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Diversity of Tapeworms in Piscean, Avian and Mammalian Hosts from Marathwada region (M.S.) India

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Abstract:

Vertebrates are the important components of the ecosystem. They are very important from the ecological and economical point of view. Man uses many fishes, birds and mammals as delicious and nutritious food. These fishes, birds and mammals are known to harbour a number of parasitic infections i.e. trematodes, cestodes and nematodes which cause deterioration in their health and increase the rate of mortality of hosts. The flesh of fishes, birds and mammals are not properly cooked, therefore, encysted stages are entered inside the body of human and cause dangerous diseases to human beings. The study was undertaken on the status of diversity of piscean, avian and mammalian tapeworms of genus *Senga, Gangesia, Proteocephalus, Cotugnia, Davainea, Raillietina, Valipora, Mogheia, Moniezia, Stilesia* and *Avitellina* from Marathwada region (M.S.) India. Tapeworms were collected and studied from different freshwater fishes, birds and mammals; and identified with morpho-taxonomical keys and advanced numerical tools.

Keywords: Diversity; Marathwada region; Piscean, avian and mammalian tapeworms.

1. INDRODUCTION

Variation is the law of nature which occurs everywhere and moment. The variation takes place at micro levels in short space and small time period, but these become apparent only over a large space and big time gap. The variety and variability of organisms and ecosystems is referred to as biological diversity or biodiversity (Pérez-Ponce de León et al., 2011). The biological variations initiate at the micro level and become apparent at species level (Beveridge and Spratt, 2015). Biodiversity refers to the variety of life forms; the different plants, animals and microorganisms, the genes they contain and the ecosystem they form. This living wealth is the product of millions of years of evolutionary history (Hugot et al., 2001). Biodiversity is usually considered at three different levels i.e. genetic diversity, species diversity and ecosystem diversity (Jaiswal, 2006; Upadhyay, 2012). Parasitic diversity refers to variety and variability of different species of parasitic taxa. Parasitic diversity includes specially helminth and protozoan diversity (Babita et al., 2019). Helminth parasite includes cestode, trematode and nematode parasites (Kumar, 2012). The study of helminthic diversity is very important in medical point of view because parasites cause some diseases to animals and humans health. Thus, an attempt is being made to study the piscean, avian and mammalian tapeworms and geographical distribution from various places of Marathwada region (M.S.) India.

2. MATERIALS AND METHODS

During parasitological investigations, the fishes, birds and mammals were collected from different localities of Marathwada region, (M.S.) India; to work out the diversity of cestode fauna in respective hosts. All the hosts were brought to laboratory for further parasitological investigations. The collected hosts were separated sex-wise, freshly weighed, their total and standard length measured (Upadhyay, 2017a). The viscera of hosts were teased by dissecting needle and examined microscopically for developing stages of helminthes parasites, while intestines, liver and gonads were carefully examined for helminth parasites (Upadhyay, 2017b). The collected worms were further processed, fixed and mounted for morphotaxometric analysis in taxonomy (Upadhyay et al., 2013a). The collected tapeworms were washes carefully in lukewarm water, stretched and fixed in hot formaldehyde (4%). The cestodes were stained in aqueous solution of Mayer's Haemalum, dehydrated in a series of alcohols then followed by dehydrated ethanol, cleared by xylene, and finally mounted in Canada balsam (Upadhyay, 2012). Microphotographs were taken by Image Analyzer unit "MOTIC" using Biovis image plus software and Nikon Trinocular Computerized photomicrography unit. Drawings were made with Camera Lucida (SIPCON SP-14) for the morphotaxometric analysis of parasites (Upadhyay, 2009). The generic diagnosis of the recovered tapeworms based on the key to the cestodes of vertebrates (Yamaguti, 1959), however the specific diversity through the available literatures as cited throughout the manuscript using advanced numerical tool (Malhotra et al., 1981).

3. RESULTS AND DISCUSSION

The detailed generic-cum-species diagnosis and identification during investigation using morphotaxonomy and numerical tools reflected the excellent diversity and richness of tapeworms in the selected hosts in Marathwada region (MS). The occurrences of piscean, avian and mammalian tapeworms in relation to its geographical area and host species from Marathwada region, Maharashtra state, India was summarized in Table 1.

Table 1: Distribution pattern of Piscean, avian and mammalian tapeworms from Marathwada region (M.S.), India

S.N.	Name of species	Name of host	Locality
	Piscean Tapeworms		
1	*Senga maharashtrii* Jadhav et al., 1991a	*Mastacembelus armatus*	Nanded, Hingoli
2	*Senga gachuae* Jadhav et al., 1991b	*Channa striatus*	Latur, Nanded, Osmanabad
3	*Senga microrostellata* Bhure et al., 2014	*Mastacembelus armatus*	Aurangabad, Beed
4	*Senga rostellata* Deshmukh et al., 2016b	*Channa punctata*	Nanded, Parbhani
5	*Senga triangullata* Nanware et al., 2016	*Mastacembelus armatus*	Osmanabad, Beed
6	*Gangesia marathwadensis,* Bhure et al., 2011	*Wallago attu*	Nanded, Aurangabad
7	*Gangesia striatusii* Bhure and Nanware, 2012	*Mystus seenghala*	Nanded
8	*Gangesia orientalis* Deshmukh et al., 2016a	*Wallago attu*	Nanded, Latur
9	*Proteocephalus raosahebae* Dandwate and Pawar, 2013	*Mystus seenghala*	Jalna, Aurangabad
10	*Proteocephalus granularis* Deshmukh et al., 2015	*Wallago attu*	Nanded, Jalna
	Avian Tapeworms		
11	*Cotugnia digonopora*, Diamare, 1893	*Gallus gallus domesticus*	Latur, Nanded, Osmanabad.

12	*Cotugnia bahli,* Johri, 1934	*Gallus gallus domesticus*	Osmanabad, Beed, Aurangabad, Nanded
13	*Cotugnia indiana* Kasar et al., 2010b	*Gallus gallus domesticus*	Aurangabad, Parbhani, Osmanabad, Latur
14	*Cotugnia hafezzi* Nanware et al., 2010	*Gallus gallus domesticus*	Nanded, Parbhani
15	*Davainea indica*, Jadhav et al., 2008	*Gallus gallus domesticus*	Latur, Osmanabad, Nanded
16	*Davainea yamagutii* Dhondge et al., 2011	*Gallus gallus domesticus*	Beed, Nanded, Hingoli
17	*Raillietina friedbergeri* Linstow, 1877	*Gallus gallus domesticus*	Nanded, Parbhani, Latur
18	*Raillietina tetragona* Fuhrmann,1920	*Gallus gallus domesticus*	Osmanabad,Latur, Beed
19	*Vallipora macrorostatum* Dhondge et al., 2011	*Gallus gallus domesticus*	Osmanabad, Nanded
20	*Moghiea passerae* Garad and Nanware, 2006	*Gallus gallus domesticus*	Nanded, Parbhani
	Mammalian Tapeworms		
21	*Moniezia (B.) caprae* Nanware, 2010a; Kalim et al., 2011	*Capra hircus*	Aurangabad, Latur, Parbhani
22	*Moniezia madhukarae* Kasar et al., 2010a	*Ovis bharal*	Osmanabad, Latur, Hingoli
23	*Moniezia (B.) maharashtrae* Shinde et al., 1985; Nanware, 2010b	*Capra hircus*	Osmanabad, Parbhani, Jalna, Nanded
24	*Moniezia (B.) kalavati* Shinde et al., 1985; Nanware, 2010b	*Capra hircus*	Osmanabad, Beed
25	*Stilesia kotdwarensis* Malhotra and Capoor,1983	*Ovis bharal*	Aurangabad, Beed
26	*Stilesia pandae* Nanware et al., 2004	*Capra hircus*	Latur, Nanded
27	*Stilesia jadhavae* Nanware and Jadhav, 2005	*Capra hircus*	Osmanabad, Nanded, Hingoli
28	*Avitellina nagbhushanami* Shinde et al., 1983	*Ovis bharal*	Jalna, Aurangabad, Nanded

The diversity of piscean, avian and mammalian tapeworms includes 28 species of eleven genera. Ten species were reported belonging to three genera viz. *Senga* (05 Species), *Gangesia* (03 Species), *Proteocephalus* (02 Species) from freshwater fishes. Ten species were recovered belonging to five genera viz. *Cotugnia* (04 Species), *Davainea* (02 Species), *Rallietina* (02 Species), *Vallipora* (01 Species) and *Mogheia* (01 Species) from *Gallus gallus domesticus*. Whereas 08 species of three genera were reported from mammalian hosts viz. *Moniezia* (04 Species); *Stilesia* (03 Species) and *Avitellina* (01 Species) were collected from *Capra hircus* and *Ovis bharal.*

The twenty eight species of cestode parasites of piscean, avian and mammalian hosts from Marathwada region M.S. India included 11 genera. The distribution range of all species was wide except some species. All these species were differs from each other in general topography of organs. The parasites belonging to the genus *Senga*, *Cotugnia* and *Moniezia* were highly diversified. In case of locality or distribution of piscean, avian and mammalian tapeworms, the maximum numbers of parasites and species were collected and recorded from Nanded district as compare to other districts of Marathwada region. Similar results were recorded by Bhure et al. (2010). Kennedy (1971, 1976) explained the ecological factors i.e. distribution and environment of host, the diet and mode of feeding of host and parasites are influenced the parasitic development (Upadhyay et al., 2013b).

Marathwada is temperate region in Maharashtra. The water becomes warm which is suitable for the growing of Zooplankton, some aquatic invertebrates i.e. molluscs and crustacean, these aquatic animals as a food of freshwater fishes as well as the intermediate host of many parasites.

The availability of food and feeding activity of the host also may be one of the reasons for occurrence of parasitic diversity. The maximum infections are occurred in the host *Gallus gallus domesticus and Capra hircus*. The infections are hosts specific because the morphological, physiological and ecological factors affect the host specificity (Jaiswal et al., 2013). The morphological factors are those which like a parasite with its host at the site of attachment. The ecological factors are such as, distribution, and environment of the host, the diet and mode of feeding. These adaptations often provide important role for limiting a parasite to a particular host sp. in a particular season (Jaiswal et al., 2014).

CONFLICTS OF INTEREST

The authors claim no conflicts of interest because none financial support was received from any government, non-government agency or organization to conduct this research work.

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