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Incidence of Chewing Lice (Phthiraptera: Insecta) on Common Mallard, *Anas platyrhynchos* (Anatidae: Anseriformes: Aves) in Karachi region, Pakistan

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Abstract: The chewing lice (Phthiraptera: Insecta) were examined for their population and rate of infestation on Common Mallards, *Anas platyrhynchos* Linnaeus (Anatidae: Anseriformes: Aves) in Karachi region during the year 2015-2016. A total of 26 mallards were observed in captive of local parks in different areas of Karachi. Five species of chewing lice were reported during the survey, with their population density on host body. The data was taken from every locality by random collection method. The chewing lice species recorded with their maximum prevalence and population abundance (in parenthesis) were *Holomenopon leucoxanthum* (Burmeister, 1838) was 43.81 (37.53), then *H. fatemae* Naz and Rizvi, 2012 was 35.2 (30.15), *Anaticola crassicornis* (Scopoli, 1763) was 19.03 (16.30), *Anatoecus icterodes* (Nitzsch, 1818) was 1.88 (1.61) and *Trinoton querquedulae* (Linnaeus, 1758) was 0.089 (0.076) with its least population of lice on 26 birds. During survey, the population density of lice (mean±SE) in four localities during winter and summer seasons were recorded maximum in locality C (Safari Park, Karachi east) which was 82.16 (164.33±65.39) in winter and 68.16 (116.33±37.82) in summer season, whereas minimum in locality D (Hill Park PECHS, Karachi central) with 32.16 (96.5±29.43) in winter and 28 (84±23.404) in summer, respectively. The population intensity and standard deviation of all the chewing lice species in four localities were also calculated season-wise, to check out the rate of infestation of lice in mallards in Karachi region, Pakistan.

Key words: Prevalence · Population density · Chewing lice · Common Mallard · Pakistan

INTRODUCTION

The common mallard, *Anas platyrhynchos* Linnaeus (Anatidae: Anseriformes: Aves) is an important poultry bird in many regions of the world. It inhabits aquatic, semi aquatic and semi terrestrial niches with variable degrees of temperature and humidity in their body regulation, hence may harbor a variety of parasites including ectoparasites mainly chewing lice as well as endoparasites like helminths [1, 2, 3].

Amongst chewing lice, eight species parasitize different breeds of *Anas platyrhynchos* throughout the world [4-8]. These species are *Holomenopon fatemae* Naz and Rizvi, 2012; *H. leucoxanthum* (Burmeister, 1838); *H. maxbeieri* Eichler, 1954; *H. transvaalense* (Bedford, 1920) and *Trinoton querquedulae* (Linnaeus, 1758) of family Menoponidae (suborder Amblycera) and *Anaticola crassicornis* (Scopoli, 1763), *Anatoecus dentatus* (Scopoli, 1763) and *A. icterodes* (Nitzsch, 1818) of family Philopteridae (suborder Ischnocera) found in less to moderate rate of infestation on mallards worldwide.

The lice infestation in ducks, mallards and other waterfowls is usually low to normal in many cases, but it can be serious if higher the number of lice and usually cause wet-feather in these birds, for waterfowls lice can be paratenic hosts of some helminthic parasites [9-13]. It was previously studied a very few work done on the biology and life cycle of some chewing lice species other than anatid host [14, 15], that the egg laying and hatching process may occur in warm to mild weather with maximum humidity, however the particular seasonal effect on egg laying and hatching of lice is not evident in the literature [15, 16, 17].

This work deals with the contribution to the prevalence, ecological parameters and seasonal variations in the population of chewing lice in particular to common

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mallards in Karachi region. This work is part of the research conducted on the infestation of chewing lice on game birds of Sindh province[2], under a funded project.

MATERIALS AND METHODS

During the present study collection of different species of chewing lice from different localities of Karachi was conducted, off the 26 birds of common mallard, *Anas platyrhynchos*. Four groups of *Anas platyrhynchos* were observed each contained both the genders and adult birds randomly. These groups of birds were tagged with numbered plastic rings in their legs, named as locality A: Gandhi Garden (Zoo) Karachi (southern region), B: Qaid-e-Azam Park, Bin Qasim Town, Karachi (west region), C: Safari Park, Gulshan-e-Iqbal Town, Karachi (north-east region) and D: Hill Park, PECHS, Karachi (central region) (Table 1). All the birds, their diet and their feather conditions were checked carefully, after the period of 10-12 days in every month except May and November in order to allow the eggs to hatch and grow the population of lice on their respective host birds in every locality for this study.

The chewing lice of mallards were collected by visual examination by using high magnifying glasses and shuffling of feathers on white sheet that yield sometimes live specimens. After collection, species wise sorting was conducted in Advanced Parasitology laboratory at Department of Zoology, University of Sindh. The chewing lice species were mounted in permanent microscopic slides for their identification using literature [4, 8, 18-22].

The average number of lice on each bird of all the localities was conducted during winter and summer seasons. The winter collection was carried out during December 2015 to April 2016 (18-27°C) and the summer collection was carried out during June 2015 to October 2015 (26-40°C) in order to check the effects of change in temperature and humidity conditions.

RESULTS AND DISCUSSION

During the present study, five species of chewing lice have been found on Common Mallard, *Anas platyrhynchos* from four different localities of Karachi City (Table 1). It was observed by surveying that all lice species were found sluggish on bird's body and were easily collected by visual examination using magnifying glass in the field. However, the two species of *Holomenopon* were observed on birds by their coloration which is relatively darker with dark lateral edges in *H. fatemae* Naz and Rizvi, 2012, that appeared clearly in some species during examination [23]. From different regions of Karachi, that the normal to low louse population (less than average 50 in number) appears to have very little effect on the healthy birds with relatively good feather condition. The infestation of lice more than average 200-500 lice may cause the bird weak and of low immunity in them against any infection, is often found particularly in heavy infestation of endoparasites, also the acari may intense the infection [1, 2, 12, 13, 23-32].

It is concluded that the temperature is also very important factor and plays a significant role in increasing the population of lice on the host body. During winter season the population of lice is increased and also the humidity which caused rapid increase of population probably because birds keep them warm by sitting close contact with each other during which transmission of the lice occurs from one host to another [2, 33, 34, 35]. During the high temperature, lice normally move towards the shaft and barbs of feathers where they feed most of the time and also the eggs hatch in warmer conditions. It might be considered that the hatching process goes rapid in summer which develops in to adults to increase their number on host body [14, 17, 36-39].

It was also observed that the weathering conditions like temperature and humidity at different seasonal variations may also affect the population dynamics in lice species [35, 40]. Presently, the population density, abundance and prevalence of chewing lice species infesting common mallards in Karachi region have been calculated with their maximum prevalence and population abundance (in parenthesis) (Tables 1 and 2, Fig. 1-3). In Table 1 were *Holomenopon leucoxanthum* (Burmeister, 1838) was 43.81 (37.53), then *H. fatemae* Naz and Rizvi, 2012 was 35.2 (30.15), *Anaticola crassicornis* (Scopoli, 1763) was 19.03 (16.30), *Anatoecus icterodes* (Nitzsch, 1818) was 1.88 (1.61) and *Trinoton querquedulae* (Linnaeus, 1758) was 0.089 (0.076) with its least population of lice on 26 birds. Only two specimens of *Trinoton querquedulae* were collected from one bird only in Qaid-e-Azam Park and the data could not be collected so far for the other parameters.

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Table 1: The Chewing lice of Common Mallard, *Anas platyrhynchos*, collected during the present work from four regions of Karachi, Pakistan, with species population density and abundance

Locality	Total number of birds examined	*A. crassicornis*	*A. icterodes*	*H. fatemae*	*H. leucoxanthum*	*T. querquedulae*	Total lice in each locality	Population Density
A: Gandhi Garden	05	88	42	-	264	-	394	78.8
B: Qaid-e-Azam Park	09	113	-	255	261	02	631	70.11
C: Safari Park	06	117	-	529	196	-	842	140.33
D: Hill Park	06	106	-	-	255	-	361	60.16
Total birds and lice species	26	424	42	784	976	02	2228	85.72
Overall Prevalence of Chewing Lice species		19.03	1.88	35.2	43.81	0.089	100.00	
Population Abundance of all chewing lice species		16.30	1.61	30.15	37.53	0.076		

Table 2: Month-wise Data on Population and Prevalence (%) of chewing lice of Common Mallard, *Anas platyrhynchos,* during Summer Season from June, 2015 to October, 2015 (26-40°C) and Winter Season from December, 2015 to April, 2016 (18-27°C)

		Summer Season							Winter Season						
Locality	Lice species	06.15	07.15	08.15	09.15	10.15	Total no. of lice in Summer	Prevalence in Summer	12.15	01.16	02.16	03.16	04.16	Total no. of lice in Winter	Prevalence in Winter
	Anaticola crassicornis	11	8	5	7	4	35	19.33	9	8	10	12	14	53	24.88
A	*Anatoecus Icterodes*	4	2	1	3	5	15	8.25	2	4	6	8	7	27	12.67
	Holomenopon leucoxanthum	27	29	30	25	20	131	72.37	18	22	28	30	35	133	62.44
	Anaticola crassicornis	10	13	15	8	5	51	17.77	13	15	14	11	9	62	18.02
B	*Holomenopon leucoxanthum*	17	20	26	28	30	121	42.16	20	25	28	32	35	140	40.69
	Holomenopon fatemae	16	20	24	27	28	115	40.06	19	28	27	32	34	140	40.69
	Trinoton querquedulae	0	0	0	0	0	0	0	0	0	02	0	0	02	0.58
	Anaticola crassicornis	13	15	9	8	10	55	15.75	10	12	14	15	11	62	12.57
C	*Holomenopon leucoxanthum*	20	22	18	15	12	87	24.92	15	18	22	24	30	109	22.10
	Holomenopon fatemae	30	41	39	62	35	207	59.31	42	60	80	78	62	322	65.31
D	*Anaticola crassicornis*	10	12	15	9	5	51	30.35	9	10	13	15	8	55	28.49
	Holomenopon leucoxanthum	18	20	23	29	27	117	69.64	21	25	28	30	34	138	71.50

Table 3: Seasonal Mean of Population Density with Standard Error (Mean ± S.E), Mean Intensity and Standard deviation of all chewing lice species of Common Mallard, *Anas platyrhynchos* during present study in all four regions of Karachi, Pakistan

	Summer			Winter		
Locality	Population Density (Mean±S.E)	Mean Intensity	SD	Population Density (Mean±S.E)	Mean Intensity	SD
A	36.2 (60.33±29.25)	18.37	50.601	42.6 (71±26.102)	17.13	45.21
B	31.88 (95.66±27.57)	29.13	55.139	38.22 (86±29.008)	27.67	58.017
C	68.16 (116.33±37.82)	35.43	65.428	82.16 (164.33±65.39)	39.66	113.126
D	28 (84±23.404)	17.05	33	32.16 (96.5±29.432)	15.52	41.5

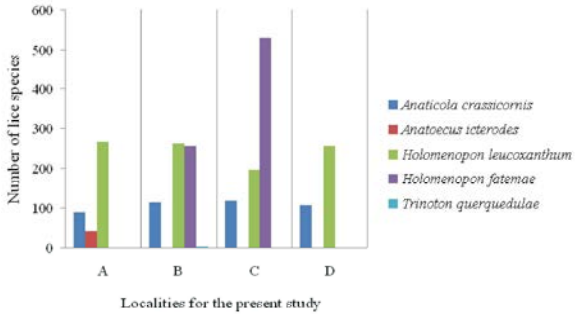

Fig. 1: The Graph representing the total number of individual species in each locality (A to D) found throughout the year in comparison with other species

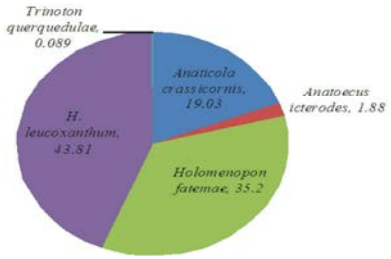

Fig. 2: Comparative ratio of Overall Prevalence of chewing lice on Common Mallard, during the present study in Karachi, Pakistan

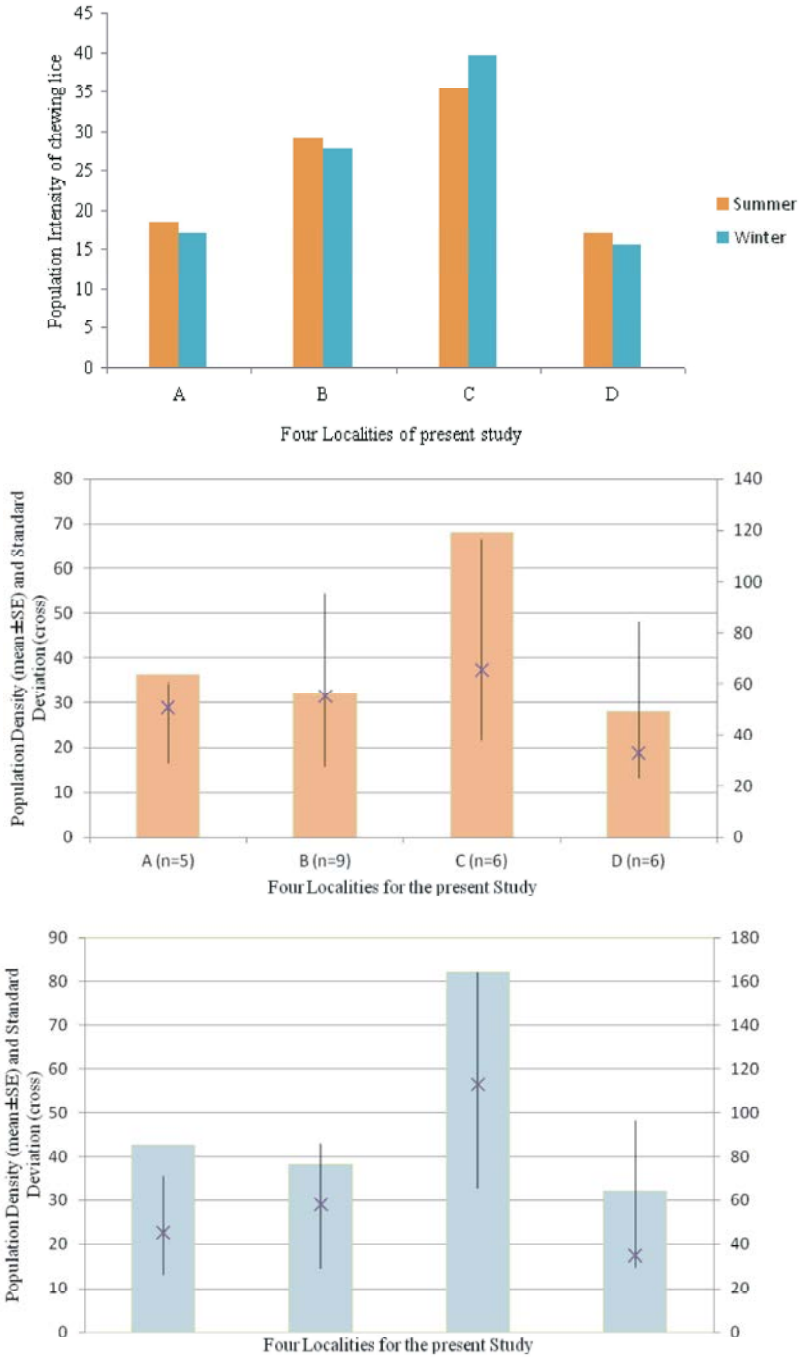

Fig. 3: Bar graphs showing the Mean Intensity (3a), Population Density (Mean±SE) and standard deviation in population shown in summer season (3b) and winter season (3c) of Chewing lice on common Mallard in 2015-2016, in Karachi, Pakistan

During the survey, the population density of lice (mean±SE) in four localities during winter and summer seasons were recorded (Tables 2 and 3), the maximum in locality C (Safari Park, Karachi east) which was 82.16 (164.33±65.39) in winter and 68.16 (116.33±37.82) in summer season, whereas the minimum in locality D (Hill Park PECHS, Karachi central) with 32.16 (96.5±29.43) in winter and 28 (84±23.404) in summer, respectively. The standard deviation, overall prevalence, abundance and difference in mean intensities of chewing lice

population in both the weathering conditions on Common Mallards are shown in Fig. 2 and 3, in all four localities of Karachi, Pakistan.

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