

## Original Research Article

### Prevalence of Ectoparasites in commensal rats in Dehradun, India

Shashi K. Solanki\*<sup>1</sup>, Rashmi Chauhan<sup>1</sup>, Abdul Rahman<sup>1</sup> and Kanika Solanki<sup>2</sup>

<sup>1</sup>Department of Zoology, D. A.V. (P.G) College, Dehradun-248001, India

<sup>2</sup>S.G.R.R.M.I.H, Medical College, Dehradun-248001, India

\*Corresponding author e-mail: [shashisolanki@outlook.com](mailto:shashisolanki@outlook.com)

#### A B S T R A C T

##### Keywords

*Rattus*;  
*R.norvegicus*;  
*M.musculus*;  
*X.cheopi*;  
*Polyplex*;  
*Ixodes*.

In the present investigation, 50 commensal rats of three species were examined for their arthropod ectoparasites from two different city habitats. Rats were captured during the period of October 2011 to March 2012 from Dehradun. Identified rats were *Rattus rattus* (54%), *Rattus norvegicus* (40%) and *Mus musculus* (6%). For all three species of rats more males 28 (56%) were captured than 22 (44%) females. 18% of captured rodents were infested with arthropod parasites. Collected ectoparasite was identified as *Xenopsylla cheopis*, *Ixodes* spp, *Polyplex* spp. Host gender does not affect ectoparasite infestation ( $P < 0.05$ ). The study documented that there was no significant difference in the rate of infestation among various species of rats ( $P < 0.05$ ).

## Introduction

Rodents together with arthropod ectoparasites can play an important role in the distribution of the arboviruses, streptococcal infections, choriomeningitis, plague, tularemia, leptospirosis, spirochaetosis etc., (Manson and Stanko, 2005). Ectoparasites include insects and acarnies (fleas and mites), some of them are permanent like lice, while most of the mature ticks and fleas are temporary parasites. Rats are known to harbor four groups of arthropod ectoparasites: fleas, ticks, mites and lice. Ectoparasites are irritating pests of human and animals.

Some of the ectoparasites can biologically or mechanically transfer infectious agents to the human or animals and results in the

spread of infection. The level of infection, intensity and activity of these vectors depends upon some factors such as abundance of various hosts, environmental conditions and locomotion (Zoghi, 2006). The objective of this study was to determine the prevalence of ectoparasites in commensal rats in Dehradun city, India.

## Materials and Methods

The investigation was carried out in two selected areas of Dehradun in period of October 2011-March 2012. Simple break – back type metal spring traps were used to collect the rats from the Grainery and Residential areas. All trapped rats were

identified up to the species level (Jeenifer and Frey, 2007). The fur of each anaesthetized rat was combed with fine tooth comb, to dislodge the ectoparasites and fine forceps was also used to remove the parasites from the skin of rats. The parasites were transferred in 70% ethanol. Dehydration and fixation were performed to definite morphological specification in light microscopy. The data was analysed by Chi-square test to study the significant difference in infestation among three species of rats and in study locations. The value of ( $P < 0.05$ ) was considered as statistically significant.

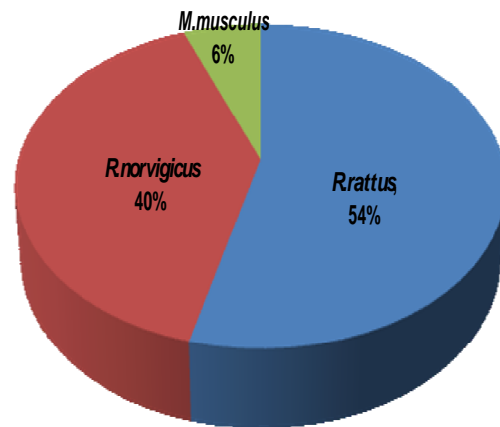
**Results and Discussion**

A total 50 rats were captured including three species 27(54%) *Rattus rattus*, 20 (40%) *Rattus norvegicus* and 3(6%) *Mus musculus* (Figure.1). For all three species of rats more males 28 (56%) were captured than 22(44%) females (Table-1). Chi- square test indicate that sex of the rats did not influence the level of ectoparasite infestation ( $P < 0.05$ ). Captured rodents in our study, *Rattus norvegicus* and *Mus musculus* were reported in some studies in Iran as vector of some ectoparasites. Other studies in some countries have similar results (Bittencourt *et.al.*, 2003; Reeves and Cobb, 2005; Hanafi *et.al.*, 2007).

In all 18% of captured rodents were infested with arthropod parasites, atotal of 12specimens were harbouring fleas accounting for 83.3% of total ectoparasites. It was observed that rats of all the three species captured from Grainery were infested with more ectoparasites (58%) as compared to the residential areas (42%) (Table.2). Rodent ectoparasite index was low in residential area (0.16) with insignificant difference in

infestation in two study locations ( $P < 0.05$ ). *R. rattus* was the most infested muridae species accounting for 67% of all ectoparasites collected followed by *Rattus norvegicus* (33%) (Table-3). There was no significant difference in the rate of infestation among various species of rats ( $P < 0.05$ ). The overall rodent ectoparasite index and individual tick, flea, louse index was lower than one (1). Results are in accordance with the study of (Omudu *et al.*, 2010) in Makurdi, Nigeria.

**Figure.1** Distribution of Rats



**Table.1** Distribution of rodent species captured at the study location

Rat Species	Grainery	Residential area	Total
<i>Rattus rattus</i>	11	16	27 (54%)
<i>Rattus norvegicus</i>	7	13	20 (40%)
<i>Mus musculus</i>	2	1	3 (6%)
<b>SEX:</b>			
Male	12	16	28 (56%)
Female	8	14	22 (44%)
<b>TOTAL</b>	<b>20</b>	<b>30</b>	<b>50</b>

*X. cheopis*, *Polyplex* spp. and *Ixodes* spp. were isolated from *R. rattus* and

*R.norvegicus*. All the examined house mice (*Mus musculus*) did not present any ectoparasite. Earlier an ectoparasite survey of small wild mammals of Dehradun

valley was conducted by (Wattel *et al.*, 1965). He reported 36 animals comprised of seven species harboured by 14 specimens of fleas.

**Table.2** Ectoparasites infestation of rodents captured at the study location

Study location	Captured rats	Infested rats	Fleas	Tick	Louse	Total ectoparasite	Rodent's Ectoparasite index	P-value
Grainery	20	5(25%)	6	1	---	7(58%)	0.35	
Residential area	30	4(13%)	4	---	1	5(42%)	0.16	P<0.05
Total	50	9(18%)	10(83%)	1 (8.3%)	1 (8.3%)	12		

**Table.3** Rodent species captured and Ectoparasites infestation

Rat Species	Captured rats	Infested rats	Fleas	Tick	Louse	Total ectoparasite	P value
<i>Rattus rattus</i>	27	6	7	---	1	8 (67%)	
<i>Rattus norvegicus</i>	20	3	3	1	---	4 (33%)	
<i>Mus musculus</i>	3	---	---	---	---	---	P<0.05
Total	50	9	10	1	1	12	
Ectoparasite index			0.2	0.02	0.02		

Among them only six (6) specimens of *X.cheopis* were recovered from three *Rattus rattus*. Presently, out of 50 rats 9 were harboured by 10 specimens of *X.cheopis* with highest index (0.2).No other documented survey has been cited in the literature of ectoparasites on rodents in Dehradun valley. This study is a step to assess the status of rodent infestation in Dehradun city. Further epidemiological and Zoonotic investigations need to be conducted in order to ascertain the role of rodents in emerging new infections. The animals were autopsied for presence of endoparasite and microbes and the results of this part will appear in due course.

### Acknowledgement

Authors are thankful to the University Grant Commission, Bhadur Shah Zafar Marg (Govt. of India) New Delhi, for providing financial assistance for the investigations.

### References

Bittencourt, E.B., and Durate Rocha,C.F. 2003. Host ectoparasites specificity in a small mammal community in an area of Atlantic rainforest (Ilha Grande, state of Rio de Janeiro), Southeastern Brazil. Mem. Inst. Oswaldo Cruz. 98 (6): 1-9.

- Hanafi-Bojd, A.A., M. Shahi, M. Baghahi, M. Shayeghi, N. Razmand and Pakari, A. 2007. A study on rodent Ectoparasites in Bandar Abbas: The main economic southern seaport of Iran. *Irani. J. Environ. Health. Sci. Engin.* 4 (3): 173-176 .
- Jennifer, K., and Frey. 2007. Key to the Rodents of New Mexico ; by, Frey biological research Post box No 294, Radium springs, New Mexico. 88054.
- Masan,P., and Stanko, M. 2005. Mesostigmatic mites (Acari) and fleas (Siphonaptera) associated with nests of mound-building mouse, *Mus spicilegus* Petényi, and 1882 (Mammalia, Rodentia). *Acta Parasitologica.* 50 (3): 228234.
- Omodu., Edward, Agbo and ATI. 2010. *Thoepphilus Terlumun*. A Survey of Rats Trapped in Residential Apartments and Their Ectoparasites inMakurdi, Nigeria. *Res. J. Agricul. Biol. Sci.* 6(2): 144-149.
- Reeves, W., and Cobb, K.D. 2005. Ectoparasites of Housemce (*Mus musculus*) from pet stores in South Carolina,USA. *Comp. Parasitol.* 72 (2): 193-95.
- Wattal, B.L., and Santosh K. Tandon 1965. An Entomological survey of Dehradun Valley; *Bull.Ind.Soc. Mal. Com. Dis.* 2(4): 297-306.
- Zoghi, A., 2006. Veterinary in public health service, Kamalolmolk Pub, pp. 119-120.