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Prevalence of *Subulura suctoria* (Molin, 1860) nematode from jungle babbler, *Turdoides striata* at Sindh, Pakistan

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Abstract

The helminthological survey was conducted on Jungle babbler; *Turdoides striata* of Sindh-Pakistan during, 2014-15. Therefore; the total (n=25) specimens were collected from (n=8) hosts belonging to the genus; *Subulura* Molin, 1860 were recovered from the large intestine of the host. Present specimen found different from its congress, but having closely resemblance with *Subulura suctoria*, 1860 having stout and medium sized body. Mouth comprised over three sclerotized pharyngeal teeth and in bulb cuticular alae were present whereas; the spicules were in alate position and unequal with longitudinal suckers possess chitinous rim. Five pairs of post-cloacal, four pairs pre-cloacal and one pair of para-cloacal caudal papillae were also present and the vulva situated at anterior distance. The eggs rounded in position, oval and tail pointed were also observed. The high prevalence of infection was found in the month of May during summer season when compared with February month in winter season with the significant difference ($P < 0.05$) among the prevalence of helminth parasite in Jungle babbler birds. This kind of research study was taken first time over the helminth parasite therefore; it is suggested that, the other passeriformes for the presence of helminth parasites with systematic study should be investigated.

Keywords: *Turdoides striata*, *Subulura suctoria*, nematode, occurrence, Sindh

1. Introduction

Birds are the precious gift of almighty Allah and they are the charming creatures, attract the people to their colourful plumages, parental care, flight, outlandish migration, sweet voices, spring time songs, game and having most economic value in respect of food. Those possess with different ranges from highest weight about 150kg of ostrich bird and smaller as only with 2 grams of West Indian humming bird. They are considered as the main driving force agents in seed dispersal^[1] and cross pollination of certain trees^[2] from big cities to the high mountains with each species is known with its unique in habitat, habit, ecology, appearance and distributions^[3] and they can eat rodent and harmful insects, which damage the different crops. In contrast, birds can play both positive and negative roles in agriculture and environment^[4]. But the avifauna includes a total of (786) species throughout the Pakistan of (39) species are accidental species^[5].

Jungle babbler, *Turdoides striata* Dumont deSainte Croix, 1823 belong to (Leiothrichidae) family found in the Indian sub-continent, commonly this bird is well known as *Saath bhai* or *seven sisters* in Hindi^[6]. They are dusty in colour^[7] eat grains, barriers and nectar^[8-9-10]. The pathogens can reach towards the other types of birds during wintering, breeding season and stop off habitats through the migratory bird species^[11], if there is a high prevalence of helminth infection in poultry and it causes direct economic losses^[12]. High densities of birds, contaminated food, wet litter, improper management, coccidiosis, bad ventilation, are the reasons by which parasite increase to their hosts^[13-14]. Bearing burden of parasites, *Histomonas meleagridis* a species of protozoa caused black head disease in the birds and this disease transfer from one host to another host by *Heterakis gallinae* chiefly found in the intestine. *Heterakis gallinae*, *Acuaria* spp., and *Ascaridia galli* mostly found in cage birds^[15]. Similarly, *Ascaridia galli* may produce the infection of *Reovirus* and *Salmonella* diseases^[16]. Helminth cause burden in domestic and wild birds^[17] as well. *Ascaridia galli* nematodes parasitize the wild and domesticated birds, cause infection of enteritis with diarrhoea and unthriftiness^[18], the variety of host species sharing same species of parasites to each other^[19-20]

The well-known *Subulura suctoria*, 1860 species in avian hosts and mammals that belongs to the family; Subuluridae Yorke and Maplestone, 1926 and sub family; Subuluridae Travassos, 1914, morphologically different from other groups of nematodes. The variety of nematode species caused deficiencies of carbohydrates, proteins, minerals, vitamins A, B1 and B12 [21]. Nematode parasite attacked small intestine duodenum, ileum and caeca, because these organs contain high amount of glucose, saline and semi-digested food [22-23] and it is truth that there is reduction of (50%) bird population [24-25]. Helminth parasites were infecting humans since from few decades, cause chronic infections, allergies and resist immune system [26]. Due to helminth hidden infections and losses occurred in (meat and eggs) production [27-28] and ultimately mortality occurs. The above facts which are mentioned will be beneficial in medical and veterinary perspective and emphasizes the scholar to choose the topic and research work on the systematic studies of the helminth parasites. Bearing mind and the purpose of research on the host bird, Jungle babbler, *Turdoides striata* was selected as an experimental model of district Naushahro Feroze, Sindh-Pakistan for the purpose of study.

2. Materials and Methods

The wild bird jungle babbler, *Turdoides striata* were captured during, 2014-15. A total of (n=32) birds were examined which were collected from various random intervals and 25 specimen was collected from 8 hosts. Mostly, the birds were purchased from local market of district N. Feroze and brought them to the Parasitology laboratory, department of Zoology. The experimental process was conducted under laboratory conditions therefore, first of all the glass slides were sterilized with the 100% of ethanol and left for 10-25 minutes in the coplin jar. Then slides were cleaned with spongy handkerchief. Cotton swab and few drops of chloroform ethanol used for the anaesthetization bird. Finally kept in to jar and dissected and the entire whole visceral organs were separated to each other and organs were poured in normal saline solution. With the help of stereo dissecting microscope each organ was thoroughly examined. Parasites were laid on the glass slides and by putting the one drop of glycerol and lacto phenol slides were covered with cover slides for the

further microscopic study. After that, slides of nematodes were mounted for a short period. Diagrams of the nematodes were formulated by the help of Camera Lucida. Photography of the new specimen were taken with camera Meiji infinity 1 DK3000. Measurement of the body and different anatomy of the specimen are taken in millimetres (mm) but eggs measurement was taken in micrometers (μm). Holotype specimen placed in the Parasitology Laboratory, Department of Zoology, Shah Abdul Latif University, Khairpur, Sindh, Pakistan and specimen were made available to the scientist and researchers for reference motivation.

3. Results

3.1 Systematic Position

Family: *Subuluridae* Yorke and Maplestone, 1926; Subfamily: *Subulurinae* Travassos, 1914; Genus: *Subulura* Molin, 1860; *Subulura suctoria* Molin, 1860; Location: intestine; Host: Jungle babbler; Locality: Naushahro Feroze, Sindh, Pakistan; Number of specimen: 25 from 8 hosts.

3.2 Description

3.2.1 Male

The body of worm measured 14.328 X 0.457. Buccal capsule measured 0.039 X 0.078. Mouth grew up with three sclerotized pharyngeal tooth. Esophagus measured 0.189 X 0.742 with 0.678 muscular parts. Bulb measured 0.221 X 0.268. Cuticular alae present. Spicules un-equal measured 0.868 X 0.963. Longitudinal sucker with a chitinous rim measured 0.031 X 0.110. Gubernaculum measured 0.039 X 0.118. Whereas; the 11 pairs of caudal papillae of which five pairs of post-cloacal, four pre-cloacal and one pair para-cloacal. Tail pointed posteriorly.

3.3.2. Female

Body was found to be larger than the males, measured 20.941 X 1.016. Mouth capsule measured 0.048 X 0.077 in size. Esophagus measured 1.133 X 0.208 with muscular part 1.1. Bulb measured 0.275 X 0.283. Nerve ring measured 0.30 X 0.35. Vulva located at the distance of 5.666 from the anterior region. Tail measured 0.641 and eggs rounded oval measured 24-48 X 34-36 (Diagram- 1 and Photograph- 2).

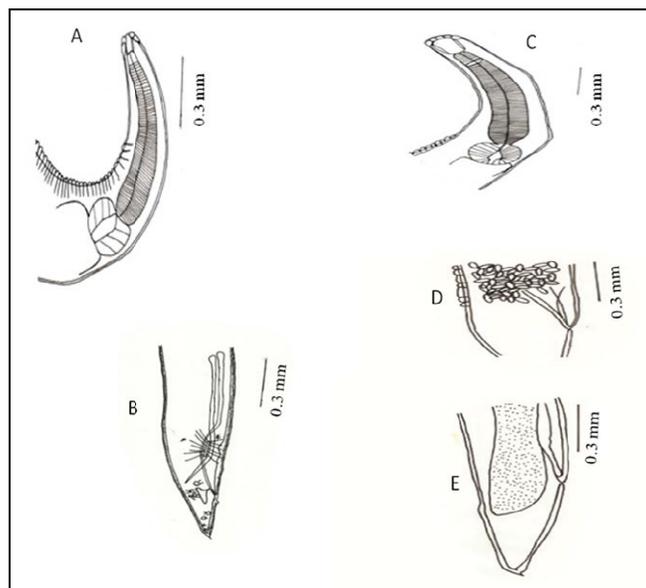
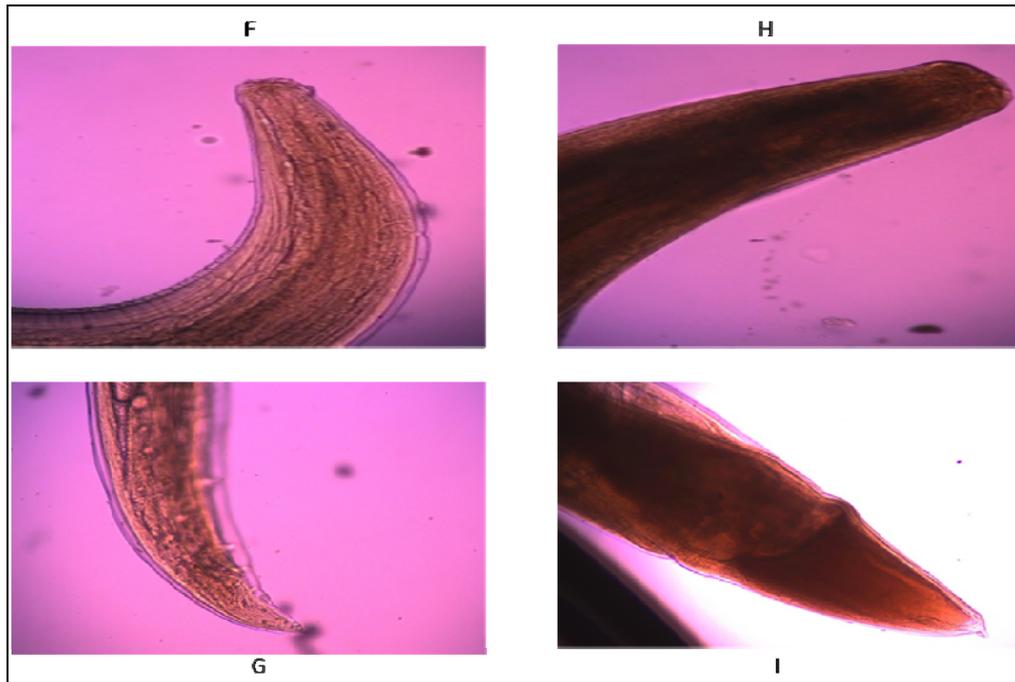


Diagram 1: *Subulura suctoria* Molin, 1860; A: Anterior portion of male; B: Posterior end of male showing spicules; C: Female anterior portion; D: Vulva; E: Posterior portion of female.



Photograph 2: Photograph of F: Anterior portion of male; G: Posterior portion of male worm; H: Anterior portion of female; I: Posterior portion of female worm

3.3 Remarks

The genus; *Subulura* Molin, 1960 was proposed to accommodate the nematodes collected from the intestine of birds. Skrjabin, Shikhobalova and Lagodovskaya, divided Subuluridae family in to two sub-families; *Leipoanematinae* and *Subulurinae*. Type species is *S. acutissima* Molin, 1860 reported from the fish eating birds at Palaearctic region.

Other species of this genus; *S. distans* (Rud., 1809) collected from the *Cercopithecus* spp., *S. forcipita* (Rud., 1819) reported from the *Diplopterus* sp., *Coccyzus* spp., and *Cuculus* spp., *S. subulate* (Rudolphi, 1819) collected from *Caprimulgus europaeus* L. *S. uncinata* (Rud., 1819) observed from *Cavia paca* and *Cavia aperea*; *S. subuluta* (Rud., 1819) in *Caprimulgus* spp., *S. strongylina* (Rud., 1819), reported from *Tinamus* sp., *Bucco* spp., and *Crypturus* spp., *S. reclinata* (Rud., 1819), reported from *Crotophaga* spp., *S. jacchi* (Marcel, 1857) recovered from *Callithrix* spp., *S. papillose* (Molin, 1860) from *Cyanocorax* sp. and *Corvus cajanus*; *S. anulata* (Molin, 1860) collected from *Ophis saurocephalus*; *S. perarmata* (Ratzel, 1868) recovered from *Tarsius* sp., *S. andersoni* (Cobbold, 1876), recovered from *Sciurus* sp., *S. curvata* (Linstow, 1883) reported from *perdix graeca* and *Cannabis* sp., *S. otolicni* (van Beneden, 1890) collected from *Galago* sp., *S. differens* (Sonsino, 1890) from *Cercopithecus* spp., *S. sarasinorum* (Mayer, 1896) from *Loris gracilis*; *S. gracilis* (Linstow, 1899) observed from *Francolinus* sp., *S. recurvata* (Linstow, 1901) reported from *Eurystomus* sp.; *S. acuticauda* (Linstow, 1901), reported from *Numida* sp., *S. rimula* (Linstow, 1903) from *Centropus sinensis*; *S. anulata* (Travassos, 1913) reported from *Ophis saurocephalus*; *S. rima* (Linstow, 1906) reported from *Otis haubara*; *S. schebeni* (Linstow, 1909) collected from *Cynictis* spp., *S. similis* (Gendre, 1909) recovered from *Cocciacis* sp. and *Centropus* sp., *S. imilis* (Gendre, 1909) reported from *Strigiformes*, *Cuculiformes* and *Coraciiformes* birds; *S.*

gracilis (Raillet and Henery, 1913) recovered from *Francolinus* spp., *S. acuticauda* (Raillet and Henery, 1913) recovered from *Numida* sp., *S. macronis* (Stewart, 1914) reported from *Macrones aor*; *S. noctura* (Seurat, 1914) reported from *Athene noctua glaux*; *S. pigmentata* (Gedoelst, 1916) collected from *Sciurus* sp., *S. seurati* (Barreto, 1917) reported from *Caccabis* spp., *S. halli* (Barreto, 1917) in *Tetrax* sp., *S. lutzi* (Barreto, 1918) form *Strix* sp., *S. olympioi* (Barreto, 1918) reported from *Crypturus* sp., *S. poculum* (Linstow, recovered from *Frnacolinus* sp., *S. plotina* (Baylis, 1919), reported from *Plotus rufus*; *S. bentocruzi* (Barreto, 1919), from *Trogon* sp., *S. carlosi* (Baretto, 1919) in *Piaya cayana*; *S. trogoni* (Barreto, 1919) in *Trogon viridis*; *S. travassosi* (Barreto, 1919) recovered from *Bucco* spp., *S. loveridge* (Baylis, 1920), from *Mungo fasciatus*; *S. galloperdicis* (Baylis and Daubney, 1922) in *Galloperdix spadicea*; *S. bolivari* (Lopez-Neyra, 1922) form *Athene noctua*; *S. chinensis* (Schwartz, 1926) collected from *Otus stictonotus*; *S. sisoworonki* (Iwanizky, 1940) reported from *Coracias garrulus* L.; *S. allodapa* (Vaidova, 1964; Kasimov, 1947, Akhmyan, 1966; Kasimov and Feyzullaev, 1965) reported from *Alectoris chukar*; *S. skrjabinensis* (Govozdev and Kasymzhanova, 1965) from *Burhinus oedicnemus*; *S. alba* (Agrawal, 1965) observed from *Tyto alba*; *S. leprincei* (Merkusheva and Bobkova, 1981) in *C. europaeus*; *S. skrjabini* (Akhmyan, 1966) collected from *Perdix perdix* L., *Francolinus francolinus* and *Alectoris chukar*; *S. alfensis* (Pinto, 1968) reported from *Athene cunicularia*; *S. lura* spp., (Ferrer *et al.*, 2004) collected from *O. scops*; *S. galloperdicis* (Sood, 2006) collected from *Tyto alba*. On the morphological basis and distinguish characteristic basis present specimen have close resemblance with *Subulura suctoria* (Molin, 1860) reported from Jungle babbler and is identified as such. *Turdoides striata* is a new host record for the genus *Subulura* Molin, 1960 in Pakistan (Table- 1).

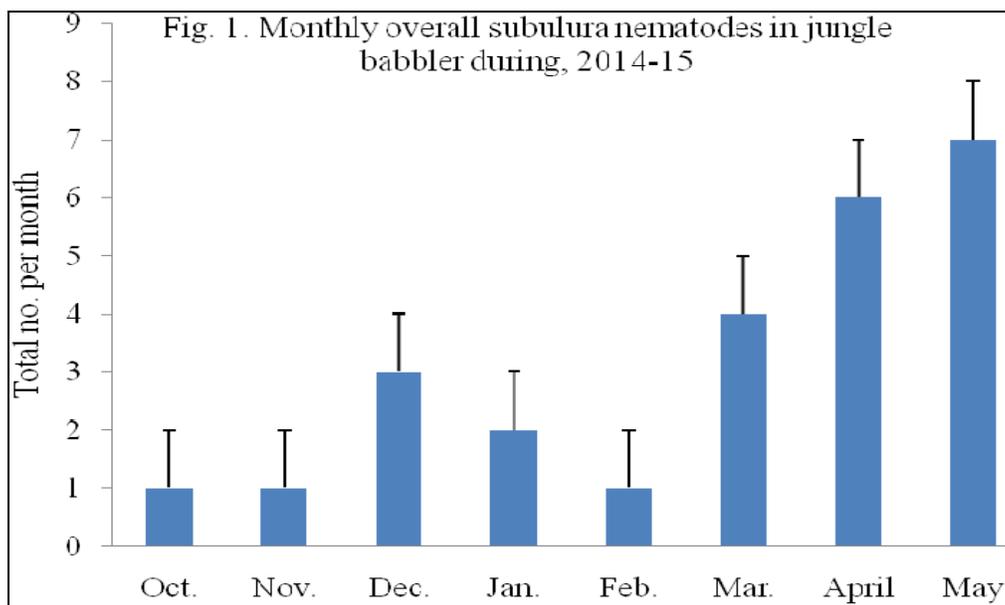
Table 1: Comparative morphological features and measurements of *Subulura* species under laboratory conditions during, 2014-15

Species	Present species	<i>S. suctorina</i> (Molin, 1860)	<i>S. mackoi</i> Barus et al., 2013
Male	12.222-14.328 X 0.322-0.457	7.98-13.68 x 0.20-0.43	10.71-11.69 x 0.329-0.342
Female	18.520-20.941 X 0.091- 1.016	11.02-19.00 x 0.32-0.51	11.90-16.90 x 0.376-0.46
Esophagus	0.189 x 1.133	0.92 x 1.42	1.083 x 1.787
Bulb	0.221 x 0.283	0.18 x 0.26	0.144 x 0.202
Gubernaculum	0.039 x 0.118	0.12 x 0.18	Absent
Spicules	Subequal	Subequal	Unequal
Vulva	5.666 anterior region	8.64 anterior region	6.43 anterior region
Eggs	24-48 X 34-36	0.06-0.07 x 0.04-0.06	46-52 x 39-48
Host	<i>Turdoides striata</i>	<i>Plegadis falcinellus</i>	<i>Otus scops</i>
Locality	N. Feroze, Sindh	Azerbaijan	Czech Republic

3.4 Prevalence of *Subulura suctorina* (Molin, 1860) helminth parasites in Jungle babbler, *Turdoides striata* (Dumont, 1823)

The research study was carried out from the month of October to May during, 2014-15, in which the birds jungle babbler (n=32) were dissected. The data was taken on weekly basis therefore; the four birds were dissected in each month. The results of the research study indicated that, in October only (1) specimen of *Subulura* nematode was observed from four hosts, whereas; in the month of November (1) infection was

found. Thus, during the month of December (3) specimens were observed and in January (2) specimens were observed, in February (1), in March (4), in April (6), in May the high prevalence was observed (7) specimens from four host birds. *Subulura suctorina* (Molin, 1860) was found at the overall mean population (3.13) during these 8 months research study. Thus, the data of analysis of variance showed the significant difference ($P < 0.05$) among the prevalence of helminths parasite in the Jungle babbler birds (Fig. 1), respectively.



4. Discussion

Jungle babbler, *Turdoides striata* (Dumont, 1823) is a member of the Leiothrichidae family found in the Indian sub-continent. This research study was conducted during, 2014-15 on *Turdoides striata* (n=32) were captured from 5 talukas of district Naushahro Feroze, namely; Mehrabpur, Kandiaro, Moro, Bhiria and Nuashahro Feroze. The prevalence of helminth parasites were observed during this research study and results are in agreement with the [29] who also carried out the research study and found the impact of cestode Helminth, *Hymenolepis* spp. (Weinland, 1858) in Jungle babbler bird in same locations of district Naushahro Feroze. Further, the same kind of research study was also conducted which was supported to this research study [30] who found the prevalence of trematode, *Lyperosomum longicauda* (Rudolphi, 1809) in jungle babbler, *Turdoides striata* (Leiothrichidae) bird at Naushahro Feroze – Sindh, during their research studies, the results were found the significantly different during the month wise infestation in these birds. Besides, the available literature regarding the helminth parasites shows that the birds,

Turdoides striata have not been properly investigated in Pakistan. However, certain research work had been conducted on the systematic basis of the helminth parasites of the variety of the bird species in Pakistan, but no work has been done on the helminth parasites of Jungle babbler. It is therefore proposed to carry out the research work on morphotaxonomy of helminth parasites of Jungle babbler, *Turdoides striata* of district Naushahro Feroze, Sindh Province.

Previously no efforts were taken in Pakistan in this context, to carry out such type of research to produce it in investigated document of the helminth parasite of *Turdoides striata*. Birds are the natural source to control pests in farmers, gardens and many other places. While as, wild birds may also serve as hand basin hosts for disease carrying agents which disturb and harmful the domestic flocks, chiefly those rise commercially as diet source for the lot of people [31]. The insectivore's birds which survive their life in forage form were beneficial for the plants because they feed insects on the plants [32]. Intensive agriculture can decrease the population of many wild lives due to this conditions many species of birds adopted altered

way for their lives^[33]. When infected birds migrate then they directly transfer the viruses to other animals, either by saliva, faecal material or scavenged upon them. Wild bird species may take a useful representative model for examining the way by which diseases could be spread from bird to bird and from bird to other animals.

Simultaneously, the occurrence of overall helminth parasites such as; nematodes, (33.80) % were observed during research study. Thus, the prominent helminth parasite species with overall mean population during consequent months were observed on, *Subulura suctorica* Molin 1860, (3.13) %, respectively. The results of this research study are in agreement with the^[34] who found the prevalence and parasitic infection of nematodes, cestodes and coccidian's serve harmful impacts such as; retarded growth, low egg production, malnutrition and sometime death to their hosts and free range scavengers birds having direct contact with parasitic vectors, faeces and soil, similarly, direct contact with humans, captive conditions, lack of hygiene, temperature and humidity. Besides, the other scientists previously^[35] found the *Heterakis* and *Capillaria* which were frequently occurring in poultry birds those caused disease and death among game birds and during harsh weather lot of birds die due to the starvation and high intensity of infestation.^[36] Reported that the nematodes such as; *Ascaridia*, *Capillaria* and *Heterakis*, cestodes; *Hymenolepis* and *Raillietina* were the main genera of parasites those found in the poultry birds. *Ascaridia gali* was worldwide distributed nematode of wild and domestic birds^[37] and Quails, chickens, pheasants and turkeys were also worldwide parasitized by; *R. echinobothrida* and *R. tetragona*^[38] ducks, guinea fowl and geese were mostly affected by nematode; *Capillaria*^[17]. This kind of research study is taken first time over the helminth parasite, *T. striata* in Sindh, Pakistan. Therefore; the present study suggests that, more research work should be carried out on the other passeriformes for the presence of helminth parasites with systematic study, because there is no any such type of research study or record was found at district Naushahro Feroze.

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