

IDENTIFICATION OF BLOODMEALS OF PHLEBOTOMINE SANDFLIES USING THE AGAROSE GEL DIFFUSION METHOD

R Srinivasan and KN Panicker

Vector Control Research Center, (ICMR), Medical Complex, Indira Nagar Pondicherry - 605 006, India.

Abstract. The source of blood meal of wild caught Phlebotomid sandflies collected in areas around Pondicherry was identified using an agarose gel diffusion method. A total of 497 blood samples obtained from freshly engorged Phlebotomid sandflies were tested. Of these 66.8% were positive to human antisera, 29.2% to bovine antisera and the remaining 4.0% to avian antisera. The human blood indices of *P. papatasi* and *P. argentipes* were 0.91 and 0.04, respectively.

INTRODUCTION

The disease leishmaniasis caused by Phlebotomine sandflies is reported to occur in over 80 countries (Marinkelle, 1980). In India, these diseases once endemic in many parts, showed a transient disappearance during 1950's, when the indoor residual spraying operation of the National Malaria Eradication Program (NMEP) was in progress (Chowdhury, 1983). The cessation of spraying activity recently has resulted in the resurgence of sandfly-borne diseases in many areas of this country (Chowdhury, 1983). For a better understanding of the epidemiology of any vector-borne disease, it is essential to understand different aspects of the ecology and behavior, including biting activity and feeding pattern. During the present study the source of blood meal of Phlebotomid sandflies collected in villages of Pondicherry was determined.

MATERIALS AND METHODS

Freshly engorged sandflies resting in human dwellings and cattle sheds were collected at weekly intervals for one year from March 1988 to February 1989 in four localities viz, Vazhakulam (urban), Arumbarthapuram (semi urban), Sethurapet and Thuthipet (both rural), all situated within 15 km from Pondicherry town. The sandflies brought to the laboratory were dissected and the head capsules were mounted on slides to facilitate identification. Keys provided by Lewis were used for identification (Lewis, 1967). The gut contents of freshly engorged

females were squashed on Whatman no. 1 filter paper and the source of blood meal was identified employing agarose gel diffusion technique (Bheema Rao, 1984), using antisera to human, buffalo, sheep, goat, dog and fowl blood proteins.

RESULTS AND DISCUSSION

Out of a total of 497 blood squashed tested, 66.8% were positive for human, 29.2% for bovine and the remaining 4.0% for avian blood (Table 1).

A high proportion of *P. papatasi* was found to have fed on human blood in three out of four collection localities. In Arumbarthapuram, where no domestic cattle were available, 171 out of 174 (98.3%) blood meals tested from *P. papatasi* were found to be positive for human blood and the remainder (1.7%) for avian blood. In Sethurapet the percentages of *P. papatasi* engorged on human and avian blood were 85.7 and 14.3 respectively and none was positive for bovine blood. In Thuthipet, 83.9% of *P. papatasi* was found to have fed on human blood, while 12.5% on bovine and 3.6% on avian blood. When the data obtained in all the three study villages were pooled together it was observed that 91.0%, 5.9%, and 3.1% had fed on human, bovine and avian blood, respectively. The average Human Blood Index (HBI) of *P. papatasi* was found to be 0.91. This is in conformity with that of earlier observations made in different parts of India (Dhanda *et al*, 1983; Dhanda and Modi, 1971; Pandya, 1985).

BLOODMEALS OF PHLEBOTOMINE SANDFLIES

Table 1

Results of precipitin test on the blood meals of sandflies collected from different villages.

Villages	Species of sandflies	No. collected from		No. of samples examined	Blood meal source (%)		
		human dwelling	cattle shed		H	B	A
Arumparthapuram	<i>P. papatasi</i>	174	0	174	171 (98.3)	0	3 (1.7)
	<i>S. clydei</i>	3	0	3	3 (100.0)	0	0
Thuthipet	<i>P. papatasi</i>	168	0	168	141 (83.9)	21 (12.5)	6 (3.6)
	<i>P. argentipes</i>	9	0	9	5 (55.6)	4 (44.4)	0
	<i>P. colabaensis</i>	0	1	1	0	1 (100.0)	0
Vazhakulam	<i>P. argentipes</i>	0	128	128	0	118 (92.2)	10 (7.8)
Sethurapet	<i>P. papatasi</i>	14	0	14	12 (85.7)	0	2 (14.3)
Total		368	129	497	332 (66.8)	145 (29.2)	20 (4.0)

Figures in parentheses denote the percentage.

H = Human

B = Bovine

A = Avian

Out of 128 *Phlebotomus argentipes* obtained from cattle sheds in Vazhakulam, 118 (92.2%) and 10 (7.8%) were found to have fed on bovine and avian blood, respectively, and none was found to have fed on man. However, among 9 *P. argentipes* collected from human dwellings in Thuthipet, 5 were positive for human blood (55.6%), the remaining 4 for cattle (44.4%) and none for avian blood. This shows the indiscriminate feeding behavior of *P. argentipes*. However, when the data were analysed together, the percentages of blood samples positive for human, cattle and avian antisera were 3.6%, 89.1% and 7.3%, respectively. The average Human Blood Index (HBI) and Bovine Blood Index of *P. argentipes* were 0.04 and 0.89, respectively.

Though it was earlier reported that *P. argentipes* is anthropophilic (Lloyd and Napier, 1930),

in the present observation this species was found to be zoophilic. Similar results were obtained by Dhanda *et al* (1983) and Dhanda and Modi (1971).

All 3 specimens of *Sergentomyia clydei* caught indoors were found to be positive for human blood, while a single specimen of *P. colabaensis* obtained from cattle shed was positive for bovine blood. Although the occurrence of mixed blood meals was reported in sandflies (Lloyd and Napier, 1930; Dhanda and Gill, 1982) in the present investigation none of the sandflies tested had a mixed blood meal.

The study gains significance in view of the fact that even though no kala azar occurs in Pondicherry, 117 cases have been reported in the past from some of the nearby areas of Tamil Nadu

(Peters and Prasad, 1983). Therefore the prevalence of anthropophilic populations of both *P. argentipes* and *P. papatasi* coupled with frequent movements of people to and from adjacent areas should be viewed with due concern.

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