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Emirian infection is great challenge to poultry industry in Aurangabad district of Maharashtra, India

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ABSTRACT

The present study showed that the broiler chicken in Aurangabad region of Maharashtra harboured 10 species of Eimeria these are, *Eimeria tenella*, *Eimeria necatrix*, *Eimeria brunetti*, *Eimeria acervulina*, *Eimeria maxima*, *Eimeria praecox*, *Eimeria mitis*, *Eimeria nikamae*, *Eimeria tarabaie*and*Eimeria shivpuri*.During the present study ten species of *Eimeria* are found in Broiler chicken. Seven species are already described and three are new species. The commonest was *Eimeria tenella*, it was found in 320 of 734 positive samples, showing a prevalence of 43.59% of the positive samples or 12.67% of the total samples examined. Followed by *Eimeria necatrix*, *Eimeria brunetti*, *Eimeria acervulina*, *Eimeria praecox*, *Eimeria maxima*, and *Eimeria mitis* .Seven species of genus Eimeria (E.) including *E. tenella*, *E. acervulina*, *E. maxima*, *E. necatrix*, *E. mitis*, *E. praecox* and *E. brunetti* are generally accepted to be the causative agent of avian coccidiosis. *E. tenella and E. maxima* are considered to be the most important to the poultry industry from consideration of their ubiquity in broiler chicks, innate pathogenicity and immunological features. In India *E. tenella* is the most prevalent and pathogenic species.Coccidiosis in chickens is generally classified as either intestinal or caecal. Most serious cases of intestinal coccidiosis in India are caused by *E. necatrix*. Caecalcoccidiosis is due to *E. tenella*. Coccidiosis occurs most frequently in young birds. Old birds are generally immune as a result of prior infection. Severe damage to the caeca and small intestine accompany the development of the coccidia. Broilers and layers are more commonly infected, but broiler breeders and turkey and pheasant poults are also affected.

Introduction

Coccidiosis in one of the major menace for poultry industry causes heavy economic losses worldwide. The disease is commonly called as Red Dysentery (Khunipachish). Coccidiosis may be Intestinal or caecal caused by intracellular protozoa, belonging to the genus Eimeria (Phylum Apicomplexa). The disease is characterized by bloody diarrhea, emaciation, ruffled feather and loss of appetite. More or less about 300 species of genus Eimeria has been known and recorded in birds and mammals. Coccidiosis is recognized as the parasitic disease that has the greatest economic impact on poultry production. Williams (1998) reported that the annual worldwide cost is estimated at about 800 million $ and that for American broiler industry about $ 45 million.

In countries like India, where the farming is substandard, the disease becomes more serious and causes heavy economic losses; although the exact losses due to coccidiosis in India are not known due to the lack of statistical indices but these will be definite in millions of rupees.

In India, more than 47.3 billion poultry eggs are produced per year, with per capita availability of 42 eggs. As per the estimates provided by the Food and Agriculture Organization (FAO) for 2007, the annual chicken meat production in India was around 2.2 million tonnes. The value of poultry exports was around Rs 441 crore during 2007-08 (Economic Survey, 2009).

Although coccidiosis is probably the most frequently reported disease of chickens worldwide (Biggs, 1982), there are considerable difficulties in arriving at a reliable figure for the specific financial losses. There are very few reports on the economic losses of Coccidiosis (Braunius, 1987; Graat, 1996 ;Oyekole, 1984). The calculation of economic losses by different country differs because of variability in factors included in the study, but no such estimates are available for India. .

The estimates include the costs of prophylactic in feed medication for broilers and broiler breeders, alternative treatments (e.g. with amprolium) if the medications fail, and losses due to mortality, morbidity, and poor feed conversion of birds that survive out breaks.

Lillehoj and Okamura (2003) reported that intestinal parasitism is a major stress factor that can lead to malnutrition and lowered performance.

Coccidiosis are ubiquitous, they are everywhere chickens are reared (traditional, industrial, label or organic/bio farms). Their survival is assured by a highly resistant form of transmission - the oocysts - which may survive for several months in the environment.Coccidia are obligatory parasite (sporozoa) belonging to the phylum of the Apicomplexa characterized by the presence of an apical complex in the free stages of the cycle (sporozoites and merozoites) which invade the epithelial cells.

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The disease is the result of a breakdown in the balance between:

1) The parasites: their number, their pathogenicity and their ability to promote immunity in the host.

2) The host: its susceptibility, including its protection by anticoccidials, and its ability to regenerate from the damage caused by the parasite. Chickens selected for their zootechnical performance are particularly sensitive to coccidia.

3) The environment: intensive rearing particularly predisposes conditions for coccidiosis.

Eimeria have a direct life cycle (only one host), are very specific to hosts, to sites of development (intestine) and to cell types (epithelial cells of the intestina villi or cells of the crypts). Nine species of *Eimeria* have been described in chickens; seven are currently recognized as valid:

Eimeria acervulina, Eimeria praecox, Eimeria maxima, Eimeria mitis, Eimeria necatrix, Eimeria tenella, Eimeria brunetti.

These seven species are specific to chickens and cannot infect other type of fowl or birds or mammals

They are distinguished by:

1. The morphology of their oocyst, the form of resistence and of dissemination of the parasite in the external environment.
2. Their intestinal location for endogenous development.
3. Their pathogenicy: characteristic intestinal lesions and type of diarrhea (e.g. with or without blood).

After an outbreak of a specific species of coccidian the flock will develop a resistance to the exposed coccidia species but remain resistant to other infective species. Although there may be some differences between poultry management systems regarding the degree of risk from coocidia, it is generally accepted that the disease may be found in most systems, both indoor and outdoor. Williams (1995) reported that oocysts sporulate readily in poultry house litter. However, they can be damaged by bacteria, other organisms, and ammonia that are also present, and their viability can begin to diminish after 3 weeks.

The major contribution in this field including those of Tyzzer (1927), Johnson (1929), Henry (1931), Fish (1931), Theiler (1932), Jones (1932), Venard (1933), Haase (1939), Walter, H. Pattillo (1958), S. A. Edgar(1955), Becker (1955), C. T. Seibold (1964), Pellerdy (1965), K. S. Hegde (1969), L. Renault (1969,70), L. P. Joyner (1974), P. L. Long (1974), M.D. Ruff (1981), P.S. Reyna (1982), L. R. McDougald (1986), Rose (1987), S. H. Fitz-coy (1988), A. Rotibi (1988), Martin W. Sherley (1989), Millard (1989), John, R. Barta (1997), M. Faeooq (2001), Anne Fanatico (2006) .

Contributions on coccidia in India are comparatively scattered and pertain mostly to areas in northern and eastern parts of the country. Though the earliest contribution in this area was made during the beginning of the century, the bulk of the publications have been made during the last fourty years, and these include work on coccidia of several vertebrate groups besides a few invertebrates.

Records of coccidia of fishes in India have been made by Halawani (1930a,b), Setna (1933), Setna and Bana (1935 a, b), Chakravarty and Kar (1944 a) and Chakravarty and Mandal (1961).

Coccidia have been described from amphibians in India by Ray (1935), Ray and Das Gupta (1935), Ray and Misra (1943) and Chakravarty and Kar (1944a).

Reptilian coccidia have been recorded by Setna and Bana (1935 a,b), Knowles and Das Gupta (1935), Ray and Das Gupta (1936 a,b),Bhatia (1936), Mitra and Das Gupta (1937), Das Gupta (1938), Chakravarty and Kar (1943, 48, 57), Ray and Raghavachari (1942), Ray, Raghavachari and Sapre (1942) and Mandal (1966).

Amongst mammals, coccidia of Sheep and Goat have been studied by Ray (1942), Ray (1952, 1961), Rao and Hiregaudar (1954), Singh (1963), Shah and Joshi (1963), Shivdas, Rajan and Nair (1965), Jha and Subramaniam (1966), Jha (1966), Bali (1972), Bhatia and Pande (1966, 67), Pande, Bhatia and Chauhan (1966), and Krishnamurthy and kshirsagar (1976). Coccidiosis in cattle have been studied by Pande, Bhatia and Chauhan (1971), Pande, Bhatia ,Chauhan and Garg (1968, 70), Patnaik and Pande (1965), Gill, Chabra and Lal (1963), Patnaik (1964), Shastri and Krishnamurthy (1974), Shastri, Krishnamurthy and Gafour (1974a,b), and Krishnamurthy and Shastri (1976). Contributions on the Coccidia of other mammals include those of Knowles and Das Gupta (1931, 34), Ray and Das Gupta (1935), Mandal and Ray (1960),Gill (1960,1968), Ray and Mandal (1962), Banik and Mukherjee (1965), Ray and Banik (1965), and Patnaik and Ray (1965).

Compared to the other vertebrate groups, relatively more work has been done on the coccidia of bird in India. Most of the work is however restricted to northern and eastern part of the country, particularly Uttar Pradesh and Bengal. As far as can be ascertained from the literature the first record of Eimerians from Indian Birds was made by Mitra and Das Gupta (1937) who described *E. Columbae* from the intestine of the pigeon. Kar (1944) described and Eimerian from the blue throated barbeta. Chakravarty and Kar (1944 a,b :1947) made the first major contribution on the coccidia of birds from Bengal covering observation on the life history of *I.lacazea* and the morphology of several species.

Misra (1944) recorded *Wenyonellabahli* from the quails in Lucknow, Uttar Pradesh. The same author in 1947 described three coccidian species from the intestine of the Wagtail, Motacillaalba while Ray (1945) described a species of *Wenyonella* from the gut of the domestic fowl, *Gallus gallus domestics*. Ray, Shivnani,oomen and Bhaskaran (1952) described coccidia of birds from Mukteshwar Uttar Pradesh. Ray and Hiregaudar(1959) studied the coccidia of some birds at the Culcutta Zoo, while Malhotra and ray (1961) described yet another species of Eimeria from Pigeon in Calcutta. Baink and Ray (1961, 64), Studies the Eimerian species from the Indian peacock in Calcutta .The first observations on the coccidia of the Indian duck was made by Dubey and Pande (1963).

Mandal (1975) made a review of the progress in the taxonomy of coccidia from India. Mandal (1970) reviewed the occurrence and distribution of avian coccidia in India, giving a classified list of 74 species of birds examined and the parasites found and a complete statement indicating the diagnostic characters of the 42 species of coccidia comprising of 19 species of Isospora, 1 species of tyzzeria, 3 species of Dorisiella, 16 species Eimeria and 3 species of Wenyonella. Mandal (1976) made a comprehensive review of the various species of coccidia described from Indian vertebrate and provided keys for the identification of the species. He stated that about 60 species of coccidia belonging to six genra have been recorded from Indian bird so far. Of these one species belongs to the genus Sivatoshella Ray and Sarkar (1968), two species to the Genus Tyzzeria Allen (1936), five Species to the genus Wenyonella

Hoare (1933), six species to the genus Dorisiella Ray (1930), 21 species to the genus Isospora Schneider (1881), and 24 species to the genus Eimeria Schneider (1875).

All the studies so far on the avian coccidia in India are thus restricted to the areas in Bengal and Uttar Pradesh. There is hardly any record of work in this field in other part of country. Recently Krishnamurthy and Bhosale (1976) gave preliminary report on incidence of avian coccidia in Maharashtra.

Discussion and results:

During our research we examine 2524 species in different seasons of year i.e. mansoon, winter, and summer season. A month wise analysis of the first year prevalence showed that maximum prevalence was during June 2006 (51.13%) followed by July, August, September, October, November, December, January, February (48.96%, 43.36%, 31.21%, 25.75%, 27.77%, 23.22%, 27.22%, 23.94% respectively). The lower prevalence was during, march, April and May (09.19%, 09.09%, 02.67% respectively).

A month wise analysis of the second year prevalence also showed that maximum, prevalence was during June 2007 (54.25%) followed by July, August, September, October, November, December, January, February, March (i.e. 43.01%, 47.40%, 29.87%, 24.44%, 26.51%, 24.60%, 21.05%, 16.66%, 14.10% respectively). The lower prevalence was during April 2008 and totally nil in May 2008 (09.09% and 00.00% respectively). The pattern suggests that the peak is in the starting of monsoon rains as like as the prevalence of the previous year.

The present study showed that the broiler chicken in Aurangabad region of Maharashtra harboured 10 species of Eimeria these are, *Eimeria tenella, Eimeria necatrix, Eimeria brunetti, Eimeria acervulina, Eimeria maxima, Eimeria praecox, Eimeria mitis, Eimeria nikamae, Eimeria tarabaie*and*Eimeria shivpuri.*

During the present study ten species of *Eimeria* are found in Broiler chicken. Seven species are already described and three are new species. The commonest was *Eimeria tenella*, it was found in 320 of 734 positive samples, showing a prevalence of 43.59% of the positive samples or 12.67% of the total samples examined. Followed by *Eimeria necatrix, Eimeria brunetti, Eimeria acervulina, Eimeria praecox, Eimeria maxima,* and *Eimeria mitis.*The species of coccidia involved in the infection undoubtedly play a major role in the pathogenicity observed. Species such as *Eimeria tenella* and *Eimeria necatrix* may produces extensive tissue damage from infection. The infection of the cells of the intestinal mucous with coccidian brings dramatic changes in the structure and appearance of the villi.

During routine observation the caeca are to be seen shortened and thickened. The lesions in the caecal wall consist of thick muciod material with blood clots which is discharged with the faces. *Eimeria tenella* is the common in caeca, colon and lower part of the small intestine of chicken cause acute coccidiosis characterized by haemorrhage.

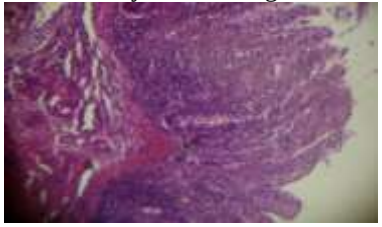

Fig no.1:- Transverse section of caecum shows the normal condition of the epithelium and other layers of wall

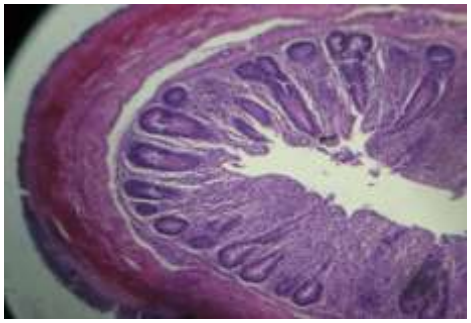

Fig.no. 2:- Transverse section of caecum shows first generation schizonts develop in the base of epithelial cell toward the lumen of gland

Fig. no 3:- Transverse section of caecum shows second generation large sized schizonts in Broiler chicken

Fig.no.4:- Transverse section of caecum shows colonies of schizonts in Broiler chicken

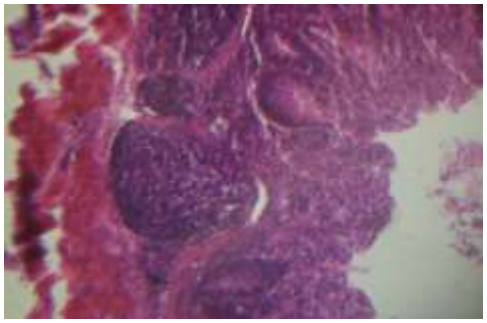

Fig. no. 5:- Transverse section of caecum shows complete disorganization of the epithelium and tunica propria and the large hemorrhagic areas near the surface

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