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Endo-Parasites Of Common Coot (Fulicaatra) Collected From Wet Lands Of Punjab, Pakistan

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Abstract – Population review was directed to access the number of common coot (Fulicaatra) and ten years population trend at Chashma Barrage (298836458), Taunsa Barrage (4198515), Ucchali Lake (72531466), Head Qadirabad (2789785), Head Marala (3226984), Head Rasool (3261), Khabbeki Lack (1486230), Head Sulaimanki (1809180), Jhalar Lake (526206) and Head Islam (1779257).To evaluate the food preference, total weight of gut (63.983.946), total weight of gizzard (26.99 1.325), weight of food material (3.590.187), gizzard weight without food material (23.39 1.244), weight of seed (1.24 0.075), weight of other material (0.690.067) and weight of vegetation (1.650.103) were calculated. The examination among female and gave results that the complete load of stomach, absolute weight of gizzard, weight of food material, Gizzard weight without food material and weight of other material was genuinely exceptionally huge and weight of seed, weight of vegetation was measurably critical. Among the 40 examples, 19 examples were viewed as tainted in by parasites of seven types of Gastro-digestive parasites were distinguished and recorded.

Keywords – Endo-Parasites, Common Coot (Fulicaatra), Wet Lands

I. INTRODUCTION

During winter many birds from Europe and central Asian countries migrate towards Pakistan. There are seven ¥y ways in whole world and only one fly way in Pakistan. Along with the Indus River by flying over Karakoram, Suleiman ranges and Hindukush the birds come to Pakistan (Aliet al, 2005).

General term waterfowl is used for members of the family Anatidaebelonging to order Anseriformes that comprise about 146 species in 43 genera. Occurring all the world's continents, the family has distribution in different countries. They are generally monogamous breeders and herbivorous. Several species migrate the whole year. One of the migratory bird is Common coot, *Fulicaatra* Linnaeus, 1758. It belongs to order Gruifomes and family Rallidae.Members of rail family migrates towards Pakistan.In/iran/rn comes from Siberia and other Russian states dwing winter from October to March every year it is a seasonal Pavelling bird and

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inhabit the aquatic habitats of Sindh province (Roberts, 1991). Their body makes up around two-thirds, that are about 50- 60 cm and weighs 0.72 1.58 kg (Manralet al, 2013), and wingspan of 81-98 cm (Cramp et al, 1977).

1.1 Parasitic fauna

Migratory birds generally send various sicknesses. A few kinds of parasites in the eggs of coots *weve* distinguished that has as of late moved (Soulsby, 1982). Egg morphology strategies were used to decide the presence of brood parasitism. The review showed that the female coots that were infected with certain infections frequently relocate to numerous different regions where they lay eggs. These new conceived coots were likewise impacted with the infection sent to it, in this way spreading the parasite (Albeshret al., 2016).It is accounted for that coots can go about as a host for certain parasites and are delicate to a few parasites. Sarcocyst is was found as blisters in the thigh muscle of coots chased at Brolos Lake arranged in the region of Kaf-El-sheik, Egypt. The sore having mushroom like banana molded bradyzoites were analyzed under transmission electron microscopy and its aspects (length of 60 840 pm and width of 50 85) not entirely settled (El-Morsey et al, 2015).

II. Review Of Literature

2.1. Parasitic fauna

Canaris and Waldmam (2017) assessed a sum of 100 American fogies, Fulica amaericana, were inspected for metazoan parasites fom the Chihuahua Desert, Center Rio Grande Valley Texas, and fom the Upper Rio Grande Valley, Colorado, U.S.A. There was no tremendous distinction in helminthes species wealth or middle overflow between the part networks from the 2 regions. Fifteen of the 25 helminthes species gathered were in like manner to both, and closeness was 65%. Similar species in every one of the 4 taxa, Notocotyluspacifera, Diorchisamericana, Amidostomumfulicae, and Polymorphus spp., had the most elevated pervasiveness and overflow in both, and similar 5 types of acanthocephalans were likewise in like manner. Eight of the 9 types of ectoparasites were normal, and likeness was 91%. The accompanying helminth species were available in each of the 3 occasional examples in Texas: A. fulicae, D. History of the U.S, Diorchisransomi, N. pacifera, Polymorphus trochus, and Tetrameresglobosa, though D. History of the U.S had the most elevated mean power in each of the 3. By and large, 70 types of helminths (33 trematodes, 15 cestodes, 14 nematodes, and 8 acanthocephalans) have been kept in F. Yankee folklore from North America.The greater paG of species are generalists (90^0/o), albeit coming up next are subject matter expeas and generally unsurprising in American fogies: trematodes (N. pacifera and Cyclocoelummutabile); cestodes (D. History of the U.S, and D. ransomi); nematodes (A. fulicae, in grown-up fogies just); Pelecitusfulicaeatrae; and the acanthocephalan, P. trochus. Cheng (2016) recognized a few types of parasites in the eggs of coots that has as of late relocated. Egg morphology procedures were used to decide the presence of brood parasitism. The review showed that the female coot that are tainted with certain infections frequently relocate to numerous different regions where they lay eggs. These new conceived coots are likewise affected with the infection communicate it to nearby inhabitant coot, in this manner spreading the parasite.

Ramey et al, (2016) saw that the coots are the transitory birds of the Focal Canada in South America and the NoGh American duck got plentiful, little artemismenes raised on it. Considering this kind of movement dri0s, this normal line is appropriate for jungle fever, flu, which can scatter the pathogenic flu as parasites. (1) Relocation availability generally known for the nasal demonstrative revelation for the normal hub between film obtaining, satellite communication, hereditary investigation and the paths of the US. Utilizing mix 2) Joined bolt diseases are displayed in Canada and the US, both native and non-latent (4) contaminations with hereditary the two parasites in North America and South Africa before. The parasitic plasmodium style related with the Neotropics in the normal fix, and (3) parasites Eight American Generally, our outcomes are regularly known as entropion and North America and thusly, in the US, the job of checking the skin to recognize skin recognition of pathogenic flu specialists from geotropic-based job in the spread of blood parasites between the objective of this sort.

Green et al (2016) assumed that blue-green can be scattering vectors for some plants, spineless creatures and microorganisms. In this way, recognizing their transient cowses and how visit locales are connected can be critical for grasping the dispersal pathways of a few creatwes and illnesses. They detailed that Fiddling ducks are additionally huge unearthing species across Europe.

El-Morseyet al (2015) revealed that coot is delicate to a few parasites and acts as a host for some parasite. Sarcocystiswas found as growths in the thigh muscle of coot chased at Brolos Lake arranged in the region of Kafr-El-sheik, Egypt. The pimple having mushroom like banana molded bradyzoites were inspected under transmission electron microscopy and its aspects (length of 60—840 pm and width of 50 85) not entirely settled.

Matta et al (2014) found that waterfowl have complex qualities that make significant host species for hematopoietic parasites from these avian. Being the resigned nature, the legitimate establishments Diptera's transmission has a lot of chances for the presence of hamematozoa. Because of the recognizable proof of a clever swimming in sub-atomic techniques to identify splashing, applying a dark stomach from Colombo to Colombia apply to tests. The all out decrease of the last option completing data is as of now investigated in the South America.

Shaikh et al (2013) directed a helminthological outline of dim coot, Fulicaatra (Gruiformes: Rallidae), in Sindh Territory of Pakistan, eight instances of undescribed sorts of trematode having a spot with class ParamonostomumLuhe, 1909 were recovered from stomach related organ of the "single have padded animal. Paramonostomumbubaki n. sp. changes from its congeners beside P. macrovesiculumDharejoet al,(2006) by having less reduced first end, a pharynx, a bifurcal genital pore, a more long posttesticular space, a Y-shaped excretory vesicle, number of uterine circles (16), and enormous size of filamentous eggs. P. bubaki n. sp. takes after P. macrovesiculum, Dharejoet al., 2006 accumulated fom Fulicaatra from Pakistan by having a pharym yet differentiates in greater body, tinier throat, a bifocal genital pore, condition of cims sac, central vesicle and balls, ceca accomplishing back utteimost point, and a more long post testicular space.

Manciantiet al (2012) presumed that Toxoplasma gondii was cacked down in 12 types of Blue-green found at the wetlands of Italy, when examined with cutting edge agglutination tests for Toxoplasma gondii. In certain examinations, it was additionally observed that these Blue-greens are likewise answerable for communicating the infection explicitly, Avian Flu Infections in Europe.

Jatauet al (2012) observed that in Nigeria, the sickness is brought about by Eimeriatenella, E. necatrix, E. bruneti, E. acervulina, E. mitis and E. praecox. Tragically, a couple of studies have been accounted for on pathogenesis of coccidian in ducks. Albeit numerous types of duck coccid-iosis are critical generally nonpathogenic, a few animal categories can taint different birds. I. mandari and E. danailovi, a duck coccidian, were tentatively tracked down in homegrown goose (36, 37). Accordingly, care ought to be treated in a serious way in duck coccidiosis.

Khan et al (2011) detailed the helminthes parasites of Dark coot, Fulicaatra Linnaeus, 1758 (Gruiformes: Rallidae) in Sindh Region of Pakistan, two Trematodes of the class Catatropis Odhner, 1905 were recuperated from digestive tract of host bird. The nitty griGy investigation of the worms came about the absence of a few symptomatic qualities for the recognizable proof up to the species level. Consequently, these worms are distinguished up to the conventional level. Already there is no record of the sort CatatropisOdhner, 1905 in the avian host of Pakistan.

Muazuet al (2008)discovered so the flimsy, purple deer-neck bug lives of the baffler concerning the neck concerning geese then, at that point, is the rationale about break of craving, ponderosas misfortune, loose bowels and passing on about birds. The two chickens yet geese be capable be defiled along with dead minuscule parasites known as coccidia who live between the baffler about the stomach. Coccidia can't remain seen void over a magnifying lens. Numerous phenomenal coccidia contaminate unmistakable paGs about the digestive tract between geese. Ducks are overall contaminated with various different coccidian.

Muraoet al (2008) found that sea-going birds from free region of the North Pacific have been serologically inspected to see the parasite, with an overall commonness of 19.3%, which proposes that these birds are presented to T. gondii.

Maikaiet al (2007) inferred that the two most illness celebrating species anyway are E. tenella and E. necatrix, however blended contamination are typically experiential resultant in lower meat and egg creation. Around 46^{0}/» helminthes disease rate was accounted for in the wholesome lots and lungs of home ducks in excess of a couple of parts of Iran that contained Tetrameresfissispina, Capillariaobsignata, C. anatis, C. contorta. 70.5% of the complete parasitic contamination rate on gastrointestinal parcels of green-winged blue-green (Anascrecca) in Fereydunkenar in Mazandaran Territory, northern Iran, ConPacaecumspp., cestoda, Diorchisstefanskii, Hypoderaeumconoideum and Notocotylus lessens were experiential. In a concentrate on inner organs and waste examples of

nearby ducks report 47.5% contamination rate that included HysPichis tricolor, Tracheophiluscymbium and W. philiplevinei(3.75%).

Dharejoet al (2006) exhibited two Trematodes named Paramonostomum (P) new species recuperated from the digestive system of the bird Dark Fogy Fulicaatra from Hyderabad Sindh, Pakistan, are depicted. The current examples were contrasted and every one of the past animal varieties and found different in a few morphological qualities including relative aspects, long throat, tiny pharym, voluminous five to six cross over circled outer fundamental vesicle, degree of vitellaria and egg size. Other morphological and morphometry contrasts noted are additionally shown.

Zoranaet al (2004) concentrated on sum of 118 Eurasian coots (Fulicaatra L.) 68.64% were viewed as contaminated with nematodes from the Belgrade region were inspected. Nine types of trematodes were identified: Metorchisxanthosomus, Echinostomasarcinum,Hyptiasmusoculeus,Cyclocoelummutabile,Notocotylusattenuatus,cotyl urushebraicus, Notocotyluspacifera, Tanaisialongivitelata and Bilharziellapolonica. These outcomes showed the critical job of the Eurasian coot in the epizootiology of aematodosis in different birds, wild and homegrown waterfowl, gallinacea and fish.

Literaet al (1992) revealed that the main boundless European review of T. gondii illness, perfom through a mouse bioassay, explore the participation of the parasite in a few wild avian animal categories and repo< a commonness of 12% in the analyst game waterfowl.

Islam et al (1988) there are many examinations on parasitism in the duck of Bangladesh. Yet, the populace thickness of relative symbols was not yet clear in Bangladesh, for quite a long time, sex, race and season.

III. MATERIALS AND METHODS

3.1. Study area

Ten wetlands (Head Qadirabad, Head Marala, Head Rasool, Chashma Torrent, Fishes Flood, Jhalar Lake, UchaliLake, Khabbeki Lake, Head Islam and Head Sulaimanki)were chose for the enumeration and test assortment.,. These wetlands had complex earthbound and oceanic natwal surroundings of coot as well concerning a few other transitory birds.

Table 3.1 List of wetlands with status and location

Sr#	Wetlands	Status	Location (Latitude; Longitude)
1	Head Qadirabad	Wildlife sanctuary	32.2974° N; 73.5020° E
2	Head Marala	Game reserve	32.7624° N; 74.4644° E
3	Head Rasool	Game reserve	32.6827° N; 73.5183° E
4	Head Islam	Game reserve	29.8258° N; 72.5508° E
5	Head Sulaimanki	Game reserve	30.3790° N; 73.8642° E
6	Chashma Barrage	Wildlife sanctuary	32.4359° N; 71.3803° E
7	Taunsa Barrage	Wildlife sanctuary	30.7055° N; 70.6577° E
8	Khabbeki Lake	Wildlife sanctuary	32.6219° N;72.2141° E
9	Uchali complex Lake	Wildlife Sanctuary	32.5600° N; 72.0200° E
10	Jhalar Lake	Wildlife Sanctuary	32.4981° N; 72.0876° E

3.2. Population survey

Ten wetlands were studied for coots (Fulicaatra) populace includes in mid-winter (January) 2019. Review was directed by walking and by boat, in morning from 7:00 am to 10:00 am and in night from 2:00 pm to 5:00 pm and normal of the two timings was taken. The Banks of heads and Blasts were reviewed by strolling while lake regions were smdied by utilizing wood transport.


Paul Fernandez
Photography

Fig-3.1 Common coot *{Fulicaatra)* captured at different wetlands during survey

All out count approach was applied following Bibby&Burgess (1992), care could be taken that the birds were not generally counted two times. Optics (l0x50 mm) Minolta and quick Telemaster model 841 Zoom-scope (l5x - 60 x .60mm) was utilized to order the bird species following Roberts (1991) and Ali and Ripley (1995 and 2001).

3.3. Identification of Endo- parasites

Quickly upon appearance of an example in the research center, two cm length was cut from each finish of digestive tract with a sterile surgical blade to wipe out tainting dwing handling. The waste material was then constrained into a clean 50 ml rotator mbe containing 10 ml of 2.5 % wt/vol K2Cr2O7 to keep up with the blisters during capacity. Waste examples were then kept at 4o C for under about a month prior to handling (Kuhn 2002). Waste examples were tried for Giardia spp. by analyzing Pichrome-stained direct smear of waste pellets (Spaulding et al., 1983). Slides were screened at 400 amplification and pimples of species were affirmed at 1000 x amplification. Inner qualities that were utilized to distinguish the sores included two to four bodies, and aloneness. The altered Zeinlnelson staining method was utilized to recognize Cryptosporidium oocysts (Henriksen and Pohlenz, 1981).

Waste examples were broke down by both waste smear and fixation strategies (radiating floatation strategy) at the Parasitological Lab, Punjab Untamed life Exploration Center; Faisalabad (Pakistan). Waste smears were ready on a magnifying lens slide, air

dried and fixed with the methanol for 5 minutes. Fixed spreads were stained with weaken carbol (1:10) for 3 to 5 min and washed with regular water. Spreads were decolorized utilizing corrosive liquor, and afterward counterstained with 0.5% Malachite Green answer for 1 min. Smear slides were dried in air and analyzed under the magnifying lens at 400 X amplification. Waste examples found negative with direct smear strategy were analyzed by outward floatation technique (Soulsby, 1982).For radial floatation technique, tests were blended in with 30-50 ml of water. The arrangement was sedimented for 10-15 minutes until the reasonable supernatant was acquired. The residue was blended in with the immersed saline arrangement in a rotator tube and cencifuged at 1500 cycles each moment (rpm) for a couple of minutes. The dri9ing oocysts were taken out by contacting with cover glass and moved to clean glass slide and analyzed under magnifying lens (400X). The parasites were recognized up to the most minimal conceivable ordered level in view of oocysts and egg morphology (MAFF, 1979; Silvanoseet al., 1998).

3.4. Statistical Analysis

Information was genuinely examined by utilizing important factual procedures. F-test, connection coefiicient (R), LSD-test and I-test were applied for populace patterns and food inclination and chi-square test was utilized for waste examples utilizing SPSS-22 measurable programming bundle.

IV. RESULTS

4.1. Endo-parasites identification

During the present study, total 40 samples (20 male and 20 female) were collected from different six wetlands of Punjab Pakistan. Among these samples, total 19 samples (08, 11) were found infected with different gastro-intestinal parasites. The parasitic load was almost equally shared by the bird sampled from different sites (Chashma Barrage 37.50%; Taunsa Barrage 50.0%; Head Marala 42.5%; Head Sulaimanki 50.0%; waterlogged areas of Bahawalnagar 44.4% and water logged areas of Faisalabad 66.6% (Table-4.10; Fig-4.19). The frequency of distribution in two sexes vary at different sampling sites, parasitic load was almost equally shared by both sexes (40% males, 55% females), and difference of both sexes were statistically non-significant (P>0.05).The total seven species of Gastro-intestinal parasites were identified which belonged to four classes (Nematode, Trematodes, Cestodes and protozoan) and seven families *{Amidostoniatidae, Trfchinellidae, Strongylfdae, EcÉfIlOStOWátIdae, Notocotylidae, Hymenolepidfaeand Hexamitidae),* inwhichNematodeswas42.85%, Trematodes 28.57%, Cestodes 14.28% and Protozones 14.28% (Fig-4.19). The total seven species of parasites which were recorded as *Amfdostomumanseris, Capillariacontorta, Strongyloidesavium, Echfnoparyphfunirecurvatuni, Notoco Çlusattenuatus, Diorchisbalaceaand Giardia* sp.

The overall prevalence of these endo-parasites was 12.5% *Amidostomumanseris,* 14.2% *Cá fllariaCOntOEtá,* 20.7% *Strongyloidesavium,* 21.05% *Echfnoparyphiumrecurvatum,* 23.33% *NotocoÇlus attenuates,* 17.5% *Diorchishalacea,* and 13.04% *Giardia* sp. The overall mixed infection was 42.5% among all the infected Birds (Table-4.11;Fig-4.21).

Five species were recorded at Taunsa Barrage *(Amidostomumanseris, Strongylofdesavfu 1, EChfnoparyphfumrecumatum, Diorchisbalacea, Giardia sp.),* at Water-logged areas of Bahawalnagar *[Amidostomumanseris,Echfnoparyphiumrecumatum, Notocotylusattenuatus, Diorchisbalaceaand Giardfa sp.)* and Water-logged area of Faisalabad *(Capillariacontorta, Strongyloidesavium,Notocotylusattenuatus,* Diorr/iixba/ncenand *Giardfa sp.).* Four species were recorded at Chashma Barrage *{Capillarfacontorta, StrongyloidesáVftlm,Notocotylus attenuate andDforchfsbalacea)* and Head Marala *[Amidostomumanseris, Strongyloidesavium, NotocoÇlusattenuafusand Diorchisbalacea)* and two species werere corded at Head Sulaimanki *(7fcúinoparypúiumrecurvafumandDforchísba/acea).*

Amfdostomumanserfs (Nematodes) was recorded among the three wetlands (Taunsa Barrage, Head Marala and water-logged area of Bahawalnagar) and was most prevalent at Head Marala (14.2%), which leads Taunsa Barrage (12.5 %) and least at water-logged area of Bahawalnagar (11.11%). *Capillariacontorta* (Nematodes) was recorded among the two wetlands (Chashma Barrage and water-logged area of Faisalabad) and was most prevalent at water-logged area of Faisalabad (33.33%), which leads to Chashma Barrage (12.5%). *Strongyloidesavium* (Nematodes) was recorded among the four wetlands (Chashma Barrage, Taunsa Barrage, Head Marala and water-logged area of Faisalabad) and was most prevalent at Head Marala (28.5%), which leads to Chashma Barrage (25.0%), water-logged area of Faisalabad (16.6%) and Taunsa Barrage (12.5%). The parasitic species *EchJnoparyphfumrecumatHm* (Trematodes) was recorded among the three wetlands (Taunsa Head Sulaimanki and water-logged areas of Bahawalnagar) and was most prevalent at Head Sulaimanki (50%) which leads to Taunsa Barrage (25%) and

water-logged areas of Bahawalnagar (11.11%). *Notocotylusattenuates* (Trematodes) was recorded among the fow wetlands (Chashma, Head Marala, water-logged areas of Faisalabad andBahawalnagar) and was most prevalent at Water-logged areas of Faisalabad (33.33%), which leads to the Chashma Barrage (25%), water-logged areas ofBahawalnagar (22.22%) and least present at Head Marala (14.2%). *Diorchishalacea* (Cestodes)was recorded among the six wetlands (Chashma, Taunsa, Marala, Sulaimanki, water-logged areas of Faisalabad and Bahawalnagar) and was most prevalent at Sulaimanki (50%), which leads to the water-logged areas of Faisalabad (33.33%), Marala (14.2%), Chashma and Taunsa (12.5% both), and water- logged areas of Bahawalnagar (11.11%). *Giardfa Sp.* (protozoan) was recorded among the three wetlands (Taunsa barrage, Water-logged areas of Bahawalnagar and Faisalabad) and was most abundant at Water-logged areas of Faisalabad (16.6%) which leads to Taunsa (12.5%) and water-logged areas of Bahawalnagar (11.11%). The overall mixed infection was 42.5% among of the infected Birds. The mixed infection was most prevalence at water- logged areas of Faisalabad (66.7%), which leads to Head Sulaimanki (50%), Bahawalnagar (33.33%), Head Marala (42.8%), Taunsa Barrage (37.5%) and Chashma Barrage (37.5%) (Table-4.11; Fig-4.22).

Table 4.10 Gut parasites load (%) in Common Coot sampled from different wetlands of Punjab. Values in renthes indicate frequencies

Wetland	**Male n=20**	**Female n=20**	**Total n=40**	**Chi-square value**	**P-value**
Chashma	25(1/4)	50 (2/4)	37.5 (3/8)	0.533^{NS}	0.465
Taunsa	75 (3/4)	25 (1/4)	50 (4/8)	2.000^{NS}	0.157
Marala	50 (1/2)	40 (2/5)	42.5 (3/7)	0.058^{NS}	0.809
Sulemanki	0 (0/1)	100 (1/1)	50 (1/2)	2.000^{NS}	0.157
Bahawalnagar	40 (2/5)	50 (2/4)	44.4 (4/9)	0.090^{NS}	0.764
Faisalabad	25 (1/4)	150 (3/2)	66.6 (4/6)	1.215^{NS}	0.270
Total	**40 (8/20)**	**55 (11/20)**	**47.5 (19/40)**	**0.902^{NS}**	**0.342**

NS = Non-significant (P>0.05)

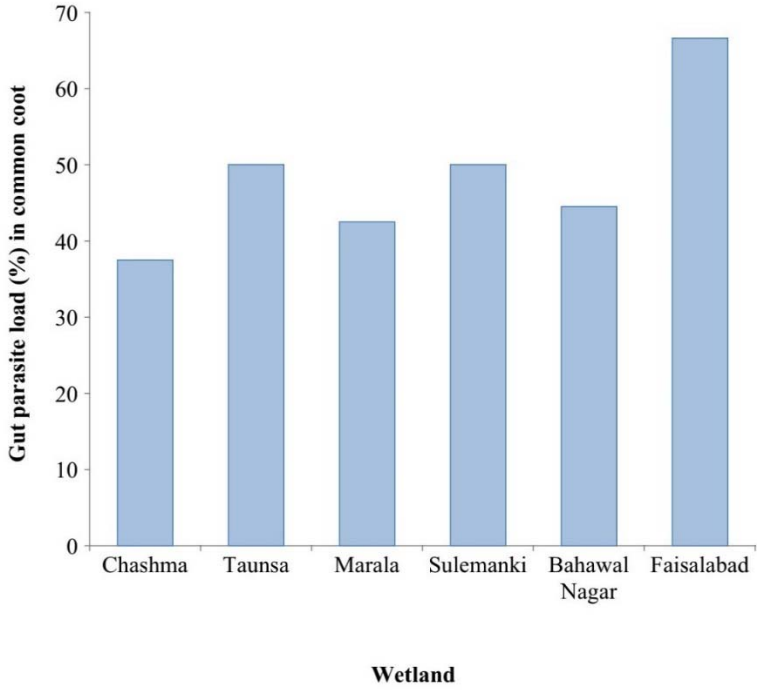

Fig-4.19 Overall comparison of gut parasitic load (%) in common coot samples collected from wetlands of the Punjab

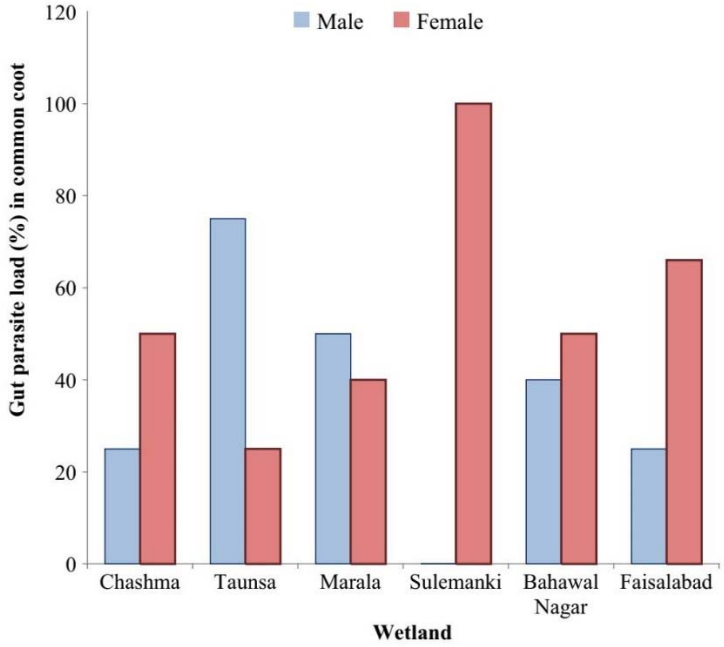

Fig-4.20 Overall comparison of gut parasitic load (%) in male and female common coot samples collected from wetlands of Punjab

Table 4.11 Revalence (%) of different species of gut endo-parasites in common coot sampled from different wetlands of Punjab (Pakistan). Values in pare•thesis present frequencies

Family	Order	Species	Wetlands						Overall
			Chashma	Taunsa	Marala	Sulemanki	Bahawalnagar	Faisalabad	
Nematoda									
Amidostomatidae	Strongylida	*Amidostomum anseris*	----	12.5 (1/8)	14.2 (1/7)	----	11.11 (1/9)	----	12.5 (3/24)
Trichinellidae	Trichurida	*Capillariacontorta*	12.5 (1/8)	----	----	----	----	33.33 (2/6)	14.2 (2/14)
Strongylidae	Rhabditida	*Strogyloidesavium*	25(2/8)	12.5 (1/8)	28.5 (2/7)	----	----	16.6 (1/6)	20.7 (6/29)
Trematoda									
Echinostomatidae	Plagiorchiida	*Echinoparyph-iumrecurvatum*	----	25 (2/8)	----	50 (1/2)	11.11 (1/9)	----	21.05 (4/19)
Notocotylidae	Plaiorchiida	*Notocotylusattenuatus*	25 (2/8)	----	14.2 (1/7)	----	22.22 (2/9)	33.33 (2/6)	23.33 (7/30)
Cestoda									
Hymenolepididae	Cyclophyllidea	*Diorchisbalacea*	12.5 (1/8)	12.5 (1/8)	14.2 (1/7)	50 (1/2)	11.11 (1/9)	33.33 (2/6)	0.175 (7/40)
Protozoa									
Hexamitidae	Diplomonadida	*Giardia spp.*	----	12.5 (1/8)	----	----	11.11 (1/9)	16.6(1/6)	13.04 (3/23)
Mixed infection			37.5 (3/8)	37.5 (3/8)	42.8 (3/7)	50 (1/2)	33.33 (3/9)	66.7 (4/6)	42.5(17/40)

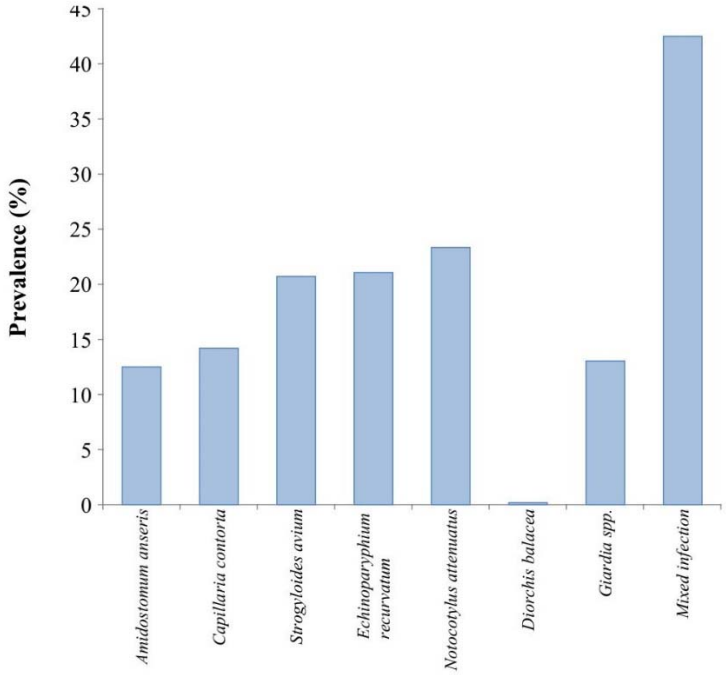

Fig-4.21 Prevalence (%) of different species of gut endo-parasites common coot sampled from wetlands of Punjab.

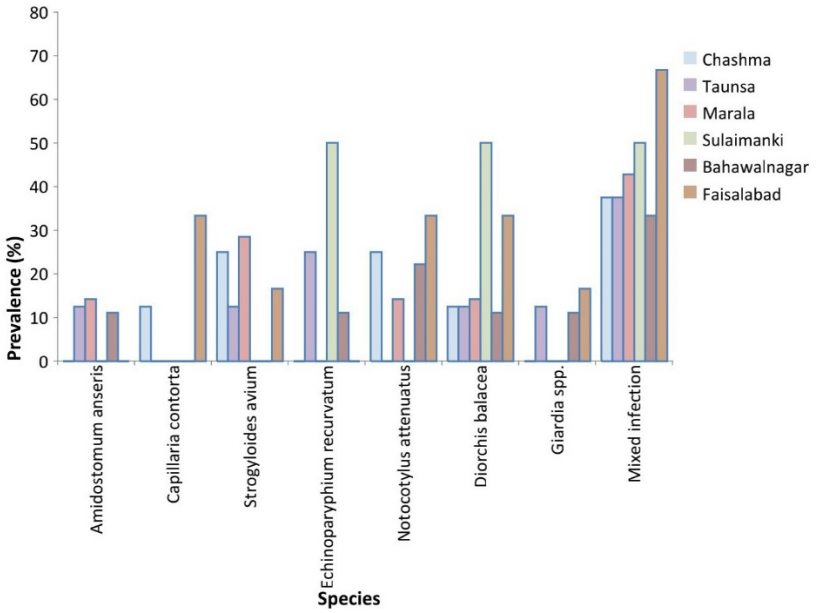

Figure-4.22Comparison of different endo-parasite species in common coot at different wetlands of Punjab

V. DISCUSSION

Population Review was held in mid-winter (January) 2019.in which greatest population of normal fogy was kept in Chashma Flood (14276), followed byUchali Lake (7319), Taunsa Torrent (6625), Head Marala (1650), Head Rasool (1377), Khabbeki lake (1351), Head Sulaimanki (1189), Head Islam (873) and Head Qadirabad (810). During the 2019 smdy, the littlest population was kept in Lake(140).In the understanding of our outcomes, Hassan et al. (2011) revealed the normal fogy at Head Qadirabad, Head Marala, Head Rasool, Chashma Flood, Taunsa Blast and Patisar Lake from 1989 through 2008 dwing midwinter (January) every year. Altogether, 852,758 coots were counted.

The most extreme population of common coots was recorded during 1989 at Chashma Flood, though the base population was recorded dwing 2008 at Head Marala. Scott (1989) announced 6,530, 18,000, 61,500, 7,510 and 5,300 Dark coots at Head Qadirabad, Head Marala, Chashma Torrent, Taunsa Flood and Patisar Lake, separately during January 1987. During concentrate on period, absolute 533,965 birds of 46 waterfowl species having a place with 26 genera from 11 families addressing 6 orders were recorded from Chashma torrent. The most continuous guest was Fulicaatra (33.91%) trailed by Anasplatyrhynchos (9.53), Aythyaferina (9.44%), A. clypeata (8.91%) A. penelope (7.90%), A. acuta (7.54%) and A. crecca (6.61%). During study, complete 77,078 birds of 44 waterfowl species having a place with 25 genera from 11 families addressing 6 orders were assessed fom H. Marala. The most bountiful wasA. crecca (25.79%) followed by A. platyrhynchos (22.79%) A. acuta (11.99%), Anserindicus (6.15%), Aythyaferina (6.43%) and A. penelope (2.80%). Bibi and Ali, (2013) detailed bird species variety at Taunsa Blast from 2009 to 2011.

Altogether, 58,598 bird species having a place with 53 families and 171 species were recorded. Thickness of the birds was 6.9 birds per hectare. Shannon-Weiner Variety File (H') was 3.39, while Simpson's Variety List (D) was 0.93. Five predominant species with their overall overflow included; Fulicaatra (13.3), Bubulcus ibis (12.28), Egrettagarzetta (11.46), Aythyaferina(8.9) and Corvussplendens (5.8). Raiset al (2011) revealed the extravagance, thickness and relative wealth of avifauna, especially the water birds of KallarKahar Lake. A sum of 86 bird species having a place with 16 orders and 36 families were recorded. Among these, 61.62 % species were occupants, 25.58% winter guests, 8.13% summer rearing guests and 4.65 % section travelers. Water birds comprised 33.72% of the avifauna of lake. As numerous as l62J-17.71 people of six types of ducks and 440£94.51 people of other 23 types of water birds were recorded with dark coots (Fulicaatra) and shoveler (Anasclypeata) as the most bountiful species. The densities of water birds and ducks were assessed to be 3.29 and 2.56 birds per hectare, individually. Especially Saccharumspontaneum and T. domingensisare utilized in fencing the houses as well with respect to supplication and floor mates. This training is exceptionally unsafe for the

debasement of vegetation and unfavorably affects ecological evolving. Nudds and Cole (1991), Korschgen and Dahlgren (1992), Vaisanen and Solonen (1996), Lebedeva and Markitan (2001), Houdkova (2003), Horn et al. (2008), Phillips (2008) and Martarano and Yparraguirre (2008), additionally found these variables which are reason for diminishing the waterfowl population.

A review was directed by Akbar et al (2006) for the evaluation of the populace fom 1996 to 2005 at Patisar Lake in region Bahawalpur. He recorded 32 types of 19 genera from 10 families. Anasplatyrhynchos was tracked down in overflow (24.09%) while other were recorded as A. strepera (12.18 %)andA. acuta (11.69 %). In a review led by Scott (1989), 114,000 birds were found on Chashma Blast in January 1975 and around 0.1 million were found in January 1987 and 1988 at Chashma Flood. He likewise found 66,000 birds of waterfowl at Marala in 1987. A few different foundations, for example, Punjab Untamed life Exploration Establishment (PWRI), Faisalabad likewise led reviews on populace elements of waterfowl every year. The tracked down in ow review, the a few factors like unlawful hunting, mesh of waterfowl, and obliteration of territory are primary Aivers of declining of populace of waterfowl in Punjab. The examination between yearly populace rate with Scott (1989) from 1987 and 1988, showed that populace of waterfowl diminished at Chashma Blast around 50% and 88%» at Marala head work.

Albeit differential assimilation among food things, particularly planktonic spineless creatures, may impact gizzard examination in waterfowl (Swanson and Bartonek 1970), this strategy is especially helpful while contrasting eating regimen sythesis between wetland destinations and time, particularly when gizzard information are joined with throat and proventriculus information (Green and Sánchez 2003; Fuentes et al. 2004). The non-huge contrasts between periods might mirror our exceptionally heterogeneous example attributes, particularly the blending of study regions and years. As a matter of fact, the assortment of tests from different wetlands, as it was the situation in the current review, is thought of as significant for assessing the taking care of propensities for waterfowl and gives more precise assessment of their eating regimen creation (Swanson et al. 1974b, Mill operator et al. 2000).

In current study,total 10 types of plants were recognized, in which Najasgraminea(75.0%),Hydrillaverticillate (72.5%), Nymphaea nouchali (67.5%), Vallisneriaspirallis (65%), Commelinabenghalensis (60.0%), Dichanthiumannulatum (57.5%), Cyperusalopecuroides(47.5%), Potamogetonnodusus (35.0%), Polygonumbarbatum (32.5%) and Trapanatans (15.0%).The wealth, overflow, Shannon's variety list, Simpson's variety record and equality for gizzard contents were determined. In the arrangement of present review, Jha (2013) reported the environmental elements including the sea-going food plants and deeding timing and so forth. During this review, 16 birds were containing around thirty-fourplant species. These birds were as Fogy, Blue-green, Gadwall, Mallard and some others.

Vegetation event at wetlands relies upon accessibility of water from the dia. It is made out of boggy, marshy, dri0ing secured, free dri0ing and lowered plants as the profundity advances. These locales give living space to a wide range of birds like waders, tinkerers and for some avian greenery. Vegetation additionally relies upon the water rise and fall. These birds feed most extreme plans in winter and least in summer. (Folker, 1987, Perry and Deller, 1996). Some water birds likewise embrace rural region as territory and take food from harvests like soybean, sorghum and rice (Mukherjee et al, 2002; Urfi, 2003).Waterfowl can go about as a primary wellspring of various sorts of parasites; they can get disease from their natural surroundings, convey and spread them in the climate, including drinking water supplies and furthermore home grown creatures (Graczyket al., 1998).

Past re-searchers had suggested a positive connection among movement and parasite extravagance could come from a debilitating of the insusceptible framework during movement (Buehler et al., 2008), a more prominent conglomeration of hosts (Krauss et al., 2010), or openness to a more extensive scope of environments and parasite types. In present review, 19 examples (08/, 11 \) were seen as contaminated with various gastro-digestive parasites. The complete seven types of Gastro-digestive parasites were distinguished and recorded as Amidostomumanseris,Capillariacontorta, Strong yloidesavium,Echinoparyphiumrecumatum, Notocotylusattenuatus, Diorchisbalaceaand Giardia sp. D. balacea was recorded among the six wetlands,S.aviumandN. constricts was recorded among the four wetlands, A.anseris, E. recumatum and Giardia sp. was recorded among the three wetlands, and C.contortawas recorded among the two wetlands.They additionally recognized broad annihilation and degeneration of the villi brought about by the connection and tension of the accidents. Bhowmiket al (1987) noticed serious enteritis in turkeys because of E. recumatum. Both the E. revolutum and E. recumatum have barbed head collar and flaky fingernail skin (Soulsby, 1982).

Forester et al., (1994) detailed hemorrhagic passages and digestive mucosa brought about by E.revolutum in waterfowl. He observed that the villi were destructed because of the accident's connection. The E.revolutum and E.recurvatumattach through flaky finger nail skin (Soulsby, 1982). Permin and Hensen(1998) were additionally concurred with these outcomes. Soulsby

(1965), was tracked down the demise of ducks by catarrhal assaults. These joined with gizzard's horny layer.Inproventriculus, roundabout ulcerative and necrotic regions with significant tissue responses and degeneration of the glandular tissues were seen. Broad leukocytic invasions and clogged veins were the normal elements. Petechial hemorrhages in the gizzard and ulcerative sores in the proventriculus in A. anseris are accounted for by Anisuzzamanet al (2006); Soulsby (1982) and Lapage (1962) in ducks. These parasites profoundly infiltrate the horny layer of the gizzard and most likely during entrance they cause hemorrhages. Then again, A. anseris was tracked in the middle of between the horny and solid layer of the gizzard. Cestode fauna in avian hosts is straight forwardly connected with the sort of food ingested (Drobneyet al 1983).

The commonness of helminths is many times more noteworthy in grown-up female water fowl and in first-year birds due to a more prominent number of spineless creatures in their eating routine (Drobneyet al 1983; Krapu and Reinecke 1992; Haukos and Neaville 2003). Besides, it is assessed that 80 to 96% of swface waters in the US are defiled withCryptosporidiumandGiardia (Hansen, 1991). The commitments of Giardia growths and Cryptosporidium oocysts from avian species to the groupings of pimples and oocysts in water tests are generally obscure, similar to the degree of transmission of bird-vectored organic entities to mammalian hosts and the significance of these parasites in avian species (Erlandsen, 1990). Relocation of different types of waterfowl toward the northern pieces of Iran significantly affects parasitic sicknesses in birds and human in Northern piece of Iran. Giardia spp. generally was accounted for from different birds including budgerigars (Melopsittacusundulatus), cockatiels (Nymphicushollandicus), people in love (Agapornisspp.), dim cheeked parakeets (Brotogerispyrrhopterus) and other psittacines (Greiner and Ritchie, 1994). Giardia growths are usually found in sewage and surface waters and every so o0en in drinking water. In Canada, a cross sectional study in 72 districts perfomed somewhere in the range of 1991 and 1995, Wallis et al. (1996) saw that as 72.6%, 21% and 18.2% of crude sewage, crude water, and treated water tests, individually, contained Giardia pimples. In a comparable repo8, waste examples were taken from wild ducks on the lower Rio Grande 5aeam around Las Cruces, from 2000 io 2001. The consequences of this study demonstrated that 49% of the ducks were transporters of Cryptosporidium, additionally 28% of the ducks were positive for Giardia (Kuhn et al., 2002). Polluted drinking water, sporting water, and food are vital and are a significant pathway for transmission.

VI. SUMMARY

Population overview was led to assess the number of inhabitants in like manner coot(Fulicaatra),the greatest population was recorded at Chashma Blast (14276), followed by Uchali Lake (7319), Taunsa Flood (6625), Head Marala (1650), Head Rasool (1377), Khabbeki lake (1351), Head Sulaimanki (1189), Head Islam (873) and Head Qadirabad (810). The least population was recorded at Jhalar lake (140) during the review of 2019.The decade population pattern, the general reach was 11000-70730 birds (298836458) at Chashma Flood, 1700- 60l0birds (4198515) at Taunsa Torrent, 400-13779 birds (72531466) at Ucchali Lake, 89-7013 birds (2789785) at Head Qadirabad, 760-11083 birds (3226984) at Head Marala, 300-8875 birds (3261) at Head Rasool, 110-2400 birds (1486230) at Khabbeki, 1189-2670 birds (1809180) at Head Sulaimanki,70-1400 birds (526206) at Jhalar Lake, 873-3090 birds (1779257) at Head Islam. The number of inhabitants in Chashma flood was genuinely exceptionally huge ($P<0.05$) when contrasted with different wetlands. The general year wise over¥ow showed that population of normal fogy expanded fom year 2010-2014, and most extreme in the extended period of 2015, while populace diminished bit by bit from year 2016 to 2019. The most extreme relative overflow of Chashma Blast (53.8%) which prompts Ucchali Lake (11.9%), Taunsa Flood (7.6%), Head Rasool (5.9%), Head Marala (5.8%), Head Qadirabad (5.0%), Head Sulaimanki (3.3 ^{0}/»),Head Islam (3.2%), Khabbeki (2.7%) and least was of Jhalar Lake (0.9%).

To assess the food inclination, all out 40 guts tests were gathered from the butchered duck. The general absolute weight of stomach went from 25.03-100.779 (63.983.946), all out weight of gizzard went fom 12.78-38.92g (26.99 1.325), weight of food material went from 1.37-6.259 (3.590.187), gizzard weight without food material was gone from 9.50-33.67g (23.39 1.244), weight of seed was gone from 0.33-2.76g (1.24 0.075), weight of vegetation was gone from 0.54-2.93g (1.650.103) an weight of other material went from 0.03-1.769 (0.690.067). The examination among male and female showed that the all out weight of stomach, absolute weight of gizzard, weight of food material, Gizzard weight without food material and weight of other material were genuinely exceptionally critical ($P < 0.01$) and weight of seed, weight of vegetation wasstatistically huge ($P < 0.05$). Absolute 10 types of plants were distinguished, in which Najasgraminea(75.0%),Hydrillaverticillata(72.5%), Nymphaea nouchali(67.5%), Vallisneriaspirallis (65%), Commelinabenghalensis (60.0%), Dichanthiumannulatum (57.5%), Cyperusalopecuroides

(47.5%), Potamogeton nodosus(35.0%), Polygonumbarbatum (32.5%) and Trapanatans (15.0%).The lavishness, overflow, Shannon's variety record, Simpson's variety file and uniformity for gizzard contents were determined.

Among the 40 samples, 19 samples (08 male and 11 female) were viewed as contaminated with various gastro-digestive parasites. The complete seven types of Gastro-digestive parasites were distinguished and recorded as Amidostomumanseris, Capillariacontorta, Strongyloidesavium, Echinoparyphiumrecumatum, Notocotylusa3enuatus, Diorchisbalacea and Giardia sp. Five species were recorded at Taunsa Flood, at Water-logged areas of Bahawalnagar and Water-logged area of Faisalabad. Four species were recorded at Chashma Torrent and Head Marala and two species were recorded at Head Sulaimanki. D. balaceawas recorded among the six wetlandss. AviumandN. weakens was recorded among the four wetlands, A. anseris, E. recwvatum and Giardia sp. was recorded among the three wetlands, and C. bend wasrecorded among the two wetlands.

VII. CONCLUSION

In conclusion, the study of endo-parasites in the Common Coot (Fulica atra) collected fom the wetlands of Punjab, Pakistan, provides valuable insights into the biodiversity and parasitic load affecting this bird species. The findings highlight the presence of a diverse range of parasites, emphasizing the impoGance of continuous monitoring and research to understand the ecological dynamics and health implications for the Common Coot population. These results underscore the need for conservation efforts and effective management practices to mitigate the impact of parasitic infections on these birds, ensuring the preservation of their habitats and the overall ecological balance within the wetlands of Punjab. Further studies could expand on these findings by exploring seasonal variations and the influence of environmental factors on parasite prevalence.

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