J Parasit Dis (July-Sept 2017) 41(3):684–686
DOI 10.1007/s12639-016-0866-2

ORIGINAL ARTICLE

Population characteristics of black kite lice

A. K. Saxena[1]

Received: 20 October 2015 / Accepted: 25 November 2016 / Published online: 16 December 2016

Abstract A look on literature revealed that the population characteristics of Phthiraptera infesting Black Kite, *Milvus migrans* Boddaert deserved investigation. Thirty-two kites were sampled in district Rampur (U.P.) India during January 2011–December 2012, for the presence of phthirapteran ectoparasites. Two amblyceran species, *Laemobothrion maximum* Scopoli and *Colpocephalum turbinatum* Denny and one ischnoceran louse, *Degeeriella regalis* Giebel were recovered. The prevalence, intensity of infestation, sample mean abundance, range of infestation, sex ratios, and adult nymph ratios of three lice were recorded. *C. turbinatum* ranked first in the order of prevalence and intensity of infestation, followed by *D. regalis*. The prevalence and intensity of *L. maximum* was quite low.

Keywords Phthiraptera · Biting lice · Mallophaga · Black kite lice

Introduction

Population of lice on particular host ranges from nil to thousands per host. Generally, the prevalence and infestation rate together with the number of hosts examined, provide a description of body population of lice on their host (Marshall 1981). The parasite abundance and distribution of parasite have received little attention despite their, diversity and potential impacts on host population and community dynamics (Santiago et al. 2008).

Reports on the population characteristics of phthirapteran ectoparasites infesting selected Indian birds viz. domestic pigeons (Singh et al. 1998; Khan et al. 2009), Common Myna (Chandra et al. 1990; Saxena et al. 2007), house Crows (Beg et al. 2008), Red Avadavats (Gupta et al. 2007), Bank Myna's (Rajput et al. 2009), House Sparrows, Indian Parakeets, White Breasted Kingfishers (Saxena et al. 2007), Domestic Fowls (Trivedi and Saxena 1991; Trivedi et al. 1992; Saxena et al. 1995, 1997, 2004; Kumar et al. 2004), Red Whiskered Bulbuls (Arya et al. 2010), Common Bayas (Arya et al. 2011), Cattle Egrets (Ahmad et al. 2010), Common Hoopoe (Agarwal et al. 2011), Striated Babblers (Ahmad et al. 2011), Common Snipe (Ahmad et al. 2012), Indian grey Horn Bills (Ahmad et al. 2013), Grey Lag Goose (Kumar et al. 2013), Ring Doves (Singh et al. 2015) and certain other poultry (Khan et al. 2008) have appeared during last twenty-five years. A scrutiny of literature revealed that the population characteristics of phthirapterans occurring on India Black Kites escaped the attention. Elsewhere, information on the population ecology of Galapagos Hawks (*Buteo galapagoensis*) have been noted by the workers (Santiago et al. 2008; Whiteman and Parker 2004a, b)

The present report furnishes information on the population characteristics of three phthirapteran species infesting India Black Kite, *Milvus migrans*.

Materials and methods

Thirty-two Black Kites, *Milvus migrans* were sampled during January 2011–December 2012, in district Rampur (India) located at 28°48′N 79°00′E 28.8.1979. Each bird was examined visually (with the help of magnifying torch), after tying the legs. The lousy hosts were deloused by the

✉ A. K. Saxena
akscsir@rediffmail.com

[1] Department of Zoology, Government Raza Postgraduate College, Rampur, U.P. 244901, India

modified Fair Isle method (Gupta et al. 2007). The body feathers of fumigated birds were ruffled manually over a plastic sheet to take out the louse load. The head was separately examined after delousing. Deloused birds were released in wild. Entire louse load so obtained was transferred to 70% alcohol and separated species wise, sex wise and stage wise. The prevalence, mean intensity, sample mean abundance, variance to mean ratio, exponent (k) of the negative binomial distribution and index of discrepancy (D) were estimated with the help of software offered by Rozsa et al. 2000. The goodness of fit between the observed and the expected frequencies (negative binomial) was determined by the χ^2 test.

Results

Three phthirapteran species (two amlyceran e.g. *Colpocephalum turbinatum* Denny; *Laemobothrioon maximum* Scopoli and one ischnoceran, *Degeriella regalis* Giebel) were recorded from thirty-two Black Kite, *Milvus migrans* during 2011–2012, in district Rampur (U.P.) India. Seventy-five percent birds were found infested with phthirapteran ectoparasites (sample mean abundance-62.6/bird; mean intensity-83.5/bird; range of infestation-24–154). Maximum percentage (68%) of birds carried two species. One species infestation was found on 6.2% birds. Simultaneous occurrence of all the three species was encountered on 25% birds. The population characteristics and population structure of all the three species has indicated in Table 1. The prevalence, intensity of infestation and sample mean abundance of amblyceran louse, *C. turbinatum* were highest, followed by ischnoceran louse, *D. regalis*.

The prevalence and intensity of infestation of amblyceran louse *L. maximum* remained lowest. An analysis of three measures of aggregation indices i.e. variance to mean ratio, index of discrepancy (D of Poulin) and the exponent of negative binomial (k) clearly indicated that the frequency distribution patterns of the three species were skewed/-clumped but somehow it failed to conform the negative binomial model. In other words, the negative binomial model was not found to be a good fit in case of all the three Black Kite lice. Females outnumbered the males in natural population in case of all the three lice. Nymphal population dominated over the adult population in case of *C. turbinatum* and *D. regalis* but not in case of *L. maximum*.

Discussion

The prevalences of *C. turbinatum* as well as *D. regalis* on Black Kites were comparatively lower (75% and 65%, respectively) than that of Galapagos Hawks (93–100% and 72–89%; Whiteman and Parker 2004a, b; Santiago et al. 2008). The sample mean abundance and mean intensity of infestation of *C. turbinatum* on Galapagos Hawks exhibited

Table 1 Population characteristics of three phthirapteran species on Black Kites

S. no.	Population parameters	*Colpocephalum turbinatum*	*Degeeriella regalis*	*Laemobothrion maximum*
1	No of bird examined	32	32	32
2	Prevalence (%)	75	68.8	25
3	Mean intensity	45.6	30.3	5.25
4	Median intensity	41	32.5	5.5
5	Sample mean abundance	45.6	27.5	1.3
6	Sample size	24	22	8
7	Total no of specimen recovered	1094	666	42
8	Range of infestation	9–110	8–58	2–9
Aggregation indices				
9	Variance/mean ratio	27.7	15.01	4.9
10	Index of discrepancy (D of Poulin)	0.473	0.455	0.782
11	k (Exponent of negative binomial)	0.479	0.423	0.127
Applicability of negative bionomial				
12	Degree of freedom	10	16	3
13	Chi square (χ^2), $p > 0.05$	20.341	53.56	10.127
14	Whether conformed to negative binomial	Not conformed	Not conformed	Not conformed
Population structure				
15	Male:female	1:2.1	1:1.4	1:1.4
16	Adult:nymphs	1:1.4	1:1.3	1:0.9
17	IN:IIN:IIIN	1:1.4:1.6	1:1.3:1.4	1:5:4

considerable variation (20.5–270.6/bird and 22–271/bird respectively). It remained 34.8 and 45.6% on Black Kites during present studies. Likewise, the sample mean abundance and mean intensity of *D. regalis* exhibited considerable variation on Galapagos Hawks (4.7–22 and 6.5–25/bird) but it remained comparatively high on Black Kites in India (20.8 and 30.2/Black Kite). In other words the abundance of ischnoceran louse, *D. regalis* on Black Kites was quite higher than that of Galapagos Hawks.

Santiago et al. (2008) have indicated that the abundance and distribution of parasites have received little attention despite their pervasiveness, diversity and potential impact on host population and community dynamics. Whiteman and Parker (2004b) have examined the relationship between host territoriality/body condition versus parasite load of 26 Galapagoes hawk. They concluded that body condition and louse abundance were significantly correlated for *C. turbinatum* but not for *D. regalis* and further emphasized that these lice directly reduce the host body condition. They further found that the mean intensity of *C. turbinatum* were higher than that of *D. regalis* on both kind of hawks (territorial as well as non territorial). Likewise, prevalence of intensity of *C. turbinatum* was higher than that of *D. regalis* on Indian kites also. But, the occurrence of *L. maximum* on Indian kites ((of course the prevalence and intensity was low) is not a good signal as it is a large sized haematophagus louse. The haematophagus of phthirapterans do not only affect the vitality and productivity of the hosts but are also involved in the transmission of various infectious agents (Saxena et al.1985).

Acknowledgements The authors are thankful to Principal Govt. Raza P. G. College, Rampur for providing the laboratory facilities.

References

Agarwal GP, Ahmad A, Rashmi A, Arya G, Bansal N, Saxena AK (2011) Bio-ecology of the louse *Upupicola upupae*, infesting the Common Hoopoe, *Upupa epops*. J Insect Sci 11(26):1–9

Ahmad A, Khan V, Badola S, Arya G, Bansal N, Saxena AK (2010) Population characteristics and the nature of egg shells of two phthirapteran species parasitizing Indian cattle egrets. J Insect Sci 10:1–7

Ahmad A, Arya G, Saxena R, Bansal N, Saxena AK (2011) Prevalance of *Myrsidea salimalii* (Amblycera: Phthiraptera) on striated babblers (*Turdoides earlei*) (Timaliidae: Passeriformes: Aves). J Parsit Dis. doi:10.1007/s12639-011-0062-3

Ahmad A, Saxena AK, Gupta N (2012) Population characteristics of *Austromenopon durisetosum* on common snipe (*Gallinago gallinago*) (Scolopacidae: Charadriiformes: Aves). Nat J life Sci 9(1):69–71

Ahmad A, Arya G, Bansal N, Saxena AK (2013) Stray notes on two phthirapteran species occurring on Indian grey horn bill, *Tockus birostris* Scopoli (Coraciformes: Bucerotidae). J Parsit Dis. doi:10.1007/s12639-013-0409-z

Arya G, Bansal N, Khan V, Ahmad A, Saxena AK (2010) Population characteristics of Phthiraptera occurring on Red Whiskered Bulbul (*Pycnonotus jocosus*). J Appl Nat Sci 2(2):263–265

Arya G, Bansal N, Ahmad A, Gupta N, Saxena AK (2011) Population ecology of Phthirapteran ectoparasites infesting common Baya (*Ploceus philippinus*) (Phthiraptera: Insecta). Turk J Vet Anim Sci 35(1):183–185

Beg S, Gupta N, Kumar S, Khan V, Bhatnagar S, Saxena AK (2008) Occurrence of Phthiraptera on the house crow, *Corvus splendens* (Passreiformes: Corvidae). Entomon 33:75–78

Chandra S, Agarwal GP, Singh SPN, Saxena AK (1990) Seasonal changes in a population of *Menacanthus eurysternus* (Mallophaga: Amblycera) on the common Myna, *Acridotheres tristis*. Int J Parasitol 20:1063–1065

Gupta N, Kumar S, Saxena AK (2007) Prevalence and population structure of lice (Phthiraptera) on the Indian Red Avadavat. Zool Sci 24:381–383

Khan V, Kumar S, Gupta N, Ahmad A, Saxena AK (2008) Prevalence of phthirapteran ectoparasites on selected poultry in the district, Rampur (U.P.). Indian Vet J 85:447–448

Khan V, Kumar S, Gupta N, Ahmad A, Saxena AK (2009) Prevalence of lice in pigeons. Indian Vet J 86:531–532

Kumar S, Gupta N, Saxena AK (2004) Population composition of selected poultry lice (Phthiraptera). Res Rev Parasitol 64:49–54

Kumar V, Hasan SS, Saxena AK, Arya G, Ahmad A (2013) Population levels of Phthiraptera on grey lag goose, *Anser anser* (L.). Turkiye Parazitol Derg 37:273–276

Marshall AG (1981) The ecology of ectoparasitic insects. Acad Press, London, 417 p

Rajput S, Joshi VD, Gupta N, Khan V, Saxena AK (2009) Population dynamics of Phthiraptera on Indian Bank Myna, *Acridotheres ginginianus*. Entomon 34(2):99–102

Rozsa L, Reiczigel J, Majoros G (2000) Quantifying parasites in sample of hosts. J Parasitol 86:228–232

Santiago AD, Whiteman NK, Parker PG, Ricklefs RE, Valkiunas G (2008) Patterns of parasite abundance and distribution in island populations of Galapagos endemic birds. J Parasitol 91(3):584–590

Saxena AK, Agarwal GP, Chandra S, Singh OP (1985) Pathogenic involvement of mallophaga. Z Angew Entomol 99:294–301

Saxena AK, Kumar A, Surman, Singh SK (1995) Prevalence of *Menopon gallinae* Linne. (Phthiraptera: Amblycera) on poultry birds of Garhwal. J Parasit Dis 19(1):69–72

Saxena AK, Surman Singh SK, Kumar A, Trivedi MC (1997) Population composition of poultry shaft louse, *Menopon gallinae* (Insecta, Phthiraptera, Amblycera, Menoponidae). Rudolstad Nat Hist Sch 7:49–51

Saxena AK, Kumar S, Gupta N, Singh SK (2004) Prevalence of phthirapteran ectoparasitic insects on domestic hens of Rampur. J Parasit Dis 28(1):57–60

Saxena AK, Kumar S, Gupta N, Mitra JD, Ali SA, Srivastava R (2007) Distribution pattern of phthirapterans infesting certain common Indian birds. J Parasitol 93(4):957–958

Singh SK, Surman Kumar A, Saxena AK (1998) Population composition of four phthirapteran ectoparasites infesting blue rock pigeon *Columba livia*. J Parasit Dis 22(2):144–147

Singh P, Arya G, Saxena AK (2015) Prevalence and intensity of phthirapteran ectoparasites infesting Eurasian Collared Dove (*Streptopelia decaocto*) (Phthiraptera: Insecta). J Parasitol Vect Biol 17:22–28

Trivedi MC, Saxena AK (1991) Population dynamics of chicken body louse, *Menacanthus stramineus* (Phthiraptera: Amblycera). J Zool Res 4(1&2):37–42

Trivedi MC, Saxena AK, Rawat BS (1992) Incidence of Mallophaga on poultry in Dehradun (India). Angew Parasitol 33:69–78

Whiteman NK, Parker PG (2004a) Effects of host sociality on ectoparasite population biology. J Parasitol 90(5):939–947

Whiteman NK, Parker PG (2004b) Body condition and parasite load predict territory ownership in the *Galapagos hawk*. The Condor 106:915–921