fig. 1. Distribution of cases of R. fever by month of occurrence. Teheran 1972–74.

twice as frequently in female than in male. The ratio of female to male with regard to R. H. D. alone was almost 2.5:1. Similar results have been noted in other parts of the world (13, 14).

Figure 1 shows the distribution of cases by month of occurrence revealing that highest seasonal incidence was during the winter and spring months. It also paralleled the highest seasonal incidence of streptococcal pharyngitis in Teheran (15).

Table 3 shows that 63 (70%) of 92 R. fever/R. H. D. cases and 24 (41%) of 56 R. H. D. patients were hospitalized. The number of bed nights due to these patients was 4,244 out of a possible total of 88,695. This represented a continuous occupancy of 4.7 beds throughout the year by patients suffering from R. fever or/and R. H. D.

Table 4 shows the number of recurrences during the trial. The result of this table could possibly be taken as a presumptive evidence that recurrences were due to the failure to adhere to prophylaxis regimen, since all of them had missed some of their penicillin injection.

Table 3. Length of stay and number of hospitalization of 148 R. fever and/or R.H.D. patients. Teheran 1972-74

Disease	No. of patients	No. of hospitalized patients	No. of hospitalizations	More than one hospitalization	Average length of stay per patient	Average length of stay per hospitalization	Total No. of days
R. fever + R.H.D.	92	63	90	17	43.9	30.07	2,770
R.H.D.	56	24	49	10	60.5	29.5	1,452

It should of course be substantiated by further observation. From the 7 cases who had recurrences 6 were female and only two of the patients were over 13 years of age. Five of the seven cases had their 1st recurrent attack after 12 months and in one case, it was after 24 months.

During the end of the three years of study 1,557 injections were administered out of the possible total of 1,800. This represents 86.5

Table 4. Some observations on 7 patients who had recurrence during the trial. Teheran 1972-74

Patient	Age	Sex	Carditis	No. of attacks	Time of recurrences after registering in months	Regularity of prophylaxis
1	7	M	+	2	8	not regular
2	8	F	+	2	18	not regular
3	10	F	-	2	15	not regular
4	12	F	+	> 2	16	not regular
5	13	F	+	> 2	22	not regular
6	22	F	+	> 2	4	not regular
7	38	F	+	> 2	24	not regular

Table 5. Degree of compliance of 148 patients during a three-year-study. Teheran

Theoretical No. of injection	Actual No. of injections	Per cent of compliance
1,880	1,557	86.5



percent adherence to the therapy by the 148 patients, who continued to be in the programme. The degree of compliance was not related to age or sex.

### **Discussion**

The crude incidence rate of R. fever per 100,000 population as shown in our results varied from a high of 58 in 1972 to a low of 51 in 1974. According to physicians working at the day clinic of Social Insurance Organization we missed possibly as many as 30–50 percent of our would be patients who did not refer to this clinic, because of overcrowdedness and sought medication elsewhere. In view of this fact and also considering the subclinical cases who never came under the medical care, we believe our figures represent a minimal estimates of the incidence of R. fever. Even so, these figures are still 5 to 6 times higher than rates reported in some of the European countries and in the USA (14, 15, 16, 17, 18). At the 81 bed pediatric ward there was a continuous occupancy of 4.7 beds throughout the year by patients suffering from R. fever and R. H. D. Considering also other reports that between 30–60 percent of all cardiac problems are of rheumatic origin in Iran we believe that R. fever and R. H. D. are a public health problem in this country and their control deserves a better priority (1, 3). Such programmes should depend heavily on efficient control of beta hemolytic streptococcal infection both in terms of primary and secondary prevention. There should be available to the public an inexpensive and efficient throat culture programme particularly among the school children. The public health authorities should bear in mind the long hospital stays as is shown in table 3 and also the high cost of operation for R. H. D. patients. Such expenses may equal preventive cost of treating several hundreds of streptococcal infection, leaving alone the economic and personal implication that these patients may have in our society. Although the degree of compliance according to our results was 86.5%, we should realize that, such success was obtained through the activity of our Public Health nurse by constantly reminding those who failed to report for their monthly injections. It is our impression, therefore, that with regards to the secondary prophylaxis there should be an organized programme and hospitals should have a rigid follow up of patients otherwise they themselves will not continue the prophylaxis. Lack of education and the difficulties of leaving the household to travel long distances for the penicillin injection were probably the two most important factors related to non compliance. The programme would be more successful if the injections could be given to the patients at their homes.

The most important feature of this study is that we found only a small effort with regards to man power and expenses were required to give the already existing medical groups at the hospital a form of organized control programme. The greatest obstacle to long term follow up is its discontinuity. Programmes of this nature and under similar circumstances will usually stop to function as soon as the investigation ends. In our opinion with the engagement of a full time nurse and a part time driver who together will entail \$ 8,000–9,000 per year, such control programmes could be created in any large size hospital. The prevention of a single case of cardiac surgery will compensate all such expenses.

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