

Research Article

Biodiversity of chewing lice and helminthes parasites of domestic fowls *Gallus gallus domesticus* (Linnaeus, 1758) (Aves: Galliformes) from Hyderabad, Sindh, Pakistan

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Abstract

Birds are valuable and precious for many purposes. They are individually representing greatly inhabited life forms and also super indicators of fitness of various ecosystems. Galliform birds (Aves: Galliformes) cover up a most important part of our poultry industry including domestic fowls, *Gallus gallus domesticus* (Linnaeus, 1758). These are commercially and inexpensively important birds and are affected by different ectoparasites and endoparasites especially under traditional and unhygienic conditions of rearing in our country. The present research work was conducted to calculate the diversity of species of chewing lice and helminthes parasites and their rate of prevalence in domestic fowls, *Gallus gallus domesticus* (Linnaeus, 1758). For this study the domestic fowls *Gallus gallus domesticus* (Linnaeus, 1758) were collected live from different urban and rural areas of Hyderabad, Sindh, Pakistan. The study was carried out from 2017-2019. A total of 95 fowls were observed and then dissected for the collection and examination of parasites. Over all prevalence were recorded 91.57%. The species of chewing lice (Phthiraptera) were recovered from wings, belly and body feathers and helminthes parasites were from small intestine only. The identified chewing lice and their prevalence were *Menacanthus stramineus* (Nitzsch, 1818), (16.89%), *Menopon gallinae* (Linnaeus, 1758), (18.72%), *Menacanthus pallidulus* (Neumann, 1912), (12.36%), *Goniocotes gallinae* (de Geer, 1776) (10.64%), and *Goniodes dissimilis* (Denny, 1842) (11.99%). The identified helminthes parasites and their prevalence were *Choanotaenia infundibulum* (Bloch, 1779) (11.01%), *Raillietina cysticillus* (Molin 1858), (9.54%) and *Cotugnia dignophora* (Pasquale 1890), (8.81%). The results of present study discovered that the less care and attention were required for handling and rearing of domestic fowls in study area.

Keywords: Biodiversity; Chewing lice; Ectoparasites; Domestic fowls; Helminthes parasites; Hyderabad

Introduction

The family Phasianidae (Insecta: Phthiraptera) of the order Galliformes is the largest family which includes more than 155 birds species [1]. A range of fowls of

this family are sedentary, resident, terrestrial, attractive, colorful, versatile and stunning birds in their habitat and life style than other form of birds [2]. The Phasianid birds have enormous diversity in their

habits of feeding and behaviors. Domestic fowls *Gallus gallus domesticus* (Linnaeus 1758) are house trained birds which are reared by humans for the production of eggs meat and their feathers. These gallinaceous birds are easy to take care and hold by householders usually all over the world [3, 4]. There are various types of domestic fowls and wild fowls of galliform birds that live in diverse conditions of environmental temperature and humidity all over the worlds [5]. The products of poultry (especially meat and eggs) are the significant sources of food as protein for human beings and second source of major food item about 30% of total protein in the world [6]. Domestic fowls *Gallus gallus domesticus* (Linnaeus 1758) contain meaningful value than other kind of animals which are kept or domesticated by householders [7]. The association of parasites with host is always harmful and lot of losses in domestic fowls has been associated with various disease causing organisms like viruses, bacteria and variety of ecto and endoparasites of susceptible environment. It was investigated that about 751 million domestic fowls, guinea fowls, turkey fowls, dove, Geese and ducks are having various parasitic infections every year in Africa but these types of infection could be reduced in poultry birds because of improved commercial production system and management practices [8]. The host parasite relationship is out of control and prevalence of chewing lice and gastrointestinal helminthes parasites are injurious for the body of host [9]. Mostly domestic fowls are kept in free range scavenging system in urban and rural areas of Hyderabad, Sindh, Pakistan. In this system domestic fowls are allowable to move around freely in the surrounding environment of the houses during day time for searching of food, which largely consists of house hold wastes, larvae of various insects and seeds [10]. This type of scavenging habit makes the domestic fowls

are at high risk of all type of infestations and infections, particularly chewing lice (Phthiraptera) and gastrointestinal helminthes parasites. The diversity of parasites like chewing lice, nematodes, cestodes and trematodes are commonly observed in domestic fowls. These types of parasites can be collected from belly, feathers, small and large intestine or droppings of feces [11]. Numerous species of helminthes parasites of cestodes and nematodes may parasitize the alimentary canal of domestic fowls. There are more than 1,450 tapeworms have been identified in domestic and wild fowls [12]. These parasitic associations are found more regular at increased temperature and humidity, when the availability of intermediate hosts is abundant. There are a number of houseflies and beetles inhabiting poultry houses act as intermediate hosts for most of the species of helminthes parasites [13]. Economic production of poultry acting a major role in mitigation of poverty and requires with a reduction of land and economic investment. Good steps of research wok are required for necessary implantation to boost up the local poultry production. It is therefore necessary to identify the diversity of parasites commonly occurring in domestic fowls. The present parasitic fauna of chewing lice (Phthiraptera) and helminthes parasites of domestic fowls in the study area is unsatisfactory and insufficient. The present investigation was approved to conclude the basic information on prevalence and diversity of chewing lice (Phthiraptera) and helminthes parasites of domestic fowls *Gallus gallus domesticus* (Linnaeus 1758) in Hyderabad, Sindh, Pakistan.

Materials and Methods

A total of 95 live domestic fowls *Gallus gallus domesticus* (Linnaeus, 1758) were purchased and brought from different urban and rural areas of Hyderabad, Sindh, Pakistan for the examination of diversity of chewing

lice (Phthiraptera) and helminthes parasites. The fowls were brought time to time to the Advanced Parasitology Laboratory, Department of Zoology, University of Sindh, Jamshoro, Pakistan during the year of 2017-2019. First live fowls were placed on white paper sheath and treated with coopexpowder (Permethrin) about 25-30 minutes for the removal of chewing lice, the collected specimens were placed in small vials containing 70% alcohol for preservation and mounted finally in Canada balsam with the help of cover slips [14]. Then domestic fowls were dissected and major parts of intestine were removed, incised and carefully examined for collection of helminthes parasites. The endoparasites were shifted to the vials containing 75% alcohol for preservation. The pressing of parasites occurred for overnight. Then parasites pass through the graded series of alcohol. The staining of helminthes parasites were occurred with Borax carmine and then washed with 70% alcohol, and passed through 90% and 100% absolute alcohol for the dehydration completely. The stained helminthes parasites were placed for a while in clove oil then clean in xylene for 05 minutes and finally mounting occur in Canada balsam [15]. The identification and explanation of helminthes parasites were occurred from literature [16, 17].

Results and Discussion

The present study is based upon the diversity of chewing lice (Aves: Galliformes) and helminthes parasites of domestic fowls *Gallus gallus domesticus* (Linnaeus 1578) from urban and rural areas at Hyderabad, Sindh, Pakistan. Initially 95 specimens were collected and examined to check the diversity and prevalence of parasites during 2017-2019. About 87 domestic fowls were found infested with 817 number of chewing lice and helminthes parasites. The various breeds of fowls were available in the study area like Aseel chicken (n=40), 95%, Misri chicken

(n=25) 88% and Sonali chicken (n=30), 90%. A total of 91.57% of domestic fowls were infected with parasites (Table 1). The basic parasitological parameters were used for data analyses which include rate of parasitism, population density and prevalence of parasites in hosts during the present study. There were five species of chewing lice *Menacanthus stramineus* (Nitzsch 1818), *Menacanthus pallidulus* (Neumann 1912), *Menopon gallinae* (Linnaeus 1758), (*Goniocotes gallinae* (de Geer, 1776), and *Goniodes dissimilis* (Denny 1842) (Table 4). *Menopon gallinae* (Linnaeus 1758) was more prevalent which is 18.72% and recovered from belly, head and body feathers of fowls (Fig. 1). The parasite belongs to the family Menoponidae of order Amblycera. (Table 2). The prevalence of *Menacanthus stramineus* (Nitzsch 1818) *Menacanthus pallidulus* (Neumann 1912), *Goniocotes gallinae* (de Geer 1776), and *Goniodes dissimilis* (Denny 1842) was shown in (Table 4). There were three species of helminthes parasites cestodes, *Choanotaenia infundibulum* (Baloch 1779), *Raillietina cesticillus* (Molin 1858) and *Cotugnia dignophora* (Pasquale 1890) were recovered (Table 3). *Choanotaenia infundibulum* (Baloch 1779), was more prevalent endoparasite (Table 4) and recovered from the part of the small intestine of the infected fowls (Fig. 1). The parasite belongs to the family Dilepididae of order Cyclophylladae (Table 3). The prevalence of *Raillietina cesticillus* (Molin 1858) and *Cotugnia dignophora* (Pasquale 1890) was shown in (Table 4). It was recorded the helminthes parasite *Choanotaenia infundibulum* (Baloch 1779) was larger than the *Cotugnia digonopora* (Pasquale 1890) and *Raillietina cesticillus* (Molin 1858) (Table 4). The parasite belongs to the family Davaineidae of order Cyclophylladae (Table 3). The result of present investigation reveals high prevalence of chewing lice (Phthiraptera) than

helminthes parasites in domestic fowls *Gallus gallus domesticus* (Linnaeus 1578) [10-12] The helminthes parasites cestodes were recovered from small intestine but no trematodes and no parasitic nematodes were found. Prevalence and diversity of parasitism

might therefore be a major proof of reduced administrative supervision and quality control efforts in either the domestic fowls *Gallus gallus domesticus* (Linnaeus 1758) or in the instant environment where infection directly or indirectly originated [16, 17].

Table 1. Diversity of parasites from different breeds of domestic fowls (*Gallus gallus domesticus*) from Hyderabad, Sindh, Pakistan

S. No.	Name of birds	No. of birds examined	No. of birds Infested	No. of lice collected	Rate of infestation	Prevalence %
1	Aseel chicken	40	38	361	9.5	95
2	Sonali chicken	30	27	269	9.96	90
3	Misri chicken	25	22	187	8.5	88
Total		95	87	817	9.39	91.57

Table 2. Chewing lice were collected from domestic fowls *Gallus gallus domesticus* (Linnaeus 1758) from Hyderabad with their type host

Suborder	Family	Genera	Species	Type Host
Amblycera	Menoponidae	<i>Menacanthus</i>	<i>M. stramineus</i> (Nitzsch, 1818)	<i>Meleagrisgallopavo</i>
		<i>Menopon</i>	<i>M. abdominalis</i> (Piaget, 1880)	<i>Coturnixcoturnix</i>
			<i>M. pallidulus</i> (Neumann 1912)	<i>Gallus gallus</i>
			<i>M. gallinae</i> (Linnaeus, 1758)	<i>Gallus gallus</i>
Ischnocera	Philopteridae	<i>Goniodes</i>	<i>G. dissimilis</i> Denny1842	<i>Gallus gallus</i>
		<i>Goniocotes</i>	<i>G. gallinae</i> (de Geer 1776)	<i>Gallus gallus</i>

Table 3. Helminthes parasites collected during present study from domestic fowls *Gallus gallus domesticus* (Linnaeus 1758) with their classification

Order	Family	Genera	Species
Cyclophyllidae	Dilepididae	<i>Coanotaenia</i>	<i>Choanotaenia infundibulum</i> (Bloch, 1779)
	Davaineidae	<i>Railletina</i>	<i>Railletinacysticillus</i> (Molin, 1858)
		<i>Cotugnia</i>	<i>Cotugniadignophora</i> (Pasquale, 1890)

Table 4. chewing lice and helminthes parasites examined and their prevalence of on host body from Hyderabad during present study

S. No.	Name of Parasites	Sample size of fowls	No. of fowls found infected	Total no. of parasites collected	Prevalence (%)
1	<i>Menacanthus stramineus</i>	13	12	138	16.89%
2	<i>Menacanthus pallidulus</i>	10	08	101	12.36%
3	<i>Menopongallinae</i>	14	12	153	18.72%
4	<i>Goniocotesgallinae</i>	11	12	87	10.64%
5	<i>Goniodesdissimilis</i>	10	10	98	11.99%

6	<i>Choanotaenia infundibulum</i>	13	14	90	11.01%
7	<i>Railietinacysticillus</i>	12	10	78	9.54%
8	<i>Cotugniadignophora</i>	12	09	72	8.81%
Total		95	87	817	99.96%

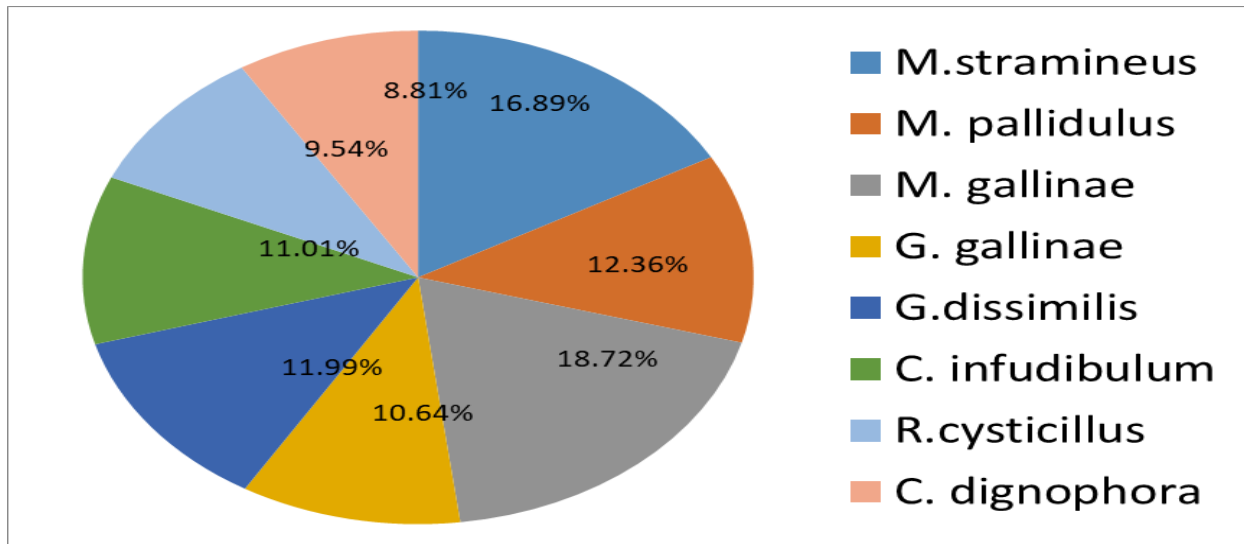


Figure 1. Representation of the prevalence of parasites found in fowls during present study

Conclusion

The present research work deals with the diversity of chewing lice (Phthiraptera) and helminthes parasites of domestic fowls (Galliformes: Phasianidae), which are cost-effectively important birds. They are usually used as Poultry birds. Poultry birds are used for food and amusement. The present work provides a fundamental knowledge to classify the diversity of internal and external parasites of the poultry and give awareness to the poultry breeders and to improve the production of poultry. The identified diversity of parasitic insects of fowls were found in Hyderabad, Sindh, Pakistan includes *Menopon gallinae* (Linnaeus, 1758), *Menacanthus stramineus* (Nitzsh, 1818), *Menacanthus pallidulus* (Neumann, 1912), *Goniocotes gallinae* (de Geer, 1776), and *Goniodes dissimilis* (Denny, 1842) and diversity of helminthes

parasites includes *Choanotaenia infundibulum* (Bloch, 1779), *Railletina cysticillus* (Molin 1858), and *Cotugnia dignophora* (Pasquale 1890). The aim of the study is to check the prevalence and diversity of ectoparasites and endoparasites in the different breeds of domestic fowls *Gallus gallus domesticus* (Linnaeus 1758) which are important source of food by most of the people of Sindh province.

Authors' contributions

Conceived and designed the experiments: S Naz & NA Birmani, Performed the experiments: F Shaikh, NA Birmani & S Naz, Analyzed the data: S Naz, Contributed materials/ analysis/ tools: S Naz & NA Birmani, Wrote the paper: F Shaikh.

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