

## ATTEMPTS TO CONTROL ZONOTIC CUTANEOUS LEISHMANIASIS IN THE ISFAHAN AREA, IRAN\*

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### ABSTRACT

In 5 villages in Isfahan area, with a population of 1368, rodents were successfully controlled using poisoned bait with Zinc phosphide, with 300 meters of houses and built up area. In another 5 villages with a population of 1471, rodent burrows were dusted with DDT within the same distance, without any effect on sandflies. A third group of 5 villages was kept as control. The incidence of cutaneous leishmaniasis was almost the same in these three groups of villages, although rodent control was very effective. This shows that either the flight of sandflies was more than 300 meters or there are other important factors affecting the transmission.

### INTRODUCTION

Control of cutaneous leishmaniasis is a matter of concern in most endemic areas, but apart from a few programmes especially arranged for the control of this disease (3, 7, 10), the programmes in other instances, had been arranged for other purposes (malaria control, land reclamation) with the concurrent control of cutaneous leishmaniasis as a side product. (1, 4, 5, 6).

In the case of zoonotic cutaneous leishmaniasis, possible ways of control can be listed as : control of the insect vector, control

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keeping these individuals out of the reach of infected insects.

In all leishmaniasis, endemic areas in which residual house spraying has been used to control malaria, the incidence rate of cutaneous leishmaniasis has decreased considerably, except at places where the disease is transmitted exclusively by wild sand-flies in the forests (2).

Our experience in Isfahan shows that anti-malaria spraying of the villages does not interrupt the transmission completely (6) and once spraying is stopped, the incidence is built up soon to the levels before spraying (8,11).

With the assumption that the flight range of sandflies is only 300 meters (9) we decided to destroy rodent reservoirs within 300 meters distance from houses in one group of villages (which comprised groups of mud houses built very close to each other), to treat rodent burrows with DDT dust within the same distance in a second group of villages, and to compare the incidence of the disease in these villages with a third control group of untreated villages.

The present paper is the result of these studies carried out in the Isfahan area, Iran in 1972-1973.

## MATERIALS AND METHODS

Fifteen villages with a population ranging from 200 to 500 were selected for this study. These were randomly divided into 3 groups each consisting of 5 villages: the first group with a total population of 1368 for the control of rodents, the second group with a total population of 1471 for the control of sandflies in rodent burrows by DDT dusting, and the third group with a total population of 1817 as control.

In groups I and II, maps of the villages were prepared and the rodent holes within 300 meters from the houses were counted and located on the map.

In the first group of villages, poisoned bait was put in all rodent burrows within 300 meters of the houses once every month from early June through September, i.e. during the whole of the active season of sandflies, poisoned bait consisted of 12-15 grams of wheat containing 2.5% Zinc phosphide. Burrows were closed after baiting and were inspected 48 hours and one week after baiting to see how many had been reopened.

In the second group of villages 75% DDT was being blown into burrows within the same distance, once every month during the same period (0.5 grams in each burrow) with a hand dusting apparatus.

The third group of villages, as mentioned before, was kept as control.

The incidence of cutaneous leishmaniasis was determined by house to house visit of all these villages in June, September and December 1972 and in March 1973. The population density of sandflies was determined in sprayed and non-sprayed (control) rodent burrows once every 10 days during the entire active season.

## RESULTS AND DISCUSSION

Table 1 shows the effect of poisoned bait on the rodents. Total number of the holes were 38,149. These holes were closed and 16,411 of them were reopened before first baiting in June, 1972. This had decreased to 21 in September 1972, a week after the last baiting and remained at the same level even 12 months after the last baiting (24 in September 1973). This means that the poisoned bait used had been very effective for the control of wild rodents.

Dusting of the burrows had no effect on the number of sandflies. This might be due to the type of soil which is so loose that the insecticide dust is quickly buried under soil falling to the ground, with no effect on sandflies coming out from the depth of the burrows. Perhaps spraying of burrows with the insecticide would have had more effect than dusting.

Table 2 shows the incidence of cutaneous leishmaniasis in these three groups of villages. There are no significant differences in this respect, all having an incidence rate of 8 to 10 per thousand per year. We took a careful history of all the cases to determine where they might have contacted. Most of the cases in this area were infants and small children and many of them had apparently contacted the disease within their village of residence.

These results show that the above mentioned techniques are ineffective for the control of cutaneous leishmaniasis.

In the group of villages in which we controlled rodent reservoirs, the method was very effective to destroy almost all the rodents in the treated area, but still there were cases in the villages. This was either because the flight range of sand-flies is more than 300 meters or there might be some other reasons.

This study shows that in an area within 300 meters in 5 villages, in approximately 2.5 square kilometers, there were 16,411 active rodent holes, or more than 6,500 holes per square kilometer. The rodent control activities are not economically justifiable under prevailing conditions of the area, even if we may assume that by the extension of the radius of treatment, we might succeed to interrupt the transmission, unless this program is carried out with several objectives at the same time like control of other diseases,

control of plant pests etc. We may have to wait for an effective vaccine to be developed in future for the prevention of cutaneous leishmaniasis.

Table 1- Decrease in the number of rodent holes by using poisoned bait in 5 villages of the Isfahan area ( last baiting, Sept. 1972 )

Name of the villages	Number of rodent burrows within 300 meters of the villages						
	June 1972 before treatment	July 1972	August 1972	September 1972	May 1973	July 1973	September 1973
Colonabad	4827	249	48	6	2	4	4
Juzdan	4769	355	79	4	11	9	9
Sussart	3683	449	20	8	2	2	7
Parvaneh	2526	100	13	2	4	4	4
Jaladeran	606	152	1	1	1	—	—
all five villages	16411	1305	161	21	20	19	24

Table 2- Incidence of cutaneous leishmaniasis in 3 groups of villages ( April 1972 - March 1973 )

Village groups	Population	No. of cases	Incidence rate (per thousand)	No. of cases contacted in the village	No. of cases contacted outside treated area
With rodent control	1368	14	10.2	4	10
With dusting of the burrows	1471	12	8.1	5	7
Control villages	1817	15	8.2	6	9

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