Eimeria arloingi (Morotel 1905; Martin 1909) in goats from Vaijapur tehsil of Aurangabad district MS India

Bhimrao N. Jadhav

M.S. P. Mandal's Vinayakrao Patil Mahavidyalaya Vaijapur, Dist. Aurangabad. Maharashtra state, 423701

Email.: bhimaarjun1982@gmail.com

Abstract:

Sheep and goat rearing is traditional business of pastoral as well as rural family but now a day lots of young peoples from various community engaged in this business. Rural economy showing great 'transition state' due to such business which boosts up economic status of the goats owners. Coccidiosis causes huge pathological impact on goats, particularly young goats.

During the period of twelve months total 680 samples were examined, out of which 133 were positive for coccidial infection, the percentage prevalence is 19.55%. Eight species of *Eimeria* were reported from goat in this region *E. arloingi, E. parva, E. christenseni, E. crendallis, E.granulosa, E. faurei, E. pallida and E. intricate.* The most prominent species found was *E. arloingi.* Morphometric observations of unsporulated as well as sporulated oocysts were reported time to time.

Key words: Goat, Coccidiosis, *Eimeria* species.

Introduction:

The world populations of 2.3 billion small ruminants (goat and sheep) which comprise 1.09 billion goats [3] provide vital milk, meat and fibre. Goats (and sheep) are particularly important in Asia and Africa where they account for more than 90% and nearly 70% respectively of the world stocks [4]. There is not well documented economic impacts of coccidiosis in sheep and goat and no data published economic losses due to clinical and sub clinical diseases. Global sheep and got production was being estimated to lose up to 140 million dollar per year [5].

Coccidiosis is a major economic concern in goatry, poultry, and in other livestock, especially in young animals, as a result of losses caused by clinical infection (diarrhea) and sub clinical (Poor weight gain) and the required treatment costs.

Eimerian protozoan are known as the enteric coccidia; monoxenous parasite in the digestive tract of various organism causing diarrhoeal disease 'coccidiosis'. Life cycle is monogenetic and undergoes through asexual multiplication followed by sexual multiplication. Many genera of Eimeria recognisedon the basis of oocysts configuration of sporocysts and its associated structure per oocysts. Among goat, 17 different Eimeria species have been described by various workers.

Goats from every kinds of rearing practices were infected from coccidial (*Eimeria*) infection. *Eimeria arloingi* and *Eimeria ninakohlyakimovae* are two of the most pathogenic species for goats [1]. *Eimeria arloingi* is one of the most pathogenic species in caprine coccidiosis, causing severe haemorrhagic enteritis due to its massive replication capacity within the first merogony in host. *Eimeria arloingi* is closely related to *Eimeria bovies* and

Eimeria zuernii which are both highly pathogenic in cattle's [2]. Infection of *E. arlonigi* was the prime cause in two month old kids, showed that its infection is highly pathogenic in young animals. *E. arlonigi* oocyst frequently seen in the fecal samples of the goat kids causes animals death.

Epidemiology:

Overcrowding, dirty and unhygienic conditions and repeated use of rearing pens for different age groups of young kids shows development of high level of infections and development of diseases. Using of same pens for successive batches, and newly born kids keep with older animals may be exposed to the severe coccidiosis in the first few weeks of life. Overgrazing, overcrowding and high level of contamination, give high risk of disease development in growing kids.

Material and methods:

During the period of twelve months i.e. from June 2020 to May 2021 total 680 samples were examined, out of which 133 were positive for coccidial infection, the percentage prevalence is 19.55%. Extensive survey to study seasonal variations from June 2020 to May 2021 was carried out to record the prevalence of coccidia in goat in Vaijapur tehsil of Aurangabad district. Material for this investigation was obtained from various villages and fields around the Vaijapur tehsil. The collected faecal samples are placed in separate plastic pouch and put it in the refrigeration until examination.

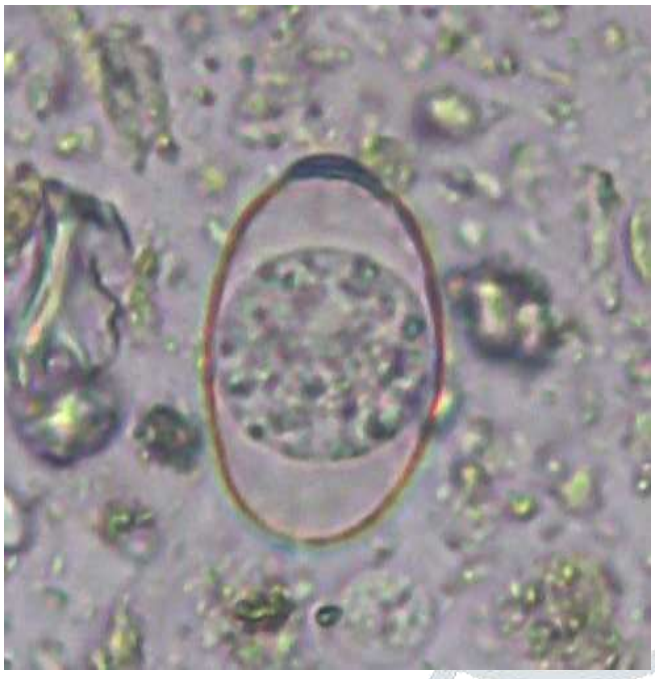
The samples were examined and processed within four to five days after collection. The faecal contents were diluted with distilled water and sieved to remove the large faecal debris. After repeated washing the oocysts were concentrated by centrifugation at 3000- 5000 r.p.m. for 10 minutes. The oocysts were then spread out in shallow petridish and covered with 2.5% solution of potassium dichromate for sporulation. Care was taken to see that they were properly aerated and also to prevent desiccation. The sporulation was carried in all cases at room temperature (about 28ºc – 32ºc). The oocysts were examined regularly to check up if they are sporulated. The checking was done twice daily in the case of species with a sporulation time of more than one or two days [6].

Results:-

Morphology of *Eimeria arloingi* :-

It is yellow to dark brown in colour with double layered smooth and thin cyst wall. Measures about 1.6 µm to 1.8 µm in thickness. The oocysts are elongated to ovoidal in shape measures 20-32 µm in length and 16-24 µm in width, with micropyle and micropylar cap. The micropyle is 3-5 µm broad and micropyle cap is 1-4 µm high and 5-8 µm wide. The cap is dome shaped and placed over micropyle. No polar body and oocystic residuum in the oocysts.

Spherical granular sporoblasts measures 10-20 µm in diameter fills the middle of the unsporulated oocysts. In the sporulated oocyst four elongated, ovoid sporocysts were presents. Each sporocysts are elongated and ovoid with narrow pointed anterior end and rounded broad posterior end. Steida body is seen. Each sporocysts measures about 10-20 µm in length and 8-12 µm in width. Sporocyst possesses sporocystic residuum wit scattered granules in between two sporozoite. Refractile body lies head to tail at broader and narrow end.



Unsporulated oocyst of ***Eimeria arloingi***

Sporulated oocyst of ***Eimeria arloingi***

Sporulation time:

Sporulation time of the species oocyst is 96-120 hrs. in goat.

Table: Showing the comparative dimensions of oocysts of *Eimeria arloingi* from goats (Based on various authors)

(All measurements are in microns**)**

Authors	Length of the oocyst	Width of the oocyst	Average
Balozet 1932	25-38	17-25	
Christensen 1938a	17-42	13-27	
Honsee 1942	24-38	18-20	
Prasad 1960	40-45	25-30	
Shah and Joshi (1963)	22.0 – 35.0	18.0 – 26.0	28 x 21
Singh (1964)	24.65 – 37.4	----------	20.3
Restani 1966	29-41	20-28	23.76-24.14
Levine and Ivens (1970)	22.0 – 35.0	16.0 – 26.0	28 x 19.21
Kshirsagar (1976)	19.0 – 43.7	17.1 – 30.4	34.66 x 22.62
Nikam (1983)	26.0 – 52.5	17.0 – 37.5	39.75 x 29.01

Jadhav (2002)	24.0 – 46.0	17.0 - 30	36.0 x 23.6
Bandyopadhy 2004	22.0-35.4	15.9-23.2	32.0 x 21.0
Kumar et. Al 2005	28.40	19.22	28.40 x 19.22
Avelis D.R.2010	16.0-36.03	13.32-26.04	29.30 x 22.4
More B.V.2011	28.0 – 55.4	19.0 – 42.1	40.32 x 32.14
Sontakke 2016	29.0 -45. 0	10.0 -34.0	34.35 x 26.45
Etsay et al. (Ethiopia) 2020	28.85	18.8	
Present author 2021	20-32	16-24	28 X 22

Discussion:

Gazyagci et al. (2015) observed that the nodular hyperplastic lesions were seen on the intestine, jejunum and ilium. Even if the animals survived from the disease, they live as a porter. Eimeria arloing results with fatal coccidiosis [8]. *Eimeria arloingi* firstly described by Marotel (1905) as *coccidian arloingi* from goats later on it is described by various authors across the world.

It is most common species of goat from India authors like Ray 1949, Sharma 1951-52, Rao And Hiregaudar 1954, Gill and Katiyar1961, Singh 1963-64, Shah and Joshi (1963), Pande, Bhatia, Dubey and Srivastava 1964, Shivdas Rajan and Nair 1965, Sharma Deorani 1965, Jha and Subramanium 1965, Bhatia and Pade 1966-70, Bali 1972, Misra and Mahaptra 1972, Chauhan, Bhatia, Arora, Agrawal, and Ahluwalia 1973, Krishnamurthi and Kshirsagar 1976,[9] Nikam (1983), Faizal and Rajapakse (2001), Jadhav (2002), Serdar et.al. (2003),and Kumar lalan (2005), Sharma et.al.(2009), Avelis D.R.2010 , More B.V.2011, and Sontakke 2016 reported this species from different parts of India. Fernando 1957 reported it from Shri lanka. Levine and Ivens (1970), Norton (1986), Kanyanri (1988), Ocollaghan (1989), Alyousif et.al.(1992), Penzhorn et.al.(1994), Bargsteed and Derchksen (1996), Koudela and Bokovo (1998), Harper and Penzhorn (1999), Yasar Goz et.al.(2006), Abdurrahman Gul (2007), and Etsay et al. (Ethiopia) 2020 [7].

A comparison of the present oocysts with the description of the earlier workers shows that the present oocysts show a wider and much larger range in dimensions. Stieda body was absent in the species reported by Kshirsagar (1976) but Nikam (1983) and Jadhav (2002) and other from India observed stieda body. We also observed sporocysts with the stieda body. Sporulation time was recorded up to 3 day which is largest period among all, as Singh (1964) recorded sporulation time 1 to 2 days and Chevalier (1966) recorded sporulation time 2 to 4 days while Kshirsagar (1976) recorded 48 hours later by Nikam (1983) recorded it as 28 to 86 hours and Jadhav (2002) 28 to 80 hours. In our observation the straight side wall in the oocysts with slightly flattened micropylar end. Such observation was recorded by Levin and Ivens 1970 from goat. On the basis of all observations this species is correlated with previous workers, so present species is *Eimeria arloingi* and redescribed here.

Host: *Capra* hircus

Habitat: Oocyst found in intestinal content

Locality: Vaijapur, Dist. Aurangabad, (M.S).

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