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## Some Epidemiological Studies on Infectious Bursal Disease in Broiler Chickens in Parts of Haryana, India

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**Abstract:** During the period from July, 1994 to June, 2003, the epidemiological data related to infectious bursal disease outbreaks in 795 broiler flocks was analyzed. The disease affected 8.89% flocks during the nine year period with morbidity, cumulative mortality and case fatality rate of 5.9, 3.63 and 61.43%, respectively. Most of the affected birds were dull, depressed and had ruffled feathers and yellowish white diarrhoea. Post mortem changes were mainly recorded in the bursa of Fabricius followed by changes in thigh and breast muscles, and in some cases in gizzard. The outbreaks were recorded more in winter season (391) than in summer (249) and rainy (155) seasons. Of the total outbreaks, 83.39% were recorded in broiler chicks of age 21-40 days while rest were in chicks of age less than 20 days or more than 40 days. However, per cent morbidity, cumulative mortality and case fatality rate were significantly more in chicks of age more than 50 days. The disease was recorded both in the vaccinated (472) as well as unvaccinated (323) flocks. However, per cent morbidity and cumulative mortality were comparatively more in the unvaccinated flocks as compared to the vaccinated ones. Improper vaccinations and existence of very virulent strains of IBD virus could be the reasons for outbreaks of disease even in the vaccinated flocks. Poor reporting system and lack of diagnostic facilities are the major constraints in knowing the exact status of the disease and the economic losses.

**Key words:** Epidemiology, infectious bursal disease, broiler chickens

### Introduction

Infectious bursal disease (IBD), an infectious viral disease of poultry is caused by RNA virus of Avibirnavirus genus of Birnaviridae family (Dobos *et al.*, 1979). After its first outbreak in 1962 in Gumboro area of Southern Delaware, USA (Cosgrove, 1962), the disease has now been recorded in poultry from all over the world. In most parts of the world before 1987, the disease was subclinical with lower morbidity and mortality rates. But after 1987, increased morbidity rate upto 100% and mortality upto 25% in broiler chickens were reported from different parts of the Europe and the Asia (Sah *et al.*, 1995; Cao *et al.*, 1998). During the 63<sup>rd</sup> General Session of the Office International des Epizooties, IBD was considered as a disease of socio-economic importance at International level, as the disease was present in more than 95% of the member countries (Eterradossi *et al.*, 1997).

In India, the disease was first reported by Mohanty *et al.* (1971) in Uttar Pradesh and subsequently, it was reported from different parts of the country (Singh and Dhawedkar, 1992; Sah *et al.*, 1995; Sami and Baruah, 1997; Kurade *et al.*, 2000; Kataria *et al.*, 2001). The present paper analyses the retrospective epidemiological data of IBD outbreaks recorded during past nine years in broiler chickens in parts of Haryana.

### Materials and Methods

During the period from July 1994 - June 2003, data from

broiler flocks suspected to be suffering from IBD from Hisar, Fatehabad, Sirsa, Bhiwani and Jind districts of Haryana state were collected. Detailed information like total population at risk, number of birds affected and died, vaccination status and age of affected birds was obtained. Clinical signs and symptoms of the affected birds were noticed. Detailed necropsy examinations were also carried out in each case.

Each year was divided into 4 quarters viz. July- Sept. (A); Oct - Dec (B); Jan - Mar (C) and April - June (D) to study the temporal distribution of disease. B and C constituted the winter season, A the rainy season and D the summer season. Data so collected was analyzed to draw the inference using Z-test as per the method of Snedecor and Cochran (1980).

### Results and Discussion

**Occurrence of the disease:** During the period from July 1994 - June 2003, a total of 795 outbreaks of IBD were recorded in broiler chickens in this part of Haryana (Fig. 1). The outbreaks in broiler chicks initially during 1994-95 were more but these decreased in subsequent years. IBD accounted for 20.02, 11.74, 15.34, 11.14, 8.44, 8.44, 6.42, 5.83 and 3.52% of total disease conditions recorded in broiler chickens during 1994-95, 1995-96, 1996-97, 1997-98, 1998-99, 1999-00, 2000-01, 2001-02 and 2002-03, respectively (average 8.89% during the nine year period). The morbidity and cumulative mortality during the nine year period varied

Table 1: Infectious bursal disease outbreaks in different age groups of broiler chickens during the period from July, 1994 - June, 2003

Age groups (days)	No. of outbreaks	Total population	Morbidity (%)	Cumulative mortality (%)	CFR (%)
11-20	40	101694	7.37 <sup>b</sup>	3.30 <sup>a</sup>	44.75 <sup>a</sup>
21-30	396	1094340	4.84 <sup>a</sup>	3.04 <sup>a</sup>	62.78 <sup>b</sup>
31-40	267	691907	6.45 <sup>b</sup>	4.21 <sup>b</sup>	65.35 <sup>b</sup>
41-50	75	216740	7.63 <sup>b</sup>	3.91 <sup>ab</sup>	51.18 <sup>a</sup>
More than 50	17	47100	11.84 <sup>c</sup>	8.28 <sup>c</sup>	69.99 <sup>b</sup>
Total	795	2151781	5.91	3.63	61.43

Different superscripts (a, b, c) within a column indicate significant difference (P= 0.05). CFR= Case fatality rate

Table 2: Effect of vaccination on occurrence of infectious bursal disease in different age groups of broiler chickens during the period from July, 1994 - June, 2003

Age groups (days)	No. of outbreaks	Total population	Morbidity (%)	Cumulative mortality (%)	CFR (%)
Unvaccinated					
11-20	21	49130	7.05	4.39	62.30
21-30	149	352910	4.92	3.07	62.35
31-40	111	243827	7.27	4.26	58.56
41-50	34	81270	6.89	3.64	52.78
>50	8	11700	10.00	6.90	68.97
	323	738837	6.14 <sup>a</sup>	3.67 <sup>a</sup>	59.85 <sup>a</sup>
Vaccinated					
11-20	19	52564	7.67	2.28	29.67
21-30	247	741430	4.80	3.02	62.99
31-40	156	448080	6.00	4.19	69.83
41-50	41	135470	8.08	4.07	50.37
>50	9	35400	12.44	8.74	70.26
	472	1412944	5.79 <sup>a</sup>	3.61 <sup>a</sup>	62.30 <sup>a</sup>

Same superscripts within a column does not indicate significant difference (P= 0.05). CFR = case fatality rate

from 4.23-8.40% (average 5.91%) and 2.47-4.40% (average 3.63%), respectively (Fig. 2). The case fatality rate during this period varied from 48.61-70.55% (average 61.43%).

Higher number of outbreaks during 1994-95 and subsequent decrease could be due to the fact that vaccination against this disease was initiated during 1994-95 under field conditions and it took at least one year to convince the farmers to carry out vaccination on routine basis. Studies conducted in Taiwan during the year 1992 revealed that the disease affected 294 flocks with mortality of 45.1% birds (Tsai and Lu, 1993). Saif *et al.* (2000) also recorded 110 outbreaks of IBD in some provinces of Egypt from 1995 to 1998. Anjum *et al.* (1993) reported that the prevalence of the disease in Pakistan increased from 19.14% in 1988-90 to 26.83% in 1991-92. Sami and Baruah (1997) recorded 55 outbreaks of IBD in broiler flocks from 1993-95 with mortality ranging from 0.9-25.7%.

According to OIE, multi annual disease status in India, during 1997, 1330 outbreaks of IBD were recorded in different states. During the years 1998, 1999, 2000 and 2001; 610, 261, 55 and 472 outbreaks, respectively were recorded. In the year 2002, there were 281 outbreaks

with mortality of 19,500 birds in different parts of country (Anonymous, 2003).

**Clinical and Post mortem findings:** Most of the affected birds were initially dull, depressed and anorectic. Later on, the birds had ruffled feathers, severe prostration, yellowish white diarrhoea, inability to take feed and water followed by death. Feed and water intakes of the affected birds were drastically reduced. The affected birds on necropsy examination revealed turgid, oedematous and swollen bursa. Presence of gelatinous exudate around bursa/or hemorrhages on serosal surface of bursa were recorded in acute form of the disease. However, in chronic cases, bursa was atrophied with or without cheesy core. Besides the bursal changes, ecchymotic hemorrhages on thigh and breast muscles were noticed quite frequently. In some of the flocks, hemorrhages at the junction of proventriculus and gizzard were also recorded. Nephrosis with swollen kidneys was another postmortem observation in the affected flocks. More or less similar types of signs and symptoms and/or post mortem findings have been recorded earlier by various workers (Mohanty *et al.*, 1971; Lukert and Hitchner, 1984; Sah *et al.*, 1995; Tran *et al.*, 2002).

**Temporal Distribution:** Though the disease was recorded throughout the year, however, the number of outbreaks (391) were comparatively more during the winter season (quarters B and C) of the years than the summer (249) and rainy (155) seasons. However, the morbidity (7.44%) and cumulative mortality (4.43%) were significantly more during summer season than the winter and rainy seasons (Fig. 3). The present finding has the support of Qureshi (1999) who on the basis of four year data from 1994-97 also reported that occurrence of the disease in Pakistan was more in winter months (14.39%) than in summer months (8.0 - 8.9%). Significantly higher morbidity and cumulative mortality during summer months recorded in the present study could be due to the fact that during summer, the temperature in this part of Haryana generally remains between 40-45°C thereby heat stress aggravates the condition leading to increased mortality during this period. However, Farooq *et al.* (2003) reported that losses in broiler chickens due to IBD were higher in winter season than in spring season in Kashmir area of Pakistan which could be due to the reason that winter is harsh in Kashmir area.

**Effect of Age:** Maximum number of outbreaks (396 of 795; 49.81%) were recorded in broiler chicks of age 21-30 days followed by 267 outbreaks (33.58%) in 31-40 days age group. Rest 16.60% outbreaks were recorded in other age groups (Table 1). It indicated that the birds of age between 21-40 days were more susceptible to the disease. Lukert and Hitchner (1984), Bekhit (1997) and Saif *et al.* (2000) also reported that broiler chicks of age 3-6 weeks were more susceptible to the disease. Khursid *et al.* (1993) also reported that incidence of the disease in broiler chicks in parts of Pakistan was maximum (43.4%) during the 4<sup>th</sup> week of age followed by 28.7% in 5<sup>th</sup>, 13.3% in 3<sup>rd</sup> and 10.7% during 6<sup>th</sup> weeks. Sami and Baruah (1997) also reported that the incidence of disease was 30.6% in birds of age 3-4 weeks, 24.2% at 4-5 weeks and 14.2% at 2-3 weeks of age.

Percent morbidity and cumulative mortality in different age groups in the present study ranged from 4.84-11.84% and 3.04-8.28%, respectively (Table 1). Morbidity (%) in birds of age groups 11-20, 31-40, 41- 50 days did not differ significantly among themselves, however, it differed significantly from the birds of age 21-30 and more than 50 days. Similarly, the cumulative mortality (%) did not differ significantly in birds of age 11-20 and 21-30 days, and it increased in birds of age more than 30 days, the increase in birds of age 31-40 was significant. The outbreaks in birds over 50 days of age though were less, but per cent morbidity as well as cumulative mortality were significantly higher as compared to other age groups. Likewise, the case fatality rate in this age group was also significantly

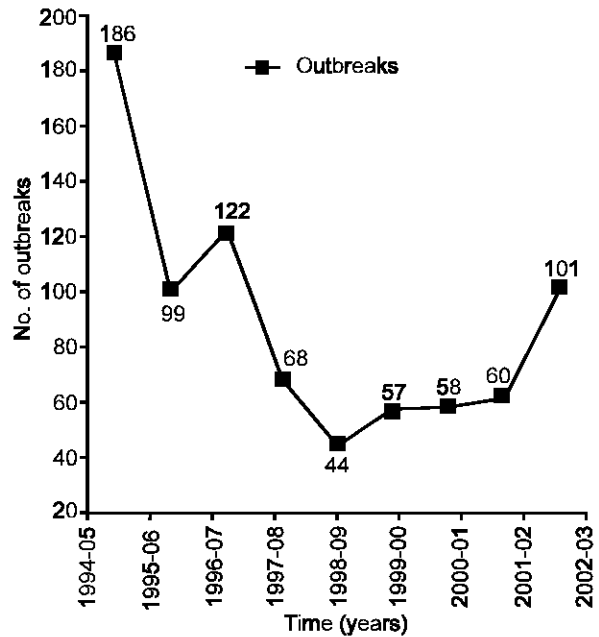


Fig. 1: Prevalence of IBD in broiler chickens during the nine year period

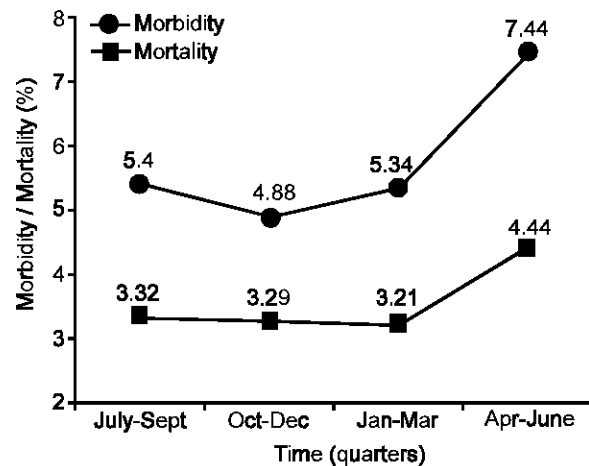


Fig. 2: Morbidity and mortality due to IBD in broiler chickens in different seasons

more than the other age groups. Higher morbidity and cumulative mortality in broiler chickens (more than 50 days of age) than the younger birds indicated that antibody titer due to IBD vaccination at 13/14<sup>th</sup> day of age might have dropped and was not sufficient to provide protection to the older birds. Bekhit (1997) also reported that the flocks which suffered from IBD within 10 days of primary or secondary vaccination against IBD had generally lower mortalities than the flocks which suffered from the disease where vaccination was carried out more than 10 days back. Farooq *et al.* (2003) also reported that mortality due to IBD in broiler chickens

were significantly higher (17.66%) at the age more than 32 days than at 19-23 days of age (12.42%).

**Vaccination status:** Of 795 outbreaks of IBD, 472 outbreaks occurred in the vaccinated flocks while 323 were in the unvaccinated flocks. Per cent morbidity and cumulative mortality were comparatively more in the unvaccinated broiler flocks as compared to the vaccinated flocks (Table 2); however, the difference was not statistically significant. The case fatality rate (CFR) was more in vaccinated flocks than the unvaccinated flocks (Table 2). When the data of vaccinated / unvaccinated flocks was further analyzed with respect to different age groups, it was observed that per cent morbidity and cumulative mortality in age groups of 21-30 and 31-40 days were more in the unvaccinated flocks than the vaccinated flocks. However, these were more in vaccinated flocks than the unvaccinated ones in age groups of 11-20 days and 41-50 and >50 days. Anjum *et al.* (1993) and Farooq *et al.* (2000) also reported severe outbreaks of IBD in non-immunized flocks than in immunized flocks.

Poultry industry in Haryana, a northwestern state of India, has made rapid strides in last two decades. There has been phenomenal increase in the small and marginal broiler farms in western Haryana. As a result, broiler meat production has increased tremendously. However, various infectious and non-infectious diseases hamper the production potential to be achieved to its maximum level. Infectious bursal disease is one of the infectious causes responsible for heavy economic losses to the poultry industry. In Haryana, vaccination against IBD in broiler chickens is generally carried out during second week of age (13-15 days of age). The occurrence of disease in vaccinated flocks could either be due to vaccine failure, non-maintenance of cold chain, improper handling of vaccine or low level of maternal antibodies. Most of the poultry farmers in this part of Haryana are small or marginal farmers with poor educational background, who are not fully aware about proper handling of the vaccines. During 1994-95, vaccination against this disease was not a routine practice. Moreover, intermediate or hotter vaccines were not available due to which the number of outbreaks during this period were more. However, subsequently due to regular vaccination, though the number of outbreaks decreased but were still recorded inspite of vaccination. Furthermore, emergence of new very virulent strains of IBD as also opined by Kataria *et al.* (2001) and Mittal (2004) might have caused outbreaks in the vaccinated flocks as these strains might have pierced the antibody titers. Molecular epidemiological studies conducted by Mittal (2004) in Haryana revealed that IBDV strains from different outbreaks during the period July 2002 to June 2003 differed from the strains of 1996 indicating the evolution occurring at genetic level in IBD viruses. This

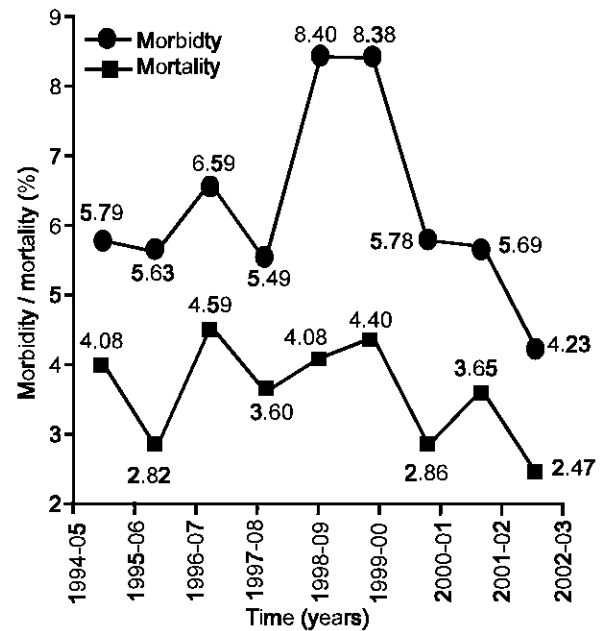


Fig. 3: Morbidity and mortality due to IBD in broiler chickens during the nine year period

could be the reason for occurrence of disease in vaccinated flocks. Due to poor recording and reporting systems in most of the developing countries as well as lack of diagnostic facilities in the poultry growing areas, the exact status and economic losses can not be estimated. Since the present study was limited only to the few districts of western Haryana, the losses to the poultry farmers in the state of Haryana are apparent.

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