Endoparasitic Infection and Antibiotic Resistance Patterns of *Escherichia coli* and *Salmonella* Isolated from Pet Birds in Chattogram

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This is to certify that we have examined this thesis and have found that it is complete and satisfactory in all respects, and that all revisions required by the thesis examination committee have been made

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Abbreviations	Elaborations
AML	Amoxicillin
AMR	Antimicrobial Resistance
AST	Antibiotic Sensitivity Test
AZM	Azithromycin
CI	Confidence interval
CIP	Ciprofloxacin
CLSI	Clinical and laboratory standards institute
CN	Gentamicin
CRO	Ceftriaxone
CVASU	Chattogram Veterinary and Animal Sciences University
DNA	Deoxyribo Nucleic Acid
DPP	Department of Pathology and Parasitology
e.g.	Example
etc.	Et cetera
GI	Gastrointestinal
GIT	Gastrointestinal tract
gm	Gram
I	Intermediate resistant
ID	Identification
MAR	Multiple Antibiotic Resistance
MDR	Multi Drug Resistance
min	Minute
OT	Tetracycline
P value	Prevalence value
PCR	Polymerase Chain reaction
R	Resistant
RCF	Relative centrifugal force
RPM/ rpm	Revolution per minute
S	Sensitive
Sec.	Second
spp.	Species
SXT	Trimethoprim-sulfomathoxazole
WHO	World Health Organization
%	Percent
µm	Micrometer

Abstract

Different parasitic and bacterial diseases are the crucial impediment in the rearing of pet birds. Gastrointestinal tract and blood are the major predilection sites for parasitic infection. The aim of this study was to identify the gastrointestinal (GI), as well as blood parasitic infection and the occurrence of *Escherichia coli* and *Salmonella* spp. with antimicrobial resistance (AMR) patterns from pet birds in Bangladesh. Between June, 2019 and March, 2020 a total of 549 (for GI parasite), 150 (for AMR of *E. coli* and *Salmonella* spp.) freshly voided faecal samples and 311 blood samples were collected from Chattogram metropolitan area, Bangladesh. For the detection of GI parasites coproscopy were performed and for isolation of *E. coli* and *Salmonella* spp. different microbiological tests were conducted followed by antibiotic sensitivity test (AST) and antibiotic resistant genes were identified by molecular technique. Blood samples tested through multiplex PCR method for *Haemoproteus, Plasmodium* and *Leucocytozoon* spp. detection. The occurrence of GI parasite was 18.9% (CI=15.7– 22.5%). Among them the protozoal cyst was 10.9% (CI=8.40–13.8%) containing *Eimeria* 7.7% (CI=5.6-10.2%), *Isospora* 2.9% (CI=1.7-4.7%), *Caryospora* 0.4% (CI=0-1.3%). Among nematode, *Ascaridia* infection rate was 3.5% (CI=2.1-5.4%), *Capillaria* 1.7% (CI=1-3%), *Heterakis* 0.91% (CI=0-2%). Within cestode, the *Coanotaenia* was found 0.36% (CI=0-1%). But no trematode egg was detected. The occurrence of blood parasitic disease was 2.25% (CI=0.91-4.58%). Among them 0.32% (CI=0.4-1.8%) was *Haemoproteus*, 1.3% (CI=0.35-3.26%) *Plasmodium* and 0.64% (CI=0.4-2.3%) *Leucocytozoon*. The overall prevalence of *E. coli* in pet birds was 48.7% (95% CI=40.4-57). The AST revealed that, the 91.78% isolates were resistant to ceftriaxone, 86.3% to tetracycline and 75.34% to sulfomethoxazole-trimethoprim. To the contrary, 98.63% isolates were sensitive to colistin sulfate followed by 97.26% to gentamicin. Majority of *E. coli* isolates were multidrug resistant and carried *bla$_{TEM}$, tetA, tetB, sul1, sul2, gyrA, gyrB, parC and CTX-M-2 genes*. The overall infection rate of *Salmonella* spp. in pet birds were 2.7 % (95% CI=0.7-6.7). The AST evolved that the isolates were 100% resistant to ceftriaxone, 75% to azithromycin, 50% to amoxiciline and tetracycline followed by gentamicin 25%. To the contrary, 100% isolates were sensitive to ciprofloxacin, enrofloxacin and colistin sulfate. Different pet bird's spp. was infected with various types of gastrointestinal and blood parasites. Due to cherished in intensive care with regular anthelmintic therapy, less vector availability, the occurrence of gastrointestinal as well as blood parasitic infections were less. In order to haphazard used of antibiotics, AMR were developed in *E. coli* and *Salmonella* spp.

Keywords: Antibiotic resistance, blood parasite, coproscopy, *E. coli*, gastrointestinal parasite, pet birds, *Salmonella* spp.