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Original Article

An Investigation Of Gastrointestinal Tract Parasites In Some Turkey Farms With Treatment Trials

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ABSTRACT

One hundred faecal samples and buccal swabs were collected from 80 diseased and 20 healthy turkey birds in private farms (25 from each, 20 diseased and 5 heathy). Parasitological examination revealed that the infection rate among the diseased birds was 40% (32 out of 80), and 55% (11 out of 20) among the healthy birds. Single and mixed infections were 68.75%, 31.25%, 45.45% and 54.55% in diseased and health birds respectively. *Ascaridia galli*, *Eimeria meleagrimitis* and *Tritrichomonas eberthi* were the internal parasites identified in the study. Infected turkeys showed a significant decrease in RBCs, Hb, serum iron, calcium, sodium and potassium levels coupled with leucocytosis, lymphocytosis, heterophilia, eosinophilia, basophilia, and monocytosis compared with healthy turkeys group. Many pathological lesions in gastro-intestinal tracts were detected as well. Flubendazole, Toltrazuril and Metronidazole were the drugs which have 100% efficiency against the mentioned parasites and consequently lead to the improvement of the hematological and mineral picture as well as the pathological lesions.

INTRODUCTION

Parasitic infections especially gastrointestinal nematodes possess a serious health threat and limit the productivity of turkeys (**Nazmiye, 2008).** Gastrointestinal nematodes sensitize animals to a shortage of trace elements and vitamins led to the destruction of gastro-intestinal mucosa (**Tomza, et al., 2014**). Coccidiosis is recognized as the major protozoal disease of bird and is caused by many species of *Eimeria* (**Kitandu and Juranová 2006**).

Trichomonas gallinae is the causative agent of trichomoniasis in birds is a parasitic disease that causes caseous, fibronecrotic lesions in oral cavity, pharynx and upper digestive tract and respiratory tract that generally lead to death of affected bird due to starvation or secondary bacterial infections **(Real et al., 2000).** Trichomoniasis is found

partically in pigeons, chickens and turkeys (**Levine, 1995**)

Flubendazole is one of the Anthelmintic drugs used in the treatment and control of gastrointestinal nematodes in birds (**Sarah, et al. 2011**) and effective against both adult and small species of *A. galli* **(Tarbiat, et al. 2016).**

Toltrazuril was an effective as anticoccidial drug and effective against intracellular developmental stages of *Eimeria* (**Said, et al. 2010**) & (**Mathis, et al. 2004**).

Metronidazole, a 5-nitroimidazole drug derived from antibiotic azomycin. It has an effect in eliminating trichomonas infection and has a low risk of serious side effects **(Sarah, et al. 2004).** It is used to treat trichomonad infections at the beginning in 1959 (**Dino, et al. 1998**)

The aim of the present study is to investigate the antiparasitic effect of flubendazole, toltrazuril and metronidazole against *A. galli*, *E. meleagrimitis* and *T. eberthi* respectively and their effects on some hematological parameters and mineral picture as well as pathological changes in some internal organs in turkey poults.

MATERIAL AND METHODS

Fecal samples

About 100 fecal samples were collected from four private turkey farms in Sharkia Province of turkey species Hybrid-Hybridturkeys.com at age of 50-70 days during the period from january 2018 to May 2019 (80 samples were collected from birds showed off food, weakness, diarrhea and unthriftiness and 20 samples from apparently healthy turkeys) in rate of 20 diseased and 5 healthy from every farm for parasitological examination. Fecal samples were transported to the laboratory where they were examined by sedimentation and floatation technique (**Soulsby, 1982**). Degree of infection was determined by counting eggs or oocysts/gram faeces through Mc Master technique **(Moning, 1963**)

Smear from droppings or intestine of dead birds were examined for detection of *Tritrichomonas eberthi* after staining by giemsa stain **(Al Sadi and Hamadi, 2011).**

Drugs:

Flubendazole (Fluvermal)®: obtained from Mena pharm Company under licence of Janssen pharmaceutica, Belgrum. Its recommended dose is 50 ppm flubendazole in drinking water for 7 consecutive days according to Manufacturer Company

Toltrazuril (Baycox)®: obtained from Bayer Company. Its recommended therapeutic dose is 25 mg/ kg b.w. for 7 successive days according to Manufacturer Company.

Metronidazole (Amrizole)®: manufactured by Amriya for pharmaceutical industries, Alexandria, Egypt. Produced in a bottle contain 120 ml each ml contain 125 mg Metronidazole. Its recommended dose is 100 mg/ litre drinking water for 7 successive days according **(Abd El-Rahman, et al. 2008).**

Experimental design:

Post parasitological examination 20 turkey (15 infected with parasites suffering from off food, weakness, diarrhea and unthriftness and 5 healthy free from any parasites) were divided into 4 equal goups (5 bird/each), 1st group healthy turkeys free from any internal and external parasites (control group), 2nd group turkeys infested with *A. galli* treated with 50 mg flubendazole /kg B.wt. in drinking water daily for 7 succesive day, 3rd group turkeys infested with *E. meleagrimitis* treated with 25mg toltrazuril/kg B.w*t.*/day for 7 consecutive days in drinking water and 4th group turkeys infested with *T. eberthi* treated with 100 mg metronidazole/kg B.w*t.*/ day in drinking water for 7 successive days. Individual faecal samples were taken from each bird at 1st, 5th, 10th, 15th and 20th days post treatment for eggs and oocyst outputs counting.

Blood sampling:

At pretreatment and at 1st day post treatment two blood samples were collected from each bird from wing vein. First blood sample was collected on tube contain EDTA as anticoagulant for estimation of blood picture **(Jain, 2000)**. Second sample was collected in clean, dry centrifuge tube without anticoagulant and centrifuged at 3000 rpm for 15 minutes for obtain clear serum for estimation of Iron according to **Willams et al., (1977)**, calcium **(Gindler, 1972),** sodium and potassium **(Oser, 1979)** concentrations were determined using atomic absorption spectrophotometry **(AOAC, 1980).**

Histopathological technique:

Samples from intestine, crop, proventriculus, gizzard and liver were taken pre treatment and post treatment from all groups after post mortem examination and fixed in 10% neutral buffer formalin and then processed using the routine histopathological technique **(Suvarna, et al. 2013).**

Statistical analysis:

Statistical analysis was performed using analysis of variance. Duncan's Multiple Range **Duncan, (1955)** was used to determine differences among treatments mean at significance level of 0.05. All statistics were run on computer using the SPSS program **(SPSS, 2004).**

RESULTS

One hundred turkeys (80 diseased and 20 healthy) were examined for enteric nematodes and protozoa. The current study showed that examined turkeys were infected with *A. galli*, *E. meleagrimitis* and *T.eberthi.* The present results revealed that overall prevalence of parasitic infections was 43%. However, the prevalence was 40% and 55% in diseased and healthy birds respectively. While, our findings showed that both diseased and healthy turkeys were infected either with single or mixed infections. Regarding single infections, *E. meleagrimitis* infections were the most prevalent among both the diseased (40.91%) and healthy turkeys (40%). In case of mixed infections, birds that were infected with both *A. galli and T.eberthi* recored the highest percentage in diseased birds (40%), while *A. galli and*

E. meleagrimitis recored the highest percentage (50%) in healthy ones (Table 1, 2).

The morphological character of adult *A. galli* worm was yellowish white and semitransparent, oral opening is surrounded by three prominent trilobed lipis. Presence ten pairs of caudal papillae on ventral surface of male caudal end. *A. galli* egg was oval in shape 0.062 mm in length and 0.045 mm in width (plate I)

Eimeria meleagrimitis oocysts is ovoid in shape with double countered wall and measured 17-22x22.5 – 19.3x16.5 µm. The micropyle oocyst residuum are absent while the poral granule is present in sporulated oocyst. The sporocysts are oval with sticda body at pointed end and contain residual body. The sporulation time was 24-72 hrs at room temperature (Plate I).

The morphological features of *T. eberthi* trophozoite that was detected from intestinal scrapings is ovoid or slight elongated and measured 8.6-14 x4-9.8 (10.4x6.5) µm, there are three equal or subequal anterior flagella. The recurrent flagellum extends beyond the posterior end for a distance equaling one half of the length of the organism, the undulating membrane is well developed and supported by a relatively heavy costa that tapers gradually towards both ends. Its nucleus is elongated or ovoid that located posterior to anterior surface of the body. The projecting teminnal axostyle appear as afine needle - like filment (Plate I).

Regarding the efficacy of used drugs in this study with recommended dose, we found that flubendazole, toltrazuril and metronidazole have 100% efficacy against *A.galli, E. meleagrimitis* and *T.eberthi* at 20^{th}, 10^{th} and 10^{th} days post treatment respectively (Table 3)

Hematobiochemical results Birds infected with *A. galli, E. meleagrimitis and T. eberthi* revealed a significant decrease in RBCs and Hb coupled with leucocytosis, lymphocytosis, heterophilia, eosinophilia, basophilia, and monocytosis compared with control group. Birds infested with *A. galli, E. meleagrimitis and T. eberthi* evoked a significant decrease in serum iron, calcium, sodium and potassium levels.

Histopathological results: Intestine of turkey infected with *A. galli* showed necrotic epithelial lining with desquamation leaving eroded surface and exposing lamina propria. Flubendazole induced nearly normal intestinal epithelium. Plate (II). *E. meleagrimitis*: Cecum showed plugging of lumen with necrotic debris, inflammmatory cells; fibrin admixed with sloughed epithelial cell. Few developmental stages of Eimeria were detected. Lamina propria. Toltrazuril lining intestinal epitheliums return to normal histological structures. Plate (III). Trichomoniasis: Grossly, yellowish white masses of caseous necrotic material were seen in the oral cavity, esophagus, crop, and proventriculus. Pale to yellow necrotic areas were noted in liver. Microscopically: liver revealed multifocal to coalescing areas of caseous

necrosis characterized by loss of cellular and architectural detail. Moreover, presence of round to pleomorphic organisms that appeared basophilic within necrotic areas in addition to congested heaptic blood vessels was also seen. Plate (IV). The crop mucosa was eroded or ulcerated and the mucosal epithelium was lost and replaced by eosinophilic cellular and karyorrhectic debris (lytic necrosis) in addition to inflammatory cells infiltration mainly lymphocytes were seen within lamina propria, proventriculus showed mononuclear cells infiltration within lamina propria with hyperplastic epithelial lining. Examined sections from gizzard showed cystic cavitations of mucosal glands with degeneration and necrosis of some muscles in muscular layers. Intestinal sections showed desquamated epithelium with necrotic some epithelial lining and inflammatory cells infiltration within lamina propria and submucosa. Plate (V). Metronidazole: Liver showed normal hepatic parenchyma and vascular tree. Crop showed apparently normal cornified stratified squamous epithelium, lamina propria, muscularis mucosae, T. submucosa, T. muscularis. Proventriculus with relatively normal epithelial lining and proventricular glands. Plate (VI).

Table 1: Total Prevalence and type of infection in examined turkeys.

Examined Turkeys	No. of samples	+ve samples					
		No	%	Type of infection			
				Single		Mixed	
				No	%	No	%
Diseased turkeys	80	32	40	22	68.75	10	31.25
Healthy turkeys	20	11	55	5	45.45	6	54.55
Total	100	43	43	27	62.79	16	37.21

Table 2: Prevalence of single and mixed parasitic infections in examined turkeys.

Examined birds	**Single infections (27)**				**Mixed infections (16)**			
	Total infected No.	Parasite species	No.	%	Total infected No.	Parasite species	No.	%
Diseased Turkeys (32)	22	*A. galli*	7	31.82	10	*A. galli+E. meleagrimitis*	3	30
		E. meleagrimitis	9	40.91		*E. meleagrimitis + T. eberthi*	3	30
		T. eberthi	6	27.27		*A. galli +T. eberthi*	4	40
Healthy turkeys (11)	5	*A. galli*	2	40	6	*A. galli+E. meleagrimitis*	3	50
		E. meleagrimitis	2	40		*E. meleagrimitis + T. eberthi*	2	33.33
		T. eberthi	1	20		*A. galli + T. eberthi*	1	16.67

Table 3: Efficacy of the used drugs against G.I. Parasites in infected turkeys (N=5).

Type of parasite / Duration		Eggs and Oocysts count per gm feces						
		Turkey No	Pre treatment	Days post treatment				
				1st	5th	10th	15th	20th
Non infected(Control)		5	00	00	00	00	00	00
Infected&treated	***A. galli* Flubendazole treated**	5	3840± 0.21[a]	660± 0.24b	310± 0.27[c]	140± 0.03[bc]	110± 0.09[d]	00
	***E. meleagrimitis* toltrazuril treated**	5	2950± 0.62[a]	710± 0.121b	330± 0.07[c]	00	00	00
	***T. eberthi* metronidazole treated**	5	3260± 0.45[a]	1340± 0.24[b]	330± 0.15[c]	00	00	00

Means with different superscripts of the same column indicate significant differences at P<0.05

Table (4): Effect of parasitic infection and treatment on blood picture in turkeys (N=5)

Parameters / Groups			(control) G1	*A. galli* G2		*E meleagri* G3		*T. Eberthi* G4	
				Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
RBCs X10^6 /µl			2.71± 0.04 a	2.33± 0.02 b	2.57± 0.03 a	2.41± 0.03b	2.60± 0.06 a	2.24± 0.02b	2.65± 0.07a
Hbgm%			12± 0.17a	9.1± 0.30 c	10.7± 0.34 b	9± 0.34 b	11.2± 0.23 a	9.7± 0.22b	11.5± 0.17a
Leukocytic count X10^6 /µl	**Total count**		15.4± .20 c	21.8± 0.53 a	17.6± 0.38 b	19.5± 0.29a	16.7± 0.17 b	19.6± 0.36 a	17.3± 0.40 b
	Differential count	**Heterophils**	4.9± 0.08 c	6.6± 0.05 a	5.4± 0.12 b	5.8± 0.14 a	5.1± 0.12 b	5.5± 0.05 a	5.2± 0.09 b
		lymphocytes	9.15± 0.32c	12.8± 0.23 a	10.6± 0.11 b	11.5± 0.23 a	10± 0.14 b	12.2± 0.17 a	10.6± 0.25 b
		Eosinophils	0.29± 0.017b	0.52± 0.014a	0.35± 0.023 b	0.54± 0.05 a	0.40± 0.02b	0.55± 0.03a	0.36± 0.02 b
		Basophils	0.28± 0.01c	0.58± 0.027a	0.43± 0.023 b	0.55± 0.014a	0.39± 0.02b	0.51± 0.02 a	0.38± 0.02b
		Monocytes	0.78± 0.02 c	1.3± 0.029a	0.89± 0.014 b	1.15± 0.03 a	0.85± 0.14 b	0.91± 0.03 a	0.80± 0.02b

Means with different superscripts of the same column indicate significant differences at P<0.05

Table (5): Effect of parasitic infection and treatment on some minerals in turkeys (N=5)

Groups / Parameters	Health bird (control) G1	*A. galli* G2		*E. meleagrimitis* G3		*T. Eberthi* G4	
		Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
Iron Mg/dl	75.9± 2.1 a	62.8± 1.3 b	71.3± 1.1 a	61.5± 0.76 b	74.5± 0.86 a	60.3± 0.88 b	72.3± 1.3 a
Calcium Mg %	9.4± 0.17 a	6.7± 0.31 b	8.9± 0.20a	6.5± 0.17b	9.2± 0.11 a	6.3± 0.24b	9.1± 0.12 a
Sodium (mEq/L)	127.3± 1.4 a	118.6± 1.5 b	125± 1.7 a	115± 1.1 b	122.6± 1.4 a	116.5± 1.3 b	124± 1.4 b
Potassium (mEq/L)	6.8± 0.17 a	5.6± 0.08 b	6.4± 0.05 a	5.2± 0.11 b	6.6± 0.17 a	6.1± 0.14 b	6.5± 0.11a

Means with different superscripts of the same column indicate significant differences at P<0.05

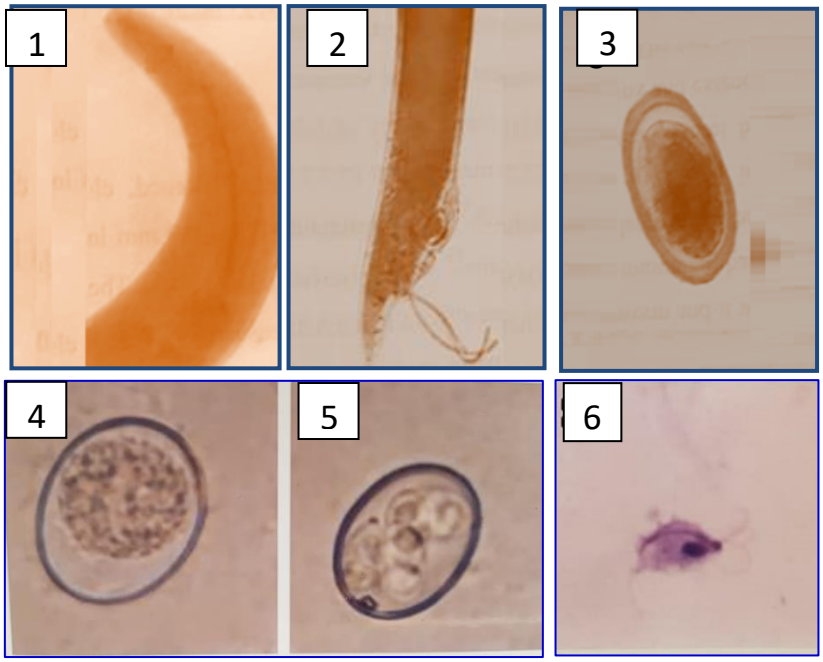

Plate (I): Intestinal parasites in the examined turkeys

Fig.(1,2&3): *Ascaridia galli* (anterior end, male caudal end & egg). X100
Fig.(4&5): *Eimeria meleagrimitis* (non sporulated &sporullated oocyst). X1000
Fig.(6): *Tritrichomonas eberthi* (trophozoite). X1000

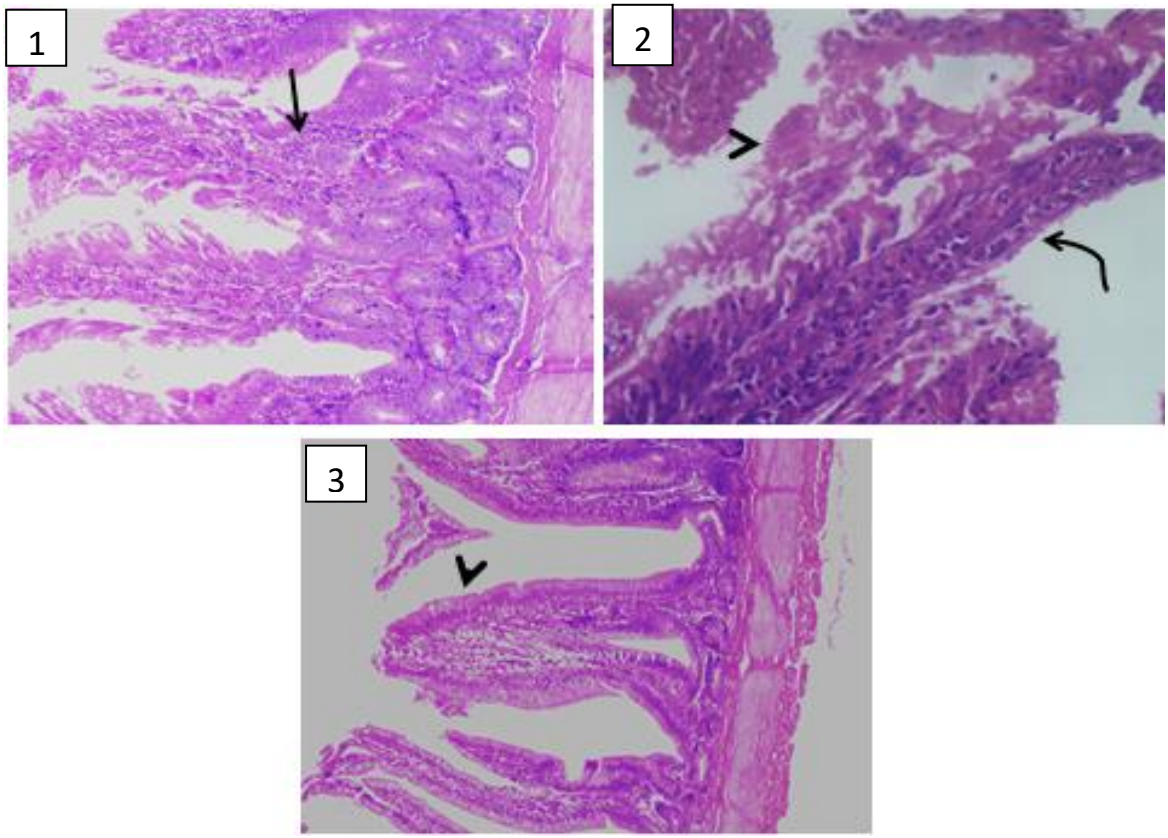

Plate (II): Intestine of turkey naturally infested with *Ascaridia galli* showing:

Fig.(1): Inflammatory cells infiltration (arrow) within lamina propria. H&E x200
Fig.(2): Necrotic epithelial lining (arrow heads) with exposing lamina propria (curved arrow). H&E x400
Fig.(3): Flubendazole treatment showing reepithelilzation of the necrotic epithelium (arrow head). H&E x100

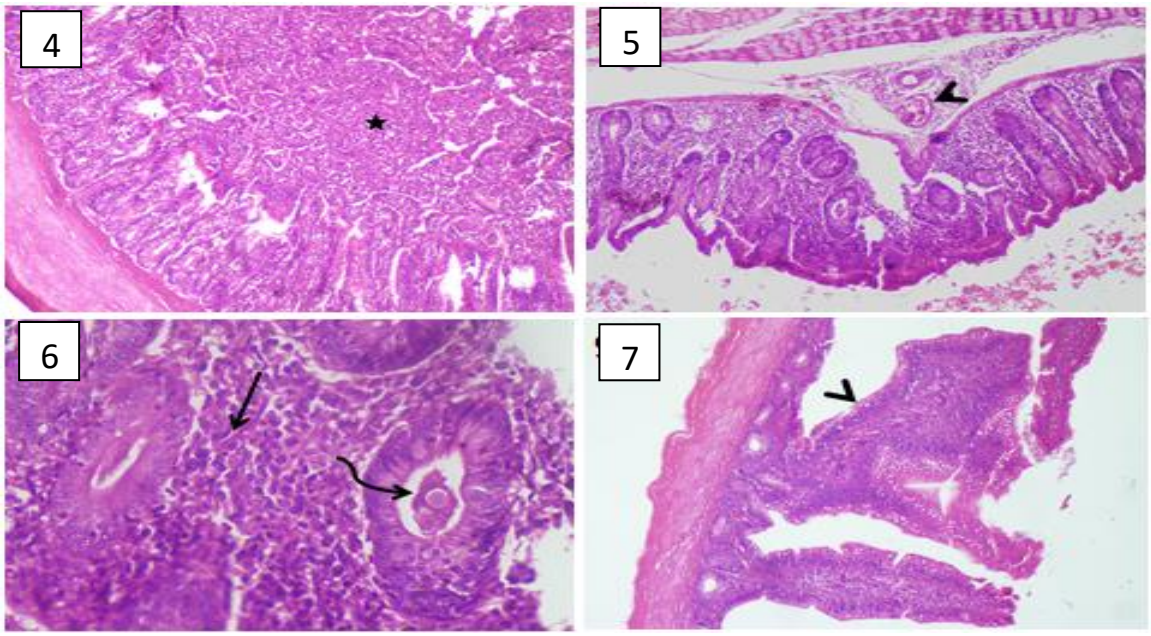

Plate (III) : cecum of turkey naturally infected with *E. meleagrimitis* showing:

Fig.(4): Plugging of lumen with necrotic debris, inflammatory cells, fibrin admixed with sloughed epithelial cells (star). H&Ex100.

Fig. (5): Congested blood vessels (arrow head). H&E x100.

Fig.(6): Infiltrated lamina propria with few heterophils and lymphocytes (arrow) and presence of developmental stages of *Eimeria* (curved arrow) H&E x400

Fig.(7): Treated turkey with toltrazuril with normal histological structures of mucosa (arrow), lamina propria, submucosa and muscular layer. H&Ex100,

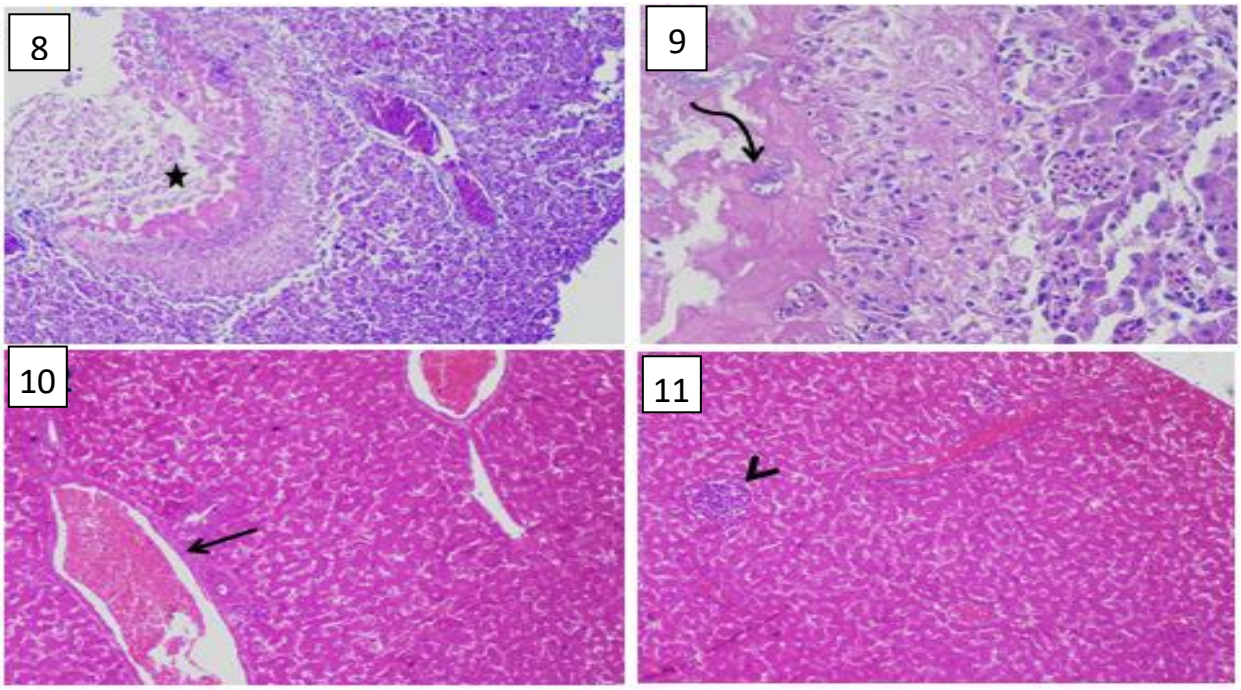

Plate (IV): Photomicrograph of turkey liver naturally infected with *Tritrichomonas eberthi* showing:

Fig.(8): Multifocal to coalescing areas of caseous necrosis (star). H&E x100.

Fig.(9): Round to pleomorphic basophilic organisms (curved arrow). H&E x400.

Fig.(10): Congested hepatic blood vessels (arrow). H&E x100.

Fig.(11): Interstitial round cells infiltration (arrow head). H&E x100.

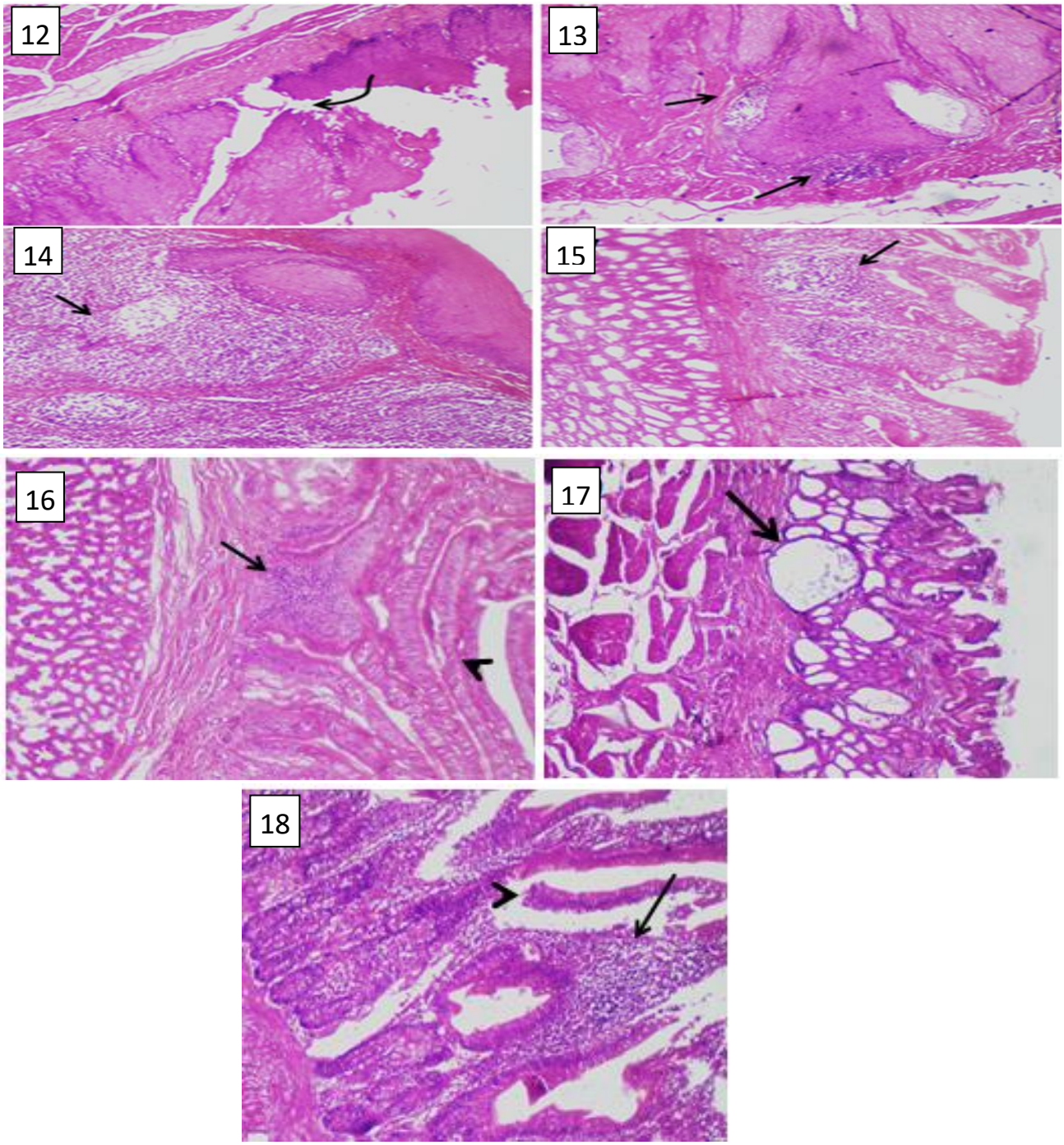

Plate (V): Photomicrograph of turkey naturally infected with Trichomoniasis showing:

Fig. (12, 13, 14): Crop mucosa with eroded epithelium and replaced by eosinophilic cellular and karyorrhectic debris (lytic necrosis) (curved arrow) in addition to inflammatory cells infiltration mainly lymphocytes within lamina propria (arrow), H&E x100.

Fig.(15,16): Proventriculus with mononuclear cells infiltration within lamina propria (arrow) and hyperplastic epithelial lining (arrow head). H&E x100,

Fig. (17): Gizzard with cystic cavitations of mucosal glands (arrow). H&E x100,

Fig.(18): Intestine with desquamated epithelium (arrow head), necrotic some epithelial lining (curved arrow) and inflammatory cells infiltration within lamina propria and submucosa (arrow). H&E x100

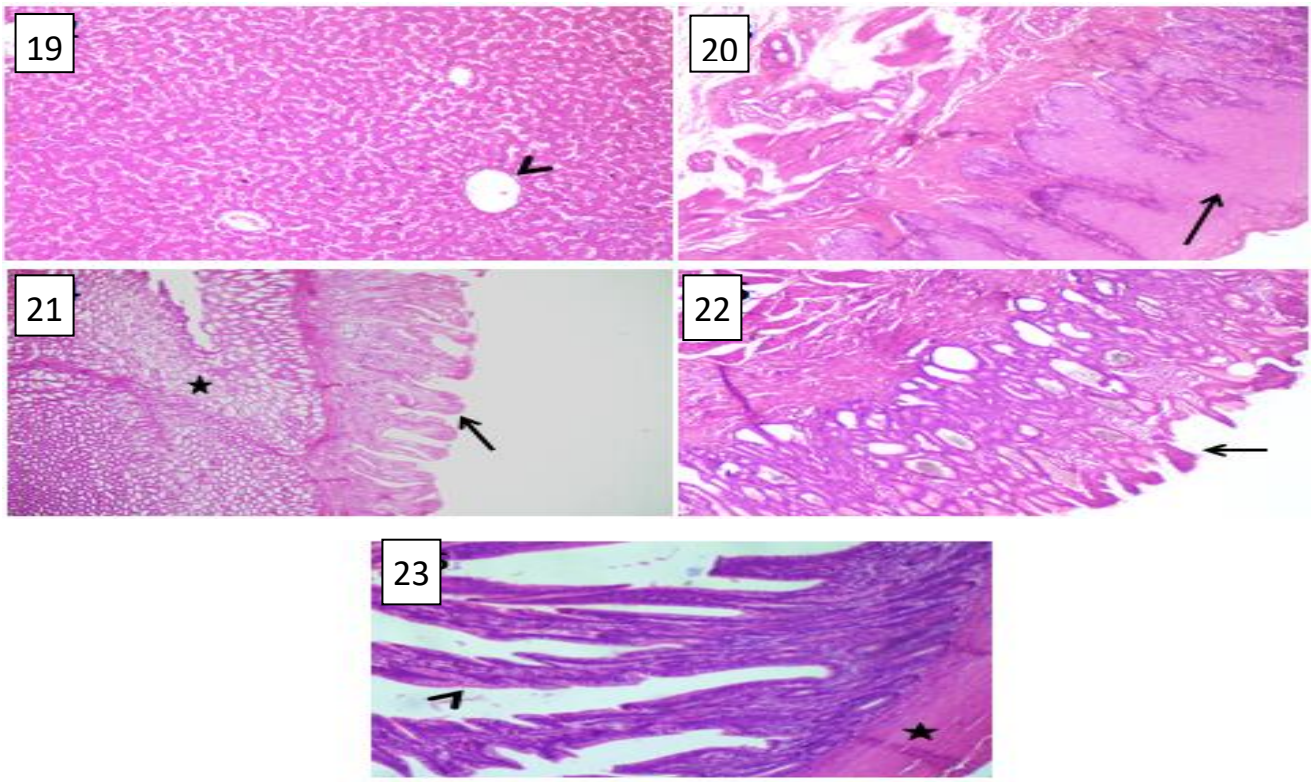

Plate (VI): Photomicrograph of Treated turkey with metronidazole showing:

Fig.(19): Liver with normal hepatic parenchyma and central vein (arrow head). H&E x100,

Fig.(20): Crop with apparently normal cornified stratified squamous epithelium (arrow), lamina propria, muscularis mucosae *T.* submucosa , *T.* muscularis.. H&E x100,

Fig.(21): Proventriculus with normal epithelial lining (arrow) and proventricular glands (star). H&E x100,

Fig.(22): Gizzard with normal epithelial lining (arrow) and muscular layers (star). H&E x100,

Fig.(23): Intestine with normal epithelial lining (arrow head), submuosa, muscularis and serosa post treatment. H&E x100,

DISCUSSION

The current study revealed that the prevalence of single infections of *A. galli, E meleagrimitis* and *T eberthi* in diseased turkeys was 31.82%, 40.91% and 27.27%, respectively. The same prevalence of *A. galli* in turkey farms were reported 29.98% by **Sarah, et al. (2011)** in Egypt. In addition, similar prevalence of *E. meleagrimitis* (41.45%) was recorded by **Rachel and John (2019)** in turkey across Canada. Nearly same prevalence of trichomoniasis (30.17) in turkeys in Sharkia province (**El-Sayed, et al. 2005)**

Infested turkeys with *A. galli* treated with flubendazole revealed significant reduction in *A. galli* egg output and complete disappearance at 20 day post treatment. Flubendazole eradicated all stages of *A. galli*. The obtained results in this study are agreed with **Jiang and Li, (1985)** who stated that flubendazole is effectiveness 100% against *A. galli* in turkeys**.** Flubendazole achieved overall efficacy of 99.4% for *A. galli* in chickens **(Sarah, et al 2011)**. Flubendazole was effective for removal of *A. galli* **(Squires, et al.2012)** in chickens and **Tarbiat, et al. (2016)** in laying hens**.**

Infected turkeys with *E. meleagrimitis* treated with toltrazuril revealed disappearance of oocyst output at 10th day post treatment (table, 3). Same results was recorded by **Greuel, et al. (1991)** stated that toltrazuril-treated caged turkeys revealed complete disappearance of oocysts at 8th day post treatment. Also, **Greg, et al. (2004)** reported that **t**oltrazuril induced disappearance of *E. meleagrimitis* oocyst. Toltrazuril have a broad spectrum of efficacy against *E meleagrimitis* **(Chapman 2008).** Toltrazuril have a broad spectrum of efficacy aganist may types of *Eimeria* species **(Rehab, 2017)**

Turkey suffering from Trichomonasis treated with metronidazole revealed disappearance of infestation at 10th day post treatment (table, 3). These results were in agreement with **Aydın, et al. (2000)** who stated that metronidazole is a powerful against *Trichomonas*. Metronidazoles induced disappear of Trichomoniasis at 7th day post treatment in Pigeons **(Abd El-Rahman, et al 2008)**. Metronidazole is effective (100%) against trichomonas gallinae (**Biswas, et al. 2010)** in pigeon and **Mirzaei, et al. (2016)** in infested turkeys.

The effect of *A. galli* infestation in turkeys and treatment with flubendazole (table, 4). showed birds infested with *A. galli* revealed a significant decrease in RBCs and Hb coupled with leucocytosis, lymphocytosis, heterophilia, eosinophilia, basophilia, and monocytosis. Our results corresponded with those of **Saeed et al (2009)** which reported that parasite infestation can cause blood loss and lead to anemia in birds. Reduction in RBCs and Hb in infested birds is due to the activities of larval stage of *A.galli* which penetrate and destruct the mucosa of small intestine and lead to rupture of blood vessels **(Matta and Ahluwalia, 1982)**. Similar results were reported by **Deka and Borah. (2008), Al-Daraji and. Al-Amery (2013) and Akter et al, (2016).** Treatment of infested birds with flubendazole resulted in improving blood picture. The obtained results in accordance with **Squires et al (2012)** and **Tarbiat et al (2016)** which stated that flubendazole is effective against all internal stages of *A. galli* in laying hens.

Concerning to the effect of *E. meleagrimitis* on blood picture in turkey (table 4), infested non-treated turkeys showed decrease in RBCs, Hb, beside increase in WBCs, lymphocyte, heterophil, eosinophil and basophil, our results agreed with those of **Razzaq et al. (2003), patra et al. (2010), Adamu et al (2013) and Melkamu et al (2018)** .This reduction in blood picture may be due to hemorrhage caused by the disease or severe bleeding and tissue damage in mucosal surface of intestine occurred at acute stage of infestation; while the elevation of WBCs could be due to increase in heterophil and eosinophil. **Wakenell (2010)** mentioned that heterophils infiltration increase immediately after infection as a first defense mechanism followed by increase in eosinophil concentration as a response to parasitic infestation. In our study a significant increase in RBCs and Hb beside decrease in WBCs, lymphocytes, heterophil, eosinophil and basophil in toltrazuril treated turkeys, our results

coincided with those obtained by **Rehab, (2017)**, Moreover **Sokoł et al (2014)** reported that toltrazuril was effective in treatment of coccidiosis in Japanese quails.

In the present study birds infested with *T. eberthi* and non-treated revealed macrocytic hypochromic anemia (decrease in RBCs and Hb) in addition to leucocytosis, lymphocytosis, heterophilia, eosinophilia, basophilia, and monocytosis) as shown in (table 4). Our results in accordance with **El-Sayed (2005) and Seddiek et al (2014).** Treatment of infested birds with metronidazole revealed a significant improvement in hematological parameters. Our results agreed with thos of **Abd El-Motelib and Galal (1993), Aydin et al (2000) and Seddiek et al (2014)**. Moreover **Abd El-Rahman et al (2008)** reported that metronidazole effective for treatment of *Trichomoniasis* in naturally infected pigeons.

In the present study birds infested with *A. galli*, *E. meleagrimitis* and *T. eberthi* evoked a significant decrease in serum iron, calcium, sodium and potassium level (table 5) our results agreed with **Anwar and Rahman (2002), Vijay, et al (2010) and Abd El-Maksoud et al (2014)**.Treatment of infested birds with flubendazole, toltrazuril and metronidazole improve serum iron, calcium, sodium and potassium.

Ascaridia galli infestation in turkeys showed pathological lesion as inflammatory cells infiltration within lamina propria, necrotic epithelial lining with exposing lamina propria. Flubendazole revealed reepithelilzation of necrotic epithelium. Same lesion was observed by **(Rajinder, et al. 2016)** in poultry infected with *A. galli*. Flubendazole is effective in treatment of *A. galli* leading to disappear paraite and so intestine lestion disappeared and intestine return to its normal state **(Squires , et al. 2012).** Flubendazole is highly effective against all developmental stages of *A. galli* in laying hens and death of *A. galli* and disappear intestine lestion **(Tarbiat et al. 2016).**

Turkey infected with E. meleagrimitis showed many lesions in intestinal lumen with necrotic debris, inflammatory cells with sloughed epithelial cells, congested blood vessels and presence of developmental stages of Eimeria species but treated turkeys with toltrazuril showed normal histological structures of intestinal mucosa, lamina propria, and submucosa. Coccidia of turkeys induce many lesions represented by petechiae, thickening of wall and a large amount of mucus in duodenum and jejunum, as well as watery contents in ileum **(Vrba and Pakandl, 2014)**. Same lesions were observed by **Ujvala, et al. (2019)** in turkey infected with *E. meleagrimitis*. Improvement in intestinal coccidial lesion were observed post treatment of Turkey Coccidiosis with Toltrazuril **(Greuel, et al. 1991)**.

Trichomoniasis in turkey showed eroded epithelium of crop, Proventriculu, gizzard and intestinal mucosa in addition to inflammatory cells infiltration in lamina propria. Proventriculus with mononuclear cells infiltration within lamina propria and hyperplastic epithelial lining. Trichomoniasis lives in the bird's anterior

digestive tract, where they can cause granulomatous lesions in oral cavity and oesophagic lumen (**Narcisi et al. 1991**). Similar signs were reported by **Mohamed, et al. (2009)** and **Borji, et al. (2011)** on pigeon infected with trichomoniasis. Similar lesions were reported by **Hafidh and Aws (2011)** who mentioned that trichomoniasis infections induced inflammatory, ulcerative, and necrotic in oral cavity, esophagus, crop and proventriculus. Similar signs were reported by **Hebat-Allah and Abd-ElMotelib (2007).**

Treated trichomoniasis with metronidazole led to improve in clinical signs with decreased mortality rate pot treatment. Same observation was observed by **Mohammad, et al. (2016)** who reported that pigeons and turkey suffering from trichomoniasis and treatment by metronidazole in drinking water revealed absence of all clinical signs and pathological leion.

It could be concluded that the infected turkey poults with *A. galli*, *E. meleagrimitis* and *T. eberthi* showed the change in blood picture and some mineral as well as pathological changes but flubendazol, metronidazole and toltrazuril act as antiparasitic drugs that improved these hematobiochemical parameters and pathological picture.

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الملخص العربي

استبيان عن طفيليات القناة الهضمية فى بعض مزارع الرومى مع محاولة العلاج

مرفت عبد البديع ايوب[1], سامى شوقى محمد[2], سناء محمد سالم[1], هبه أحمد محمد احمد عويس[1], هند محمد مجاهد[3]
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أقسام (الباثولوجى[1] , الطفيليات[2] والكيمياء [3])

تم تجميع مائة عينة براز ومسحة فموية ومسحات من أمعاء الطيور النافقة (80 طائر رومي مريض و 20 طائر سليم ظاهرياً) من مزارع خاصة ، 25 من كل مزرعة ، (20 طائر مريض و 5 سليم). أظهر الفحص الطفيلي أن نسبة الإصابة بين الطيور المريضة كانت 40٪ (32 من 80) و 55٪ (11 من 20) بين الطيور السليمة. كانت الإصابات الفردية والمختلطة 68.75٪ و 31.25٪ و 45.45٪ و 54.55٪ في الطيور المريضة والسليمة على التوالي.

كانت الاسكاريديا جالى و الايميريا مليجريميتس والترايترايكومونس إيبرثى هي الطفيليات الداخلية التي تم تحديدها والتعرف عليها في هذه الدراسة. وتعاني الطيور المصابة بهذه الطفيليات من انخفاض معنوي في مستويات كرات الدم الحمراء ، والهيموجلوبين ، والحديد في السيرم ، والكالسيوم ، والصوديوم ، والبوتاسيوم إلى جانب زيادة عدد كرات الدم البيضاء ، الخلايا اليمفاوية ، خلايا الهيتروفيل ، الخلايا الحامضية ، الخلايا القاعدية ، الخلايا الملتهمة الكبيرة وكثرة المونوسايتس (monocytes) وذلك مقارنة بمجموعة الطيور السليمة. كما تم الكشف عن العديد من الآفات والتغيرات المرضية (pathological lesions) في الجهاز الهضمي.وعقارات فلوبندازول ، تولترازوريل وميترونيدازول هي الأدوية التي لها فعالية 100٪ ضد تلك الطفيليات المذكورة وبالتالي تحسن الصورة الدموية والمعدنية وكذلك الآفات المرضية.