Leishmaniasis in Bahrain*

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DURING a period of 30 years there were 15 cases of histologically proven cutaneous leishmaniasis in Bahrain and only two of these were Bahraini patients who developed the lesions while being to an endemic countries with leishmaniasis. Four non-Bahraini patients also developed the lesions either in their home country or while being to leishmania endemic zone. The disease has not been observed in Bahraini population, probably as a result of combination of ecological, geomorphological, biological and environmental factors.

LEISHMANIASIS is a major public health problem in many countries. In the Arabian Gulf region it is known to occur in Iraq, Iran (3, 13), Kuwait (5) and Saudi Arabia (2, 4). No epidemiological studies of the disease have been reported from other parts of the Gulf, including Bahrain, Qatar, United Arab Emirates and Oman. It is the aim of this communication to provide a preliminary report on leishmaniasis in Bahrain.

GEOGRAPHICAL AND CLIMATIC FEATURES

Bahrain is an archipelago of about 26 small low-lying islands situated about half way down the Arabian Gulf some 25 kilometer from the Arab coast and slightly more distant from the Qatar peninsular. There are 13 principal islands in the group whose total area is 669.3 square kilometers, the largest (571.8 square kilometers) is Bahrain which is about 45 kilometers long and 15 kilometers at its broadest.

The weather in the islands is generally humid and hot. The Statistical Outline of Bahrain (9) showed that the average monthly minimum and maximum humidities for the period from 1972 - 1979 was 39 per cent and 86 per cent respectively. The humid season extends throughout the year with monthly average of 68 per cent. The average monthly minimum and maximum temperatures for the same period were 23°C and 34°C respectively. The lowest minimum temperature, an average of 16°C occured for a period of 4 months between December and March and the average maximum for the same period was 27°C. The highest maximum temperature, an average of 41°C occured for 5 months between May and September and the average minimum for the same period was 29°C.

The prevailing winds are the "Shemal" a dry hot wind from the north-west and the "Qaws" a damp wind from the south-west. The average annual rainfall during the period between 1974 - 1979 was 14.6 mm. Rain falls mainly in winter.

The 1981 census showed the population of Bahrain to be 358857, of whom 116261 (32.4 per cent) are non-Bahraini. The population density is 510 inhabitants per square kilometer. Eighty per cent of the population live in urban areas, three quarters of them in the main cities of Manama and Muharraq (11).

* Based on a paper presented at the First Pan-Arab Seminar on Leishmaniasis sponsored by the Arab Biologists Union, Amman, Jordan, 15 - 17 June, 1981.

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LIFE CYCLE

Leishmaniasis is an infection of the reticuloendothelial system caused by a protozoa of the genus Leishmania (3, 13). It is transmitted to man by the bite of the female sandflies of the genus Phlebotomus (6). The epidemiology of the disease whether cutaneous, mucocutaneous or visceral is determined by a reservoir of infection (animal, man or both) from which the sandflies can infect themselves.

There are two phases in the life cycle of leishmania; (a) Leishmanial (aflagellate) form which occur in man and animal reservoir hosts. This is an oval organism 2 - 4 um in diameter made of rounded nucleus, small rod-shaped kintoplast or rhizoplast and a vacuole. It is known as the Leishman-Donovan (L - D) body. In man the leishmanial forms are found in the large mononuclear cells of the reticuloendothelial system especially the liver, spleen and bone marrow. (b) Leptomonad (flagellate) form found in the vector sandfly and in culture media.

When the appropriate sandfly feeds on an infected host (man or animal) it ingests the leishmanial forms with the meal and these develop in its gut into the leptomonad forms. When the sandfly next feeds, some leptomonads are injected into the new host and these again assume the leishmanial forms. They are phagocytosed by macrophages, multiply by simple division and cause rupture of the cells. They are then carried in the circulation to give rise to the characteristic lesions.

Leishmanias are parasites of wild animals transmitted to man by the phlebotomine sandflies. Man become an accidental host when he intrudes into the natural habitat of these animals. In such cases, the

disease is referred to as zoonotic leishmaniasis. A wide variety of species are involved as reservoir hosts and their types varies between one country and another as well as within the same country (8). Moreover different leishmanias may have different specific zoonotic reservoirs. For example dogs are important hosts in infantile visceral leishmaniasis in the Mediterranean basin while wild rodents are major hosts for Mexican cutaneous leishmaniasis (13). Other important reservoir hosts include cattle, horses and wild canine.

The distribution and the various biological aspects related to the phlebotomine sandfly vectors as well as the leishmanial and leptomonad forms are also different from one geographical area to another (6). These include among many other factors the geomorphological characteristics of the natural habitate, physiological age movements, time of activity, flight range, feeding habits, reproductive activity, condition of the alimentary canal and the effects of wind, temperature, humidity and light (6).

PATIENTS AND METHODS

The study was based on the review of all 15 patients who between 1953 - 1982 were diagnosed as having leishmaniasis in the Department of Pathology, Ministry of Health, State of Bahrain. This is the only such centre in the islands with a catchment area include the State and private hospitals and clinics. These cases were ascertained through the Medical Records Department of the hospitals concerned for additional clinical information.

RESULTS

During a period of 30 years under study there were 15 histologically confirmed patients with cutaneous leishmaniasis (see Table). Visceral leishmaniasis was not diagnosed. The disease was found to affect more males than females in a proportion of 4 : 1. The mean age of the patients was 25 years (range 7 to 60 years).

The majority of the patients had single cutaneous lesion (73%) but there were few (27%) with multiple lesions. The lesions were distributed on the face (54.2%), forearms (29.2%), trunk (8.3%) and legs (8.3%).

The nationality distribution of the patients were as follows; 2 Bahrainis, 4 Yemanis, 4 Iranis, 3 Omanis, One Saudi and one Cypriot.

Information regarding the duration of the cutaneous lesions was available in 10 patients, 6 of which had additional history of being to leishmania endemic countries. One of the Bahraini patients (case No. 8) had a cutaneous lesion of 8 months duration which developed in Bahrain but she may have been exposed to the leishmania while in Syria 4 months before the appearance of the lesion. The other patient (case No. 13) developed the lesion while being on a visit to Iraq. The 4 non-Bahraini patients also developed the lesion either in their home countries (Case Nos. 6, 11 and 14) or while being on a visit to leishmania endemic country (Case No. 9).

DISCUSSION

Because of varied clinical manifestations, patients with cutaneous leishmaniasis present either to dermatologists or surgeons. None of these specialists had seen the disease in Bahrainis. Visceral leishmaniasis has also never been described in Bahrainis. Moreover the characteristic leishmanial scar have not been observed in Bahrainis. All cases of leishmaniasis reported in this communication were of the cutaneous type and only two of these were Bahrainis who developed the lesions while being to an overseas countries endemic with leishmaniasis. Four non-Bahraini patients had similar history of having the lesion in their home countries or while being to endemic country. All these six patients developed the lesions during the incubation period of the disease which is known to be from 2 weeks to 18 months (3, 13). Bahrain is however, surrounded by countries in which leishmaniasis is endemic (2, 3, 4, 5, 13) and the non-occurence of the disease among the Bahraini population may perhaps be attributed to one or combination of factors.

It is probable that the successful ecology of leishmaniasis in Bahrain has not yet been developed into the so called natural focus of the disease. This is defined by Neronov and Gunin (7) as "part of a homogenous geographical area in which characteristic relationships between the causal agent, the donor animal, the causal-agent recipient, and the vector have been fully established in the course of evolution in an environment that is favourably or at least not inhibitory to the circulation of the causal agent". Many factors are therefore involved especially those related to vectors, reservoirs, geomorphological characteristics of the landscape, flora and fauna and environmental conditions. The concept of an unsuccessful natural focus for leishmaniasis in Bahrain is supported by several observations and it is possible that once the relationships are established in the ecological system of the islands, the circulation and life cycle of leishmaniasis can be completed. Pre-

liminary results of an entomological survey in Bahrain showed that there were no phlebotomine sandflies in the islands. The sandflies may have existed previously but their breeding sites were probably destroyed in the early 1950s during the antimalarial campaign as well as in the process of desert exploitation and land reclamation. Moreover, there are no large animal reservoirs in the country and most wild canine species were erradicated a long time ago, although rodents and possibly some desert reptiles (1, 13) constitute a potential danger. Foreign workers from endemic areas of the world residing in Bahrain could act as a human reservoir but due to the absence of other links, the life cycle of leishmaniasis is interrupted. The geomorphological characters of the landescape and the distribution of funa in Bahrain have not been studied and the vegitations characteristics of the ecosystem of leishmaniasis such as Astragalus Harmaletum has not been described among the flora of Bahrain (12).

The environmental variables in Bahrain, namely temperature and humidity, do not appear to favour the endurance ability and survival of phlebotomine sandflies. This is supported by the work of Theodore (10) who found that one hour exposure to a temperature of 40.5°C and to all ranges of humidity killed all unfed females and the majority of males. After 24 hours exposure to a relative humidity of 40 - 60%, 50 - 80% of the flies died. Moreover all sandflies were killed after 24 hours exposure to 39.5°C at all humidities. In Kuwait the activity of the phlebotomine sandflies is limited to the period between May to August at a temperature below 38°C and at a relative humidity below 25% (5). In Bahrain however, the hot season extends for 5 months (May till September) with an average peak of 41°C and a monthly relative humidity of 68%. These environmental variables do not appear to favour the survival of phlebotomine sandflies.

The phlebotomine sandfly is a weak organism that can hardly travel beyond its breeding site (3) It is therefore doubtful that the sandflies can cross the 25 kilometer waterway barrier between the eastern Saudi coast and Bahrain.

Age, sex, nationality and number, site and duration of cutaneous leishmanias diagnosed in Bahrain between 1953 - 1982.

No.	*Age*	*Sex*	*Nationality*	*No. of lesions*	*Site of lesion*	*Duration of lesion*
1	—	M	Irani	2	face, leg	—
2	—	M	Irani	1	forearm	—
3	7	M	Saudi	1	leg	—
4	35	F	Omani	1	cheek	—
5	18	M	Omani	1	nose	—
6	13	M	Yemani	1	cheek	6 months. Developed while in Yeman
7	21	M	Yemani	5	face, trunk	8 months.
8	25	F	Bahraini	1	forearm	8 months. Was in Syria one year ago.
9	23	M	Yemani	1	cheek	One year. Started while in Saudi Arabia.
10	22	M	Irani	3	face, forearm.	8 months.
11	60	M	Omani	1	face	6 months. Started while in Oman
12	22	F	Irani	1	forearm	8 months.
13	30	M	Bahraini	1	cheek	2 months. Developed while in Iraq
14	23	M	Cypriot	1	cheek	3 months. Developed while in Cyprus
15	23	M	Yemani	3	forearm	3 months.

It is well established that the concentration of phlebotomine sandflies is more in the urban areas where the density of humans and animals is higher. In Bahrain where the density is as high as 510 inhabitants per square kilometers, 80% of the population live in urban areas (11), but even with local areas of high density, leishmaniasis in Bahrain does not exist.

ACKNOWLEDGEMENT

I am grateful to Dr. W.F. Whimster and Dr. H. Yacoobian for reading the manuscripts and their valuable suggestions.

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