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Leprosy in Iran[1]

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Central Africa is, according to Felsenfeld (13), the cradle of leprosy. Leprosy has been recorded in Ethiopia during the past 3,000 years (37). It was spread in the year 500 B.C. by merchants from India and China to Persia (1) and then by the Persian troops under Darius and Xerxes to Asia Minor.

The disease was brought from Central Africa to Egypt (1) in 1550 B.C., where cases were referred to in the *Ebers papyrus* (24, 43) and as "Cholms" disease according to Luger (23). The *Brugsch papyrus* mentions that leprosy was carried from Egypt to the Israelites and was subject to legislation by their leader Moses. Leprosy was probably the "Zarrat" (wrongdoer) in the Bible, although this name implied probably any scaly skin condition and not a particular disease (18). The Old Testament using the word "leprosy" as a punishment for sin, has played an important part in influencing social reactions to the disease. The disease was very common in the Middle Ages in the Near East while few cases were recorded in Europe. It was brought to Europe by the Crusaders. Decrees issued by the Crusader commanders tried to halt its spread (24, 43).

It became pandemic in Europe, thereafter to be nearly extinguished by the "Black Death" (plague) in the 15th century (24). Today it is most frequent in Central Africa, Southeast Asia, India and Oceania, South America and the Northern Territory of Australia (13)

The pharmacopoeia of Avicenna, a famous Iranian physician of the 13th century, suggested simple drugs which were warm and which did not purge for the treatment of leprosy. Drugs for leprosy included *Wajj*, and *Sweet flag* which were also used as aphrodisiacs and diuretics respectively. *Sweet flag* is the pungent rootstock of *Acorus calamus* according to Avicenna. *Ammi* is a small genus of herbs from India and Egypt having a minute spicy fruit, the aromatic volatile oil of which contains thymol of Cymol, and has a burning taste. This drug is not only used for colic and as a diuretic, but is also a carminative and is useful for chest suppuration and impetigo (21).

Distribution of cases in the Middle East. Cases have been reported from Aden (3), the Arabian Peninsula (3, 46). Bahrain (3, 50), Cyprus (3, 9), Egypt (17, 51), Ethiopia (10, 16, 17, 37, 38, 43), Iraq (3, 22, 33, 43, 49), Iran (5, 8, 11, 15, 20, 22, 25, 26, 28, 30, 35, 39, 40, 43), Israel (3, 22, 34, 41, 42, 51), Jordan (3, 14, 47), Kuweit (3), Lebanon (3, 27, 31), Libya (44, 51), Muscat and Oman (3), Pakistan (3, 43), Quatar (3), Saudi Arabia (3, 43), the Southern Arabian Protectorate (3), Sudan (2, 36, 43, 51), Syria (3, 49, 51), Trucial Oman (3) Turkey (3, 7, 31, 48) and Yemen (3, 12, 19). In the Middle East the estimated infection rate is higher in Cyprus, Bahrain Iran, Iraq and Syria. The best figures come from Bahrain since the island is small and medical services are readily available.

Geographical distribution in the Middle and Near East. In the Arabian peninsula leprosy is more common in the southern parts than in the northern areas and is considered endemic (8). In Aden it is mostly seen in immigrants (3). In Bahrain it is occasionally seen in the Bahrnias, but seldom in Arabs (50). In Yemen it is endemic with 53 cases, mostly the anesthetic form, having been found from 1952-1957 (12, 42). In Jordan it is not considered a health problem (47). In Turkey there are believed to be 6,000 to 12,000 cases. The majority of these cases are found in Eastern Anatolia and along the Black Sea. Only a few cases are seen in the rest of the country (5, 7, 31). It is considered uncommon in Syria (18).

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Leprosy in Iran. Iran had an estimated population of twenty-nine million in 1972 ([32]). At the time of the last epidemiologic investigation on leprosy in 1965 the population was twenty-seven million. There were 0.54 cases per thousand population in 1966, with a registered rate of 0.20 cases of leprosy per thousand ([3]).

Iran has a varying climate, it is mostly hot and dry in the central and eastern regions, moist in the north and hot and humid in the south. There are wide temperature differences in the mountains of the west. There are few cases in the central, dry provinces. There are no reports of leprosy cases in the provinces of Hamadan, the Bakhtiari region, Gorgan, Khuzestan, Esfahan, Semnan and Kerman, or in the southern port areas. One observer, however, did find 27 cases in the port area and four cases in Oman and the surrounding islands of the gulf, in 1969 ([39]).

Lepromatous cases are more often seen than tuberculoid ([10]) (Table 1). Among 1,403 cases studied in 1969, there were 838 lepromatous, 484 tuberculoid, 156 borderline and 36 indeterminate types of leprosy. In another series of 426 cases, there were 218 lepromatous, 173 tuberculoid, 21 indeterminate and 14 borderline ([1]).

Leprosy is called *Josam* or *Khoreh* (something that eats away) in Persian (Farsi). There were 4,852 cases of leprosy recorded during the period of 1965-1966 for an estimated twenty-seven million population ([15]). Case finding was considered adequate in all areas, but especially in the more peripheral provinces of Iran ([15]). There are two large sanatoria in Meshed and Tabriz, with over half of the cases concentrated in two provinces. Many areas have a high number of cases, in others the disease does not seem to exist, or case finding was not as successful as reported. The highest incidence of leprosy cases is found in the provinces of East Azarbaijan (1,780 cases). Similar high numbers are reported from Kurdistan, Khorassan, Gilan and West Azarbaijan. The true incidence of leprosy in Iran cannot be stated. The figures vary from 4,852 to an estimated 12,000 cases ([40]). Dermatologists are few in Iran and many cases may go undiagnosed. Pettit in 1960, found few cases of leprosy among his dermatological patients in Tabriz. The existence of this disease in Iran is briefly mentioned by Binford and Mehregan. The latter reviewing 1,500 dermatological patients seen during a one year period (1961-1962) in Shiraz, found eight cases of leprosy. One was tuberculoid, two lepromatous and five of the indeterminate type. In 1968, Saidat ([35]) reported clinical trials with rifamycin on nine untreated leprosy patients in Iran with rapid clinical improvement, and Radji in the same year

TABLE 1. *Distribution of leprosy in Iran according to various reports.*

Author	L[a]	T	I	U	Total	Year	Area
Pettit ([28])					Few cases	1960	Tabriz
Mehregan ([25])					8	1964	Shiraz
Shahriari ([40])					12,000	1964	Iran
Geographic pathology ([15])					4,852	1970	Iran
Aramesh ([1])	218	173	1	1	5,467	1969	All Iran
Radji ([30])					5,867	1968	Iran
Saidat ([35])	2	7			9	1968	Iran
Sehati ([39])	45	67	3		115	1970	South Iran
Minoo ([26])	838	484	156	36	6,133	1969	All Iran
Minoo ([26])					1,403	1969	Iran (own study)
Kohout ([20])	15	11	16	8	50	1971	South Iran
Geographic pathology ([15])					450	1970	New cases
Aramesh ([1])					426		(Own study)

[a] L=lepromatous; T=tuberculoid; I=indeterminate; U=unclassified, borderline.

TABLE 2. *Areas in which leprosy is found in Iran (15).*

Census 1965 —	4,852 cases	New cases: 1970—	450 cases total
Azarbaijan East	1,780	Azarbaijan East	22
Azarbaijan West	635	Azarbaijan West	39
Kurdestan	248	Kurdestan	187
Kermanshah	227	Kermanshah	2
Khorassan	413	Khorassan	47
Khoramabad	—	Khoramabad	16
Tehran	126	Tehran	51
Baluchistan	28	Baluchistan	32
Fars	125	Fars	20
Ghalije Fars	—	Ghalije Fars	1
Gilan	979	Hamadan, Bakhtiari, Golbulieh, Khuzestan, Esfahan, Semnan, Kerman	No cases
Mazandaran	151		
Hamadan	—		
Khuzestan	144		
Golgulieh	—		
Bakhtiari	—		
Esfahan	5		
Kerman	23		
Semnam	—		

(30) reported the experience from the Behkaden rehabilitation center in Tehran. Case numbers probably varied according to the thoroughness of search in different provinces and the availability of health services. Minoo (26), analyzing the cases of leprosy in this country registered 6,133 cases in 1969, of these 4,473 were male and 1,660 female. The male-female ratio was well-maintained in most instances. Only in Baluchistan and Seistan were an equal number of males and females afflicted. In an age incidence analysis of 525 cases, the most frequent involvement was from the age of 15 and up. Minoo also analyzed types of leprosy. Aramesch discussed cases in the sanatoria of Iran (1).

The case frequency in the provinces is listed in Table 2. Provinces located in the north, northwest and west have a colder climate. The hot, dry provinces in the central area have the least cases. There are probably many infected foci and therefore numerous unknown cases. The distribution of sex, age and occupation, however, is the same as in other countries of the world.

Social reaction to leprosy. In Iran a historical fear of those afflicted with leprosy exists, as in many parts of the world. Medical personnel and the public have been reluctant to allow the patients to lead a normal life. This has encouraged the afflicted to engage in robbery and the smuggling of narcotics (29). In one of the major cities of Iran, until quite recently, the leprosy-afflicted were considered to be a "Zendeh-be-Gur" or an outlaw, who could not walk among people. In 1963, several patients were locked in a hospital room. They were given food only and finally were transported to the leprosarium with a cloth between the truck drivers and themselves to prevent the "spread of bacilli." Everything was burned in the hospital room after the patients had left. No drugs had been given to the patients during their hospital stay.

In the past, diseased villagers in the southern part of the country were banished to the desert if the clinical features of the disease were apparent, and they were provided only with water and dates, since among the village population the fear of contracting the disease is great. Many cases remain undiagnosed if the village is far away from the nearest health unit. For fear of contamination it is not an uncommon practice to admit the patient and his family to the leprosarium. The family feels obliged to look after the diseased relative. Eshraghi (11) states that historically the devil's presence, the fury of gods or the entrance of bad spirits have been accused of afflict-

TABLE 3. *Leprosy: cities of origin in Fars Province.*

Cities	Number of cases	
	Kohout (20)	Sehati (39)
Shiraz and surroundings	11	13
Jahrom	1	2
Bushehr	3	
Lar	2	10
Abadeh	3	
Borazjan	3	
Kazeroun	1	9
Fassa	2	
Darab	1	14
Khafr	1	
Tribes	1	
Not Fars Province	3	
Unknown	18	4
Neiriz		27
Firouzabad		5
Estahbanat		2
Southern ports		27
Oman		4
Total	50	117

TABLE 4. *Signs and symptoms of 50 leprosy patients; Fars Province.*

Incidence		Percentage of patients diseased
Rashes	10/26	39
Eczema	4/23	17
Skin discoloration	23/31	74
Burning	8/25	32
Crusts	8/25	32
Leonine face	18/31	58
Skin ulcers	7/23	30
Loss of eyebrows	21/27	77
Loss of hair	16/27	59
Neural lesions[a]	16/33	48
Sensory loss	19/45	49
Paraesthesia	20/27	74
Cribbling	1/24	4
Paralysis	5/24	20
Deformities	13/30	43
Biopsy, positive or negative	19/30	69
Nasal smear, positive	8/27	33

[a] Neural lesions include hypertrophy of auricular and ulnar nerves.

ing these unfortunates. They were condemned to live in ruins, in cemeteries, in forests and on islands where they lived a miserable life. They lived on alms, left-over food and plants of the desert. Their mouth had to be closed, they had to speak from a distance, and if anyone came near they had to say the word *najess* (unclean). They were forbidden to visit public places and cities, and were *sangsar* (stones could be thrown at them). Although great changes have taken place, leprosy sufferers are still ostracized from society and have to live separate from their families. Perhaps the virulence of the disease was higher previously and this may explain this behavior (26). Schallimer, a teacher of the Dar ol Fonoon science school in Tehran, in 1885 met families in the forest of Iran who could not enter the village and whom nobody was allowed to help. People are more afraid of leprosy than of other curable diseases. Those who have leprosy are even today hated and rejected though they are no longer stoned. They still cannot enter society and cannot visit their families. Even doctors and nurses often refuse to have contact with them and in the sanatoria the doors are opened with the shoes in order to avoid touching the door handles. Awareness of their own condition keeps patients away from other people. Cured cases find no occupation and cannot marry. Their products are not bought. Their children may not attend school with other children and educational and occupational opportunities are few. Even treatment in therapeutic centers is often not possible (11).

Treatment facilities. There are two leprosy sanitoria in Iran; one at Mehrjoin, two kilometers from Meshed (Khorassan), and the other twenty kilometers from Tabriz, the Baba Baghi Sanatorium (Table 6). Each sanatorium consists of an inpatient ward and a home for leprosy cases. According to 1967 statistics there were 92 children in the orphanage at that time and 30 patients were permitted to live in Behkaden, a 24,000 square hectar area for rehabilitation, where treated cases can stay, work and live with their families under close observation. Returning to the original villages of the patients is often not possible. Behkadeh has its own bus, schools, stores and parks and includes also farms and gardens. Breeding of animal stock is possible for patients and growing of

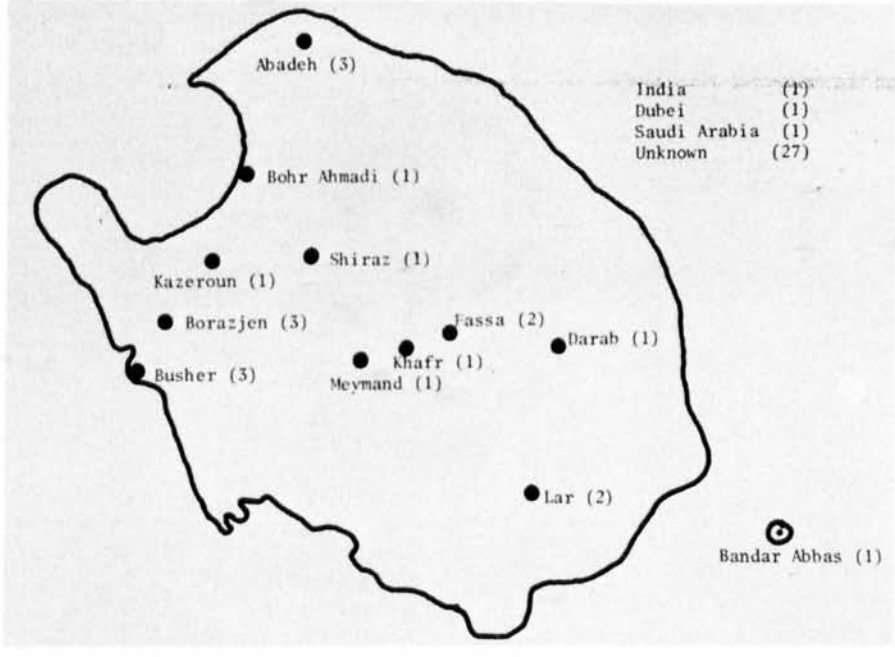

FIG. 1. Map of leprosy in Fars Province, 50 cases. Figures in parentheses represent numbers of patients.

various goods which are later sold (1). In addition to these two sanatoria and Behkadeh, Iran has a central outpatient department which opened in 1967, as well as health teams and public health departments in each city which facilitate diagnosis and treatment. Leprosy work is under the protection of her Majesty the Queen of Iran.

Control of leprosy. It is the impression of the public health experts that the disease will be controllable with the development of public health centers and the rising economic level of the country. Various leprosy control plans have been developed, including mobile units in the villages for dispensary treatment. Nevertheless, case finding in villages is often of more theoretical than practical value (29), whereas the large public health centers in the cities allow the diagnosis and control of early disease with drugs currently used for treatment. Regional and international cooperation are needed.

Leprosy in Fars Province (Fig. 1). In 1963, only 34 cases were known in Fars, and in 1969 about 117 were recorded clinically, although people would not help to find cases. According to the national census there had been 125 cases in 1965. An additional 20 cases were reported in 1970. Hushangi, however, recorded 450 cases in Fars province in 1970.

Between 1966 and 1968, 50 cases of leprosy were transferred for laboratory workup from the Public Health Department of Fars to Pahlavi University laboratories, which serves 1,500,000 people. Of the patients, 34 were males and 16 females. Several other patients were sent with a clinical diagnosis of leprosy which could not be substantiated either by smears or by biopsy examination.

Among those who were sent under the suspicion of leprosy but who did not have leprosy, was a patient with tabes dorsalis, one each with squamous cell carcinoma of the foot, lupus erythematodes, leishmaniasis of the tuberculoid type and tuberculosis of the skin and bone; also one with neurodermatitis as well as a patient with the after effects of strychnine and opium poisoning.

All patients transferred had nasal and skin smears taken. If these were negative, skin and nasal mucosa biopsies were performed from clinically suspicious areas.

Most of the patients were from the city

TABLE 5. *Occupations of 50 leprosy patients; Fars, Iran.*

Occupations of cases in Fars	No. patients
Farmer	12
Housewife	4
Houseworkers	5
Driver's aide	2
Salesman	1
Shepherd	1
Musician	1
Student	1
Unknown	23
Total	50

of Shiraz and the surrounding villages. Three cases came from the Port of Bushehr on the Persian Gulf, from Abadeh halfway to Isfahan and from Borazjan respectively at the foot of the Zagros Mountains, close to Bushehr. Other patients came from the cities of Lar, Jahrom, Kazeroon, Darab and Khafr, about 100 to 250 km from Shiraz in all directions. One patient was a tribesman from the nomadic tribes. Three were from outside the province of Fars, from cities on the Persian Gulf. In 17 patients we did not know their precise village or origin (Table 3). The youngest patient was 15, the oldest 70. Two cases of familial distribution were observed; one a husband-wife, the other a father-son association. Farmers were quite often diseased (Table 5).

Clinical estimation. Typical leonine facies was seen in 1,818 cases (Figs. 2 and 3). The most frequent lesion was the loss of the lateral part of the eyebrows which was noted in 21 patients. Paresthesia and sensory loss were noted in 20 patients. Some of the cases were advanced and 13 had developed deformities and mutilation (Figs. 3 and 4). Eczematous rash was noted in 14, burns in 8 and skin lesions were quite heterogenous. Fifteen cases were of the pure lepromatous type according to the international standard classification, 11 cases were purely tuberculoid and 16 were cases of varying severity with neurogenic and dermatological manifestations. Eight cases remained unclassified and were either borderline lepromatous or borderline tuberculoid.

Nasal scrapings were positive in 8 of 27 and skin biopsy sections were positive for bacilli in 8 of 27 patients. The biopsies showed diagnostic lesions in 19 of 30 patients from whom tissue was submitted. The diagnosis was made on purely clincial grounds in 23 cases, because of typical features such as the leonine face, loss of

FIG. 2. Lepromatous leprosy, face, front view.

FIG. 3. Lepromatous leprosy, face, side view.

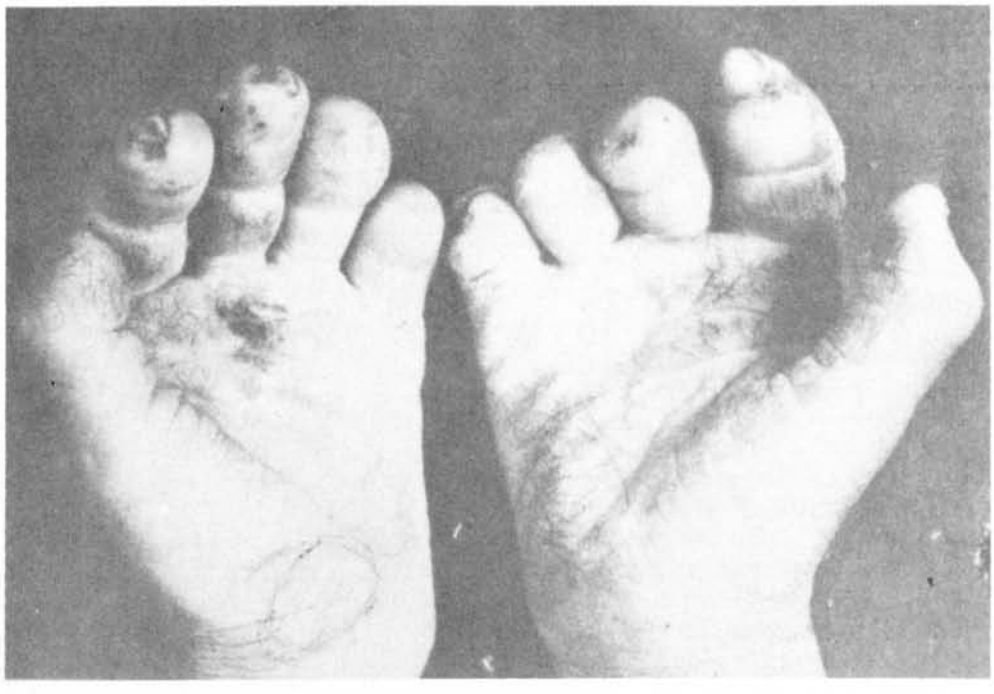

FIG. 4. Lepromatous leprosy, end stage, deformities of hands.

FIG. 5. Lepromatous leprosy, end stage, deformity of foot.

TABLE 6. *Leprosy patients in sanatoria in 1967—Aramesch (1).*

	Tabriz	Meshed	Children
New cases	49	73	92 in orphanage of sanatorium
Treated cases	103	372	
Deaths	7	10	
Inpatients (end of year)	476	544	30 improved patients sent to Behkadeh

lateral eyebrows, characteristic loss of fingers and toes with classical deformities, or a combination of the above.

Four patients presented internal lesions. Three of these showed lesions of the larynx and one patient had a lesion on the palate (Table 4).

Histopathologic findings. The biopsies taken in the lepromatous cases revealed many globi within histiocytic macrophages, the typical histiocyte-free subepidermal zone as well as a variety of large characteristic lepra cells in all stages of development. Tuberculoid lesions with granulomata were seen in three instances. These granulomata are important, since the lesions of the equally frequent skin tuberculosis and the much more frequent tuberculoid leishmaniasis often have to be differentiated. The tuberculoid granuloma showed Langhans type giant cells; one slide revealed a pseudosarcomatous pattern and two cases a pseudoepitheliomatous hyperplasia of the epidermis. The tuberculoid borderline lesions were characterized by perineural, subcutaneous lymphocytic infiltrates and often hyperplasia of neuronal bundles.

Amyloidosis occurred in 13 cases. Once diagnosed, patients were referred to the Public Health Department of Fars province for free therapy and follow-up.

SUMMARY

Leprosy is still a formidable problem in Iran. The incidence varies from 0.2 to 0.75 per 100,000 in different reports. Sex, age and occupation are much as in other countries. The northern provinces with a cold climate are more, and the drier central provinces are less often involved. Iranians, mostly of Caucasian descent, and/or a mixture of many races, have more lepromatous disease. Contact, crowding and nutrition do play a role in transmission of disease. Undetected foci persist. A small series proven histologically serves as an illustration of the country-wide problem. Attempts to pick up all cases of leprosy within the country and to find ways of control of this disease persist, yet superstition will probably persist for a long time to come.

One of the major problems in therapy constitutes the high frequency of glucose-6-phosphate dehydrogenase deficiency in our population. All patients have been tested for this deficiency in our population. All patients have been tested for this deficiency for the past several years. One patient under leprosy treatment developed an acute hemolytic crisis. Yet the damaging effect of sulfones on the red cells is doubted by some authors (4). Prospective studies into the effect of sulfones on G-6 PD deficient red cells have not been performed (6).

RESUMEN

La lepra es todavía un problema grave en Irán. La incidencia varía entre 0,2 y 0,75 por 100.000 en diferentes informes. El sexo, la edad y la ocupación son similares a los de otros países. Las provincias del norte, con un clima más frío, están más afectadas; las provincias del centro, que tienen un clima más seco, a menudo están menos afectadas. Los Iranios, la mayor parte descendientes de caucasianos y/o una mezcla de muchas razas, tienen más enfermedad lepromatosa. El contacto, la promiscuidad y la nutrición sí juegan un papel en la transmisión de la enfermedad. Persisten focos no detectados. Una pequeña serie, comprobada histológicamente, sirve para ilustrar el problema que abarca toda la nación. Se mantienen los intentos para identificar todos los casos de la enfermedad dentro del país y para encontrar medios de controlarla; sin embargo, la superstición probablemente persistirá durante un largo tiempo.

Uno de los mayores problemas terapéuticos lo constituye la alta frecuencia de deficiencia de glucosa-6-fosfato deshidrogenasa en nuestra población. Desde hacen varios años se han estado estudiando todos los pacientes para determinar si tienen esta deficiencia. Un paciente bajo tratamiento antileproso desarrolló una

crisis hemolítica aguda. Sin embargo, el efecto nocivo de las sulfonas sobre los glóbulos rojos es puesto en duda por algunos autores. Existe el propósito de estudiar el efecto de las sulfonas sobre los glóbulos rojos G-6-F D deficientes, pero estos estudios no se han realizado hasta el momento.

RÉSUMÉ

La lèpre est encore un problème formidable en Iran. L'incidence varie de 0,2 à 0,75 par 100.000 personnes, d'après différents rapports. Les caractéristiques de sexe, d'âge, et d'occupation, sont fort semblables à celles observées dans d'autres pays. Les provinces septentrionales, dotées d'un climat froid, sont plus souvent atteintes, et les provinces centrales, plus sèches, le sont moins souvent. Les Iraniens, dont la plupart sont de descendance Caucasienne, et qui constituent un mélange de nombreux groupes ethniques, ont davantage le type lépromateux. Le contact, la promiscuité et la nutrition ne jouent pas de rôle dans la transmission de la maladie. Des foyers non détectés persistent encore. Une petite série de malades, dont la maladie a été confirmée histologiquement, fournit une illustration de l'ampleur du problème au niveau national. Des tentatives faites pour dépister tous les cas de lèpre dans le pays et pour mettre au point une manière de controler la maladie, se poursuivent. Néanmoins la superstition continuera probablement pendant encore longtemps.

Un des problèmes majeurs de la thérapeutique dans notre population est constitué par la fréquence élevée de déficience en glucose-6-phosphate déhydrogénase. Tous les malades ont été étudiés en ce qui concerne cette déficience pour plusieurs années déjà. Un malade sous traitement a développé une crise hémolytique aiguë. Et pourtant, l'effet délétère des sulfones sur les globules rouges est encore mis en doute par certains auteurs. Des études prospectives sur l'effet des sulfones sur des globules rouges déficients en G-6-PD n'ont pas été menèes.

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