

CLINICO - PATHOLOGICAL INVESTIGATION OF COLIBACILLOSIS IN PIGEONS

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ABSTRACT

Colibacillosis is the localized or systemic infection caused entirely or partly by avian pathogenic *Escherichia coli* (APEC) and is manifested as a wide range of disease conditions in poultry including colisepticemia, coligranulomatosis (Hjarre's disease) and air sac disease (chronic respiratory disease -CRD). The present study was undertaken to investigate the clinico-pathological changes associated with pigeon colibacillosis. The cause was identified following isolation, biochemical tests and histopathological examination. The organism was identified as *Escherichia coli* and the treatment was suggested based on the antibiotic sensitivity test. A small step of prompt disease diagnosis and treatment can bring about a major leap in controlling the multiple drug resistance.

Keywords: Colibacillosis, E.coli, Antibiotic sensitivity, Pigeon.

1. INTRODUCTION

Pigeons reared for racing, shows

and squab meat has gained much importance (Bolla and Gerry, 2007) in many countries including India. As per unofficial records, there are about 400 ornamental pigeon farmers and 180 racing pigeon farmers in Palakkad district and pigeon races are conducted without fail during monsoon season every year. It has been identified as a fast-growing field like poultry industry. Despite significant advances made in the field of avian management and health, diseases take a hefty toll in all types of poultry enterprises including pigeon industry. Though many disease conditions have been reported among the pigeon, there are limited systematic studies carried out to assess the magnitude. Early diagnosis of disease is important for development of suitable treatment and effective implementation of prevention and control strategies.

The spread of multiple antimicrobial resistant pathogenic bacteria has been recognized by World Organization for Animal Health (WOAH), the Food & Agricultural Organisation (FAO) and

World Health Organization (WHO) as a serious global human and animal health problem. Identifying the causative agents in infectious diseases and determining the antibiotic sensitivity spectrum of the isolates could facilitate poultry health care workers in selection of suitable antibiotics for the control and treatment of bacterial diseases.

Colibacillosis refers to any localized or systemic infection caused entirely or partly by avian pathogenic *E. coli* (APEC), including colisepticemia, coligranulomatosis (Hjarre's disease), air sac disease (chronic respiratory disease -CRD), swollen head syndrome, venereal colibacillosis, coliform cellulitis (inflammatory process), peritonitis, salpingitis, orchitis, osteomyelitis or synovitis (turkey osteomyelitis complex), pan ophthalmitis, omphalitis or yolk sac infection, and enteritis (Calnek *et al.*, 1997). Colibacillosis in mammals is most often a primary enteric or urinary tract disease, whereas colibacillosis in poultry is typically a localized or systemic disease occurring secondarily when host defences have been impaired or overwhelmed by virulent *E. coli* strains. Strains of *E. coli* that cause disease outside the intestinal tract of any species share common characteristics and are called extra intestinal pathogenic *E. coli* (EPEC) (Kariuki *et al.*, 2002). Avian colibacillosis has been noticed to be a

major infectious disease of pigeon of all ages (Otaki, 1995).

The present study reports the occurrence of colisepticemia as a cause of mortality in two different pigeon lofts in Palakkad. The isolation and identification of *E. coli* and the antibiotic sensitivity pattern of the isolates obtained, helped in successful management of the disease which highlights the importance of accurate diagnosis and timely treatment, avoiding trial and error method of using various antibiotics.

CASE HISTORY AND CLINICAL OBSERVATION

Mortality was reported from two different pigeon lofts located in Palakkad district of Kerala. The birds were of age spanning from two to six years. The birds were reported to be raised on cages with one race pigeon or two ornamental pigeons per cage of an area of 1.5 sq. ft., whereas ten to twenty squabs were raised in the same area. The pigeons were reported to be fed with wheat and ragi. The deworming was also reported to be regular. The mortality and morbidity pattern are depicted in table 1.

Samples

Carcasses of pigeons presented at Clinical Laboratory, District Veterinary

Table 1: Mortality and morbidity pattern

	Flock 1	Flock 2
Total number of Birds	40	150
Adults Affected	30	4
Young Ones Affected	Nil	16
Adult mortality	10	3
Squab mortality	Nil	14
Autopsy carried out (Adult)	1	1
Autopsy carried out (Squab)	Nil	2

Center (DVC), Palakkad, for necropsy to identify the cause of death formed the material for investigation. The carcasses were presented in a span of one week.

Clinical signs

The clinical signs shown by the birds prior to death were blood and mucus discharge from oral cavity (Fig.1), unthriftiness, reduced feed intake and loss of weight. An increased squab mortality was also reported.

Pathology of Visceral organs

The carcasses were subjected



Fig 1: Bleeding from oral cavity

to detailed gross and histopathological examination as per standard procedures. Heart blood smear and impression smears from liver and spleen were stained with Giemsa. Representative tissue samples collected from liver, spleen, lungs and kidney were preserved in 10 per cent formalin solution for histopathological examination. The formalin fixed samples were processed by routine paraffin embedding procedures and the tissue blocks were sectioned and stained by routine H &E staining (Bancroft and Cook, 1994). The sections were examined under light microscope.

Isolation of bacterial organism and antibiotic sensitivity test

Mac Conkey's agar, Eosin Methylene Blue (EMB) agar, Brilliant Green Agar (BGA), Xylose Lysine Desoxy cholate (XLD) agar and Triple Sugar Iron (TSI) agar was used for the isolation and identification of the organism. The isolates were identified (Markey *et al.*, 2015). Antibiotic sensitivity test of the isolates obtained was done as per the standard single disc diffusion method of Bauer *et al.* (1966) using Mueller Hinton agar. Antibiotic discs of known concentrations were employed for this study. The following discs were used: ampicillin (25mcg), bacitracin (10U/disc), cephalixin (30mcg), ceftriaxone (30mcg), chloramphenicol (50mcg), ciprofloxacin

(30mcg), furazolidone (50mcg), gentamicin (50mcg), nitrofurazone (100mcg), norfloxacin (10mcg), pefloxacin (5mcg), triplesulpha (300mcg), oxytetracycline (30mcg).

DISCUSSION

Improper management practices and failure to remove droppings was an important cause for the disease in all presented cases. This clearly indicates the faecal contamination as a major route of transmission (Guabiraba and Schouler, 2015)

Pathology of visceral organs

On post-mortem examination, air sac thickening and pulmonary congestion was present in 37.5 per cent carcasses. Liver necrosis, enteritis, haemorrhage of trachea and tracheal mucosa was evident in all cases. Haemorrhage of kidney was evident



Fig 2: Post mortem lesions –necrosis of liver

in 25 per cent cases and the reproductive tract was congested in 37.5 per cent cases Fig. 2 depicts the post-mortem lesions in a representative sample.

Hepatomegaly with necrotic foci has been reported in liver of broilers and layers (Omer *et al.*, 2010). Haemorrhage of kidneys have been reported by Dutta *et al.* (2013), which might be due to the *E. coli* endotoxin causing vascular damage (Srinivasan *et al.*, 2014). *Escherichia coli* is reported to cross respiratory epithelia and penetrate deep into mucosa and submucosa to reach the blood stream. Sequelae of colisepticemia could lead to subacute fibrinopurulent airsacculitis and salpingitis (Barnes *et al.*, 2008; Dziva and Stevens, 2008)

Histopathological studies of H&E-stained sections of liver revealed focal hepatitis, focal mononuclear infiltration, degeneration and atrophy of hepatocytes, extensive congestion and sinusoidal

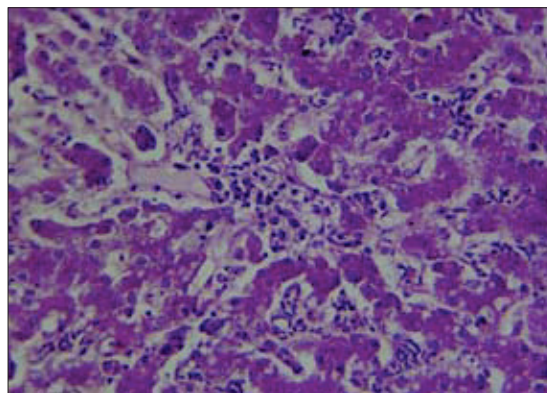


Fig 3: Focal hepatitis

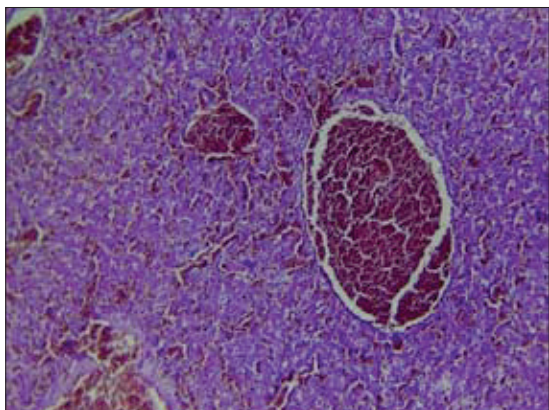


Fig 4: Sinusoidal congestion and dilatation

dilatation (Fig 3, 4). The necrotic and inflammatory lesions observed in liver might be due to vascular injury caused by *E. coli* endotoxin (Truscott *et al.*, 1974).

Isolation and Identification

Escherichia coli was isolated from liver, heart blood and spleen of all the eight pigeon carcasses. Culture of heart blood, liver and spleen on Mac Conkey's agar yielded bright pink lactose fermenting medium sized colonies in pure form after incubation at 37 °C for 24 h. On Gram's staining the isolate revealed Gram negative medium sized rods that were positive for catalase, indole and methyl red (MR) and negative for oxidase, Voges Proskauer (VP) and citrate. The isolate gave acid butt (yellow) and acid slant (yellow) in Triple Sugar Iron (TSI) agar slant and was motile at 37°C. When inoculated on to EMB agar a distinct metallic sheen was observed whereas, on BGA yellow colonies were produced and on XLD agar an acid

reaction was observed as yellow colonies. Hence, based on morphological, cultural and biochemical reactions the isolates were identified as *Escherichia coli*. The identification of the organism was carried out as per Markey *et al.* (2015).

Antibiogram

Antibiotic susceptibility pattern using 14 different antibiotics were carried out. All isolates were found to be sensitive to chloramphenicol and gentamicin, moderately sensitive to nitrofurazone and furazolidone and resistant to ciprofloxacin, oxytetracyclin, ampicillin, ceftriaxone, norfloxacin, pefloxacin, triple sulpha, bacitracin and cephalixin.

The disease in other affected pigeons in the flocks were successfully treated with intra muscular injection of gentamicin at 1mg/kg body weight for five days along with supportive therapy using liver stimulants (Liv 52 syrup orally) and vitamin supplements. The birds were reported to have an uneventful recovery and no deaths were reported after treatment.

Multi drug resistance of the organisms may be due to indiscriminate use of antibiotics by owners. Fanciers rely heavily on various concoctions of routine treatments and antibiotics, without knowing the contents. However, owners reported that no antibiotics were used previously for the

present cases. The bacterial resistance to antibiotics is due to the indiscriminate use of these drugs, in terms of dose, protocol and duration (WHO, 2012).

SUMMARY

The present study was conducted to investigate the mortality in two different pigeon farms in Palakkad. Being a fast-growing industry, mortality of pigeons is a major hurdle to pigeon farmers. Hence, accurate identification of the disease-causing agent and the predisposing factors are of prime importance. Also, the management and sanitation practices must be designed so as to minimise the exposure level of *E. coli* in the birds' environment. Avoiding indiscriminate use of antibiotics and treatment based on diagnosis can save the valuable pigeon wealth.

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