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STUDY ON LOCAL AND BROILER CHICKEN ECTOPARASITES PREVALENCE AND ESTIMATION IN QUETTA REGION, BALOCHISTAN, PAKISTAN.

Shereen[1], Asmatullah Kakar*[1], Mahrukh Naseem[1], Faizullah[2], and Zafarullah[1]

[1]Department of Zoology, University of Balochistan, Quetta-87300, Pakistan
[2]Directorate of Live-Stock, Brewery road, Quetta-87300, Pakistan
**Corresponding Author email:asmardanzai@yahoo.com*

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ABSTRACT
The present study was aimed at ascertaining the ectoparasites of poultry birds. Poultry pests are remarkably involved in the morbidity of the host by sucking blood and causing irritation to them and consequently lower their trade and industry by letting down the production and quality. In this study ectoparasites prevalence was monitored in local and broiler chickens of the Quetta region. One hundred local chickens inhabit the rural areas and one hundred from town poultry farms were examined for the presence of parasites. A total of 156 parasite specimens were collected by the random sampling method. The local poultry harbored 89 lice, 50 ticks, 9 mites, and 5 fleas while 45 specimens of lice species were massed from broiler chickens by standard methods. These were identified by using taxonomic keys. Results showed 40 indigenous and 43 broilers (out of 200 chickens) infested by lice species namely: *Phthiraptera* sp., *Menacanthus cornutus*, *Menacanthus stramineus*, *Goniocotes gallinae*, *Goniodes dissimilis*, *Menopon gallina*e), whereas 24 chickens (indigenous) were found to be infested by tick species (*Argas persicus*). The mite species *Dermanyssus gallinae* were observed infested 6 indigenous chickens, while 5 chickens (indigenous) were plagued by flea parasite *Echidnophaga gallinacean* compare to broiler poultry which was not infested by tick and mite or flea species. Lice were observed more prevalent than other ectoparasites examined in indigenous chickens compare to broiler farms. The present study results concluded that suitable ectoparasites control measures have to be practiced to minimize the effect of infestation by poultry pests specifically to indigenous chickens.

1. INTRODUCTION

The poultry ectoparasites like ticks, lice, and mites play a significant role in the dispersal of certain pathogens resulting in morbidity by intake blood and create severe irritations to the chickens. The poultry pests cause extensive economic losses to the poultry industry. (Phulan et al., 1984). Ectoparasites drive annoyance, obstruct the feed consumption, and thus resulting in anemia, thinness, and ultimately loss the productivity (Soulsby, 1982). Ectoparasites reduce the egg yield at the rate of about 66 eggs per bird in a year and cause sudden weight loss at the rate of about 711 g per bird. (Elkifl et al., 1973). Several factors relate to the prevalence of ectoparasites more in local chicken. One of the major factors is their free-ranging and lack of appropriate pest controlling effects and practices (Mungube et al., 2008).

Under-developed countries facing ectoparasites burden recognized as major factors that threaten to scavenge village poultry production systems (Zumani, 2011). Common ectoparasites of village chickens are mostly include lice, mites, fleas, and ticks (Nnadi and George, 2010). Reports on poultry infestation have revealed that mortality rate due to parasitic diseases is higher than those certified to some poultry viral infectious diseases such as fowl pox disease and Newcastle disease (Nnadi and George, 2010; Opara et al., 2014). Lice cause multi-focal skin lesions on the affected birds and leg-scale mites cause swelling, irritation with exudates, and afterward keratinization of the legs (Permin and Hansen, 1998; Njunga, 2003; and Prelezov and Kolnarski, 2006). Avian chewing lice are divided into the suborders *Ischnocera* and *Amblycera. Ischnocera* is morphologically particular for locomotion on feathers and hardly ever if ever gamble onto the skin of the host, feed entirely on feathers and dermal debris, which they metabolize in the incidence of symbiotic bacteria in contrast *Amblycera* are capable of abandoning a dying host and so maybe less reliant than *Ischnocera* on direct contact between hosts for transmission (Eichler et al., 1972; Marshal et al., 1981). This study aimed to report the prevalence and estimation of different ectoparasites in indigenous and broiler chicken of the Quetta region, Balochistan Pakistan. The result will enable the stakeholders in the poultry industry to fully realize the importance of ectoparasites and be motivated to implement a feasible control program to reduce the associated economic losses**.**

2. MATERIAL AND METHOD

2.1. Study Area

Ectoparasites samples were collected from 200 broiler and indigenous chicken from various regions of Quetta.

2.2. Parasites Sampling

The collection of ectoparasites was done between January 2019 to December 2019. These ectoparasites were preserved in 70% Ethanol (70 parts alcohol and 30 parts distilled water) and kept in McCartney bottles. All the preserved samples were transported to the Department of Zoology, University of Balochistan, Quetta, for their further advanced analysis was taken to Parasitology Lab. at CASVAB (Center of advanced study in vaccinology & biotechnology), University of Balochistan Quetta. These samples were identified according to their morphological characteristics using entomological keys then.

2.3. Microscopic Examination

The collected Ectoparasites were microscopically analyzed for identification. Later on, by following slid mounting technique of Palma, R. L. (1978). The materials were dehydrated each in, 70, 80, 90%, and absolute ethanol for 5 to 10 minutes 2. Maceration and decolonization - 20% aqueous KOH for 15-35 hours. 3. Neutralization - 10% aqueous acetic acid for 30-40 minutes. 4. Staining - highly concentrated aqueous acid fuchsine for 8-16 Hours. 5. Dehydration - 40%, 70%, and absolute (or 96%) ethanol for 30-40 minutes in each concentration. 6. Clearing - pure clove oil for 24 hours at least. 7. Dissection 8. Labeling of slides. 9. Mounting - neutral Canada balsam in and stained and mounted on slides with Canada balsam for long term preservation. Parasitic prevalence and mean intensity of all ectoparasites was determined.

3. RESULTS

Results of the present study revealed 93/100 indigenous chickens were infested by poultry pests namely, lice, mites, fleas, and soft ticks. While 34/100 broiler chickens were only infested by lice. Ninety-three chickens had lice belonging to different genera and species including *Phthiraptera, Menacanthus cornutus, Menacanthus stramineus, Goniocotes gallinae, Goniodes dissimilis, Menopon gallinae*). Fifty-three chickens were infested by soft ticks species *Argas persicus,* six by mites (*Dermanyssus gallinae*), and five were plagued by fleas species *Echidnophaga gallinacean,* while others had mixed infestations in the following combinations in descending order: lice and fleas (4.3 %), mite and lice (6.4%); lice mite and fleas (3.2%); lice, mites, and ticks (4.3%); lice, fleas, ticks and mites (4.3%); and fleas and mites (2.1%) (Table 1). A total of 100 broiler chickens were examined only 43 were infected by different types of lice other ectoparasites were not found in the broiler form of chickens (Table 2).

Lice were observed to be the most prevailing parasites (93%). In species definite prevalence, the prevalence was as follows: *Menacanthus stramineus* (32.2), *Menopon gallinae* (21.5%), *Goniodes dissimilis* (13.9), *Goniodes gigas* (16.1), *Menacanthus cornutus* (16.1) as shown in Table 3.

4. DISCUSSION

In the present study different ectoparasites species were identified which plagued the chickens consists of sex species of lice genera, *Phthiraptera* sp., *Menacanthus cornutus, Menacanthus stramineus, Goniocotes gallinae, Goniodes dissimilis, Menopon gallinae,* tick species (*Argas persicus*), mite species (*Dermanyssus gallinae*), and flea parasite (*Echidnophaga gallinacean*) (Figures 2-9). These parasites were abundant in indigenous chicken (93%) and reported for the first time from the Quetta region (Table 1, Figure 1). Comparable observations of the high prevalence of ectoparasites in chicken have been reported in other tropical African countries such as Nigeria (Fabiyi, 1996; Sadiq et al., 2003), Ethiopia (Abebe et al., 1997), Malawi (Njunga, 2003); Zimbabwe (Permin et al., 2002), and another district in Kenya (Mungube et al., 2008), and in-market birds (Maina, 2005), southeast Nigeria ((Osegboka et al., 2008) backyard chicken California (Murillo and Mullens, 2016).

The present study exposed the incidence of a variety of species of ectoparasites within different exterior parts of indigenous and broiler chickens following systematic body examination of each randomly sampled bird. This study has revealed an unreliable prevalent rate of ectoparasitism in poultry with the highest prevalent rate of lice in indigenous chicken. Previous studies did not establish results of the prevalence of ectoparasites in both indigenous and broiler chicken. Four types of ectoparasites genera were encountered in this current study in all the study areas of the Quetta region. The prevalence of ectoparasites infestation encountered in indigenous chicken in this study was 93% lice of different types, 53% soft ticks,15% mite, and 8% flea. This finding is consistent with the finding of Sabuni et al. (2010) and Lawal et al. (2016).

Ectoparasites were found on various body parts of the chickens which were the main cause of different irritations, and infections in them by sucking blood and biting the flesh of their body. These activities may divert the birds from their normal activities such as feeding, incubation of eggs, weight loss, blood deficiency, and such parasites also serve as transmitters of blood parasitic diseases in chickens (Wall and Shearer, 2001;

Shanta et al., 2006; Hobbenaghi et al., 2012)

The observable prevalence rate in indigenous chicken overall was 93%, and in broiler was 43%, so these findings indicated that indigenous chicken is more infested by ectoparasites because of poor hygienic conditions while broiler chicken is well managed and are given proper vaccines and sprays to prevent ectoparasites, moreover, they are marketed after the completion of the incubation period.

The dissimilarity between our findings and that of the other previous researches may be due to seasonality of infection, husbandry systems, agro-environmental, and implemented methods of the parasitic control (Mungube et al., 2008; Mekuria and Gezahegn, 2010; Bala et al., 2011). Our study was conducted during the rainy season towards the early dehydrated season of the year (January 2019-December 2019) while others might have conducted ectoparasites samples collected during the heavy drizzly season (Firaol et al., 2014) or the dry season of the year (Belihu et al., 2010). Fomol and Katayeva (2019) evaluated Ectoparasite species composition and seasonal dynamics in domestic fowl in Russia, results of the analysis demonstrated that chickens were infested with ectoparasite species: shaft louse *Menopon gallinae* with the highest invasion extensity of 100% and average invasion intensity of 18.6 parasites; poultry red mite *Dermanyssus gallinae* (55.7%) with average invasion intensity of 12.5 parasites; two species of scaly leg mites, *Knemidocoptes mutans* (17.7%) with average invasion intensity of 39.4 parasites; and *Knemidocoptes gallinae* (17.7%) with average invasion intensity of 35 parasites. Seasonal dynamics of fowl infestation with ectoparasites showed that shaft louse *Menopon gallinae* was found in spring, summer and autumn on all farms. Mites *Dermanyssus gallinae* were found more often in spring with maximum invasion extensity of 74.4%. The prevalence of scaly leg mites *Knemidocoptes mutans* and *Knemidocoptes gallinae* was as high as 76%. The results of the tests indicate that infestation of domesticated chickens with different species of ectoparasitres can be linked with bad hygiene practice and free access system, creating favourable and stable environment for them. \

Ectoparasites infected chickens in the present study were found in the single or mixed infestation of ectoparasite species. 43% of the total examined chickens were found to be infested with single species of ectoparasites while 93% were infested with varied ectoparasites infestation. The mixed infestation of chickens has observed in the present study was greater than 81% infestation caused by poultry pests reported by Al-Saffar and Al-Mawla (2008) in Iran but higher than 48.21% reported by Firaol et al. (2014), 52.8% by Mirzaei et al. (2016) in Iran and 67.4% recorded by Amede et al. (2011) in Ethiopia. However, the single infestation of 19% reported by Al-Saffar and Al-Mawla (2008) was slightly higher than that of our findings. Other authors like Ebrahimi et al.(2016) recorded prevalence of infestation in poultry birds in western Iran was higher in females (74.5%) than males (56%), although the difference was not statistically significant (P>0.05). *Menopon gallinae* was the most frequent species (65.4%), followed by *Menacanthus stramineus* (37.2%), *Lipeurus caponis* (10.9%), and *Dermanyssus gallinae* (9.1%).

In our study, lice infestation (93%) was the most prevalent followed by soft ticks infestation (53%), mite (15%) and the least prevalent (8%) ectoparasites was a flea, while (43%) of lice infestation observed in broiler chicken other examined ectoparasites were not observed in them due to systematic management in poultry farms. The finding of the present study is consistent with the findings of Sabuni et al. (2006) from

Kenya where 88% lice infestation was reported, whereas Mekuria and Gezahegn (2010) reported 90% lice infestation from Ethiopia. These results may indicate favorable climatic circumstances for the flourishing breeding and growth of the parasites in the study areas (Hopla et al., 1994). Aspanagona and Jeffery (2020) investigated the prevalence, geographical distribution, zoonotic potential, and control measures of avian mites in poultry farms in Asia. Result indicates the poultry mites, *Dermanyssus gallinae* (Poultry Red Mite), *Ornithonysus sylviarum* (Northern Fowl Mite), and *Ornithonyssus bursa* (Tropical Fowl Mite) are endemic species across the Asian continent.

Our findings are also in line (in terms of identified lice, mites, ticks and flea species) with those of Bala et al. (2011) and Mukaratirwa and Hove (2009) where they reported 10 and 11 different ectoparasites respectively in village chickens during a similar study. Most of these species of ectoparasites were also reported from different parts of the African countries such as Zimbabwe (Mukaratirwa and Hove, 2009), Ethiopia (Mulugeta et al., 2013).

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Table 1. Ectoparasite of groups (single or mixed infestations), number of birds infested, and percentage prevalence parasitic rate in indigenous chicken

Ectoparasite groups	Number of birds in the group	Percentage of parasitic prevalence rate (x/100)
Lice	40	43.0
Fleas	5	5.37
Ticks	24	25.8
Mites	6	6.4
Lice and Fleas	4	4.3
Mites and Lice	6	6.4
Lice, Fleas, and Mites	3	3.2
Lice, Mites, and Ticks	4	4.3
Ticks, Lice, Fleas, and Mites	4	4.3
Fleas and Mites	2	2.1
Total prevalence	93	93

Table 2. Ectoparasite of groups (single or mixed infestations), number of birds infested, and percentage prevalence parasitic rate in Broiler chicken.

Ectoparasite groups	Number of birds in the group	Percentage of parasite prevalence rate (x/100)
Lice	43	43
Fleas	0	0.0
Ticks	0	0.0
Mites	0	0.0
Lice and Fleas	0	0.0
Mites and Lice		0.0
Lice, Fleas, and Mites	0	0.0
Lice, Mites, and Ticks	0	0.0
Ticks, Lice, Fleas, and Mites	0	0.0
Fleas and Mites		0.0
Total prevalence	43	0.0

Table 3. Prevalence rates of various ectoparasite species found on indigenous chicken and their predilection sites.

Ectoparasite	Common predilection site	Number of birds with the parasite	Percentage prevalence
Lice		93/100	93
Menopon gallinae	Feather shafts and all over the body	20	21.5
Menacanthus stramineus	The underside of the large wing feathers	30	32.2
Goniodes dissimilis	Under wing feathers	13	13.9
Goniocotes gallinae	Shafts and feathers	15	16.1
Menacanthus cornotus	Body feathers	15	16.1

Mites		15/100	15
Dermanyssus gallinae	The entire body of the bird	15	15
Soft tick		53/100	53
Argas persicus	Ventral abdominal area and below wings.	53	53
Fleas		8/100	8
Echidnophaga gallinacea	At head portion	8	8

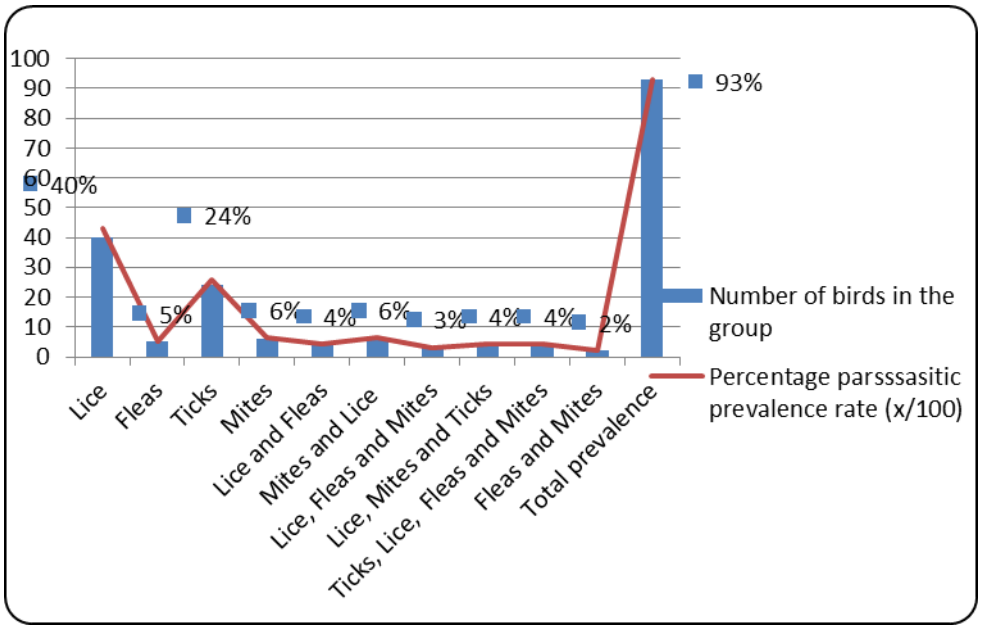
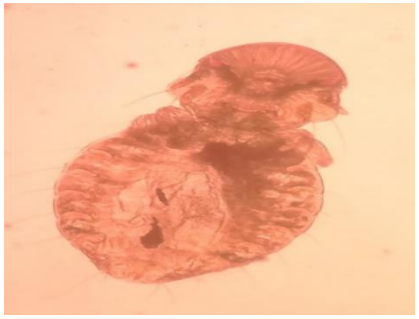


Figure. 1. Prevalence rate of various ectoparasite species found on indigenous chicken and their predilection sites.

Fig. 2. ***Menopon gallinae***

Fig. 3. ***Menacanthus stramineus***



Fig, 4. ***Goniocotes gallinae***

Fig. 5. ***Menacanthus cornutus***

Fig. 6. ***Goniodes dissimilis***

Fig. 7. ***Argas persicus***

Fig. 8. ***Dermanyssus gallinae***

Fig. 9. ***Echidnophaga gallinacean***