Epidemiology of Leprosy in Iran [1,2]

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As old as leprosy is, the available information about leprosy in general, and especially in Iran, is very scanty and limited. Although it has been said that leprosy was brought back to Iran by troops of Darius and Xerxes from Egypt ([8]), the earliest documented information available mentions the presence of some villages in the northwest (Azerbaidjan), and northeast (Mash-had) of Iran with few leprosy cases, and comments that "leprosy is not prevalent in Iran" ([6]). However, Bechelli and Dominguez ([3]) give the estimated rate of 0.54/1000 for Iran. The number of new cases for the whole country in 1972 was recorded as 305 by WHO ([14]), which gives an incidence rate of about 1/100,000. Kohout et al ([8]), while mentioning that the total number of leprosy cases in Iran might be estimated to be as high as 12,000; accounts for 5,301 cases of leprosy from various parts of Iran of which they considered 405 as new cases for one year. On the other hand, Mobien ([11]), while reporting the data on 7,929 cases accumulated over the 16 years prior to 1974, gave the average prevalence rate for the whole country as 0.25/1000. The maximum prevalence rate, according to Mobien, is seen in East Azerbaidjan and the minimum in Isphahan, these being 0.86/1000 and 0.0003/1000, respectively. An intensive mass survey of 103,146 individuals in Ahar, the alleged heartland of the endemic area in East Azerbaidjan, provided a prevalence rate of 2.03/1000 for that region.

The aim of the present study is not to account for cases, but rather to describe the important epidemiologic characteristics of leprosy in Iran.

MATERIALS AND METHODS

Data for this study were collected from the following sources:

Baba-Baghi. This is a very old leprosarium in East Azerbaidjan which has been functioning for about 80 years. Unfortunately, many of the files, especially the old ones, are so incomplete as to be almost useless. Altogether 709 of the most recent files, which covered a span of ten years, were considered suitable for this study and were included.

Ahar. In this city in East Azerbaidjan, which is thought to be the heartland of the endemic area for leprosy in Iran, the available information on 198 cases found in an active case finding survey were collected from monthly screening reports prepared by unskilled paramedical workers.

RESULTS

The geographic distribution of cases in Iran from two available reports is shown in Table 1. These reports were published three years apart. Regardless of some minor discrepancies, a general agreement on frequencies of cases in various parts of the country is evident. The only major discrepancy is Khoramabad in which a new focus has been discovered since 1973. The average age of the patients in Baba-Baghi is 34.8 years, while that of Ahar is 37.4 years. This difference is statistically significant at $p < .05$. The analysis of data on two major age groups below 35 years versus 35 and over shows that the female population with lepromatous leprosy at Baba-Baghi is significantly younger ($p < 0.005$) whereas such difference is seen neither among the male population with lepromatous leprosy nor among the tuberculoid cases. Data from the Ahar survey do not show any significant age difference in the lepromatous or tuberculoid cases of either sex (Table 2). About 70% of all cases are male (69.2% from Ahar, 69.8% from Baba-Baghi), but the overall distribution of various types of disease is not similar in the two sexes. Table 3 shows the distribution of different types of disease in Ahar and Baba-Baghi. The proportion of lepromatous leprosy is significantly higher in Baba-Baghi ($p < 0.005$).

An estimate of the prevalence trend of leprosy at various ages, by five year intervals, is

TABLE 1. *Distribution of population and cases of leprosy in Iran (Kohout et al, 1973; and Mobien, 1976).*

Locality	Kohout	Population, 1966 Census	Mobien
Azerbaidjan East	1,802	2,897,094	2,514
Guilan	979	1,974,820	1,292
Azerbaidjan West	674	1,133,488	916
Khorassan	460	2,807,336	653
Kurdestan	435	531,719	512
Kermanshah	229	1,069,124	390
Zanjan	—	2,712,944	376
Teheran	177	5,571,668[a]	309
Mazandaran	151	204,747	251
Fars	146	1,658,392	195
Khoramabad	16	774,903	103
Khuzestan	144	2,003,053	99
Baluchistan	60	702,604	85
Hamadan	—	100,196	74
Boushehr	—	301,459	64
Bandar-Abbas	—	372,484	53
Kerman	23	859,536	16
Isphahan	5	1,602,990	6
Ilam	—	191,763	2
Shahrkord	—	336,590	1
Yazd	—	315,693	1
Semnan	—	233,987	16
Total	5,301[b]		7,929

[a] Central province including Teheran with 4,000,000 population.
[b] The total in the original paper is 5,302.

TABLE 2. *Comparison of sex and age distribution of lepromatous and tuberculoid leprosy from Ahar and Baba-Baghi, 1976.[a]*

Type of disease	Lepromatous leprosy		Tuberculoid leprosy	
Sex	M	F	M	F
Age				
Less than 35	119 (33)	76[b] (16)	71 (16)	37 (3)
35 and over	111 (38)	32 (14)	73 (15)	33 (5)
Total	230 (71)	108 (30)	144 (31)	70 (8)

[a] Numbers in parentheses denote data from the Ahar study.
[b] $X^2 = 10.45$, $p < 0.005$.

presented in Figure 1. This figure suggests that the risk of developing clinically evident leprosy increases with age to a maximum at 25–30 years and remains constant thereafter.

About half of the cases in Baba-Baghi were diagnosed when they had at least four signs of the disease. The most prevalent signs are shown in Table 4. The average aggregation of cases in the family is 1.48. The average family size having leprosy in the family is 4.9 persons. There is no significant difference in either of the averages with respect to the type of the disease.

In 47.7% of all cases the occupation was recorded as "farmer" followed by 29.8% as "housewife." The most usual treatment has been the administration of diaminodiphenyl sulfone (dapsone, DDS) and all discharged patients were labeled as "under surveillance." Only two deaths were registered among lepromatous cases in Baba-Baghi.

DISCUSSION

In any retrospective study of records, the researcher is at the mercy of the available information and the accuracy of the reports. The results are, therefore, always open to

criticism as to validity, comparability, and the influence of newer technics of diagnosis. This study is no exception. However, we think that the files for a serious disease such as leprosy might be more complete and reliable than those for other illnesses. Data from

Ahar is based on the preliminary results of an active case-finding study and it is hoped that final data can be published soon. It should also be remembered that the patients were classified primarily by clinical symptoms rather than by immunopathologic meth-
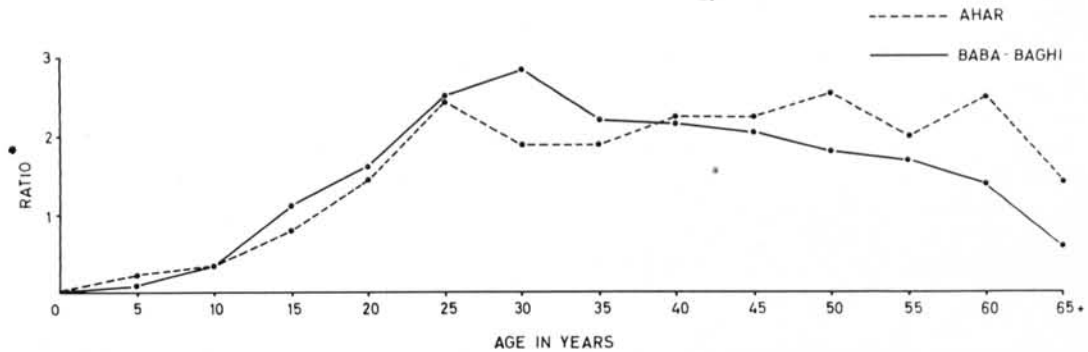
• RATIO OF THE PROPORTION OF CASES OVER THE PROPORTION OF THE POPULATION IN EACH AGE GROUP

FIG. 1. Estimated trend of leprosy prevalence by the source of information, Iran 1976.

TABLE 3. *Number and percentage of different types of leprosy by the source of information.*

Type of disease	LL[a] No.	LL[a] %	BL No.	BL %	TL[b] No.	TL[b] %	IL No.	IL %	U No.	U %	Total No.	Total %
Ahar	116	58.6	3	1.5	40	20.2	16	8.1	23	11.6	198	100
Baba-Baghi	339	47.8	11	1.5	216	30.5	58	8.1	85	12.0	·709	100
Total	455	50.2	14	1.5	256	28.2	74	8.2	108	12.0	907	100

[a] $X^2 = 7.2$, $p < 0.01$.
[b] $X^2 = 8.7$, $p < 0.005$.
LL=lepromatous, BL=borderline, TL=tuberculoid, IL=indeterminate, U=unknown cases.

TABLE 4. *Prevalence of various symptoms of leprosy by the type of disease.*

Symptoms	Type of Leprosy LL No.	LL %	BL No.	BL %	TL No.	TL %	IL No.	IL %
Loss of eyebrow	390	92.4	9	75.0	108	56.7	31	51.7
Leproma	309	73.2	4	33.3	12	5.2	7	11.7
Anesthesia	240	56.9	8	66.7	200	86.6	53	88.3
Hand deformity	179	42.4	4	33.3	190	82.2	57	95.0
Paralysis	158	37.4	4	33.3	173	74.9	56	93.3
Eye involvement	124	29.4	4	33.3	156	67.5	54	90.0
Infiltration	106	25.1	4	33.3	7	3.0	—	—
Macule	68	16.1	7	58.3	94	44.1	26	43.3
Mutilation	38	9.0	—	—	106	45.9	29·	48.3
Nodule	16	3.8	1	8.3	4	1.7	1	1.7
Total no. cases	422	—	12	—	231	—	60	—

LL=lepromatous, BL=borderline, TL=tuberculoid, IL=indeterminate.

ods; thus, the data on polar forms of the disease may be more reliable than those of borderline leprosy (BL) or indeterminate leprosy (IL), even though 5.2% of tuberculoid cases were registered as having lepromas which are clearly a sign of lepromatous leprosy.

Admittedly, when more than 50% of patients show the minimum of four distinct signs at their first consultation, then the calculation of age specific incidence rate has no relevance. However, an estimate of prevalence rate is given in Figure 1. The curves in this figure are the ratio of the proportion of cases in each age group to the proportion of the population in the same age group as given by the census of 1966. The curve for the Ahar case finding study gives a general trend for the prevalence of disease which rises from 0 in the 0-4 year age group to a maximum in the 25-29 year age group and remains constant thereafter with minor fluctuations.

The curve for Baba-Baghi, however, peaks in the 30-34 year age group and exhibits a downward trend afterwards. It is believed that the Ahar curve is a true reflection of the trend of the disease, whereas the Baba-Baghi curve is a reflection of hospital referrals, which might have been influenced by various factors. The average age of all cases of leprosy in Baba-Baghi is about 2.5 years less than that of Ahar, and this difference is statistically significant at $p < 0.01$. This finding is in contrast to that of Hertroijs[7] who showed that, at least in Tanzania, the hospital attenders were older than the defaulters or irregular attenders. This apparent discrepancy in the age distribution of patients from Ahar as compared with those at Baba-Baghi might be due to the accuracy of the data on age from Baba-Baghi which was usually taken from the birth certificate, whereas the ages of cases from Ahar are more or less presumptive.

Although about 70% of all cases are male, the sex distribution of different types of disease does not show any significant difference and this is in accordance with Bechelli *et al* [4] who note that there is no sex difference in susceptibility to leprosy. The age distribution of different types of leprosy by sex does not show any difference except for female lepromatous leprosy patients from Baba-Baghi who were significantly younger (Table 2). Data from Ahar does not show such dif-ference, thus the reason may lie in their referral to the hospital. Considering that the loss of eyebrows is the most prevalent sign of lepromatous leprosy (Table 4), one might think that such a sign would be more alarming to young females and might be the cause of their aggregation in the referral of patients to the hospital. The male/female ratio of 2.3 in this study is similar to that of other studies [12].

The overall proportion of lepromatous leprosy is 50.2%, but in Ahar it is 58.6%, and 47.8% in Baba-Baghi. A reverse of this situation is seen for tuberculoid leprosy which is higher in Baba-Baghi. Both differences are statistically significant (Table 3). Although the classification of leprosy is always open to valid questions, it may be safely stated that about 50% of the leprosy cases in Iran are lepromatous. The reason for this is not yet evident. Such figures are in agreement with the results of Amblard *et al* [2] in Martinique (47%), Bello [5] in Minas Gerais (51%), and Loaiza [10] in Ecuador (41%). Very high and very low proportions of lepromatous leprosy are also on record. Ahmed [1] reported 10.2% from the Sudan, and Lew [9] 80.5% from Korea.

The question of tuberculoid leprosy is more profound and might very well reflect a misclassification since at present there are very few cases of tuberculoid leprosy in Baba-Baghi [13]. The aggregation of cases of leprosy in the household is 1.5, and shows no difference with respect to the type of disease. The average size of the household in which a case of leprosy has been detected is about five persons which is in agreement with other studies concerning family size in Iran. Such findings negate the general understanding about the infectivity of lepromatous leprosy and justify further studies along this line.

Much of the data in this study is contradictory and this may be due to the fact that a high proportion of cases in Baba-Baghi are referrals from other parts of the country and thus might represent differing populations. On the other hand, since there is another leprosarium just like Baba-Baghi in the northeastern part of Iran, one cannot make any generalizations for the whole country until a similar study is made there. The problems with the sources of data reduce the comparability of this study. However, such studies may bring new ideas and confirm that unless a central registry is established to enable a

systematic approach, the disease will continue to be the problem it has been thus far.

SUMMARY

A total of 907 cases of leprosy from two sources, records from Baba-Baghi Leprosarium (709 cases) and Ahar case finding survey (198 cases), have been studied. The main characteristics of the cases are: a) about 50% of all cases are lepromatous leprosy; b) the leprosarium cases are about 2.5 years younger; c) about 70% of all cases are male; and d) the incidence of leprosy shows a steady increase up to 25-30 years of age and levels off thereafter. These and other findings are discussed.

RESUMEN

Se estudiaron 907 casos de lepra de los cuales, 709 correspondieron al leprosario de Baba-Baghi y 198 derivaron de la búsqueda de casos en Ahar. Las principales características de los casos fueron: (a) aproximadamente el 50% de todos los casos son de lepra lepromatosa, (b) los casos del leprosario son aproximadamente 2.5 años más jóvenes, (c) aproximadamente el 70% de todos los casos son pacientes del sexo masculino, y (d) la incidencia de lepra muestra un incremento sostenido hasta los 25-30 años de edad y después disminuye. Se discuten estos y otros hallazgos.

RÉSUMÉ

On a étudié 907 cas de lèpre sur base de deux sources de documents, à savoir les dossiers médicaux provenant de la léproserie de Baba-Baghi (709 cas), et les observations recueillies lors des opérations de dépistage à Ahar (198 cas). Les caractéristiques de ces cas étaient les suivantes: a) environ 50% de tous les cas étaient atteints de lèpre lépromateuse; b) les cas hospitalisés en léproserie étaient en moyenne 2,5 années plus jeunes; c) environ 70% des cas étaient de sexe masculin; d) l'incidence de la lèpre montre une augmentation progressive jusqu'à l'âge de 25-30 ans, et n'augmente plus ensuite. Ces résultats, ainsi que d'autres observations, sont discutés.

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