Epidemiological aspects of kala-azar in Meshkin-Shahr, Iran: human infection

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During the last decade, kala-azar, which used to be a sporadic disease, became endemic in parts of East-Azerbaijan province in north-west Iran. Many of the 1051 cases observed between 1985 and 1990 were in the district of Meshkin-Shahr (800 cases). The diagnosis was based on symptoms and signs of the disease plus a positive serological test (indirect immunofluorescence assay or direct agglutination test) and, in some cases, the finding of parasites in bone marrow smears. About 90% of the cases were children under 5 years of age. The disease incidence in 1990 was almost ten times that in 1985. New cases are diagnosed throughout the year, but mostly from January till April. Cases were treated with meglumine antimoniate with very satisfactory results; deaths were few among the treated children.

Sporadic cases of kala-azar have appeared in East-Azerbaijan province, including the district of Meshkin-Shahr, during the past 50 years (*1*). After the mid-1970s, these cases started to increase and large numbers have been reported from all parts of the province, but mostly from Meshkin-Shahr (*2*). A pilot control programme was started in May 1991 in collaboration with the provincial Health Department and the Institute of Public Health Research of the Teheran University of Medical Sciences, and supported by the WHO/World Bank/UNDP Special Programme for Research and Training in Tropical Diseases (TDR). This paper describes the situation of human infection in the district between 1984 and 1990 (i.e., before the start of the control programme).

Study site and methods

Meshkin-Shahr district (population, c. 175 000 in 1986) lies in north-west Iran (Fig. 1). The city of Meshkin-Shahr is situated at an altitude of 1490 m above sea level, the whole district occupying the foothills on the northern slopes of Mount Sabalan (alt. 4811 m). The weather is warm during the summer (up to 40 °C) and extremely cold in the winter (down to –27 °C). The main occupation is sheep farming.

Health services are delivered through the district health network, consisting of a district hospital and a district health centre in the city, and many rural health centres in the larger villages, each one sup-

Fig 1 **Map of the eastern part of East-Azerbaijan showing the degree of endemicity of kala-azar.**

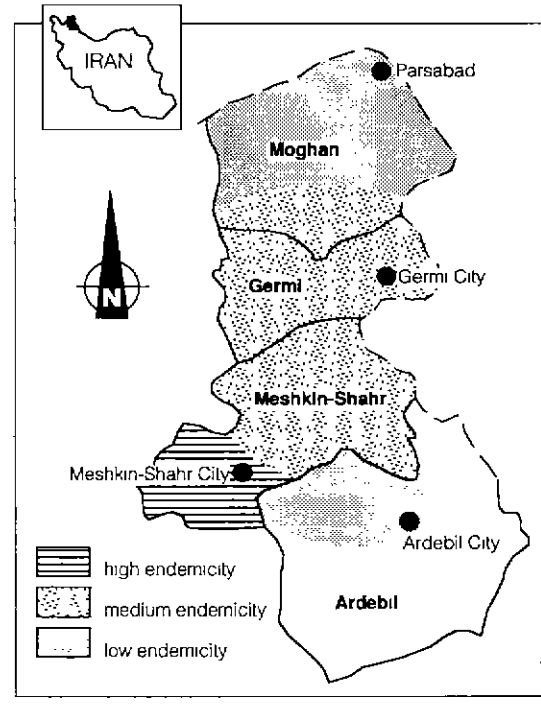

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Table 1· **Number of outpatient and hospitalized cases of kala-azar treated in Meshkin-Shahr district hospital, by the district of origin and year**

Year	Meshkin-Shahr		Moghan and Germi		Ardebil		All districts		Total
	Outpatient	Hospital	Outpatient	Hospital	Outpatient	Hospital	Outpatient	Hospital	
1985–86	60	39	1	9	0	0	61	48	109
1987	82	75	4	20	0	0	86	95	181
1988	153	37	11	16	1	0	165	53	218
1989	113	33	22	29	1	1	136	63	199
1990	150	48	54	84	5	3	209	135	344
Total	558	232	92	158	7	4	657	394	1051

porting 5 to 7 health houses. Each health house is staffed by one female and one male village health worker (called *behvarz*) who provide primary health care to a population of 1500 to 3000 living in the village and nearby satellite villages.

The village health workers were trained to refer all suspect cases of kala-azar to the district hospital where one of the authors (G.S.) is the specialist in charge of the paediatric ward. Some patients were also referred by private or government physicians in Meshkin-Shahr, and from the nearby districts of Germi, Moghan and Ardebil.

The referred cases were carefully examined in the district hospital and investigated by routine laboratory tests and serological tests, i.e., indirect immunofluorescence assay (IFA) and direct agglutination test (DAT);[a] in some cases, bone marrow puncture was carried out for detection of *Leshmania* parasites. Patients with clinical symptoms and signs of kala-azar plus a positive IFA or DAT, or with parasites in the bone marrow smears, were treated in hospital or as outpatients (according to the severity of the illness) using meglumine antimoniate (Glucantime) provided by the provincial Health Department.

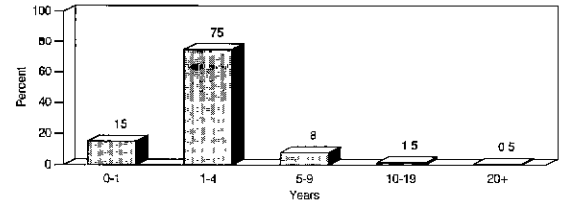
Results and discussion

From 1985 till 1990, a total of 1051 cases were seen and treated in the Meshkin-Shahr district hospital. Table 1 and Fig. 1 show that the majority were from Meshkin-Shahr district, followed by the districts of Moghan and Germi situated to the north of Meshkin-Shahr. Within the Meshkin-Shahr district, more than 50% of the cases were from the city itself and neighbouring larger villages. As mentioned before, parasitological diagnosis was not attempted in all cases. Of the 479 bone marrow punctures performed during 1985–90 (66 in 1985–86, 172 in 1987, 120 in 1988, 59 in 1989 and 62 in 1990), only 69% were positive for *Leishmania* parasites. Diagnosis and treatment were based on clinical signs and symptoms plus positive IFA or DAT serological tests. From our previous results, we considered the titres of 1/160 or more as positive for IFAT, and titres of 1/3200 or more as positive for DAT. The highest titres seen were 1/20 480 for IFAT and 1/204 800 for DAT. Signs and symptoms of the disease were the same as those mentioned in textbooks. The presenting symptoms in most cases were fever and the feeling of a heavy mass in the abdomen. The local people call the disease *dalakh*, which means "spleen". Many of the children are brought to the health centre because of vomiting or generalized oedema. In adults, the disease runs a subacute or chronic form, most of the time without fever. In 155 outpatients, since serological and parasitological examinations were not practical, the diagnosis was based only on clinical symptoms and signs.

Fig. 2 shows the age distribution of the cases: 90% were under 5 years of age and 15% under 1 year. Very few cases occurred among older children and adults; 55% of patients were male and 45% female.

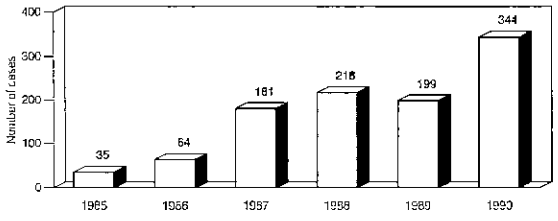
Fig. 3 shows the increasing incidence of the disease between 1985 (35 cases) and 1990 (344 cases).

Fig 2 **Percentage distribution of kala-azar cases, by age, seen in Meshkin-Shahr district hospital, 1985–90.**



[a] Leishmania antigen for DAT was provided by Dr A. El Harith, N.H. Swellengrebel Laboratory in the Royal Tropical Institute, Antwerp, Belgium through WHO (Special Programme for Research and Training in Tropical Diseases).

Fig. 3. **Number of kala-azar cases, by year, seen in Meshkin-Shahr district hospital, 1985–90.**

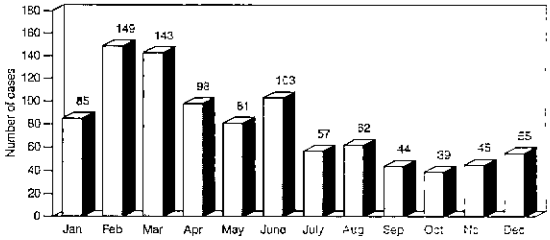


Most of this was due to the better facilities and coverage provided by the primary health care network. Fig. 4 shows the distribution of cases by the month of their first visit: most cases were seen for the first time in the colder months (January till April), while their lowest level was in October. Taking into consideration that the second peak in the activity of sandflies in this area is in August (*3*), this distribution shows that the average incubation period is about 6 months.

Treatment results. The dosage of meglumine antimoniate was 17–23 mg Sb^{5+}/kg body weight/24 h intramuscularly for 20 consecutive days. Hospitalized patients, after the fever had abated and the appetite was good, were discharged and the injections were continued as outpatients. Outpatient cases were visited on the 10th and 20th (last) days of treatment. If necessary, a second course was administered after a 20-day interval. The treated patients were followed up by village health workers. The response to the treatment was very good; 92% were satisfactory with one course of the drug, 8% needed a second or third course, and, in exceptional cases, more than that. Two or three days after the start of treatment, the fever disappears and appetite becomes almost normal; the spleen decreases in size gradually and the oedema also disappears.

In addition to meglumine, supportive treatments were also given. In some cases, antibiotics were given against intercurrent infections, or blood transfusion to control complications like haemorrhage and one case of noma. Deaths were due to diffuse intravascular coagulation or hepatic complications; one fatal case developed meningitis after splenectomy due to hypersplenism and another failed to respond to meglumine (this patient was sent to Teheran, but as there was no other drug available for treatment, he died there in a paediatric hospital). We do not know exactly how many of our patients died later because of this or other diseases, because we could not follow them up for long periods (this is part of the present control programme supported by WHO, which started in May 1991).

Fig. 4. **Distribution of 961 cases of kala-azar, for which the month of the first visit was recorded, in Meshkin-Shahr district hospital.**



Visceral leishmaniasis occurs in many countries of the Eastern Mediterranean region, where it seems to be a zoonosis and is seen only in sporadic form. The disease has established itself in the form of endemic foci in some countries (Saudi Arabia, Iraq, Iran, and Tunisia).[b] The focus of Meshkin-Shahr seems to have the highest incidence of the disease, since in this population of less than 200 000, over 1000 cases were diagnosed and treated in 5 years.

[b] **Desjeux, P.** *Information on epidemiology and control of leishmaniasis, by country and territory* Unpublished WHO document WHO/LEISH 91 30, 1991

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Résumé

Aspects épidémiologiques du kala-azar à Meshkin-Shahr, Iran: l'infection humaine

Au cours des dix dernières années, le kala-azar, qui était une maladie sporadique, est devenu endémique dans certaines parties de la province de l'Est-Azerbaïdjan, dans le nord-ouest de l'Iran. Une proportion importante des 1051 cas observés entre 1985 et 1990 se situait dans le district de Meshkin-Shahr (800 cas). Le diagnostic était basé sur les symptômes de la maladie, sur une séropositivité dans les épreuves d'immunofluorescence indirecte, d'agglutination directe et, dans

certains cas, sur la découverte de parasites dans des frottis de moelle osseuse. Environ 90% des cas concernaient des enfants de moins de 5 ans. L'incidence de la maladie était en 1990 près de dix fois supérieure à ce qu'elle était en 1985. De nouveaux cas sont diagnostiqués tout au long de l'année, mais surtout de janvier à avril. Le traitement par l'antimoniate de méglumine donne des résultats très satisfaisants, et le nombre de décès chez les enfants traités est très faible.

References

1. **Nadim, A. et al.** Present status of kala-azar in Iran *Am. j. trop. med. hyg.*, **27**: 25–28 (1978).
2. **Edrissian, G.H. et al.** An endemic focus of visceral leishmaniasis in Meshkin-Shahr, East Azerbaijan province, north-west part of Iran. *Bull Soc. Path. Exo.*, **81**: 238–248 (1988)
3. **Nadim, A. et al.** Epidemiological aspects of kala-azar in Meshkin-Shahr, Iran: investigation on vectors *Iranian j. publ. hlth* (in press).