International Journal of Science, Environment and Technology, Vol. 6, No 5, 2017, 2911 – 2920

ISSN 2278-3687 (O)
2277-663X (P)

INCIDENCE OF ENDOPARASITE AND PROTOZOAL INFECTION IN CAPTIVE WILD BIRDS

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Abstract: The study was carried out in different captive avian unit such as Avian and Exotic Pet unit (AEPU), Madras veterinary college, Chennai, University Research Farm (URF)-Madhavaram, Arignar Anna Zoological Park, (AAZP)-Vandalur, Private and Pet Shops in and around Chennai. The endoparasitic fauna like *Ascarid* sp., *Capillaria* sp., *Strongyle* sp., and *Eimeia* oocyst. were revealed in the fecal samples from four different captive avian unit. Total number of samples collected for endoparsitic examination in AEPU were n=60.Overall positivity of endoparasitic fauna here was found to be 15 per cent with presence of *Ascarid* sp and *Eimeria* of oocyst in AEPU(OP). A total of 50 fecal samples from private and pet shops were collected. Overall positivity of endoparsitic fauna was 22 per cent with presence of *Ascarid* sp., *Capillaria* sp., *Strongyle* sp. and *Eimeria of* oocyst in private and pet shops. Endoparasitic study carried out with the fecal samples of captive wild avians (n=33) collected at Arignar Anna Zoological Park, Vandalur revealed eggs of *Ascarid* sp., *Capillaria* sp., *Strongyle* sp. And *Eimeria of* oocyst and the overall positivity of endoparasitic fauna was 30.30 per cent. Similar parasitic fauna were encountered in the fecal samples captive wild avian (n=35) obtained from University Research Farm and the overall positivity of endoparasitic fauna here was found to be in 34.28 per cent. Protozoa encountered in pigeon were *Trichomonas* sp.

Keywords: Endoparasite, protozoa, captive wild birds.

Introduction

Birds were an integral part of every ecosystem and it is commonly found in households and zoos all over the world. Birds could be parasitized by a wide variety of endoparasites, that is, nematodes, trematodes, cestodes, acanthocephalans, and protozoa and it is important to identify and control parasite species capable of producing diseases in captive birds (Roberto *et al.,* 2012). Severe infestation of endoparasites in birds generally cause droopinesss, loss of weight and diarrhea (Alimohammad *et al.*, 2011). Parasitic infections including protozoans, blood parasites and helminthic parasites were commonly encountered among the aviary populations (Dorrestein *et al.,* 2003). Alsadi (2011)

*Received Sep 1, 2017 * Published Oct 2, 2017 * www.ijset.net*

documented yellowish- white masses of caseous necrotic material in oral cavity, esophagus, crop and Proventriculus in trichomonas infected pigeons.

Sakas (2002) reported the tapeworms were common in fiches, cockatoo and eclectus parrots. Flukes are rarely reported in imported birds. They were periodically seen in raptors. Doneley (2009) quoted that many species of tapeworms infecting psittacine birds, but more common species include *Railietaenia, chonataenia, Idiogenesis*and *amoebataenia*. Their life cycle require intermediate host. Kellogg *et al* (1971) reported that Ascarid (*Ascaridia galli* related to chicken, jungle fowl, and turkey and *Ascaridia columbae* related to pigeon and *Ascaridia numidae* related to guinea fowl and *Ascaridia dissimilis* related to turkey) infestations occur in the small intestine. Price (1992) who stated that the coccidiosis was a serious disease of budgerigars and in aviary birds, coccidiosis was shown to cause significant mortality.

Gafoor (2002) reported the prevalence of *Ascaris* sp., *Capillaria* sp., *Spirurid* sp., *Syngamus* sp, *Acanthocephala* sp. and Coccidian oocysts in sea birds. Arora (2003) stated that Psittacines and Galliformes harbored *Ascaridia* species.

Gonzalez *et al* (2012) encounterd intestinal nematodes such as Ascoropes sp., and capilaria spp. Other nematode genera found in the proventriculus and ventriculus nare tetrameres, dispharynx, spiroptera and procyrnea. Papini *et al.* (2012) quoted about the occurrence of strongyles in pet and zoo birds.

Prathiba *et al.* (2013) identified ascardia sp and capillaria sp in budgericar, african love bird and cockatiel. Saleem *et al* (2008) reported trichomonas in wild pigeon.

Ozmen *et al* (2009) encountered leucocytozoon and haemoproteus in avain. Haemoproteus is commonly encountered and easily identified protozoan parasite that infect red blood cells of wild birds of many species. Alsadi *et al* (2011) studied the prevalence of trichomoniasis in free – living urban pigeon in the city of mosul, Iraq during the month of august and September 2007.

MATERIALS AND METHODS

Study areas

This study was undertaken in psittacine birds from Avian and Exotic Pet Unit (AEPU) (OP) of Madras Veterinary College, Arignar Anna Zoological Park (Vandalur), University Research Farm (URF, TANUVAS) and private and pet places in and around Chennai from October 2016 to July 2017.

Study period

The total period of study was approximately ten months from October 2016 to July 2017.

Collection and preservation of fecal samples for endoparasitic examination

Throughout this study programme fresh fecal samples of captive wild avifauna were collected from the bird cages in small containers in 10% formalin for parasitic examination and were labeled and sealed properly

Parasitological examination

Analysis of fecal samples

For fecal examination, both centrifugal sedimentation technique and floatation technique were used as per procedure recommended by Soulsby, (1982).

Centrifugal sedimentation technique

To a 100 ml beaker, fecal samples collected were placed and were subsequently emulsified, completely with 10 to 15 ml of water. A strainer was used inorder to filter the contents in a cup and then, it was transferred into a centrifuge tiube by using a funnel. The centrifuge tubes were placed in a balanced state and centrifuged for 5 minutes at 5000 rpm. A small quantity of the top layer of sediment was shifted to a clean microscopic slide, by using Pasteur pipette and bulb. Subsequently, the cover slip was duly placed over the drop of sediment and the slide was examined under both low and high power objectives.

Floatation technique

Fecal samples were taken in a 100 ml beaker and were thoroughly emulsified with 10 to 15 ml of saturated solution of sodium chloride. The mixture was strained through a strainer into a cup and then, it was transferred into a floatation tube, till the mixture reached the brim of the tube and formed a positive meniscus and was left undisturbed for 15 to 20 minutes. A clean cover slip was taken and the tip of the positive meniscus was gently touched with a cover slip and then the cover slip was placed on a slide and was examined microscopically under both low and high power objectives.

RESULTS

Endoparasitic incidence of captive wild birds in AEPU

Out of 60 samples were collected from AEPU, Madras veterinary college, found to be positive for A*scarid*sp*., Eimeria* sp., Further, 8.33% (n=5) of samples revealed evidence of *Ascarid*sp and 6.67% (n=4) of samples revealed evidence of *Eimeria* sp (Plate-1). The

values were presented in Table-1. Overall value of parasitic infection in AEPU was 15% (n=9) (Figure -1).

Statistical analysis failed to reveal any significant differences in endoparasitic incidence encountered in AEPU (Table 2).

Table-1: Overall endoparasitic incidence in AEPU

Sl.No	Parasites	AEPU (n=60)
1	*Ascarid sp*	5 (8.33%)
2	*Eimeria sp*	4 (6.67%)
	Total	9 (15%)

Figure –1
Overall place wise endoparasitic incidence in AEPU, URF, AAZP, Private and pet shops

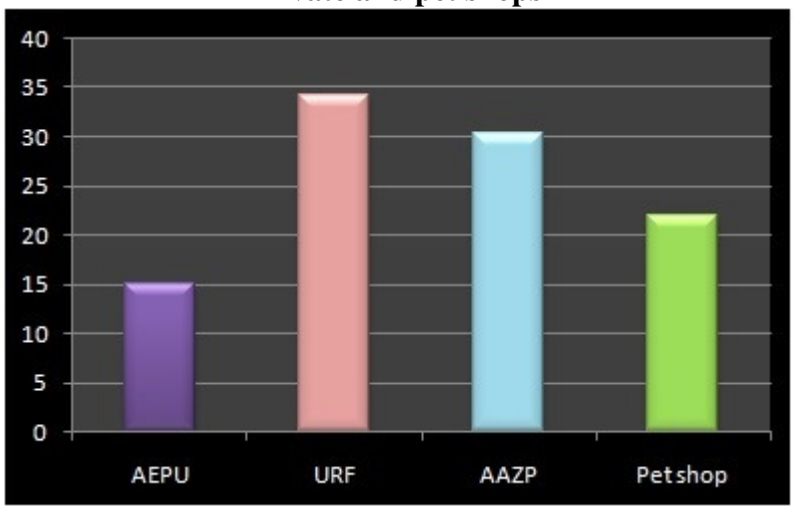


Table -2: ENDOPARASITIC INCIDENCE IN CAPTIVE WILD AVIAN AT AEPU - CHI-SQUARE TEST

Sl.No	AEPU(n=60)	Positive	Negative	Chi square test (X^2)
1	*Ascarid sp*	5	55	0.12
2	*Eimeria sp*	4	56	

$X^2 = 0.12^{N.S} P \geq 0.01$.

Statistically no significant difference between *Ascarid* sp *and Eimeria* sp in AEPU
N.S – Not significant.

Endoparasitic incidence of captive wild birds in AAZP, URF, Private and pet shops (pooled samples)

The faecal samples (n=33) obtained from AAZP vandalur were positive for *Ascarid sp., capillaria* sp., *strongyle* sp., *and Eimeria* sp. Further 6.06% (n=2) of samples

revealed evidence of *Ascarid*, 6.06%(n=2) of samples revealed evidence of *Eimeria* sp, 6.06.% (n=2) of samples revealed evidence of *Capillaria* sp, 12.12% (n=4) of samples revealed evidence of *Strongyle* sp.(plate-1). The values were presented in Table -3. Overall value of parasitic infection incase of AAZP was 30.30% (n =10) (Figure-1).

Thirty five samples were collected from URF AND revealed *Ascarid* sp., *Eimeria* sp., *Capillaria* sp., and *strongyle* sp., encountered in 4 no of faecal samples (11.42% of samples), 4 number of faecal samples (11.42% of samples), 3 number of faecal samples (8.57% of samples) and 1 no of faecal samples (2.82% of samples), respectively (Plate - 3). The values were presented in Table -3. Overall value of parasitic infection incase of URF was 34.28% (n= 12) (Figure-1).

The details of endoparasitic incidence revealed in private and pet shops were presented in Table-9. Out of 50 samples collected in private and pet shops positive for *Ascarid* sp., *Strongyle* sp., *Eimeria* sp., *capillaria* sp. Further 4% (n=2) of samples revealed evidence of *Ascarid*sp, 4% (n=2) of samples revealed evidence of *Eimeria* sp, 10% (n=5) of samples revealed evidence of *Capillaria* sp, 4% (n=2) of samples revealed evidence of *Strongyle* sp (Plate-3). The values were presented in Table -3. Overall value of parasitic infection incase of Private and pet shops was 22% (n =11) (Figure-1).

Table – 3: Overall endoparasitic incidence in URF, AAZP, Private and pet shops

Sl.No	Parasites	URF (n=35)	AAZP (n=35)	Private and pet shops (n=50)
1	*Ascaridia* sp	4 (11.42%)	2(6.06%)	2 (4%)
2	Oocyst of *Eimeria* sp	4 (11.42%)	2 (6.06%)	2 (4%)
3	*Capillaria* sp	3 (8.57%)	2 (6.06%)	5 (10%)
4	*Strongyle* sp	1 (2.85%)	4 (12.12%)	2 (4%)
	Total	12 (34.28%)	10 (30.30%)	11 (22%)

Table – 4: ENDOPARASITIC INCIDENCE IN CAPTIVE WILD AVIAN AT URF, AAZP, PRIVATE AND PET SHOPS - CHI-SQUARE TEST

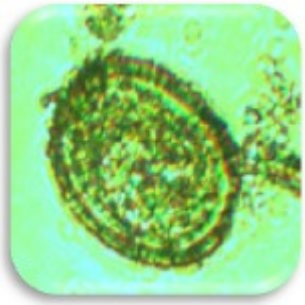
Sl.No	Avian units	Positive	Negative	Chi square test (X^2)
1	URF (n=35)	5	55	$1.58^{N.S}$
2	AAZP (n=35)	4	56	
3	Private and pet shops (n=50)	11	39	

$X^2 = 1.58^{N.S}$ P Value= 0.45 N.S – Not significant

Statistical analysis failed to reveal any significant differences of endoparasite encountered in URF, AAZP and private and pet shops (Table 4).

PLATE-1: Endoparasites In Captive Wild Avians

***1. Eimeria* sp**



2. Egg of *Ascarids* sp

3. Egg of *capillaria* sp

4. Egg of *strongyle* sp

Protozoa

Trichomonas infected pigeon

Pear shaped structure of trichomonas sp

DISCUSSION

Endoparasitic incidence in Captive wild avifauna

The endoparasitic incidence encountered in Avian and Exotic Pet Unit, Madras veterinary college, in addition to the captive bird areas like Arignar Anna Zoological Park, Vandalur as well as University research farm (URF) – TANUVAS and Private and pet shops

were generally found associated with endoparasitic fauna like *Ascarid* sp., *Capillaria* sp., *Strongyle* sp. and *Eimeria* sp. in this study.

Evidence of endoparasitic Incidence in captive wild birds

Egg of *Ascarid* sp, egg of *capillaria* sp, *oocyst of Eimeria* sp were encountered in AEPU, AAZP, Private and pet shops and URF was in agreement with finding of Patel *et al* (2000) who reported the eggs of *Ascarid* sp and *Capillaria* species in 22(20.75) and 14(13.2%) group faecal samples respectively, while the oocyst of coccidia (*Eimeria* sp) were observed in 19(17.92%) group faecal sampes.

Fecal samples from four avian unit (AAZP, URF, AEPU and Pet shops), *Ascaridia* sp. was found with the keys furnished by Soulsby (1982). In this regard, Urgaurt *et al* (1994) opined that the eggs of *Ascarid*sp. were distinctly oval with a smooth shell and Berith *et al* (2006) quoted about the presence of unsegmented yolk in the eggs of *Ascaridia* sp. and all these feature were revealed in the samples studied. Similarly, the barrel – shaped eggs along with bipolar plugs which did not project far were the characteristic features revealed in the eggs of *Capillaria* sp. in this study and was in agreement with the findings documented by Soulsby (1982) .

Though EPG could not be carried out in this study, as the quantity of the sample available was scanty.

Kellogg *et al* (1971) also encountered *Ascarids* in jungle fowl, turkey, guinea fowl and pigeons and the affected avifauna revealed clinical signs of anorexia, diarrhea, emaciation, anaemia and even death. However, such symptoms were not encountered during the study period, in captive wild birds. Encountering of *Capillaria* sp. in the faecal samples of wild birds in captive area under study was in agreement with the findings of Gafoor (2002) who documented incidence of capillariasis.

Among the Psittacine group of birds studied at Arignar Anna Zoological Park, Vandalur and URF, Private and Pet shops, eggs of *strongyles* were encountered mainly as mixed infections along with *Ascarid*sp. and *Capillaria* sp. In this regard, Papini *et al.* (2012) opined that during a survey in 63 pet birds and 83 Zoo birds, Strongyles were encountered at the rate of 5.5 per cent. In this regard Fowler (1986) quoted that the *strongyle* nematodes, parasitize the trachea of many birds especially gallinaceous, passerine and anseriform species and gape worms are transmissible between group of birds.

Ascarid sp., *Capillaria* sp and *strongyles* sp were encountered in parakeets, macaw, lorikeet of Arignar Anna Zoological Park indirectly indicated clinical interventions subsequent to the detailed and periodical investigations of fecal samples.

Burr (1987) opined that numerous species of coccidiae occurred in birds and these protozoans infected the small intestine of birds and produced the oocysts that were passed in the feces. Oocysts of *Eimeria* species were identified in the fecal samples based on the keys provided by Soulsby (1982). The sporulated oocysts containing four sporocysts each with two sporozoites were identified in the positive fecal samples, in this regard. coccidial parasites in the psittacine birds was documented during my study period were supported by the reports from Price (1992) who stated that the coccidiosis was a serious disease of budgerigars and in aviary birds, coccidiosis was shown to cause significant mortality and the clinical signs were bloody diarrhea and those associated with the sick bird syndrome.

Papini *et al.* (2012) stated that intestinal coccidia occurring in birds included species of the genera *Eimeria*, *Isosopra, Tyzzeria* and *Wenyonella* and could be distinguished by the characteristic morphology of their sporulated oocysts which differed mainly in number of sporocysts and sporozoites. Incidence of *Eimeria* infections as encountered in the present study at different avian unit was documented in psittacine birds.

The degree and stage of parasitism, the bad condition, feed factors, etc. could be attributed as the causal factors for this. Interestingly, even in Rainbow lorikeet, *Eimeriahaematodi* was encountered, as stated by Varghese (1977). In this regard, Arora (2003) also quoted about the occurrence of coccidian parasites in avifauna belonging to passerines as well as psittacines.

Place-wise endoparasitic composition (Figure-1) revealed higher percentage endoparasitic incidence in URF followed by AAZP, pet shops and AEPU with mixed infection of *Ascaridia* sp., *Capillaria* sp., *Strongyle* sp. and *Eimeria* sp. The reasons for the evidences of higher incidences of mixed infections might be attributed to the differences in the climatic zones including weather and humidity related factors and nutritional factors in addition to biological preferences, attributes and less number of samples studied. The overall percentage of endoprasitic incidence in URF was 34.28%.

Statistical analysis using Chi-Square test revealed no significant difference of endoparasitic incidence (Table-2) between *Ascarids* sp and *Eimeria* sp (AEPU).

Statistical analysis using Chi-Square test revealed no significant difference of endoparasitic incidence (Table-4) between URF, AAZP, Private and pet shops.

Evidence of Protozoal infection

Saleem *et al* (2008) reported higher prevalence of trichomonas infestation ($p<0.05$) was recorded in wild pigeon (60%) than in domestic pigeon. Avian trichomoniasis caused by T.gallinae and is a disease of young birds, which may result in a high mortality in young pigeon within 10 days soulsby (1982)

The finding of trichomonas in AEPU unit was in agreement with finding of Al-sadi and Hamadi (2011) who studied the prevalence of trichomoniasis in free – living urban pigeon in the city of mosul, Iraq during the month of august and September 2007. In infected pigeon, yellowish- white masses of caseous necrotic material were seen in oral cavity, esophagus, crop and proventriculus

Management measures for Parasitic infections

Parrots and Macaws, therapy with broad-spectrum anthelminthic fenbendazole, albendazole, pyrantel pamoate or preferably, ivermectin might be used in these birds against different helminthic infections. However, the attending veterinarian needs to take utmost care in the administration of the medicament chosen, considering the risk of physical capture and restraint procedures, safety pertaining to the handler as well as the invariably high-valued or rare avifauna that is being handled, definite delivery of the drug in the bird, etc. if oocysts of coccidia are noticed in the fecal samples as encountered in the birds under study, periodical examination needs to be carried out in such occasions. If the oocysts from fecal samples are higher in number preferably coupled with typical clinical signs like bloody diarrhea in the concerned Psittacine birds, then the clinical approach should associate the usage of specific drugs like amprolium at the rate of 3 ml of 9.6 per cent solution or potentiated sulphonamide drugs in them by prathipa, (2013).

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