

ECTOPARASITES OF *RATTUS RATTUS DIARDII* FROM KUALA LUMPUR CITY MALAYSIA

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Abstract—Ectoparasites of the common house rat, *Rattus rattus diardii* from Kuala Lumpur city, Malaysia was investigated. The study was conducted over a period of one year. 73% of the rats harboured the flea *Xenopsylla cheopis*, followed by mites *Laelaps echidninus* 64%, *L.nuttalli* 31% and lice *Polyplax spinulosa* 21%. The flea index for Kuala Lumpur city was 7.4. House rats were also collected from semi-urban areas in the vicinity of Kuala Lumpur. The study was done to investigate and to compare the differences if any in ectoparasite fauna of rats from urban and semi-urban environment. It was noted that rats from semi-urban areas were mostly infested with mites; 50% were infested with *L.nuttalli* and 38% with *L.echidninus*. Also, 55% were infested with the lice *P.spinulosa* and 12% with *Hoplopleura pacifica*. 22% of the rats were infested with the flea *X.cheopis*; the flea index for the semi-urban area was 0.4.

The study shows distinct differences in ectoparasite fauna of the two house rat populations sampled. The flea index in the city was rather high compared to those reported in other parts of the country; it must be pointed out that plague was last reported in Malaysia in 1928. The prevalence of mites was also high in the city. *L. echidninus* is the commonest mesostigmatid mite on Malaysian house rats, with *L. nuttalli* occasionally being present. One rat caught in the city also had *Ornithonyssus bacoti*; although the mite is rare on house rats it has been implicated in the cause of pruritic dermatitis in Malaysia. In semi-urban areas, lice was the predominant ectoparasite on house rats. Rodent lice were known to harbour plague bacilli and probably act as secondary vectors in the transmission of tularaemia and bartonellosis from rat to rat.

The role of house rats in the transmission of diseases of public health importance in urban and semi-urban environment should not be underestimated. They are reservoir hosts for a number of parasites, plague and other pathogens. Although house rats live in gardens and rubbish dumps, they are rarely far from man; 6% of the rats trapped in the city during the study harboured the cat flea, *Ctenocephalides felis*. The public should be cautious of these potentially dangerous creatures and efforts must be made to eliminate them.

INTRODUCTION

Domestic rodents are closely associated with man and his environment. Rodents can play both direct or indirect roles in the transmission of human diseases. There are a number of studies on Malaysian rodents but little attention was given to the common house rat, *Rattus rattus diardii*. The house rat is one of the principal domestic pests in urban Malaysia, commonly seen nesting in fields and bushes near human habitations (Harrison and Siew-Keen, 1962). They are reservoirs for a number of parasites (Leong *et al.*, 1979; Sinniah, 1979) and pose a threat as a potential disseminator of plague, scrub and murine typhus, tularaemia and bartonellosis.

In this communication, the results of a year-long survey on ectoparasites of *R.r.diardii* are presented. The aim of the study was to elucidate the ectoparasite fauna of urban house rats and to compare that fauna to those of rats caught from the surrounding semi-urban areas. The emphasis of the study was on flea infestation of urban rats and their role in transmission of diseases of public health importance.

MATERIALS AND METHODS

Two locations were selected for the study to represent urban and semi-urban environments. The site in Kuala Lumpur city was in the vicinity of Chow Kit-Kg.Baru area, an environment typical of

many developing cities in Malaysia. The area consists of pre-independent shophouses, modern shopping complexes and government institutions; a small semi-modern Malay settlement is located nearby. A downtown residential area approximately 10 km away from the city was chosen to represent a semi-urban environment. The area consists of terrace houses and traditional Malaysian village houses.

Rat trappings at both sites were done over a period of one year. The sampling was done with the assumption that the rat populations sampled were geographically isolated. Trappings were done using wire-box traps, both outdoors and indoors. Captured rats were combed and examined for ectoparasites. Ectoparasites were fixed in 70% alcohol and mounted in Hoyer's mounting medium (gum arabica 30 gm., chloralhydrate 200 gm., glycerine 20 cc., water 500 cc) and identified.

RESULTS

Table 1 shows the prevalence of ectoparasites of the common house rat, *R.r.diardii*. One flea (*Xenopsylla cheopis*), 2 lice (*Polyplax spinulosa* and *Hoplopleura pacifica*) and 2 mites (*Laelaps echidninus* and *L. nuttalli*) were identified. The prevalence and infestation index of *R.r.diardii* according to types of ectoparasites is shown in Table 2. The flea index for the city of Kuala Lumpur was 7.4, the mite index 5.3 and the lice index 0.7. The flea index for the semi-urban area was 0.4, the mite index 1.5 and the lice index 4.7.

Table 1. Ectoparasites of the common house rat, *Rattus rattus diardii*

Species	Kuala Lumpur city			Semi-urban area		
	No.rats.	% +ve.	No. EP.	No.rats.	% +ve.	No. EP.
<i>X.cheopis</i>	52	73	384	60	22	24
<i>L.echidninus</i>	52	64	181	60	38	35
<i>L.nuttalli</i>	52	31	96	60	50	56
<i>P.spinulosa</i>	52	21	38	60	55	265
<i>H.pacifica</i>	52	0	0	60	12	15

No.+ve = Number of rats infested/No.rats trapped \times 100

No. EP. = Total number of ectoparasites collected.

Table 2. Specific prevalence and infestation indices of ectoparasites of the common house rat, *Rattus rattus diardii*

Species	Kuala Lumpur city			Semi-urban area		
	Crude index	Specific index	EP index infested rat	Crude index	Specific index	EP index infested rat
FLEA	7.4		10.1	0.4		1.9
X.c		7.4	10.1		0.4	1.9
MITE	5.3		5.7	1.5		1.7
L.e		3.4	5.5		0.6	1.5
L.n		1.9	6.0		0.6	1.9
LICE	0.7		3.5	4.7		7.0
P.s		0.7	3.5		4.4	8.0
H.p		0	0		0.3	2.1

X.c - *Xenopsylla cheopis*

L.n - *Laelaps nuttall*

H.p - *Hoplopleura pacifica*

L.e - *Laelaps echidninus*

P.s - *Polyplax spinulosa*

EP = Ectoparasites.

DISCUSSION

There are distinct differences in the ectoparasite fauna of the two house rat populations studied. The prevalence of *X. cheopis* was higher on rats from the city (73%) compared to those from the semi-urban area (22%). The specific flea index (*X. cheopis*) obtained by us was high compared to those reported by the Institute for Medical Research, Malaysia. The Institute maintains a plague surveillance programme and house rats are routinely trapped by the Health Department City Hall Kuala Lumpur. They reported that during the period 1987–1992, the specific flea indices of *R.r.diardii* ranged from 0.13–0.42 and the flea indices of infested rats were 0.01–0.03 (Inder Singh *et al.*, 1995). Our study gave a higher specific flea index (7.4) and flea index of infested rats (10.1). Similarly, the semi-urban area gave a flea index of 0.4 and the flea index of infested rats was 1.8. These differences may be due to patchy distribution of fleas on rodents and many other poorly defined factors. Apparently, fleas were more uniformly distributed on urban rats, and less so on rats in the semi-urban areas. The overall low flea indices of infested rats reported by the Institute for Medical Research, Malaysia during the period 1987–1992, when compared with our study, shows that flea infestation is very much localised within the city where certain areas are more heavily infested with the flea, *X. cheopis*. A specific index of over 1.0 for *X. cheopis* is always regarded as indicative of a dangerous situation (Bahmanyar and Cavanaugh, 1976); it must be pointed however that plague was last reported in Malaysia in 1928.

Flea forms 55% of the total ectoparasites collected on city house rats. Similarly, more mites were collected from the city (65%) than from the semi-urban area. Mites constitute 40% of the total ectoparasites from the city. Two species of mites, *L. echidninus* and *L. nuttalli* were collected from both the areas sampled. On city rats, *L. echidninus* forms 65%, followed by *L. nuttalli*, whereas *L. nuttalli* forms 62% of the mites on rats from the semi-urban areas. One rat from the city was also positive for *Ornithonyssus bacoti*; although the mite occurs worldwide its occurrence in Malaysia is uncommon. However, a case of dermatitis due to *O. bacoti* has been reported in Malaysia (Nadchatram and Ramalingam, 1974).

Lice were the predominant ectoparasite on rats from the semi-urban area. Only one species of lice was collected on city rats whereas 2 species were collected from the semi-urban environment. Rodent lice are known to harbour plague bacilli and to transmit tularaemia and bartonellosis (Traub *et al.*, 1978). Their actual role in the transmission of these diseases to man is not known.

R.r.diardii is closely associated with man, and is the most frequently trapped species in Kuala Lumpur city. The cat flea, *Ctenocephalides felis felis* was found on 6% of the city rats and the presence of the flea proves that house rats are rarely far from man. Thus their role in the transmission of diseases of public health importance should not be underestimated.

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