

Species Composition and Population of Mosquitoes in the Scenes of Curmal Leishmaniasis in Uzbekistan

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Abstract Some regions of Uzbekistan are endemic for cutaneous leishmaniasis. Research was conducted in Jizzakh, Kashkadarya and Surkhandarya regions to determine the current situation of the mosquito population in the areas considered to be ATL and ZTL foci. 7 species of mosquitoes belonging to 2 genera were identified in the researched leishmaniasis foci: *Phlebotomus* (6 species) and *Sergentomyia* 1 species.

Keywords Leishmaniasis, ATL, ZTL, Endemic foci, Mosquito, Foral fluid, *Phlebotomus*, *Sergentomyia*

1. Introduction

Various forms of leishmaniasis are common in 82 countries of the world, about 350 million people live in areas of high risk of infection. [1] The World Health Organization has included this group of infections in the Tropical Diseases Research Program. Zoonotic cutaneous leishmaniasis (ZCL) is widespread in Asia and Africa. In Uzbekistan, cutaneous leishmaniasis (CL) is currently registered in the regions of Uzbekistan and in the Republic of Karakalpakstan, an increased incidence is observed in Surkhandarya, Kashkadarya and Jizzakh regions. About 1.5 million people are at risk of infection. According to the official data of the ResTSGSEN for 2016, an increase in the incidence of CL by 37% was noted in the republic (from 503 to 766 cases, in an intensive indicator - from 1.6 to 2.4 per 100 thousand of the population) due to the high rates of the Surkhandarya region, where the increase in incidence was 40% (from 149 to 248 cases), in the Republic of Karakalpakstan, cases of CL increased by 2.2 times (from 60 to 129 cases), in Samarkand - by 3.3 times (from 27 to 88 cases), in Bukhara by 35% (from 66 to 102 cases), in Jizzakh by 19% (from 42 to 52 cases) and Khorezm regions by 6 times (from 6 to 36 cases). In 2016, local cases were registered in the Tashkent region (Almalyk city).

In connection with the complication of the situation with leishmaniasis, it is very important to study the species composition and monitoring the number of mosquitoes - carriers of these diseases in the settlements of Uzbekistan. To clarify the current state of mosquito populations, we conducted research in Jizzakh, Kashkadarya and Surkhandarya regions, on the territory, which is the foci of

ACL and SCL in Uzbekistan.

On the territory of Uzbekistan, 17 species of mosquitoes belonging to 2 genera were found: *Phlebotomus* 12 species and *Sergentomyia* 5 species [2,3,4,5,6,7,8,9,10,11,13,15,16], of which the main carriers of leishmaniasis are 4 types of mosquitoes: *Phlebotomus papatasi*, *P. _ longiductus*, *P. _ Sergenti* and *P. _ smirnovi*.

In this regard, a study of mosquitoes was carried out in a number of regions of Uzbekistan - Surkhandarya, Kashkadarya and Jizzakh, where patients with leishmaniasis have been registered in recent years.

2. Materials and Methods

Mosquito capture was carried out during 2017 and 2020. in the above areas. Mosquitoes were caught using sticky sheets of paper (A 4), which were installed in residential and utility rooms and on colonies of large gerbils (*Rhombomys opimus*) 1 hour before sunset and filmed in the morning.

A total of 1241 ind. mosquitoes. Captured mosquitoes were placed in 96% ethanol. To determine the species of mosquitoes, permanent preparations were prepared using a gum arabic mixture (Foral liquid). Species identification was carried out by determinants [1,12]. The number of mosquitoes was calculated by the index of abundance - the number of mosquitoes of each species per one Velcro.

3. Results and Discussion

In the foci of leishmaniasis of Uzbekistan examined by us, 7 species of mosquitoes belonging to 2 genera *Phlebotomus* and *Sergentomyia* were found: *P. papatasi*, *P. _ caucasicus*, *P. _ alexandri*, *P. _ mongolensis*, *P. _ sergenti*, *P. _ andrejevi* and *S. _ Clydei*.

5 species of mosquitoes were found in natural foci of the ZKL in Surkhondarya and Kashkadarya regions. In residential and utility rooms, the dominant species was *P. papatasi* (79.0 - 87.9%). In this regard, the highest incidence of people with SCL was registered in the city of Mubarek. The abundance of other species such as *P. _ sergenti*, *P. _ caucasicus*, *P. _ alexandri*, *P. _ mongolensis* was insignificant in all collections.

It should be noted that in the colonies of great gerbils located near the city of Mubarek - in the desert zone, *P. caucasicus* (62.2%) and *P. papatasi* (25.8%). As we approach settlements, the number of *P. caucasicus* decreased, and *P. papatasi* - increased. The number of mosquitoes in the settlements was higher (from 1.7 to 4.87 mosquitoes per sheet of sticky paper per night), mainly due to *P. _ papatasi*. In the burrows of the great gerbil, the number of all types of mosquitoes (from 0.005 to 1.1 mosquitoes) was significantly less than in the settlements. Our studies have shown that in the Karshi steppe, natural foci of SCRs are ubiquitous.

To establish the role of different mosquito breeding sites in the studied areas, we compared the number of mosquitoes caught in different types of shelters. It turned out that the largest number of mosquitoes were caught in adobe rooms and cattle sheds, therefore, these rooms should be considered the main breeding grounds for mosquitoes in Mubarek.

In the natural focus of ZKL (Mubarek) in the fauna of mosquitoes, the following were found: *P. papatasi* and *P. _ sergenti* are carriers of zoonotic and anthroponotic cutaneous leishmaniasis.

In all settlements and in all collections, 2 types of mosquitoes were present: *P. _ Sergenti* and *P. _ papatasi*.

In the AKL foci in the Jizzakh region, 7 species of mosquitoes were found in residential and utility rooms, in the surveyed settlements, *P* was the predominant species, both in residential and utility rooms. *sergenti* (50.0-89.0%) is the main carrier of AKL.

The main breeding grounds for mosquitoes in the surveyed settlements were adobe dwellings and utility rooms.

In the fauna of the surveyed areas, mosquitoes are everywhere present: *P. sergenti*, in this regard, in Kashkadarya and Jizzakh regions, it requires increased attention of the sanitary and epidemiological service, not only in relation to SCL and anthroponotic leishmaniasis.

4. Conclusions

1. 17 species of mosquitoes were found on the territory of Uzbekistan, in the course of our research in the foci of leishmaniasis in Surkhondarya, Kashkadarya, and Jizzakh regions, 7 species of mosquitoes belonging to 2 genera were found: *Phlebotomus* (6 species) and (*Sergentomyia* 1 species). The predominant species in

human settlements are *P. sergenti* and *P. _ papatasi*, and in colonies of large gerbils, *P. caucasicus*.

2. The abundance of mosquitoes in settlements in the oasis zone with foci of leishmaniasis was extremely low, in the steppe zone, due to the proximity to the burrows of gerbils, it was somewhat higher.
3. The main breeding grounds for mosquitoes in settlements are adobe dwellings and utility rooms, and under natural conditions, burrows of the great gerbil, where there are optimal conditions for the development of preimaginal stages and the breeding of mosquitoes.
4. The main vectors (CL) of leishmaniasis - *P. _ papatasi*, *P. _ Sergenti* in the surveyed territories of Uzbekistan are distributed everywhere.
5. Due to the dominant position of *P. sergenti* among other types of vectors of leishmaniasis in the Jizzakh region in the coming years, cases of ACL may become more frequent.

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