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A Review on Poultry Coccidiosis

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A B S T R A C T

Coccidiosis is a importance disease in poultry production. The protozoan parasites of the genus *Eimeria* multiply in the intestinal tract and cause tissue damage, with resulting in haemorrhagic enteritis, loss of blood and death. This paper gives a glimpse on the brief review on epidemiology, transmission, clinical signs, diagnosis, control and economic losses due to coccidiosis in poultry.

Coccidiosis

Definition

Coccidiosis is a disease of universal importance in poultry production.

The protozoan parasites of the genus *Eimeria* multiply in the intestinal tract and cause tissue damage, with resulting interruption of feeding and digestive processes or nutrient absorption,

Dehydration, blood loss, loss of skin pigmentation and increased susceptibility to other infectious agents (McDougald and Fitz-Coy, 2008).

Distribution

Global scenario

Coccidiosis in poultry was reported in various continents and countries of the world including China (Sun *et al.*, 2009), Ethiopia (Gari *et al.*, 2008), Europe (Williams *et al.*, 1996), Netherlands (Graat *et al.*, 1988), North and South America (Mattiello *et al.*, 2000) and Turkey (Akcay *et al.*, 2011).

Indian Scenario

Coccidiosis is an old parasitic disease, prevalent all over the country and has a

significant impact on poultry production (Bera *et al.,* 2010). Overall prevalence of coccidiosis in Jammu region of India was of 39.58 per cent and five *Eimeria* species have been identified in this region were *E. tenella, E. necatrix, E. maxima, E. acervulina* and *E. mitis* (Sharma *et al.,* 2013).

Tamil Nadu

Aarthi *et al.,* (2010) reported that *E. acervulina, E. brunetti* and *E. necatrix* were the most preponderant species of *Eimeria* found in Tamil Nadu.

Various *Eimeria* species including *E. acervulina, E. brunetti, E. maxima, E. necatrix, E. mitis* were isolated from various parts of Tamil Nadu, including Coimbatore, Cuddalore, Madurai, Namakkal, Udumalpet, Tirupur in chicken and lesion scoring was used to assess virulence and pathogenicity (Raman *et al.,* 2011).

Epidemiology

Agent

Coccidiosis is an infectious disease caused by protozoan parasite of the genus *Eimeria* (Tyzzer, 1932). Coccidian are members of the phylum Apicomplexa, which is characterised by the presence of an apical complex in sporozoites. The most common apicomplexans in poultry belongs to the genus *Eimeria* (McDougald and Fitz-Coy, 2008). Seven *Eimeria* species, *E. acervulina, E. brunetti, E. maxima, E. mitis, E. necatrix, E.praecox* and *E. tenella* are now accepted (Shirley, 1986). *Eimeria tenella* and *E. necatrix* are the most pathogenic species, *E. acervulina, E. maxima* and *E. mivati* are common and slightly to moderately pathogenic, *E. brunetti* is uncommon but pathogenic when it does occur, *E. mitis, E. praecox* are relatively non-pathogenic species (Soulsby, 1982). Each species causes a separate disease, each exhibiting a characteristic degree of pathogenicity (Williams, 2005).

Host

Coccidiosis in chickens is caused by *E. acervulina, E. brunetti, E. maxima, E. mitis, E. mivati, E. praecox* and *E. tenella*. Chicken is the only natural host of these seven species of *Eimeria*. Reports of these species of *Eimeria* infecting other birds can be considered spurious. Cross-transmission of *Eimeria* spp. from chickens to other host species has been unsuccessful except for a few instances in which severely immunocompromised birds were used (McDougald and Fitz-Coy, 2008).

Epidemiological measures of causal association

Age and breed

Among commercial hybrids, layers are frequently more susceptible to coccidiosis than broilers but results vary (Williams and Catchpole, 2000). Coccidial pathogenicity is influenced by the bird of chicken, since differences in innate immunity occur (Smith *et al.,* 2002).

Maximum prevalence of coccidiosis in chicken was reported during 41-50 days of age (Amare *et al.,* 2012). Most of the *Eimeria* spp. affects birds between 3 and 18 weeks of age group (Sharma *et al.,* 2013).

Other predisposing factors

Higher crude protein levels increase coccidial pathogenicity (Sharma *et al.,* 1973) possibly because of increased tryptic activity in the host leads to more efficient excystation of oocysts in the intestine (Williams, 2005).

Eimeria tenella is more pathogenic in chickens fed wheat-based diets than those fed maize-based diets. Because wheat contains much higher amounts of soluble non-starch polysaccharides, which increases digesta viscosity, than does maize (Williams, 1992).

Immunosuppressive diseases such as MD (Rice and Reid, 1973) and IBD (McDougald *et al.*, 1980) are increasing susceptibility of chickens to coccidiosis.

Clinical signs

Unlike bacteria and viruses, which potentially multiply infinitely until checked by immune responses or host's death coccidian have a genetically fixed, self - limiting lifecycle (Tyzzer, 1929). The severity of coccidian infection depends on the age of birds, *Eimeria* species, number of sporulated oocysts ingested, immune status of the bird and environmental management (Hafez, 2008).

Coccidiosis in chicken is characterised by dysentery, enteritis, emaciation, drooping wings, poor growth, low production with high rate of mortality and morbidity (Awais *et al.*, 2012). Pathophysiological effects of coccidiosis including poor weight gain and poor feed conversion efficiency, reduced feed and water intake, intestinal malabsorption, reduced nutrient digestion, villous atrophy, increased intestinal passage time, intestinal leakage of plasma proteins and increased intestinal acidity (Willams, 2005).

Gross lesions

Clinically the infection can be recognized by the accumulation of blood in the caeca and bloody droppings (*E. tenella*), small white spots usually intermingled with rounded, bright or dull red spots of various size (*E. necatrix*), numerous array of whitish transverse patches in the upper half of the small intestine (*E. acervulina* and *E. mivati*) and there is a catarrhal enteritis and thickening of the intestinal wall and extensive coagulative necrosis and sloughing of the mucosa throughout the entire intestine (*E. brunetti*) (McDougald and Fitz-coy, 2008).

Diagnosis

Coccidiosis can be best diagnosed from birds sacrificed for immediate necropsy. Diagnosis was based on zone of intestine parasitized, gross appearance of lesion, oocysts morphology, location of parasite in the host intestinal epithelium (Conway and Mckenzie, 2007).

Microscopic examination

Diagnostic characteristics which are of value include the clusters of the large schizonts of *E. necatrix* and *E. tenella*, the small round oocysts of *E. mitis*, or the large gametocytes of *E. maxima*. Presence of clusters of large schizonts in the midgut area is pathognomonic for *E. necatrix*, and a similar findings in the ceca indicates *E. tenella*. Oocysts associated with lesions in the duodenum are *E. acervulina*, *E. mivati*, or *E. praecox*, and oocysts associated with lesions in the lower gut are *E. mitis*, *E. mivati* or *E. brunetti* (McDougald and Fitz-Coy, 2008).

Dropping score may be used in the same manner as lesion score for a rapid and fairly reliable rating of the infection (McDougald *et al.*, 1986). Species identification of coccidian is by morphological characteristics (Williams *et al.*, 1996). Polymerase chain reaction was also used for detection of coccidial infections and species identification (Haug *et al.*, 2008)

Economic losses

Coccidiosis remains one of the most expensive and common diseases of poultry

production. It costs chicken producers worldwide at least 3 million United States dollars annually (Dalloul and Lillehoj, 2006). Total loss due to coccidiosis in poultry in India has been found to be of Rs. 1.14 billion for the year 2003-04 (Bera *et al.,* 2010).

References

Aarthi, S., G. Dhinakar Raj, M. Raman, S. Gomathinayagam and K. Kumanan, 2010. Molecular prevalence and preponderance of *Eimeria* spp. among chickens in Tamil Nadu, India. *Parasitol. Res.*, 107: 1013-1017.

Akcay, A., O. Ertugrul, I.S. Gurcan and Z. Karaer, 2011. Quantification of risk factors of coccidiosis in broilers by using logistic regression analysis. *Ankara. Univ. Vet. Fak. Derg*., 58: 195-202.

Amare, A., A. Mengistu and S. Nazir, 2012. Prevalence and etiology of poultry coccidiosis and associated risk factors in White leghorn grower chickens at Kombolcha poultry farm, Ethiopia. J. World's Poult. Res., 2: 54-59.

Awais, M.M., M. Akhtar, Z. Iqbal, F. Muhammad and M.I. Anwar, 2012. Seasonal prevalence of coccidiosis in industrial broiler chickens in Faisalabad, Punjab, Pakistan. *Trop. Anim. Health Prod.,* 44: 323-328.

Bera, A.K., D. Bhattacharya, D. Pan, A. Dhara, S. Kumar and S.K. Das, 2010. Evaluation of economic losses due to coccidiosis in poultry industry in India. *Agricl. Eco. Res. Rev.,* 23: 91-96.

Conway, D.P. and M.E. Mckenzie, 2007. Poultry coccidiosis: Diagnostic and testing procedure. 3rd edn., Blackwell publishing Ltd., Oxford, UK. pp. 8.

Dalloul, R.A. and H.S. Lillehoj, 2006. Poultry coccidiosis: recent advancements in control measures and vaccine development. *Expert Rev. Vaccines*, 5: 143-63.

Gari, G., G. Tilahun and P. Dorchies, 2008. Study on poultry coccidiosis in Tiyo district, Arsi Zone, Ethiopia. *Int. J. Poult. Sci.*, 7: 251-256.

Graat, E.A., E. Van der Kooij, K. Frankena, A.M. Henken, J.F. Smeets and M.T. Hekerman, 1998. Quantifying risk factors of coccidiosis in broilers using onfarm data based on a veterinary practice. Prev. Vet. Med., 22: 297-308.

Hafez, H.M., 2008. Poultry coccidiosis: Prevention and control approaches. *Arch.Geflugelk*., 72: 2-7.

Haug, A., A.G. Gjevre, P. Thebo, J.G. Mattsson and M. Kaldhusdal, 2008. Coccidial infections in commercial broilers: epidemiological aspects and comparison of Eimeria species identification by morphometric and polymerase chain reaction. *Avian Pathol*., 37: 161-170.

Mattiello, R., J.D. Boviez and L.R. McDougald, 2000. *Eimeria brunetti* and *E. necatrix* in chickens of Argentina and confirmation of seven species of *Eimeria*. *Avian Dis.*, 44: 711-714.

McDougald, L.R. and S.H. Fitz-Coy, 2008. Coccidiosis, In: Saif, Y.M., A.M. Fadly, J.R. Glisson, L.R. McDougald, L.K.Nolan and D.E. Swayne, (ed.), Diseases of poultry, 12th edn., Blackwell publishing professional, Ames, Iowa, USA. pp. 1069-1085.

McDougald, L.R., A.L. Fuller and J. Solis, 1986. Drug sensitivity of 99 isolates of coccidia from broiler farms, *Avian Dis*., 30: 690-694.

McDougald, L.R., T. Karlsson and W.M. Reid, 1980. Interaction of infectious bursal disease and coccidiosis in layer replacement chickens. *Avian Dis.*, 24: 999-1005.

Raman, M., S.S. Banu, S. Gomathinayagam and G.D. Raj. 2011. Lesion scoring

technique for assessing the virulence and pathogenicity of Indian field isolates of avian *Eimeria* species. *Veterinarski Arhiv.*, 81: 259-271.

Rice, J.T. and W.M. Reid, 1973. Coccidiosis immunity following early and late exposure to Marek's disease. *Avian Dis.*, 36: 499-503.

Sharma, S., A. Iqbal, S. Azmi and H.A. Shah. 2013. Study of poultry coccidiosis in organized and backyard farms of Jammu region. *Vet.World.*, 6: 467-469, doi: 10.5455/vetworld, 2013, 467-469

Sharma, V.D., M.A. Fernando and J.D. Summers, 1973. The effect of dietary crude protein level on intestinal and cecal coccidiosis in chickens. *Canadian J. Comp. Med.*, 37: 195-199.

Shirley, M.W., 1986. New methods for identification of species and strains of Eimeria. In: L.R. McDougald, L.P. Joyner and P.L. Long (ed.), Research in Avian coccidiosis, University of Georgia, Athens. pp. 13-35.

Smith, A.L., P. Hesketh, A. Archer, M.W. Shirley, 2002. Antigenic diversity in *Eimeria* maxima and the influence of host genetics and immunization schedule on cross-protective immunity. *Infect. Immun.*, 70: 2472-2479.

Soulsby, E.J.L., 1982. Helminths, Arthropods and Protozoa of domesticated animals. 8th edn., English language book society and Baillere Tindal, London. pp. 809.

Sun, X.M., W. Pang, T. Jia, W.C. Yan, G. He, L.L. Hao, M. Bentueand, X. Suo, 2009. Prevalence of *Eimeria* species in broilers with subclinical signs from fifty farms. *Avian Dis.*, 53:301-305.

Tyzzer, E.E., 1929. Coccidiosis in gallinaceous birds. *American Journal of hygiene*, 10: 269-383.

Tyzzer, E.E., 1932. Criteria and methods in the investigation of avian coccidiosis. *J. Am. Vet. Med. Assoc*., 33: 747.

Willams, R.B., 2005. Intercurrent coccidiosis and necrotic enteritis of chickens: Rational, integrated disease management by maintenance of gut integrity. *Avian Pathol.*, 34: 159-180.

Williams, R.B. A.C. Bushell, J.M. Reperant, T.G. Doy, J.H. Morgan, M.W. Shirley, P. Yuore, M.M. Carr and Y.Fremont, 1996. A survey of *Eimeria* species in commercially reared chickens in France during 1994. *Avian Pathol.*, 25: 113-130.

Williams, R.B. and J. Catchpole, 2000. A new protocol for a challenge test to assess the efficacy of live anticoccidial vaccines for chickens. *Vaccine*, 18: 1178-1185.

Williams, R.B., 1992. Differences between the anticoccidial potencies of monensin in maize–based or wheat-based chicken diets. *Vet. Res. Commun.*, 16: 147-152.

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