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Prevalence and Effect of Helminthiasis on Haematological Parameters in the Migratory Sparrows *(Alauda arvensis)* and Treatment with an Antihelmintic, Fenbendazole

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Abstract.- The present study was conducted to investigate the prevalence of helminthic parasites of gastrointestinal tract (GIT) and its effect on blood picture in the captured migratory sparrows *(Aluda arvensis).* The parasitized sparrows were treated with a broad-spectrum anthelmintic *i.e.*, panacur containing fenbendazole. On the basis of the cloacal swab samples seen under microscope, a prevalence rate of 56% (n=112) among all the two hundred migratory sparrows was observed. Half of these positive birds (n=56) in number were necropsied in order to recover the live parasites from the gastrointestinal tract. Live *Heterakis gallinae* and *Ascaridia galli* were recovered from 50% and 32% of the birds, respectively and 18% birds showed live mixed infection of both the parasites. None of the birds was parasitized with live trematode and/or cestode. The haematology revealed that total erythrocyte count, hemoglobin, lymphocytes and eosinophils were decreased and total leucocytic count was increased. From the remaining live, half of the parasitized birds *i.e.,* 56 migratory sparrows, a treatment trial was conducted and an efficacy rate of 95% was observed 7 days post-medication.

Key words: Blood picture, Fenbendazole, *Heterakis gallinae, Ascaridia galli.*

INTRODUCTION

Millions of birds migrate from Russian Siberia, Central Asian States and European Union during September through November every year to Afghanistan, Karakoram Range and along the Indus River in Pakistan. The migration is compelled by the severity in winter weather leading to scarcity of food, reduced hour of daylight and instinctive behavioral change in reproduction (Fisher, 1997).

Internationally, there are seven flyways identified so far: I) Northern Europe to Scandinavian countries, II) Central Europe to Mediterranean Sea, III) Western Siberia to Red Sea, IV) Green route from Siberia to Pakistan, V) Ganga flyway from Eastern Siberia to India, VI) Manchuria to Korea, and VII) Chakotaka to California (Anjum, 2004). Migratory birds move from one place to another with the help of familiar natural landmarks. Some migrants often follow established routes of coasts, rivers, stars and mountain ranges called "leading lines" (Fisher, 1997). The Indus flyway is one of the major routes for several species of the migratory birds.

In Gilgit, an army officer Biddulph (1881) noted that *Aluda arvensis* sparrow is a common winter visitor to the main valley, arriving every year in November and staying until the end of March. It is also an abundant winter visitor to the Potohar plateau around the Islamabad and Rawalpindi area (Whistler, 1930). Since the migration depends upon geographical features (Matthews, 1955), these sparrows fly directly over the Himalayas through mountains, passes and come along the Indus Valley. Before flying, sparrows accumulate considerable fat as a migratory fuel (Griffin, l969). A non-stop flight of 400-500 miles at a stretch has been observed (Mead, 1983). The migratory passerine birds play an important role in the range of pathogens between co-feeding of *Ixodes ricinus* ticks (Dubinina and Alekseev, 2003). The influx of the waterfowl in the area and emergence of Avian Influenza in poultry suggests a relationship between the two. This relationship is worth investigating (Anjum, 2004).

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The captured migratory sparrows, *Alauda arvensis* were the migratory winter visitors to Pakistan in the wide geographical territory of Balochistan, Punjab and Sindh provinces generally avoiding the mountainous regions. It eats young green wheat grains, rice stubbles and insects (Meinertzhagen, 1920). The following species of sparrows were commonly captured from the fields in and around district Gujranwala each year in the past as reported by Ahmad (1988): *Passer domesticus bactrianus, P. hispaniolensis transcaspicus, P. moabiticusyatii* and *Petronia intermedia.*

The present study aims at determining the prevalence of parasitic load in the migratory sparrows, effect of worms on haematological parameters, and efficacy of panacur (fenbendazole) against these parasites.

MATERIALS AND METHODS

Collection of guts

A total of 200 live migratory sparrows were purchased form the professional hunters who captured these birds from District Gujranwala during the month of January 1994. Faecal swabs of these two hundred sparrows were taken for the detection of helminthic ova under the microscope. A total of 56% (n=112) birds were found positive for helminthic ova. They were divided into two groups of 56 parasitized and 44 non-parasitized birds. All of the parasitized birds were slaughtered and necropsied for collection of live parasites from gastrointestinal tract (GIT) and blood which was stored in sterile glass tubes for haematological studies. Each gut was examined as suggested by Soulsby (l982) and the worms were collected in a glass jar having normal saline solution. The nematodes were fixed in formoacetic fixative for 24 hours and then preserved in 70% alcohol. Whole mounts of nematodes were prepared according to Culling (1974). After staining, the helminths were identified using Soulsby (1982) and Hofstad *et al.* (1984).

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Haematological parameters

The bloods of the parasitized and non-parasitized sparrows were collected in the test tubes containing anticoagulant ethylene diamine tetraacetate (EDTA) as 1.1 mg/ml of blood. Total erythrocyte count (TEC) and total leukocyte count (TLC) were determined according to the method described by Natt and Herrick (1951).

Blood smears were fixed with methyl alcohol and were stained with Giemsa's staining. The staining technique and hemoglobin estimation was performed as described by Coles (1986).

Efficacy of anthelmintic

The remaining 56 parasitized sparrows were medicated with a broad-spectrum anthelmintic "panacur" (Ciba Geigy, Switzerland) containing Fenbendazole at a dose of 9.9mg/Kg body weight. The efficacy in terms of reduction in egg per gram (EPG) of faeces was determined 7 days post-medication.

RESULTS AND DISCUSSION

Prevalence

Faecal swabs from the cloaca of two hundred wild migratory sparrows were tested for helminthic ova and 112 sparrows were found positive. Half of the parasitized migratory sparrows were necropsied for collection of the live parasites from the gut. It was observed that 18 (32%) guts were found positive against *Ascaridia galli,* 28 (50%) guts were positive against *Heterakis gallinae.* The remaining 10 (18%) showed the mixed infection (Table I). However, not a single bird showed infection with trematode or cestode. Results of prevalence are in close agreement with the findings of Birjees and Hayat (1983), Salfina *et al.* (1990) and Fakae *et al.* (1991).

Table I.- Prevalence of gastrointestinal nematodes in wild migratory sparrows (n=56).

Species	Parasitized guts containing live nematodes	
	Number	Percent
Ascaridia galli	18	32
Heterakis gallinae	28	50
Mixed infection	10	18
Total	56	100

The findings of the present study do not coincide with Chand (1967), who reported that out of 300 fowls 90% of the birds in India were infected with *Rallitina tetragona* (45%), *Cotugnia dinopora* (38%), *Ascaridia galli* (60%) and *Heterakis gallinae* (41%). This disagreement might be due to species and geographical differences.

Effect of worm load on haematological parameters

Table II shows haematological examination of parasitized and non-parasitized but apparently healthy birds. The erythrocytic count of parasitized sparrows ranged between 2 and $3.75x10^6$ RBCs/µl, while in the normal non-parasitized birds, it was 2.5 – $5xl0^6$ RBCs/µl. The hemoglobin level in non-parasitized wild sparrows ranged between 10.5 and 11.8 g/100ml, while it ranged between 7.2 and 8.3 g/100ml in the parasitized sparrows. The average TLC value ranged between 4.5 and $7.3x10^3$ WBCs/µl in parasitized sparrows, while in the non-parasitized birds, it was 3.5 – 6.5 x 10^3 WBC/µl.

Table II.- Average haematological values of parasitized wild migratory sparrows.

Haematological tests and their measurement units	Non-parasitized sparrows (n=44)	Parasitized sparrows (n=56)
Erythrocyte count (TEC) (10^6/µl)	2.5 – 5	2 – 3.75
Hemoglobin (g/100 ml)	10.5 – 11.8	1.2 – 8.3
Lymphocytes (10^3/µl)	0.5 – 0.5	0.2 – 3.25
Monocytes (10^3/µl)	0 – 0.2	0 – 0.2
Hetrophils (10^3/µl)	1.2 – 6	2.2 – 7.2
Eosinophils (10^3/µl)	0 – 0.1	0 – 0.4
Basophils (10^3/µl)	0 – 0.5	0 – 0.5
Leukocyte count (TLC) (10^3/µl)	3.5 – 6.5	4.5 – 7.3

The heterophils ranged between 2.2 and $7.2x10^3$ in the parasitized sparrows, while in non-parasitized birds it was 1.2 to $6x10^3$ µl. The average value of eosinophils ranged between 0.0 to $0.04x10^3$ eosinophils/µl in parasitized birds while it was 0.0 to $0.01xl0^3$/µl in non-parasitized birds. The average values of monocytes and basophils ranged between 0.0 to $0.2x10^3$ µl and 0.0 to $0.5x10^3$ µl respectively, in non parasitized birds. No effect was observed on both of the above mentioned values as shown in Table II. The results of haematology agree with the findings of Matta and Ahluwalia (1982), Sekhar *et al*. (1986) and Sekhar and Simha (1986).

Drug efficacy

The EPG of the parasitized birds was performed pre-medication and 24, 96 and 168 hours post-medication. A dose of panacur at the rate of 9.9 mg/kg body weight was given orally. After medication, the efficacy was calculated on the basis of reduction in EPG. After 24 hrs, EPG decreased by 27%, after 96 hrs by 41% and after 168 hours decreased upto 97% (Table III).

Table III.- Showing the dose and average eggs per gram of feces (EPG) per bird of the treated and untreated group of the wild migratory sparrows (n=100)

Parameters	Treated with Panacur	Untreated / control
No. of sparrows	56	44
Dose (mg/kg body weight)	9.9	-
Average EPG before medication	600	0
Average reduction of EPG post-medication in hour		
24 hours	27	0
96 hours	41	0
168 hours	97	0

The results of anthelmintic efficacy are in close agreement with the findings of Malakhov (1985), Migacheva and Belourova (1984), Kirsch (1983), Kovalenku (1988), Malakov (1984) and Berezkina *et al*. (1986).

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