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## Miscellanea

### Leishmanin Skin Sensitivity in Northwestern Mali<sup>1</sup>

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#### *Introduction*

Both visceral and cutaneous leishmaniasis are reportable diseases in the Republic of Mali. Although the visceral form of the disease has never been reported, the cutaneous type has been observed in most parts of the country. In the past it had been thought that two principle foci of cutaneous leishmaniasis existed in Mali, the cercle of Nioro in the western region of Kayes and the cercle of Segou in the region of Segou in central Mali (1). Recent epidemiological studies of the disease using the leishmanin skin test and case investigations, reveal, however, that cutaneous leishmaniasis is widely distributed in Mali (2, 3).

During the ten year period from 1957 to 1966, there were a total of 589 cases of cutaneous leishmaniasis reported in Mali (1). Of this number, 339 (57.5%) were reported from the cercle of Nioro and 413 (70.1%) from the entire region of Kayes in which the cercle of Nioro is located (map). By comparison, no clinical cases had ever been reported from the cercle of Timbuctoo which lies in a similar latitude where climate, rainfall, vegetation and topography are the same. In 1968 a leishmanin skin test survey was conducted in Timbuctoo and showed that of 179 subjects tested and read, 87 (48.6%) had reactions greater than 5 mm in diameter. The absence of reported cases, therefore, does not indicate that leishmaniasis does not exist in a given locale. Because of the large number of cases of cutaneous leishmaniasis reported from Nioro, a study was undertaken in that cercle in 1969 in order to determine in a more precise manner the epidemiology of the disease. For administering the skin tests, a new method, the jet injector apparatus (photo) was used. A total of 572 skin tests were performed among life long residents of the cercle.

#### *Materials and Methods*

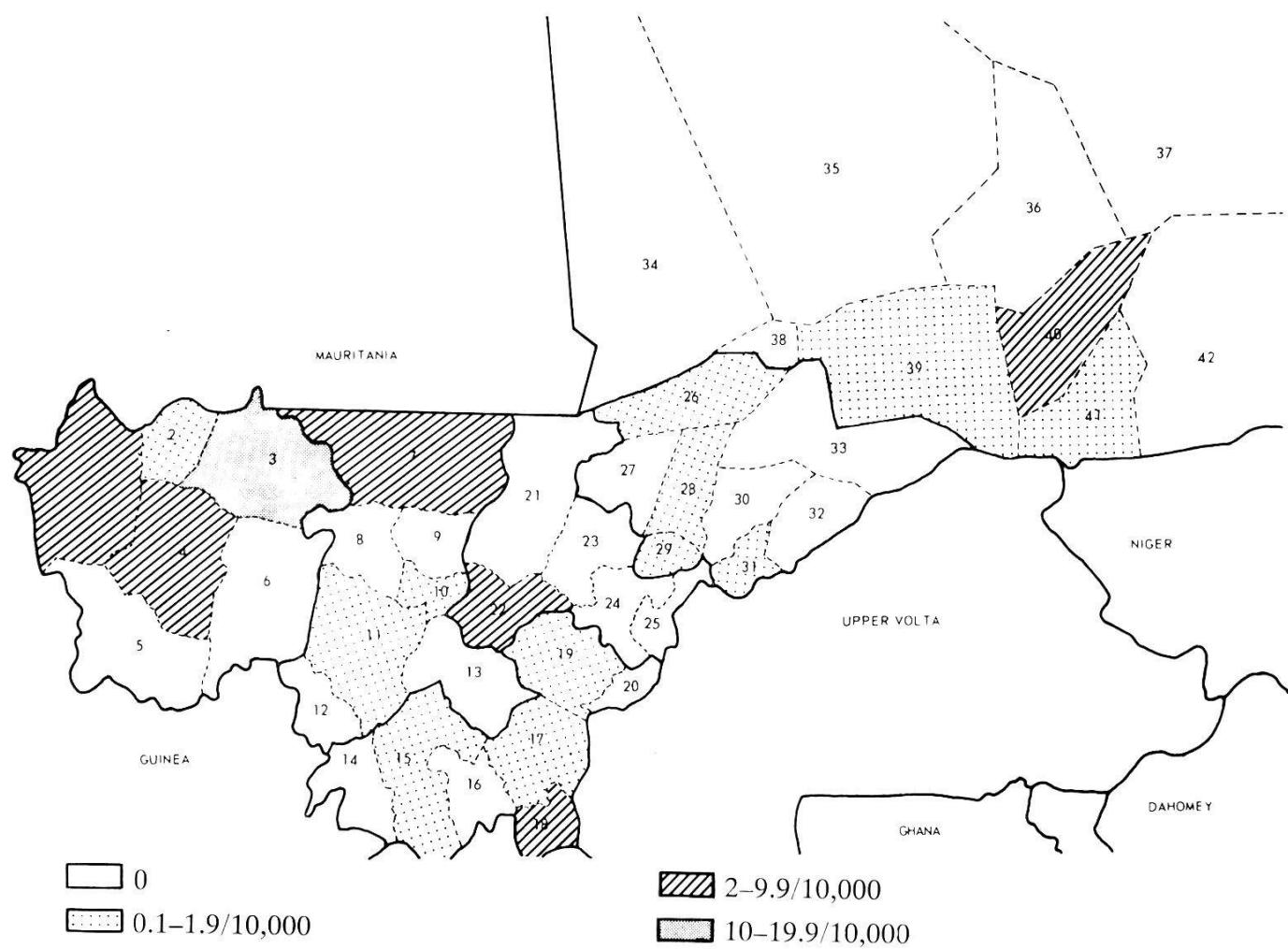
For a number of years now, the leishmanin skin test has been widely used in Asia, Africa and South America as an excellent tool for case finding and epidemiological surveys (4). Essentially, the test is an immunological procedure similar to the Mantoux test in which 0.1 to 0.2 ml of an antigen containing a phenol killed suspension of 6-10 million leptomonads per ml are injected intradermally. During the present study, a Kenya strain of *L. donovani*, prepared by

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Average yearly attack rate for leishmaniasis, 1957-1966.

Region	Cercle	Region	Cercle
KAYES	1. Kayes 2. Yelimane 3. Nioro 4. Bafoulable 5. Kenieba 6. Kita	SEGOU	21. Niono 22. Segou 23. Macina 24. San 25. Tominian
BAMAKO	7. Nara 8. Kolokani 9. Banamba 10. Koulikoro 11. Bamako 12. Kangaba 13. Dioila	MOPTI	26. Niafounke 27. Tenenkou 28. Mopti 29. Djenné 30. Bandiagara 31. Bankass 32. Koro 33. Douentza
SIKASSO	14. Yanfolilla 15. Bougouni 16. Kolon-Dieba 17. Sikasso 18. Kadiolo 19. Koutiala 20. Yorosso	GAO	34. Goundam 35. Timbuctoo 36. Bourem 37. Kidal 38. Dire 39. Gourma-Rharous 40. Gao 41. Ansongo 42. Menaka



The Ped-O-Jet model automatic jet injector.

Professor P. E. C. MANSON-BAHR of the London School of Hygiene and Tropical Medicine was used. This antigen is group specific and suspensions of either *L. tropica* or *L. braziliensis* will elicit the same reactions (4). The test is a delayed hypersensitivity reaction and the results are read 48 to 72 hours after injection.

The usual technique for administering the test consists of the intradermal injection of the antigen with needle and syringe. For the present study, however, the Ped-O-Jet model automatic injector was used for applying the antigen. 0.15 ml of antigen was administered intracutaneously on the upper inner aspect of the right forearm with the Ped-O-Jet injector. New injectors and heads were used to apply the leishmanin and both heads and injectors were reserved exclusively for leishmanin skin testing. The test group was examined 72 hours later, and the transverse diameter of the induration measured with a small flexible ruler. An induration of 5 mm or more was considered a positive test. Positive reactions occur in active and inactive cases of cutaneous leishmaniasis and in cured cases of kala azar (4). False negatives are seen in instances where there is severe systemic disease and debilitation (4). Since the antigen is suspended in phenol, false positives may be expected. In a previous leishmanin skin survey in Mali, false positive reactions were seen in 4.7% of those tested with a control solution containing 0.1 ml of  $\times 0.5\%$  phenol in saline (2).

The subjects who participated in the present study were students in Nioro's schools. They were all between the ages of five and twenty-two years, and life long residents of the cercle. The mean age of the test group was 14.8 years. None of the subjects were suffering from known leishmaniasis, tuberculosis, cancer or other debilitating illnesses.

### Results

The results of the survey are shown in Table 1. Of the 572 students who participated in the study, 550 completed it. Among these, 337 (61.3%) had positive reactions. Rates of positive reaction were highest for males in the 15-25 year age group (73.3%) and for the females in the same age group (63.6%). The smallest induration size considered positive was 5 mm and the largest recorded was 11 mm with a mean of 8.2 mm.

TABLE 1

Leishmanin skin test reactions by age and sex, Nioro, Republic of Mali, 1969

Age group n years	Male			Female			Total		
	No Tested	No Positive	% Positive	No Tested	No Positive	% Positive	No Tested	No Positive	% Positive
5-10	77	44	57.0%	50	30	60.0%	127	74	58.2%
11-14	141	77	54.6%	70	38	54.0%	211	115	54.5%
15-24	135	99	73.3%	77	49	63.6%	212	148	69.8%
Total	353	220	62.3%	197	117	59.3%	550	337	61.3%

### Discussion

The use of the jet injector for skin testing with various antigens has been previously reported (5-7). COCKBURN and co-workers found a good correlation between results obtained with the Mantoux test and the jet injection technique (7). Recently, DULL et al. carried out a comparative study using the Mantoux test and the jet injection technique. Among those whose Mantoux test was smaller than 10 mm, they found a considerable difference in reaction size. There was a better correlation of reactions between the two techniques among those who had larger Mantoux reactions (5). Further studies by LUBY et al. showed that there was no demonstrable relation between the amount of tuberculin injected with the jet gun and the reaction size. They demonstrated that the jet gun resulted in reactions which were consistently smaller than those produced with the needle and syringe technique. This occurred even when the injected volumes of the two methods were the same. The inference from these latter studies is that the reaction size produced with the jet injector is smaller than that with needle and syringe (6).

The attack rate for cutaneous leishmaniasis has been consistently highest over the past ten years in the cercle of Nioro (1). There has always been an awareness of cutaneous leishmaniasis in Nioro on the part of medical authorities and hence reporting has been very conscientious. Absence of reporting and/or under reporting undoubtedly occurs in some areas of the country due to either an unawareness of the disease or to the fact that most cases are not brought to medical facilities for treatment. Prior to the carrying out of leishmanin skin test surveys in Mali, it was not known whether the high attack rate for Nioro represented

conscientious detection and reporting of cases compared to a lack of such in other cercles or whether it represented a genuinely higher rate. The results of this survey show that 337 of 550 (61.3%) persons tested had positive reactions which represents the highest rate yet recorded in Mali. By comparison, reaction rates recorded in the cercle of Bamako have been 12.7% (90 positive of 705 tested) and in Timbuctoo 48.6% (2, 3).

As in other surveys performed in Mali, positive leishmanin skin sensitivity increases with age for both males and females. Although precise statistics are lacking, it has been observed that the majority of clinical cases of cutaneous leishmaniasis in Mali occur below the age of twenty years. There appears to be no overall sex difference in leishmanin skin sensitivity.

In 1961, LARIVIÈRE, ABONNENC & KRAMER undertook a study of the possible vectors of cutaneous leishmaniasis in West Africa (8). In the cercle of Nioro, they found large numbers of *Phlebotomus dubosqi*. The results of the present survey confirm the surveillance data for cutaneous leishmaniasis in Nioro. The presence of a known vector of cutaneous leishmaniasis in the area would seem to indicate that this sensitivity represents previous infection with *L. tropica*. The possibility that some of the positive reactors may represent previous healed infection with *L. donovani* cannot of course be ruled out. However, kala azar has never been diagnosed in Nioro by medical authorities keenly aware of both forms of leishmaniasis. Although kala azar and cutaneous leishmaniasis can be found together in the same locale, such is usually not the case (9).

Although the leishmanin skin test is a useful test in epidemiological surveys for leishmaniasis, it has certain limitations. In and of itself, it only indicates that leishmaniasis is either absent or present. It cannot be used to distinguish cutaneous from visceral leishmaniasis. This renders it of limited use in those areas where both forms of the disease might be present. In order to delineate the relative prevalence of both forms of the disease in such areas, one would have to carry out an integrated survey using ulcer biopsies, scar surveys, serological studies and spleen punctures.

#### *Summary*

A leishmanin skin test survey was carried out in northwestern Mali in the administrative cercle of Nioro which has had the highest reported attack rate for cutaneous leishmaniasis in the country. 550 persons completed the study of whom 337 (61.3%) had positive tests. This represents the highest positive reaction rate yet recorded in Mali. The skin tests were applied with the Ped-O-Jet injector. The results of this survey confirm that cutaneous leishmaniasis is very prevalent in this part of Mali.

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