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S. sintoni and *S. clydei* (2,5,6,10) in transmission of lizard leishmaniasis, the presence of leptomonad infection in *S. dentata* and a high population of lizards in the area indicate that, this species, too, can be a vector of lizard leishmaniasis.

Acknowledgement

The authors wish to express their thanks for the collaboration of the staff of Meshkinshahr and Germe Public Health workers and Dr. M. Mohebbali Head of Health Training and Research Center, Meshkinshahr, Iran and A.R. Zahraii staff of Health Training and Research Center, Isfahan, Iran.

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and *Ph. papatasi* were dominant indoors species.

The changes in seasonal activity of two potential vectors of V.L. such as *Ph. kandelakii* and *Ph. perfiliewi* are shown in Figs. 1 and 2. The activities of *Ph. kandelakii* and *Ph. perfiliewi* were started in June and ended in September, with a peak in August for the former species and two peaks in July and August for the latter species.

In this survey, 2659 sand-flies were dissected and identified. They were *Ph. caucasicus*, *Ph. sergenti*, *Ph. kandelakii*, *Ph. perfiliewi*, *Adlerius subgenus*, *S. dentata* and *S. sintoni*, 1.09% of 549 *Ph. perfiliewi*, 0.34% of 882 *Ph. kandelakii* 13.64% of 44 *S. sintoni* and 9.76% of 205 *S. dentata* were found to have natural promastigote infection. All of the infective sandflies were caught by sticky traps (indoors and outdoors) from Germe districts, while the species of *Ph. kandelakii* was caught by indoor C.D.C. light trap from Meshkinshahr district. This is the first report on natural promastigote infection in *S. dentata* in Iran.

Discussion

The vectorial role of *Ph. kandelakii* and *Ph. perfiliewi* in transmission of visceral leishmaniasis is well known in the world (3,4). In this study we found high populations of these species from outdoors and indoors with the natural leptomonad infection in Meshkinshahr and Germe districts, where widespread human and dog infection (as an important domestic reservoir) has been found before (1). Thus, it is concluded that *Ph. kandelakii* and *Ph. perfiliewi* are the probable vectors of VL in Meshkinshahr and Germe districts respectively.

Another interesting finding was the existence of natural leptomonad infection in *S. dentata*, not reported previously by other investigators. Considering the vectorial role of the *Sergentomyia* sandflies such as

Warm season is rather short in the area lasting from mid may to late September. Total rain fall (in 1994) was 314.6 mm and 301.76 mm in Meshkinshahr and Germe districts respectively. The main occupation of the people in these areas are agriculture and animal (sheep and cattle) husbandry.

In this survey sand-flies were collected by an aspirator and sticky paper trays (15 x 20cm) from indoors (stable , living room , cow shelter) and outdoors (dog and fox shelters , hole of rocks and cave). Sticky papers were put before sunset and collected on the following morning before sunrise. Three DC light traps were used in this study ; one was suspended from the ceiling of a house with Kala-azar V.L. Patient , another from the ceiling of a stable and the last light trap from the trees near the outdoor resting places of sandflies.

During dissection , the head and abdomen of each sand-fly and also male sand-flies were mounted in a drop of Puri's medium on a slide for latter species identification (7).

Results

Altogether 3509 sand-flies were collected from different parts of Meshkinshahr and Germe districts. The species of Meshkinshahr district were, *Ph. kandelakii* (31.08%) , *Ph. perfiliewi* (2.36%) , *Ph. balcanicus* (4.52%) , *Ph. major* (0.98%) , *Ph. longidactus* (0.09%) , *Ph. halpensis* (1.6%) , *Ph. papatasi* (21.70%) , *Ph. caucasicus* (22.68%) , *Ph. sergenti* (12.28%) , *Ph. mongloensis* (0.22%) , *S. dentata* (2%) , *S. sintoni* (0.4%) and *S. squamipleuris* (0.04%) and also in Germe district the species of *Ph. kandelakii* (31.42%) , *Ph. perfiliewi* (13.62%) , *Ph. major* (1.81%) , *Ph. balcanicus* (6.38%) , *Ph. halpensis* (2.05%) , *Ph. brevis* (0.08%) , *Ph. papatasi* (2.6%) , *Ph. caucasicus* (1.65%) , *Ph. monglensis* (0.31%) , *Ph. jacusieli* (0.16%) , *S. dentata* (34.09%) and *S. sintoni* (6.14%) were caught. It should be mentioned that *Ph. kandelakii*

Introduction

Visceral leishmaniasis has been reported sporadically from all over the country (8). But during recent years, Fars province, South of Iran and Ardabil province, north west of Iran, especially Meshkinshahr and Germe districts, have been recognized as important foci of V.L. Altogether more than 1600 cases of V.L. have been diagnosed and treated from 1985 - 1994 (9,11).

There are several potential vectors of V.L. (sand - flies) such as *Phlebotomus kandelakii* and *Ph. perfiliewi transcausicus* (4,9). The former species has been reported from central Asia, Afghanistan, Iran, Lebanon, Turkey and USSR and the latter species from Iran, USSR and Italy (4).

It should be mentioned that in Afghanistan *Ph. kandelakii* is very hydrophilic and moderately thermophilic and bites man and large animals easily. It is considered to be a main vector of V.L. in Transcaucasia (4). On the other hand *Ph. perfiliewi transcausicus* appears to be a vector of V.L. in Azerbaydzhane (4).

The main purpose of this study was to determine the natural promastigote infection of sand flies in these provinces, and also. The fauna and seasonal activities of two mentioned potential vectors of V.L. has been surveyed.

Materials and methods

Germe (population 123000 in 1986) and Meshkinshahr (population 176000 in 1986) districts are located in the northwest of Iran. The cities of Meshkinshahr and Germe are situated at an altitude of 1490m and 1100m above sea level respectively. The weather is very cold in the winter (down to -27°C) and warm in the summer (up to 40°C).

NATURAL PROMASTIGOTE INFECTION OF SAND-FLIES AND ITS FIRST OCCURRENCE IN *SERGENTOMYIA DENTATA* IN ARDABIL PROVINCE, NORTH WEST OF IRAN

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Key words: *Promastigote* , *Phlebotomus* , *Sergentomyia* , *Leishmaniasis* , *Iran*

Abstract

Visceral leishmaniasis is endemic and zoonotic in several foci in Ardabil province , north west of Iran. The main objective of this study was to determine the natural promastigote infection of sand-flies in active seasons, during 1991-1995.

Sand-flies were caught by sticky traps , aspirator and CDC light traps from indoors and outdoors.

Altogether 2659 sandflies were dissected and identified. They included *Ph. kandelakii* , *Ph. perfiliewi transcausicus* , *Ph. papatasi* , *Ph. jacusieli* , *Ph. caucasicus* , *Ph. sergenti* , *Adlerius subgenus* , *S. dentata* and *S. sintoni*.

1.09% of 547 *Ph. perfiliewi transcausicus* and 0.34% of 882 *Ph. kandelakii* were found with natural promastigote infection. Also several specimens of *S. dentata* and *S. sintoni* , from Germe district , were with natural promastigote infection. This is the first report of natural promastigote infection in *S. dentata* in Iran.

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