

Population levels of Phthiraptera on Greylag Goose, Anser anser (L.)

Gri Yaban Kazı, Anser anser (L.) Üzerinde Phthiraptera Popülasyon Düzeyleri

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ABSTRACT

Objective: The present study was performed to record the mean monthly prevalence, intensity of infestation, sample mean abundance and frequency distribution pattern of one phthirapteran species infesting of *A. anseris*.

Methods: Ten birds were examined every month. Infested birds were deloused. The bird was placed in a polythene bag containing a wool of cotton soaked in chloroform (head protruded out to allow breathing). After 10 minutes, the bird's feathers were ruffled on a white plastic sheet placed below. The head was examined separately. The louse load was transferred to 70% alcohol and separated stage wise and sex wise.

Results: A total of 339 specimens of A. *anseris* were recovered from 66 infested hosts. Male-female ratio was 1: 1.8. Prevalence of Anaticola anseris was 55% (n=120). The sample mean abundance was 2.38 lice/bird. Variance to mean ratio exceeded unity (10.70). The index of discrepancy (D) was 0.75 and the value of exponent of negative binomial (k) remained 0.334. The observed and expected frequencies did not differ significantly (χ 2= 13.33, df= 15, p=0.05).

Conclusion: The prevalence of *A. anseris* on Indian greylag goose was high but its intensity remained quite low. The distribution pattern of *A. anseris* conformed the negative binomial model. The temperature, photoperiod and heat index exhibited significant positive correlations with the prevalence of *A. anseris*. (*Turkiye Parazitol Derg 2013; 37: 273-6*)

Key Words: Phthiraptera, biting lice, prevalence, greylag goose, anaticola

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ÖZET

Amaç: Bu çalışma *A. anseris*'i enfeste eden bir phthiraptera türünün ortalama aylık prevalansı, enfestasyon yoğunluğu, ortalama örnek bolluğu ve frekans dağılım paternini kaydetmek için yapıldı.

Yöntemler: Her ay 10 kuş incelendi. Enfeste olan kuşların bitleri ayıklandı. Kuş, kloroforma batırılmış pamuk yumağı içeren bir politen torba içine (baş solumaya izin verecek şekilde dışarda) yerleştirildi. 10 dakika sonra, kuşun tüyleri altına yerleştirilen beyaz plastik bir örtü üzerinde karıştırıldı. Baş ayrıca incelendi. Biti yükü %70 alkole aktarıldı ve evre ve cinsiyete göre ayrıldı.

Bulgular: Toplam 339 A. anseris örneği enfeste olmuş 66 konaktan elde edildi. Erkek-kadın oranı 1: 1,8 idi. Anaticola anseris prevalansı %55 (n=120) idi. Ortalama örnek bolluğu 2.38 bit/kuş idi. Varyans/ortalama oranı üniteyi aştı (10,70). Tutarsızlık (D) indeksi 0,75 ve negatif binomial üsdeğeri (k) 0,334 oldu. Gözlenen ve beklenen frekanslar anlamlı farklılık göstermedi (χ^2 =13,33, df=15, p=0,05).

Sonuç: Hint gri yaban kazlarında A. anseris prevalansı yüksekti ancak yoğunluğu oldukça düşük kaldı. A. anseris dağılım paterni negatif binomial modele uygundu. Sıcaklık, fotoperiyot ve ısı indeksi A. anseris prevalansı ile anlamlı pozitif korelasyon gösterdi. (*Turkiye Parazitol Derg 2013; 37: 273-6*)

Anahtar Sözcükler: Phthiraptera, ısırıcı bitler, prevalans, gri yaban kazı, anaticola

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INTRODUCTION

Selected workers have recorded the population levels of Phthiraptera on certain common Indian birds i.e. domestic fowls (1-5), pigeons (6), bank myna (7), sparrows, parakeets, king fishers (8), red avadvats (9), common myna (10), house crows (11), common hoopoe (12), red whiskered bulbuls and common baya (13, 14) during the past 25 years. In case of avian lice, a negative binomial model is frequently used to describe the pattern of frequency distribution (15, 16). The scrutiny of literature revealed that the population characteristics of Phthiraptera on the Indian greylag goose deserved investigation.

The present report furnishes information on the prevalence and intensity of infestation of an ischnoceran louse, *Anaticola anseris L.* on 120 greylag goose, *Anser anser*, in the district of Rampur and adjoining areas, during the year 2012.

METHODS

Ten birds were examined every month during the year 2012 in different localities of the Rampur district (28°48'N 79°00'E) and adjoining areas (Bilaspur, Tanda, Swar and Rudrapur). Each bird was examined visually with the help of a magnifying lens by deflecting the feathers, after tying the legs. Infested birds were deloused by the modified fumigation method indicated by Gupta et al. (9). The bird was placed in a large polythene bag containing a wool of cotton soaked in chloroform (head protruded out to allow breathing). After 10 minutes, bird feathers were ruffled to allow anasthetized lice to fall on a white plastic sheet placed below. The head was examined separately. Deloused birds were

Table 1. Population characteristics of Anaticola anseris on 120greylag goose, during 2012 in the district of Rampur andadjoining areas

Parameters	Anaticola anseris
Sample size	120
Prevalence	55.0%
Mean intensity	5.14 lice/bird
Median intensity	3.0 lice/bird
Sample mean abundance	2.83 lice/bird
Variance to mean ratio	10.70
Index of discrepancy (D)	0.886
Exponent of negative binomial	0.073
Whether conformed to negative binomial model	Yes
Value of χ_2	13.33
Degree of freedom	1.5
Level of significance	0.05
Sample mean crowding	403.69
Range of infestation	1-33
Total number of lice recovered	339
Sex ratio (M:F)	1:1.8
Adult nymph ratio (A:N)	1:1.5
Ratio of three nymphal instars (I:II:III)	3.9:1.8:1

released to lead a healthy life. The louse load was transferred to 70% alcohol and separated stage wise and sex wise.

Statistical analysis

The prevalence, mean intensity, sample mean abundance, variance to mean ratio, exponent (k) of negative binomial distribution, index of discrepancy (D) and the goodness of fit between the observed and expected frequencies (negative binomial) were computed with the help of software, Quantitative Parasitology- version 3.0 (17). The degree of correlation between mean monthly prevalence and the four eco-factors (temperature, RH, heat index and photoperiod) were computed with the help of software, StatPac for statistical analysis.

RESULTS

Prevalence of Anaticola anseris on the greylag goose, Anser anser was 55% (n=120) during 2012 in the district of Rampur and adjoining areas. The sample mean abundance was 2.38 lice/bird and the values of mean intensity and median intensity remained 5.14 lice/bird and 3.0 lice/bird, respectively (range of infestation 1-33, n=120). Variance to mean ratio exceeded unity (10.70). As far as aggregation indices are concerned, the index of discrepancy (D) was 0.75 and the value of exponent of negative binomial (k) remained 0.334 (Table 1).

Fifty four birds were found louse free. One louse occurred on 24 birds, 02 lice on 07 birds, 03 lice on 08 birds, 04 lice on 04 birds, 05 lice on 04 birds, 06 lice on 03 birds, 07 lice on 05 birds, 09 lice on 02 birds, 11 lice on 02 birds, 12 lice on single bird, 15 lice on single bird, 17 lice on single bird, 19 lice on single bird, 21 lice on single bird, 31 lice on single bird and lastly 33 lice on single bird. The aforesaid pattern of frequency distribution was clearly skewed (Figure 1). The observed and expected frequencies did not differ significantly (χ^2 =13.33, df=15, p=0.05). Thus, the negative binomial distribution represents the observed data, as a theoretical model.

Moderate correlation (r=+0.508; non significant) existed between mean monthly prevalence and mean monthly RH. However, significant positive correlation was recorded between mean monthly



Figure 1. Frequency distribution pattern of *Anaticola anseris* on 120 greylag goose, during 2012, in the district of Rampur and adjoining areas. Bars indicate the observed frequency and the dark points represent the frequency expected by the negative binomial model

prevalence, mean monthly temperature, heat index as well as photoperiod (r=0.686, 0.608 and 0.614, respectively). However the mean monthly infestation intensities of *A. anseris* were not found to be significantly correlated with RH, temperature, heat index and photoperiod (r=0.32, 0.045, 0.067 and 0.13 respectively).

As many as 339 specimens of *A. anseris* were recovered from 66 infested hosts. Females outnumbered the males in the natural population, as the male-female ratio was 1:1.8. Likewise, nymphs dominated over adults in the natural population and adult nymph ratio was 1:1.5. The ratio of three nymphal instars (first: second: third) remained 3.9:1.8:1.

DISCUSSION

Greylag goose, Anser anser is known to harbour 07 phthirapteran species (Three ischnocerans e.g Anaticola anseris, Anatoecus dentatus, Anatoecus icterodes and four amblyceran species Ciconiphilus pectiniventris, Holomenopon leucoxanthus, Ornithobius mathisi, Trinoton anserinum) (18). However, in India a single species, Anaticola anseris has been recorded, so far, (19). During present investigations the same louse was recorded from the aforesaid host.

The population of lice on avian hosts ranges from nil to thousands per host (20). Generally, the population of lice on avian hosts does not reach alarming levels due to different defense tactics adopted by the host bird (21). Present studies indicate that, in contrast to other Indian birds studied so far (except fowls), the prevalence of A. anseris on Indian greylag goose was high but its intensity remained guite low (mean intensity 5.14 lice/bird; sample mean abundance 2.8 lice/bird). Phthirapteran ectoparasites generally exhibit a skewed/ aggregated distribution pattern which often corresponds to negative binomial model (16). The degree of aggregation is quantified with the help of three indices (i.e. variance to mean ratio, value of exponent (k) of negative binomial and the value of index of discrepancy (D). In the present case, the distribution pattern of A. anseris conformed to the negative binomial model (i.e. in other words, negative binomial was found to be a good fit).

CONCLUSION

Avian lice are known to exhibit seasonal variation in the population. Several factors have been assigned for the summer rise in their population (20). In the present case, the temperature, photoperiod and heat index exhibited a significant positive correlation with prevalence of *A. anseris* on greylag goose. As far as population composition of *A. anseris* is concerned, sex ratio was skewed in favor of females, as in the case of most of the avian lice studied, so far. The reasons for establishment of skewed sex ratios have been discussed by Gupta et al. (9).

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