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Infestation of Nematodes in Phlebotomus Argentipes Annandale and Brunetti (Diptera: Psychodidae), Bihar, India

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Abstract- Visceral Leishmaniasis (VL) is a major health problem in Bihar, India. The disease is caused by a protozoan parasite *Leishmania donovani* and transmitted by the established vector *Phlebotomus argentipes* (Diptera: Psychodidae) in India. *P. argentipes* transmits viral and bacterial pathogens. Nematodes were isolated from the body of *P. argentipes* for the first time in India. Its role as pathogen is yet to be established.

Keywords: *visceral leishmaniasis, phlebotomus argen-tipes, nematodes.*

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Infestation of Nematodes in *Phlebotomus Argentipes Annandale and Brunetti* (Diptera: Psychodidae), Bihar, India

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Abstract Visceral Leishmaniasis (VL) is a major health problem in Bihar, India. The disease is caused by a protozoan parasite *Leishmania donovani* and transmitted by the established vector *Phlebotomus argentipes* (Diptera: Psychodidae) in India. *P. argentipes* transmits viral and bacterial pathogens. Nematodes were isolated from the body of *P. argentipes* for the first time in India. Its role as pathogen is yet to be established.

Keywords: visceral leishmaniasis, *phlebotomus argentipes*, nematodes.

I. INTRODUCTION

Visceral Leishmaniasis (VL) is a vector borne parasitic disease caused by a protozoan parasite *leishmania donovani* and transmitted by the established vector *Phlebotomus argentipes Annandale and Brunetti* (Diptera : psychodidae) in Bihar, India. *P. argentipes* also transmits virus and bacteria to the human beings. The transmission of Nematodes is not known so far. The Nematodes or roundworms (Phylum: Nematoda) are the most diverse pseudocoelomates. There are more than 28,000 species of Nematodes (Hugot et al. 2001), of which over 16,000 are parasitic. Sand flies are the main vector of Leishmaniasis. Out of 700 hundred worldwide populations of sand flies, approximately 70 are responsible for transmission of disease to human (Lane 2009). However, these are carrying some entomopathogens like viruses, bacteria, protozoa, fungi, nematods and mites. Phlebotomine sandflies spend most of their lives in dark habitat with stable temperature and high humidity. Their developmental stages from eggs to pupae are passed in crevices, tree buttresses, caves rodent burrows with organic debris like leaf litter and dung (Killick-Kendrick 1979, 1987). Even adult also prefer the dark and humid diurnal resting sites. These circumstances might be conducive to the development of entomopathogens in sandflies.

It is difficult to find out immature stages of sandflies in nature (Killick-Kendrick 1987), hence, natural pathogens in immature stages in sand flies have not been reported so far. Most of the pathogens were

identified from adult sand flies while doing the research work on leishmaniasis (Young and Lewis 1977, 1980). This study reveals the presence of nematodes inside the body of *P. argentipes* in nature.

II. MATERIAL AND METHODS

Sandflies were collected early in the morning from indoor habitats of dwellings using aspirator and flash light as well as CDC (Centre for Disease Control) light trap. The dissection of gravid females was made in normal saline under dissecting binocular microscopes (Zeiss) and observation was made in high magnification.

III. RESULTS

In the present study 25% *P. argentipes* were found infested with Nematodes in Bihar, India out of 100 dissected wild populations for the first time collected from villages of Muzaffarpur districts (Figure).

IV. DISCUSSION

Particular work on pathogens of phlebotomines has been conducted by (Killick-Kendrick et al. 1989; Warburg 1991). Many pathogens were found transmitting the diseases. The transmission of phlebovirus, family Bunyaviridae was found infecting mammals (Tesh 1988). The bacterial pathogen like *Bartonella bacilliformis*, the causative agent of human diseases in some Andean regions of Peru, Ecuador and Colombia is transmitted by *Lutzomyia* spp. as a group of protozoan kinetoplastids apart from *leishmania* spp species of *Endotrypanum* and *Trypanosomes* are also transmitted by sandflies to vertebrates other than man (Killick-Kendrick 1979; Shaw 1981). In New World *Plasmodium* spp. the causative agent of reptilian malaria are transmitted by sandflies (Ayala 1977; Klein et al. 1988). Entomophthorean fungi may constitute important pathogens of adult sand flies *L. pia* in Colombia (Warburg 1991). Saprophytic fungi are found in adult sand flies (Warburg 1991) which may influence the development of *Leishmania* infections (Schlein et al. 1985). Mites (Acarina) collected from sandflies comprise 21 species reported to affecting some 39 species of sand flies hosts. In India mites were found from the body surface of *P. argentipes* and in laboratory predated the larvae (unpublished).

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Nematodes were reported from different countries in sandflies. Encapsulated third stage spirurid nematodes (rodent infecting *Mastophorus muris*) have been reported in *P. arisasi* (Killick Kendrick et al. 1976). Sand fly parasitic nematode i.e tetradonematid was found in *P. papatasi* and *P. sergenti* in Afganistan. In adults the nematode interfered with blood feeding by female sandflies (Killick Kendrick et al. 1989). Tylenchid nematodes have been recorded in *L. sanguinaria*, *L. vespertilionis* and *L. panamensis* (Mc Conell and Correa 1964) and *L. shanoni* (Warburg 1991). Eggs, free juveniles and gravid females were recorded in *P. papatasi* and *P. sergenti* in Syria by R. Killick-Kendrick was previously in Bagdad (Alder and Theodor 1929). Gregarines (*Ascogregarina saraviae*) and nematodes (Tylenchida and Spiruda) were recorded in *Lutzomyia* spp. (Warburg et al. 1991). Infestation of a nematode parasite was observed in the natural population of *P. papatasi* in Pondicherry, India. Of the 877 males and 959 females sandflies examined for the natural infection, 11 females were found infested with nematodes (0.59%). The presence of a stylet at the opening of the dorsal oesophageal duct suggests that the parasite belongs to the super family Tylenchoidea (Srinivasan et al. 1992). It requires detail studies on sand flies to find out any role of *P. argentipes* in transmission of helminthes diseases in human in India.

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REFERENCES RÉFÉRENCES REFERENCIAS

- Gamelin FX, Baquet G, Berthoin S, Thevenet D, Nourry C, Nottin S, Bosquet L (2009) Effect of high intensity intermittent training on heart rate variability in prepubescent children. *Eur J Appl Physiol* 105:731-738. doi: 10.1007/s00421-008-0955-8
- Adler S, Theodor O (1929). The distribution of sand flies and leishmaniasis in Palestine, Syria and Mesopotamia. *Ann. Trop.Med.Parasitol.* 23: 269-306.
- Ayala SC (1977) Plasmodia of Reptiles .In: Parasitic Protozoa (J.P. Kreier Ed.). Vol .3, pp 267-309.
- Hugot JP, Baujard P, Morand S (2001) Biodiversity in helminths and nematodes as a field of study: an overview. *Nematology*.3:199–208. doi:10.1163/156854101750413270.
- Killick-Kendrick R (1979) the biology of Leishmania in Phlebotomine sandflies- Biology of the Kinetoplastida (W.H.R) Lumsden & D.A. Evans Eds.). 2:395-460.Academic Press, London/New York.
- Killick-Kendrick R (1987) Breeding Places of *Phlebotomus ariasi* in the Cevennes focus of leishmaniasis in the south of France. *Parasitologia*. 29:181-191.
- Killick-Kendrick R, Killick-Kendrick M, Quala NA, Nawi RW, Ashford RW, Tang Y (1989) Preliminary observations on a tetradonematid nematode of phlebotomine Sand flies of Afghanistan. *Ann. Parasitol. Hum. Comp.* 4: 332 -339.
- Kellick-Kendrick R, Leaney AJ, Molyneux DH, Rioux JA (1976) Parasites of *Phlebotomus ariasi*. *Trans. R. Soc. Trop. Med. Hug.* 70: 22.
- Klein TA, Akin DC, Young DG, Telford SR, Butler JF (1988) Sporogony , development and ultra structure of extrinsic stages of *Plasmodium mexicanum*. *Int. J. Parasitol.* 18: 463-476.
- Lane RP (2009) *Phlebotomine sand flies- Manson's Tropical Diseases*, 22th Edn. Saunders, Elsevier www.elsevier.com
- McConnel E, Correa M (1964) Trypanosomes and other microorganisms from Panamanian *Phlebotomus* sand flies. *J. Parasitol.* 50: 523-528.
- Schlein Y, Polaczek I, Yuval B (1985) Mycoses, bacterial infections and antibacterial activity in sand flies (Psychodidae) and their possible role in the transmission of leishmaniasis . *Parasitol.* 90: 57-66.
- Shaw JJ (1981) The behavior of *Endotrypanum schaudinni* (Kinetoplastida: Trypanosomatidae) in three species of laboratory-bred Neotropical sandflies (Diptera : Psychodidae) and its influence on the classification of the genus *Leishmania-Parasitological Tropics* (E.U. Canning Ed.) . Society of Protozoologists Special Publication No. 1, Allen Press, USA. pp 232-241.
- Srinivasan R, Panicker KN, Dhanda V (1992) Occurrence of entomophilic nematode infestation among phlebotomid sandfly, *Phlebotomus papatasi*- a preliminary report. *J. Commun. Dis.*24:8-11
- Tesh RB (1988) the genus *Phlebovirus* and its Vectors. *Annu. Rev. Entomol.* 33: 169-181.
- Warburg A (1991) Entomopathogens of Phlebotomine sand flies: Laboratory experiments and natural infections. *J. Invertbr. Pathol.* 58: 189-202.
- Warburg A, Ostrovska K, Lawyer PG (1991) Pathogens of Phlebotomine sand flies: A review. *Parasitologia*, 33: 519-526.
- Young DG, Lewis DJ (1977) Pathogen of Psychodidae (Phlebotomine sand flies)-Bibliography on Pathogens of medically important arthropods. (D.W. Roberts & J.M. Castillo, Eds.). *Bull. WHO.* 55: S9-S24.
- Young DG, Lewis DJ (1980) Pathogens of Psychodidae (Phlebotomine sand flies)-Bibliography on Pathogens of medically important arthropods. (D.W. Roberts & J.M. Castillo, Eds.). *Bull. WHO* 58: S9-S11.

Caption:

Figure : Nematodes collected from sandflies after dissection

