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Colibacillosis in Broilers: A case report

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Abstract
Colibacillosis, an acute, infectious and mostly systemic disease resulting in significant economic losses, is being increasingly detected among poultry flocks worldwide. The present study aimed to supply documented information on the epidemiological and economic effects of the disease to oblige in disease control policies and planning research preference in the poultry sector. The clinical signs respiratory distress, reduced appetite; poor growth and mortality were evident. The morbid chicks were examined for postmortem changes and gross lesionsinclude cheesy deposition over heart and liver, pericarditis, highly congested and septicemia liver, perihepatitis and airsacculitis. The chicks were treated with levofloxacin (10%) antibiotic (@ 1 gram/Liter of water for 3 days) and found to be effective against *Escherichia coli* infection in broilers. General hygienic and bio-security measures should be part of the overall management plan of poultry farms for effective control of bacterial infection.

Keywords: Colibacillosis, E. coli, Pericarditis, Perihepatitis, Bio-security

Introduction
Escherichia coli is a normal inhabitant of the gastrointestinal tract of mammals and birds, belongs to *Enterobacteriaceae* family. E.coli are gram-negative, facultative anaerobic, rod shaped, non-spore forming bacteria. They are usually motile, catalase-positive; oxidase-negative; citrate-negative; nitrate reducing; attack sugars fermentatively. Most of its strains are nonpathogenic however certain serotypes can cause disease in poultry. *Escherichia coli* infections are being increasingly detected among poultry flocks, indicating the growing importance of this pathogen to the industry. E.coli is associated with heavy economic losses to the poultry industry worldwide [1] by its association with various disease conditions, either as primary pathogen or as a secondary pathogen. It causes diversified disease manifestations in poultry including colibacillosis, omphalitis, septicemia, yolk sac infection, respiratory tract infection, swollen head syndrome, polyserositis, coli granuloma, enteritis, cellulitis and salpingitis. Avian colibacillosis caused by enterotoxigenic *Escherichia coli* i.e. Avian Pathogenic Escherichia coli (APEC) [2, 3], an acute and mostly systemic and serious infectious disease occurring in different types of chickens [4, 5]. Colibacillosis is a common disease in poultry flocks worldwide especially in intensive farming system [6]. Avian colibacillosis is characterized in its acute form by septicemia resulting in death and in its subacute form by a complex syndrome that includes multiple organ lesions peri-carditis, airsacculitis, perihepatitis and peritonitis [7, 8]. Avian colibacillosis primarily affects broiler chickens between the ages of 4 and 6 weeks. E.coli persists for long period outside the bird's body in dry and dusty conditions. Contaminated feed and water are the potential source of E. coli infection. Faecal contamination of the eggs results into penetration of *E. coli* through shell is also considered important source of infection. Due to its high morbidity and mortality rates avian colibacillosis results in significant economic losses every year in the global poultry industry [9]. Avian colibacillosis is a disease of zoonotic importance [10, 11]. Most APEC isolated from poultry are specific for birds and have no significance zoonotic importance disease [12, 13]. Chickens readily infected experimentally with *E. coli* O157:H7 is an important enterohemorrhagic pathogen of humans [14].

2. Materials and Methods
Based on history, visual observation of clinical signs and postmortem examination finding, the case was reliably confirmed colibacillosis.

2.1 Case history and observations
A total of 3000 broiler birds are reared in optimum management system at the poultry farm located in KVK campus, Ainthu, Dist. Pratapgarh. The case was reported during the month of February, 2019. A few morbid chicks of 9 -11days of age were presented for investigation. The clinical signs reported were drop in feed intake, watery diarrhea, Weakness, loss of bodyweight, huddling of chicks, labored breathing and mortality.

2.2 Postmortem Examination
At necropsy, septicemia, pericarditis and perihepatitis, were evident. Fibrinous pericarditis with adhered white pericardial sac was reported. Liver was dark and congested. The gross lesions were similar to several reports [15, 16].

2.3 Treatment
Based on the clinical signs, the treatment has been started with levofloxacin (10 %) at the rate of 1 gram/Liter of water for 3 days. In addition, acidifier (1ml/2 Lt. Water) was mixed to the water supplied to the birds.

3. Results and Discussion
Colibacillosis is the most common infectious bacterial disease of poultry and responsible for significant economic losses in the poultry industry worldwide due to high morbidity and mortality rates in chicken and carcass rejection at slaughter cause [15, 17]. Current increasing trends in prevalence and severity of colibacillosis indicates that it is likely to be a greater problem in the poultry industry [18, 19]. Serotypes of *E. coli* are classified based on antigens present in it. Approximately 180 O, 60 H, and 80 K antigens are reported [20]**.** O antigen is the antigenic portion of Lipopolysaccharide (LPS) in the cell wall. H antigens are proteins found in the different types of flagellin that comprise the flagella. K antigens are polymeric acids containing 2% reducing sugars, are associated with virulence. E.coli is always found in the digestive tracts of poultry, particularly in large numbers in the lower part of the small intestine and caeca. The serotypes which cause septicemia are also likely to be found in the throat and upper trachea. The infection occurs when pathogenic E. coliinvades the bird's body from the respiratory tract when mucosal barriers are compromised. Colibacillosis is a significant zoonotic poultry disease since chicken is the commonest source of animal protein consumed by people worldwide [10, 21]. Birds of all ages found to be susceptible to colibacillosis but young birds are affected more frequently [22, 23]. Host susceptibility factors for colibacillosis are compromised skin or mucosal barriers (e.g., unhealed navel, wounds, mucosal damage from viral, bacterial, or parasitic infections, lack of normal flora, etc.), immunosuppression (Ranikhet disease, Mycoplasma infection, Infectious Bursal Disease, infectious bronchitis etc.), nutritional deficiencies, environmental contaminations, poor ventilation, contaminated water and exposure to abnormal stress etc. [16]. Various antibiotics can be used for controlling and treating colibacillosis, including sulphamethiozole, co-trimoxazole, cephalexin, chloramphenicol, amikacin, gentamicin, neomycin, enrofloxacin, ciprofloxacin and other fluoroquinolones [8, 24-30]. Fluoroquinolones are an important group of antibacterial drug and have broad spectrum activity. They are gaining widespread acceptance in veterinary medicine due to their effectively against Gram-negative and Gram-positive bacteria, mycopalasma, ricketsia as well as against bacteria resistant to other drugs [31]. Treatment with levofloxacin is found to be very effective against colibacillosis. Levofloxacin is a newer molecule of third generation fluoroquinolones [32, 33]. It is active L - isomer of the racemate ofloxacin having twice antimicrobial activity than parent compound [32] and effective against species of Staphylococci, Streptococci, Enterobacteriaceae, *Escherichia*, *Klebsiella*, *Proteus*, *Pseudomonas*, *Bacteroides*, *Clostridium*, *Haemophilus*, *Moraxella*, *Mycoplasma* and *Chlamydia* [34]. There are several studies on pharmacokinetics of levofloxacin in cow, calves and poultry [35-38]. Levofloxacin has potential therapeutic applications through water medication in chickens [33]**.** Acidifier reduces pH of drinking water which prohibits further growth of bacteria. Isolation of sick birds anddisinfection of the entire farm by lime also helped in control of the disease. The control of E. coliis difficult since it persists in the environment for long period in dry and dusty conditions. All manure was scraped from floors and walls and all feeding and watering equipments were disinfected. Whole farm was disinfected with lime. Feeding and watering equipment were placed outdoors in the sunlight. E.coli can be controlled by strict biosecurity measures such as disinfection or cleaning of hatching eggs, good hygiene conditions in the farm, use of acidifiers in drinking water and chemoprophylaxis with suitable antibiotics. In condition of colibacillosis outbreak, timely treatment is required to control the infection and farm should be kept on rest for a month or so.

Fig 1: Septicemic liver and hepatomegaly in 9 days old broiler

Fig 2: Septicemic liver and fibrinous pericarditis in 10 day old chick

4. Conclusion
From the findings of the present study, it is concluded that therapeutic application of water medication of levofloxacin for 3 days along with use of acidifier in drinking water is an effective and well-tolerated treatment for colibacillosis in broilers.

5. References

1. Schouler C, Schaeffer B, Bree A, Mora A, Dahbi G, Biet F *et al*. (Diagnostic strategy for identifying avian pathogenic *Escherichia Coli* based on four patterns of virulence genes. J Clin. Microbiol. 2012; 50:1673-1678.
2. Solà-Ginés M, Cameron-Veas K, Badiola I, Dolz R, Majó N, Dahbi G *et al*. Diversity of multi-drug resistant avian pathogenic Escherichia coli (APEC) causing outbreaks of colibacillosis in broilers during 2012 in Spain. PLoS One, 2015, 10(11).
3. Know SG, Cha SY, Choi EJ, Kim B, Song HJ, Jang HK. Epidemiological prevalence of avian pathogenic Escherichia coli differentiated by multiplex PCR from commercial chickens and hatchery in Korea. J Bacteriol. Virol. 2008; 38:179-188.
4. Cao GT, Zeng XF, Chen AG, Zhou L, Zhang L, Xiao YP *et al*. Effects of a probiotic, *Enterococcus faecium*, on growth performance, intestinal morphology, immune response, and cecalmicroflora in broiler chickens challenged with Escherichia coli K88. Poult. Sci. 2013; 92:2949-2955.
5. He C, Fu B, YiP, Wei X, Yin Z, Lv C *et al*. Effectiveness of Xiang- Qi-Tang against Avian Pathogenic Escherichia coli. Pak. Vet. J. 2014; 34:127-129.
6. Chansiripornchai N. Comparative efficacy of enrofloxacin and oxytetracycline by different administration methods in broilers after experimental infection with avian pathogenic Escherichia coli. Thai. J Vet. Med. 2009; 39:231-236.
7. Calnek BW, Barnes HJ, Beard CW, McDougald LR, Saif YM. Diseases of Poultry. 10th ed. Iowa State University Press; Ames, IA, USA, 1997.
8. Kabir SML. Avian Colibacillosis and Salmonellosis: A Closer Look at Epidemiology Pathogenesis, Diagnosis, Control and Public Health Concerns. Int. J Environ. Res. Public Health. 2010; 7:89-114.
9. Lau GL, Sieo CC, Tan WS, Hair-Bejo M, Jalila A, Ho YW. Efficacy of a bacteriophage isolated from chickens as a therapeutic agent for colibacillosis in broiler chickens. Poult. Sci. 2010; 89:2589-2596.
10. Khoo LL, Hasnah Y, Rosnahy Y, Saifur N, Maswati MA, Ramlan M. The prevalence of avian pathogenic Escherichia coli in peninsular Malaysia. Malays. J Vet. Res. 2010; 1:27-31.
11. Matin MA, Islam MA, Khatun MM. Prevalence of colibacillosis in chickens in greater Mymensingh district of Bangladesh, Veterinary World. 2017; 10(1):29-33.
12. Caya F, Fairbrother JM, Lessard L, Quessy S. Characterization of the risk to human health of pathogenic Escherichia coli isolates from chicken carcasses. J Food Prot. 1999; 62:741-746.
13. Ron EZ. Host specificity of septicemic Escherichia coli: human and avian pathogens. Curr Opin Microbiol. 2006; 9:28-32.
14. Beery JT, Doyle MP, Schoeni JL. Colonization of chicken cecae by Escherichia coli associated with hemorrhagic colitis. Appl Environ Microbiol. 1985; 49:310-315.
15. Vegad JD, Katiyar AK. A Textbook of Veterinary Special Pathology (Infectious disease of livestock and poultry). 3rd Reprint. Ch. 3. IBDC Print. 2008, 293-295
16. Barnes HJ, Nolan LK, Vaillancourt JP. Colibacillosis. Diseases of Poultry.13th ed. Ch. Ames: Wiley-Blackwell, Print, 2013, 716-757.
17. Ragione RM, Woodward MJ. Virulence factors of Escherichia coli serotypes associated with avian colisepticaemia. Res. Vet. Sci. 2002; 73:27-35.
18. Altekruse SF, Elvinger F, Lee KY, Tollefson LK, Pierson EW, Eifert J *et al*. Antimicrobial susceptibilities of Escherichia coli strains from a turkey operation. J. Am. Vet. Med. sensitivity testing, at an optimal dose for Assoc. 2002; 221:411-416.
19. Joshi S, Singh R, Singh SP. Antibiotic resistance profile of Escherichia coli isolates from Colibacillosis in and around Pantnagar, India. Vet. World. 2012; 5(7):405-408
20. Stenutz RA, Weintraub, Widmalm G. The structures of Escherichia coli Opolysaccharide antigens. FEMS Microbiol Rev. 2006; 30:382-403.
21. Mitra D, Sarkar A, Joardar SN, Mukhopadhyay SK. Characteristics of Escherichia coli isolated from poultry birds of certain farms of Kolkata. Indian J Comp. Microbiol. Imunol. Infect. Dis. 2009; 30(1):39-41.
22. Montgomery RD, Boyle CR, Lenarduzzi TA, Jones LS. Consequences to chicks hatched from Escherichia coliinoculated embryos. Avian Dis. 1999; 43:553-563.
23. Johnson LC, Bilgili SF, Hoerr FJ, Murtrey BL, Norton RA. The influence of Escherichia coli strains from different sources and the age of broiler chickens on the development of cellulitis. Avian Pathol. 2001; 30:475-479.
24. Rahman M, Rahman BM, Rahman B. Antibiogram and plasmid profile analysis of isolated Escherichia coli from broiler and layer. Res. J Microbiol. 2008; 3:82-90.
25. Akond MA, Hassan SMR, Alam S, Shirin M. Antibiotic resistance of Escherichia coli isolated from poultry and poultry. environment of Bangladesh. American J Environ. 16. Sci. 2009; 5(1):47-52.
26. Omer MM, Abusalab SM, Gumaa MM, Mulla SA, Omer EA, Jeddah IE *et al*. Outbreak of colibacillosis among broiler and layer flocks in intensive and semi intensive poultry farms in Kassala University state, Eastern Sudan. Asian J Poult. Sci. 2010; 4(4):173-181
27. Sharada R, Ruban SW, Thiyageeswaran M. Antibiotic resistance pattern of Escherichia coli isolated from poultry in Bangalore. The Internet J Microbiol. 2009; 7(1):1-5.
28. Sharada R, Ruban SW, Thiyageeswaran M. Isolation, characterization and antibiotic resistance pattern of Escherichia coli isolated from poultry. American-Eurasian J Sci. Res. 2010; 5(1):18-22.
29. Alam MJ, Rahman MT, Siddique MP, Khan MFR, Rahman MB. Antibiogram and plasmid profiling of E. coli isolates. Int. J Bio Res. 2010; 1(3):01-07.
30. Rahman MA, Rahman AKMA, Islam MA, Alam MM. Antimicrobial resistance of escherichia coli isolated from milk, beef and chicken meat in Bangladesh. Bangl. J Vet. Med. 2017; 15(2):141-146.
31. Brown SA. Fluoroquinolones in animal health. J Vet. Pharmacol. Ther. 1996; 19:1-14.
32. Patel JH, Varia RD, Patel UD, Vihol PD, Bhavsar SK, Thaker AM. Safety level of levofloxacin following repeated oral administration in White Leg Horn layer birds.Veterinary World. 2009; 2(4):137-139.
33. Varia RD, Patel JH, Patel UD, Bhavsar SK, Thaker AM. Disposition of levofloxacin following oral administration in broiler chickens. Israel journal of veterinary medicine. 2009; 64(4):118-121.

34. Davis R, Bryson HM. Levofloxacin: a review of its antibacterial activity, pharmacokinetics and therapeutic efficacy. Drugs. 1994; 47:677-700.
35. Dumka VK, Srivastava AK. Pharmacokinetics, urinary excretion and dosage regimen of levofloxacin following single intramuscular administration in cross bred calves. Journal of Veterinary Science. 2006; 7:333-337.
36. Dumka VK, Srivastava AK. Kinetic disposition, urinary excretion and dosage regimen of subcutaneously administered levofloxacin in cross bred calves Iranian Journal of Veterinary Research. 2007; 8:313-318.
37. Dumka VK. Disposition kinetics and dosage regimen of levofloxacin on concomitant administration with paracetamol in cross bred calves. Journal of Veterinary Science. 2007; 8:357-360.
38. Ram D, Dumka VK, Sharma SK, Sandhu HS. Pharmacokinetics, dosage regimen and in vitro plasma protein binding of intramuscular levofloxacin in buffalo calves. Iranian Journal of Veterinary Research. 2008; 9:121-126.