World Journal of Environmental Biosciences
Available online at:
www.environmentaljournals.org Volume 1, Issue 1:
5-8

Open Access **Review Article**

Studies on Gut Microbial Parasites from Fecal Contents of *Pteropus giganteus*: Short Review

Singh Preeti, Sushil Kumar Barolia, Kanchan Deora, Priya Mogra, Habiba Bano, Sudha Javeria

Department of Zoology, College of Science, M.L.S. University, Udaipur-Rajasthan, 313001 India

Corresponding author: harshitasushil@yahoo.com

Abstract:

Parasitic diseases continue to be a cause of major concern to human and animal health in several parts of the globe including India, causing high morbidity, mortality and economic losses. Food, water and soil borne infection are estimated to be affecting almost half of the world population. Zoonoses (Disease that are transmittable between animal and man) of parasitic origin contribute to this statistics by affecting human health and causing heavy losses directly or indirectly to the economy. Udaipur region boasts of one of the largest colonies of *Pteropus giganteus* in the world. The aim of the present study was to ascertain the incidence and transmittance of microbes by *Pteropus giganteus,* through the analysis of faeces collected from different regions of Udaipur. The present study showed the presence of gut microbial parasites spp. in the studied samples, thereby highlighting the role of *Pteropus* in the spread of diseases caused by the microbial agent.

Keyword: diseases *Pteropus,* zoonoses, faeces, microbial parasites,

1.0 Introduction:

India is one of the world's richest countries in terms of its vast array of biological diversity. Chiropterans belong to order Chiroptera of Class Mammalia. Chiropteran mammals (bats) are unique to their evolutionary status, aerial habit, the diverse ecological habit and habitat and geographical regions in which they occur. Chiropterans are classified in two suborders the Megachiroptera which includes all the frugivorous bats and Microchiroptera that includes the insectivorous bats. In total there are 1240 known species of bats. The suborder Megachiroptera comprises of 186 species confined to a single family, the Pteropodidae which includes about 170 species (Wund and Myers, 2001). This family of fruit- and nectar-feeding bats is found in the tropical and subtropical regions of the Old World, Australia and the Caroline and Cook islands (Hill and Draser, 1975). All megachiropterans feed primarily on plant material that could be fruit, nectar or pollen. The remaining 16 families (around 759 species) belong to Microchiroptera (Marshall, 1983, 1985; Fleming, 1986; Cox *et al.*, 1991 and Pierson and Rainey, 1992). The majority of these species are insectivorous. The megachiropterans act as seed dispersers and pollinators, while the microchiropterans play an important role in pest control. Chiropterans have attracted the attention of many researchers and scientists as they are the only mammals capable of true flight and also possess a unique system of echolocation for navigation in the dark. Further, many species are either threatened or endangered because of habitat loss.The various aspects related to the behavior and physiology of bats has been studied, however their role as vectors in transmission of certain diseases is yet to be ascertained and elucidated.Udaipur region boasts of one of the largest colonies of *Pteropus giganteus* in the world. One such aspect related to *Pteropus giganteus* is to evaluate its status as a host for various microbes, both beneficial and non beneficial and its role in spread of zoonotic disorders. Parasitic diseases continue to be a cause of major concern to human and animal health in several part of the globe including India, causing high morbidity, mortality and economic losses. Food, water and soil borne infection are estimated to be affecting almost half of the world population. Hence, the present study aims to investigate the presence of gut microbial parasites on the basis of fecal matter analysis and culture of microbes obtained from the fecal matter of *Pteropus giganteus* present in Udaipur region. This study would help to generate a data base for assessing the transmission of certain microbial species.

Table 1: Transmission of microbes by chiropterans to human and domestic animal (courtesy: Klite ,P. D.,1965b)

Name Of Microorganism	Infective To Man And Domestic Animal	References	Remarks
Arsinia enterocolitica	M+ve , D +ve	Vogel(1969)	Experimental infection
Besnoitia jellisoni	M-ve , D +ve	Unpublished result	Experimental infection
Besnoitia panamanasis	M-ve , D +ve	Schneider (1966)	Experimental infection
Borrelia see spirochita Escherichia coli spp.	M+ve , D +ve	Klite(1965)	Three Continent Panamanian bats
Klebsilla- Aerobecter serratia	M+ve , D +ve	Klite(1965)	Panamanian bats
Leishmania donovani	M+ve , D +ve	Mackie (1914)	Experimental infection
Leptospira australis	M+ve , D +ve	Tesh (1967)	From bat kidneys
Leptospira cynopetri	M+ve , D?	Tesh (1967)	Colombian bat
Leptospira medanesis	M+ve , D?	Henderson (1965)	Malayan bat
Leptospira schiiffneri	M+ve , D +ve	Hull (1963)	Indonesian bat
Leptospira sejroe	M+ve , D +ve	Benie Steele (2009)	Experimental infection
Leptospira sexkobing	M+ve , D +ve	Henderson (1965)	Indonesian bat
Leptospira wolffi	M+ve , D +ve	Henderson (1965)	Malayan bat
Mycobacteriumburuli	M+ve , D-ve	Church (1968)	Experimental infection
Mycobacteriumleprae	M+ve , D-ve	Dempster (1960)	Bat from the U.S.A
Mycobacteriummurinum	M+ve , D-ve	Guillon (1919)	Hypothetic infection
Mycobacteriumtuberculosis	M+ve , D +ve	Griffith (1928)	Bat kept in zoo
Numerous heminths	M+ve , D +ve	Bats in relation	Spurious parasitism
Pasteurella pestis	M+ve , D +ve	Hull (1963)	Experimental infection
Pasteurella pseudotuberculosis	M+ve , D +ve	Dramid (1962)	English Bat
Proteus spp.	M+ve , D?	Klite (1965)	Panamanin bat
Psedomonas spp.	M+ve , D +ve	Klite (1965)	Panamanin bat
Salmonella serotype	M+ve , D +ve	Arata ,Tesh (1966)	Colombian bat
Shigella boydii	M+ve ,D-ve	Tesh (1967)	Colombian bat
Spirochaeta (syn.borrelia)	M? , -ve	Taylor,(1956)	African bat
Spirochaeta bispania	M+ve , D-ve	Feisenfeld and Baltimore., Carvalho(1942)	Two continents
Spirochaeta crocidurae	M+ve , D-ve	Feisenfeld, and Baltimore (1923)	African bat
Spirochaeta duttoni	M+ve , D-ve	Arata ,Tesh (1953)	Colombian bat
Spirochaeta graingeri	M? , -ve	Carvalho (1942)	African bat
Spirochaeta mazzoti	M+ve , D-ve	Feisenfeld , and Baltimore. (1942)	African bat
Spirochaeta megadermae	M? , -ve	Heisch(1952)	African bat
Spirochaeta persica	M+ve , D-ve	Feisenfeld, andBaltimore(1942)	Russian bat
Spirochaeta recurrentis	M+ve , D-ve	Sofiew(1927)	Experimental infection
Spirochaeta slatyschewi	M? , D-ve	Sofiew(1941)	African bat
Spirochaeta spp.	M? , D-ve	Roever-Bonnet(1969)	Three continents
Spirochaeta vespertillionis	M? , D-ve	Dollfus,R.P Novel, Pavlovsk(1954,1966,1968)	From two continents
Toxoplasma gondii	M+ve , D +ve	Roever-Bonnet (1969)	From two continents
Trypanosoma brucei	M+ve , D +ve	Tamsitt (1970)	African bat
Trypanosoma congolense	M-ve , D +ve	Stiles (1931)	Experimental infection
Trypanosoma cruzi	M+ve , D +ve	Marinkelle (1943)	Many virulent strains
Trypanosoma equiperdum	M-ve , D +ve	Kalabuchov (1935)	Experimental infection
Trypanosoma rangli	M+ve , D +ve	Marinkelle (1965)	Colombian bat

2.0 Material and Methods:

The samples of fecal matter of Pteropus were collected under sterile conditions from Samor Bagh Udaipur, Rajasthan, India in the month of June 2011. In order to avoid the contamination with environmental bacterial flora these were placed immediately inside sterile plastic containers and were later processed in laboratory for subsequent culture. As per requirement, these fecal pellets were dissolved in soluble sterile buffers and cultured in different medium with microbiological culture in the laboratory. Each sample was incubated under anaerobic conditions initially in nutrient agar and subsequently in specific media, for the identification of the isolated strains.

For isolation, identification and cultivation of specific microorganisms, the following kits purchased from Sisco Research Laboratory Pvt. Ltd. Mumbai, India were used;

1. *Pseudomonas* Test Kit (PK 052)
2. *Staphylococcus aureus* Test Kit (SK 054)
3. *E. coli* test kit (EM 011)

3.0 Results:

There are many pathogens that can cause disease in multiple species of animals including humans. These transmitted diseases are called zoonoses. People are exposed to the bacteria, protozoa, fungi, viruses and parasites that cause zoonoses in a number of ways and therefore anyone working with or handling animal needs to know about zoonoses and the precautions they must take to minimize their risk of infection.

In the present study, the fecal matter analysis of *Pteropus*, from Samor Bagh, Udaipur,Rajasthan India., showed the presence of *Staphylococcus, Pseudomonas* and *E. coli* spp. These have also been previously reported by a number of researchers in several chiropteran species present in different parts of world (Table- 1). The present study delineates that *Staphylococcus, Pseudomonas* and *E. coli* spp. can be transmitted to different organisms by *Pteropus*. People such as farmers, shearers, and veterinarians who are in close vicinity with large numbers of animals are at a higher risk of contracting a zoonotic disease. Occasionally infection can also occur through indirect contact with other animals such as Listeriosis from drinking un-pasteurised milk or Leptospirosis from contact with infected urine that has contaminated streams or ponds. Some people are more susceptible to contracting a zoonotic disease due to their compromised immune status. The occurrence of zoonotic diseases is uncommon and contact with zoonotic disease agents is preventable by taking a number of precautions against it. It is important to realise that zoonoses may be counteracted from both ill and apparently health animals. Members of the wider community are also at risk from these zoonoses that can be transmitted by chiropterans.

References:

1) Arata A. A., J.B.Vaughn, K.W. Newell, J.P, Barth, R.A.J. and Gracian M.; *Salmonella and Sbigella* infection in bats in selected areas of Colombia –*Amer. J trop med Hyg.*, 17 (1),92-95,Baltimore Md.,(1968).
2) Cox, P.A., T. Elmqvist, E.D. Pierson, and W.E. Rainey. 1991. Flying foxes as strong interactors in south Pacific island ecosystems: a conservation hypothesis. Conservation Biology 5(4): 448-454.
3) Fleming, T.H. 1986. Opportunism versus specialization: the evolution of feeding strategies in frugivorous bats. Pages 105-118 in A. Estrada and T.H. Fleming, eds. Frugivores and seed dispersal. Dr. W. Junk, Dordrecht, The Netherlands
4) Hill, M., and Draser., (1975): The Colonic Bacterial Flora .Gut 16:318-323.
5) Kalabuchov, N.,and Levinson, N., (1935). Effect of low temperature upon trypanosomes (*trypansoma equiperdum)* in mammals. *Nature., 136:3440,553.*
6) Klite P. D.,(1965a): - Intestinal bacterial flora and transit time of three Neotropical bat species. *J. Bacteriol.*, 90: 375-379, Baltimore Md 1965.
7) Klite P. D.,(1965b): - Isolation of *Salmonella* from a Neotropical bat. *J. Bacteriol*., 90: 831.
8) Klite P.D and Diercks FH. Histoplasma capsulatum in fecal contents and organs of bats in the canal zone. am j trop med hyg. 1965 may;**14**:433–439.
9) Klite, P.D. and Dierks, F. H.: Histoplasma capsulatum in fecal contents and organs of bat in the canal Zone.- *Amer. J. trop. Med. Noel Hyg*., 14, 433-439, Baltimore Md. 1965.
10) Marinkelle, C. J. and Grose, E. S.: Histoplasma capsulatum from liver of a bat in Colombia; Science, 147, 1039-1040, Washington D.C. 1965.
11) Marshall, A.G. 1983. Bats, flowers and fruit: evolutionary relationships in the Old World. Biological Journal of the Linnean Society 20: 115-135.
12) Marshall, A.G. 1985. Old world phytophagous bats (Megachiroptera) and their food plants: a survey. Zoological Journal of the Linnean Society 83: 351-369.

13) Pierson, E.D., and W.E. Rainey. 1992. The biology of flying foxes of the genus Pteropus: a review. Pages 1-17 in D.E. Wilson and G.L. Graham, eds. Pacific Island flying foxes: proceedings of an international conservation conference. U.S. Department of the Interior Biological Report No. 90.
14) Stiles, CW., and Nolan, M.O., (1931).Key catalogue of parasites reported for Chiroptera (bats) with their possible public health importance. National Institute of Health Bulletin, 155:603-742.
15) Tesh RB, Arata AA, Schneidau JD., Jr Histoplasmosis in Colombian bats, with a consideration of some of the factors influencing the prevalence of natural infection in chiroptera. Am J Trop Med Hyg. 1968 Jan; **17**(1):102–106.
16) Tesh RB, Schneidau JD., Jr Experimental infection of North American insectivorous bats (Tadarida brasiliensis) with Histoplasma capsulatum. Am J Trop Med Hyg. 1966 Jul;**15**(4):544–550.
17) Constantine, D.G., Greenhall, A.M.; Schmidt, U(1988): Natural History of Vampire Bats, Transmission of pathogenic microorganisms by vampire bats., p. 167-189 Descriptors: rabies, reviews, vectors, transmission, parasites.
18) Tamsitt; J.R., and Fox, I., (1970), Report on bats ectoparasites from the Carribean Region *Canadian j, of zoology48:1093-1097*.
19) Vogel, S. 1969. Chiropterophilie in der neotropischen Flora. *Neue Mitteilungen III. Flora, Abt. B.*, 158, 289–323.