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Short note [Nota corta]

HEXAMITIASIS (*Hexamita eleagridis*) IN TURKEY COMMERCIAL FARMS IN YUCATÁN, MÉXICO

[HEXAMITIASIS (*Hexamita eleagridis*) EN GRANJAS COMERCIALES DE PAVOS DE YUCATÁN, MÉXICO]

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SUMMARY

The objective of the study was to estimate the prevalence and to describe the lesions and signs found in an outbreak of *Hexamita meleagridis* in three turkey farms in Yucatan, Mexico. Three hundred randomly selected, turkeys were sacrificed and their intestines explored for lesions associated with *H. Meleagridis* infection. Also, gut content, feces samples and fresh intestine smears were taken to determine the presence of *H. Meleagridis* parasites. Macroscopic lesions such as the presence of congested areas, and watery and foamy content in duodenum, presence of gases, fetid odor and the presence of watery and yellowish feces in the caeca were identified. The overall prevalence of *H. Meleagridis* was 25.3% and there was not association of the parasite with sex, age or farm. However, the thickening of some sections of the duodenum (52.3%), the presence of congested areas (23%), the watery and yellowish content of the duodenum (24.3%), the presence of gas (21.0%), fetid odor of the content (22.3%), and the watery and yellowish feces of the caeca (20.0%) were associated with *H. meleagridis* Presence of *H. meleagridis* in those farms was confirmed. Diarrhea signs and intestine lesions observed in the sacrificed turkeys were associated to hexamitiasis infection. Sex, age and farm were not associated with the presence of *H. meleagridis*.

Key words: Turkeys; *Hexamita meleagridis*; diarrhea; intestine lesions.

RESUMEN

El objetivo de este trabajo fue el de estimar la prevalencia y describir las lesiones encontradas en pavos durante un brote de *Hexamita meleagridis*, en tres granjas de Yucatán, México. Trecientos pavos seleccionados al azar fueron sacrificados y sus intestinos fueron estudiados para identificar lesiones asociadas con *H. Meleagridis*. También se obtuvieron muestras del contenido intestinal, de las heces y frotis frescos de la pared intestinal para determinar la presencia de *H. Meleagridis*. Se identificaron lesiones macroscópicas como la presencia de áreas congestionadas, contenido duodenal acuoso y espumoso, presencia de gas, olor fétido y la presencia de heces acuosas y amarillentas en los ciegos. La prevalencia de *H. Meleagridis* fue de 25.3% y no estuvo asociada la presencia del parasito con el sexo y edad de los pavos, o la granja de origen. Sin embargo, el grosor de algunas secciones del duodeno (52.3%), la presencia de áreas congestionadas (23.0%), el contenido acuosos y amarillento de el duodeno (24.3%), la presencia de gas (21.0%), olor fétido del contenido (22.3%) y el contenido acuoso y amarillento de las heces de los ciegos (20.0%) fueron atribuibles a la presencia de *H. Meleagridis*. La presencia de *H. Meleagridis* en las granjas estudiadas fue confirmada. Los signos de diarrea y las lesiones intestinales observadas en los pavos sacrificados se asociaron con una infección por *H. Meleagridis*. El sexo y edad de los pavos y la granja de origen no se relacionaron con la presencia de *H. Meleagridis*

Palabras clave: pavos; *Hexamita Meleagridis*; diarrea; lesiones intestinales.

INTRODUCTION

Turkey production is a very important activity in Mexico, the state of Yucatan being the first producer at Mexican national level. Health problems are the main factors producing losses in the turkey production specially those under intensive production systems. Among the diseases that are worth

mentioning some are in the digestive tract, which cause poor use of nutrients and in consequence, poor body weight gain, and also mortality.

Hexamitiasis is an acute infectious disease of young turkeys and other birds such as quail, chukar partridges, pigeons and pheasants (Cooper *et al.* 2004;Wood and Smith, 2005; McDougald, 2008).

Hexamitiasis, in turkeys, is caused by the flagellated protozoan parasite *Hexamita meleagridis* (Dezfoulain *et al.* 2010). Flagellated protozoan parasites could be found in the lumen of the duodenum and jejunum and in the intestinal crypt (Cooper *et al.* 2004; Lloyd et al., 2005). In parrots the protozoa has been detected histologically in crypts of Lieberkühn in the intestine in association with exudation of mucus (catarrhal enteritis) or lymphoplasmacytic enteritis (Philbey *et al.* 2002).

The disease affects young turkeys and results in diarrhea, listlessness, depression, emaciation and high morbidity and mortality (Swarbrick, 1990; Cooper *et al*. 2004; Lloyd *et al.* 2005; Lloyd and Gibson, 2006). This disease is found primarily in turkeys at age of 2 to 5 weeks (Stolkov, 1985). However, resistance develops rapidly with increasing age, regardless of previous exposure. Those recovered birds become carriers (Swarbrick, 1990; McDougald, 2008).

Symptoms are easy to confuse with those cause by other pathogens, making difficult it diagnosis under field conditions and the failure of control measures. A definite diagnosis cannot be made unless typical flagellated organisms can be detected in intestinal contents of the duodenum (Stolkov, 1985).

Although Hexamitiasis has been reported in many countries (Dezfoulian *et al.* 2010) information about it in Mexico is scarce, being this of the non-documented type. By the best knowledge of the authors this is the first report of *Hexamita* infection in turkeys in Mexico.

The objective of this study was to estimate the prevalence and describe the sings and lesions associated with an outbreak of *H. meleagridis* in three turkey farms in Yucatan, Mexico.

MATERIALS AND METHODS

Because of diarrheic symptoms, together with weight loss and mortality higher than normal had been reported from local farms in Yucatan, Mexico, a sample of 300 turkeys, from 6 to 14 weeks of age, was taken in order to detect the presence of *H. meleagridis.* Turkeys were from the Hybrid Company with weights between 7 and 15 kg. Turkeys were randomly selected in the months of October, November and December of 2009 in three commercial farms (100 turkeys in each farm). The farms were located around Merida city, Mexico. The climate of the region is tropical subhumid (Aw_0) with average temperature of 26.1 °C, and summer rainfall (Duch, 1991). During the time of the study, the highest temperature and rainfall was reported for September (33 ºC and 150 mm). Rainfall for the months of October and November were 94 and 43 mm, respectively.

Turkeys sampled were sacrificed and intestinal collected for *H. meleagridis* identification. *Hexamita meleagridis* was identified taken fresh smears of the intestine (Rodríguez Vivas and Cob-Galera, 2005). Duodenum and ceacal sections of the intestine were obtained immediately after the animals were sacrificed. Samples of the duodenum and ceacal content were taken. The samples were collected in Petri boxes and mixed with the help of a wood applicator. Afterwards a droplet of the mix was put in a glass slide, being added a drop of distillated water and cover with a coverlid. The sample was observed under a compose microscope at 10x and 40x to identify the protozoa. The signs of diarrhea identified in the intestine where those, which suggested the presence of *H. meleagridis* such as the presences of gas, fetid smell, watery and yellowish feces and lesions associated to *H. meleagridis*as thickening and congested areas (Soulsby, 1987).

A case was defined as an animal with at least one parasite detected under the microscope. The risk factors studied were sex (female, male), age (6 and 14 weeks), farm (1, 2 and 3) and lesions associated to inflammation of the duodenum tissue (thickening and congested areas), signs of diarrhea (watery and yellowish content, watery and foamy content), and signs of diarrhea in caeca (gas presence, fetid odor, watery and yellowish content). To determine the association of the risk factors with *H.meleagridis* Chi-square tests were used. Also, odd ratios and 95% confidence intervals were calculated.

RESULTS

The prevalence of *H. meleagridis* considering the lesions and signs of diarrhea in duodenum and caeca was 25.3%. The prevalence of positive animals in duodenum, caeca or both were 6.0, 9.3 and 10.0%, respectively. The frequency of lesions and their location in the gut of turkeys are presented in Table 1. The main lesion was the focused thickening of the duodenum (52.3%), follow by the presence of watery and foamy content (24.3%) and the presence of congested areas (23.0%). With respect to the caeca, the main signs of diarrhea observed were the fetid odor of the content (22.3%), the presence of gas

(21.0%) and the presence of watery and yellowish feces (20.0%). Risk factor results are presented in Table 2. There was found no association of the presence of *H. meleagridis* with sex and age of the bird and farm. However, it was found association with type of lesions.

DISCUSSION

This is the first report of the presence of *H. Meleagridis* in turkey commercial farms in Yucatán, México. The prevalence here obtained (25.3%) is higher than that reported by Dezfoulian *et al.* (2010) in native turkey poults in Iran. Usually, regions with 80% or higher humidity as Yucatan are normally associated with higher presentation of the parasite. Therefore, this parasite infection could be more relevant in tropical regions.

Table 1. Frequency of lesions and signs of diarrhoea found in 300 turkeys from three farms in the state of Yucatan, Mexico sampled to detect the presence of *H. meleagridis*.

Lesion	N	Frequency
Focused thickening in the duodenum	157	52.3%
Presence of congested zones in duodenum	69	23.0%
Watery and foamy content in the duodenum	73	24.3%
Presence of gas in the caeca	63	21.0%
Fetid odor of the caecal content	67	22.3%
Watery and yellowish feces in the caeca	60	20.0%

Table 2. Risk factors associated with the presence of *H.* melea*gridis* in three commercial turkey farms in Yucatan, Mexico.

Variable	N	Positive	Frequency	Probability	OR	95% CI
Sex						
Male	74	14	18.9	----	1	----
Female	226	62	27.4	0.144	1.62	0.84-3.11
Age						
<6 weeks	230	56	11.3		1	
>6 weeks	70	20	28.5	0.506	1.24	0.68-2.27
Farm						
1	150	36	24.2		1.01	0.53-1.92
2	70	21	30.0		1.38	0.66-2.86
3	80	19	23.8	0.600	1	
Focused thickening in the duodenum						
Negative	143	29	20.3		1	
Positive	157	47	29.9	0.055	1.68	0.98-2.86
Presence of congested areas in the duodenum						
Negative	242	35	14.5		1	
Positive	58	41	70.7	0.000	14.26	7.28-27.9
Watery and foamy content in the duodenum						
Negative	231	38	16.5		1	
Positive	59	38	64.4	0.000	1.82	1.52-2.13
Presence of gases in caeca						
Negative	237	20	8.4			
Positive	63	56	88.9	0.000	4.46	4.00-4.14
Fetid odor of the caecal content						
Negative	233	20	9.01			
Positive	67	56	82.1	0.000	3.83	3.44-4.14
Watery and yellowish feces in the caeca						
Negative	240	21	8.8			
Positive	60	55	91.7	0.000	4.74	4.22-4.10

OR = odd ratios; IC = Confidence interval.

The presence of *H.meleagridis* in duodenum and caeca agrees with Cooper et al., (2004); Stolkov, (1985); Philbey et al., (2002) and Dzfoulian *et al*. (2010), who mention that this parasite is mainly found in the duodenum and the caeca. The duodenum is an important part of the gut because nutrient digestion and absorption is carrying out mainly in it. Lloyd *et al.* (2005) reported that the presence of high levels of *H. Meleagridis* in the small intestine was associated with considerable reduction in intestinal absorption in tissues from pheasants and partridges. Thus, *H. Meleagridis* cause that the affected turkeys do not reach the expected body weights and they become carriers and shedders of encysted hexamitas parasites (Cordero del Campillo and Rojo, 1999).

In despite that *H.meleagridis* parasites have found regularly in duodenum and jejunum (Cooper *et al.* 2004; Lloyd *et al.* 2005), in this report it was more frequently found in the caeca probably because most of the turkey sampled had already curse the disease, acting as asymptomatic carriers. According to Cordero del Campillo andRojo (1999) a big number of *H. Meleagridis* persist in the lower parts of the intestine. However, there was not found association between age and the presence of *H. meleagridis.*

The different types of lesions found in this study were associated to the presence of *H. meleagridis.* Also the odds of finding congested areas in the duodenum of positive birds were 14.3 times more frequent. According to Trigo-Tavera (2004) one of the main lesions caused by *H. Meleagridis* is catarrhal enteritis with a lack of intestinal tone of the duodenum. The watery intestinal content is yellow due to a decrease of bile secretion by the biliary vesicle. The reddish of the mucosal due to hyperemia microscopically characterizes this pathological process of the intestine. However, Hussain (2001) reported no evidence of intestinal pathology related to presence of inflammation, ulceration or villus atrophy in pheasants infected with hexamitas.

With respect to the presence of diarrhea in the cecum, probably the gas is produced as a result of fermentation and the fetid odor as result of the decomposition of the proteins in the feces. On the other hand, the watery aspect of the feces suggests an increase of secretions and a decrement of absorption (Lloyd *et al.* 2005).

The prevalence of *H. meleagridis* in the commercial turkeys was relatively high (25.3%). Sex, age and farm were not associated with the presence of *H. meleagridis*. Lesions in duodenum, such as congested and thickening areas, and signs of diarrhea such as watery and foamy content with presence of gases, fetid odor of the content, watery and yellowish feces in the caeca were associated with the presence of *H. meleagridis.*

Due to scarce reports of infection by *H. Melagridis* in Mexico and particularly in Peninsula of Yucatan, this study may facilitate diagnosis of field cases. Further research on the occurrence of *H. melagridis* in turkey flocks may elucidate the source of *H. melagridis* disease outbreaks. Also, research on related risk factors may contribute to knowledge of the disease and may enable the development of control actions to reduce *H. Meleagridis* associated growth depression and mortality.

CONCLUSION

The diarrhea signs observed and the intestine lesions identified at necropsy in the sacrificed turkeys were associated to hexamita parasite observed in the laboratory, in the coproparasitological studies. Sex, age and farm did not influence on the presence of *H. meleagridis* in the turkeys.

REFERENCES

Cooper, G.L., Charlton B.R., Bidford A.A., Nordhausen R. 2004. *Hexamitameleagridis* (*Spironucleusmeleagridis*) infection in Chucker patridges associated with high mortality and intracellular trophozoites. Avian Dis. 48:706-707.

Cordero del Campillo, M., Rojo V.1999. Parasitología veterinaria. McGraw-Hill-Interamericana. Madrid, España. p. 777-779

Dezfoulian O., Gharagozlou M.J., Rahbari S. 2010. *Hexamita*infection associated with diarrhoea and stunting in native turkey poults. Trop Biomed. **27**, 504-508.

Duch, G.J. 1991. Fisiografía del estado de Yucatán.Universidad Autónoma de Chapingo. México DF. p. 120-210.

Hussain, A.Z. 2001. Morphometric evaluation of the small intestines and caeca of pheasants infected with Hexamita and Trichomonas species. Vet Rec. 148: 484-485.

Lloyd, S., Irvine, K.L., Eves S.M., Gibson J.S. 2005. Fluid absorption in the small intestine of healthy game birds and those infected with Spironucleus spp. Avian Pathol. 34: 252-257.

Lloyd, S., Gibson, J.S. 2006. Haematology and biochemistry in healthy young pheasants and red-legged partridges and effects of spironucleosis on these parameters. Avian Pathol. 35:335-340.

McDougald, L.R. 2008. Histomoniasis (Blackhead) and other protozoan diseases of intestinal tract. In: Safe YM, Fadly AM, Gilson JR. editors. Diseases of Poultry. 12th ed. Blackwell Publishing. USA.p.1103-1105

Philbey A.W., Andrew, P.L., Gestier, A.W., Reec R.L., Arzey, K.E. 2002. Spironucleosis in Australian king parrots (*Alisterusscapularis*). Aus Vet J. 80:154-160.

Rodríguez-Vivas, R., Cob-Gallera L. 2005. Técnicas diagnósticas en parasitología veterinaria,2nd ed. UADY. Mérida, Yucatán. México. p. 39-41

Soulsby, E.J.L. 1987. Parasitologia y enfermedades parasitarias de los animales domésticos.7th ed. Interamericana. México. p. 583.

Stolkov, D. 1985. The isolation of *Hexamita meleagridis* in Bulgaria. Veterinarno Meditsinski Nauki. 224: 44-50.

Swarbrick, O. 1990 Hexamitiasis and emaciation syndrome in pheasant poults: Clinical aspects and differential diagnosis. Vet Rec. 126: 265-267.

Trigo-Tavera J. 2004. Patología general veterinaria.4th ed, UNAM. México. p. 29-32.

Wood, A.M., Smith, H.V. 2005. Spironucleosis (Hexamitiasis, Hexamitosis) in the ring-necked pheasant (*Phasianuscolchicus*): detection of cysts and description of Spironucleus meleagridis in stained smears. Avian Dis. 49:138-143.

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