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Prevalence of *E. coli* isolated from broiler chickens in the Haryana state

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Abstract

E. coli is normal inhabitant of GI tract in broiler birds and is also a leading cause of economic losses in broiler industry. The high prevalence underscores the need for stringent measures to ensure the safety of poultry products and minimize the risk of foodborne illnesses. Present study was carried out to assess the prevalence of *E. coli* in finisher broilers. Cloacal swabs were collected from apparently healthy broiler chickens from 2019 to 2020 in Haryana state. All the samples were found to have *E. coli* isolates (100%, n=150/150). The present study was carried out to assess the prevalence of *E. coli* in finisher broilers. Improved biosecurity measures, proper waste management, and judicious use of antibiotics can help to reduce the prevalence of pathogenic microbes in broilers.

Keywords: Broilers, *E. coli*, prevalence rate

Introduction

Escherichia coli (*E. coli*) is a common bacterium found in the intestinal tracts of animals, including broiler birds. In India, broiler production is a significant sector of the poultry industry (DAFD, 2020) [1]. *E. coli* infections can lead to economic losses due to decreased growth rates, increased mortality, and reduced feed conversion efficiency in broiler birds. Broiler birds are a common source of meat in India, and their rearing conditions, such as overcrowding and poor hygiene, can contribute to the proliferation of *E. coli*. Contaminated feed, water, contact with contaminated surfaces, and the presence of other infected birds can contribute to the spread of *E. coli* within flocks. Prevalence is the number of instances of disease or related attributes in a known population, at a designated time, without distinction between old and new cases (Thrusfield, 2007) [5]. The prevalence of *E. coli* in broiler birds can vary depending on several factors, including management practices, biosecurity measures, and environmental conditions. Indiscriminate use of antibiotics in livestock particularly poultry is incriminated as leading cause of accumulation of antibiotic resistance genes (ARGs) in commensal as well as environmental bacteria leading to emergence of antimicrobial resistance (AMR) among human bacterial pathogens which needs to be checked for betterment of humanity. Life-cycle of broiler chicken is categorized into pre-starter (1-7 days), starter (8-21 days) and finisher (21 days onwards) (ICAR, 2013) [2]. The present study was carried out to assess the prevalence of *E. coli* in finisher broilers.

Material and Methods

The study was conducted at Department of Veterinary Public Health and Epidemiology, COVS, LUVAS, Hisar. Permission from Institutional Animal Ethics Committee (IAEC) was obtained prior to initiation of this study vide no. VCC/IAEC/2161-2179, dated 26/09/2019. A total of two cloacal swabs from apparently healthy broiler chickens were taken from each of farm amounting a total of 150 samples from 75 farms located in Haryana. The samples were collected from September 2019 to September 2020. Cloacal swabs were taken in phosphate buffered saline (PBS) solution and transported on ice to Department of VPHE, LUVAS, Hisar.

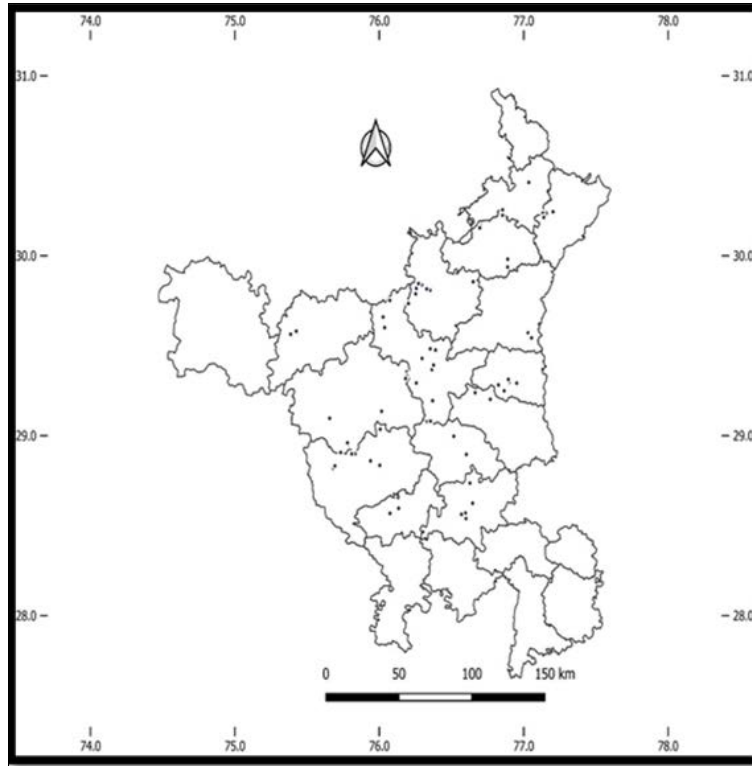


Fig 1: Location of Farms under study.

The samples were inoculated in sterile MacConkey’s broth for 24 h at 37 °C. Loopful of content was inoculated on to the MacConkey’s Agar (MLA) and incubated for 24 h at 37 °C. One pink colored purified colony was inoculated on the EMB plate for 24 h at 37 °C. Colony forming units which showed metallic green sheen were characterized by gram staining and biochemical tests as given by Markey *et al.*, 2013 [3].

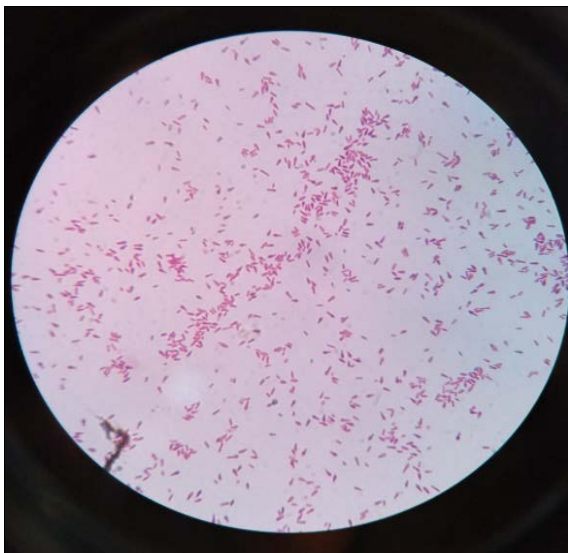


Fig 2: Gram’s staining test showing gram negative coccobacilli (pink-colored rods)

The confirmation of isolated *E. coli* was done by PCR using species specific primer (*phoA* gene) using standard temperature and time combination. Amplicons from *E. coli* positive isolates showed band at product size 465 base pairs. All the data collected during the study were entered and systematically organized in Microsoft Excel. All Statistical analyses were carried out using STATA™IC/15.1.

Results and Discussion

All the isolates on microbiological culture showed pink colored colonies on MLA and metallic green sheen on EMB agar. Isolates on gram’s staining were found to be gram-negative rod-shaped bacteria which also showed +++ profile on IMViC testing. Upon molecular testing, all the isolates (100%, n=150/150) were confirmed to be *E. coli* positive. The prevalence rate (100%) is higher than the findings of Montoro-Dasi and co-workers (2020) [4] who found that approximately 100% positive samples for *E. coli* in their GI tracts. The reason for this high prevalence is that *E. coli* is normal inhabitant of gastrointestinal tract in healthy birds and there was no history of recent antimicrobial administration since last few weeks, which otherwise could have killed *E. coli* and lowered its prevalence in GIT tract of broilers. District-wise highest prevalence was found in Jind district followed by Hisar, Jhajjar, Kaithal, Bhiwani, Kurukshetra, Panipat, Fatehabad, Rohtak, Ambala, Karnal, Yamuna Nagar, Charkhi Dadri and Sonipat districts in Haryana state.

Table 1: Prevalence of *E. coli* isolates in different districts of Haryana state

Sr. No.	Districts	No. of flocks	Prevalence
1	Ambala	3	4%
2	Bhiwani	6	8%
3	Charkhi Dadri	2	2.67%
4	Fatehabad	4	5.33%
5	Hisar	10	13.33%
6	Jhajjar	8	10.67%
7	Jind	12	16%
8	Kaithal	8	10.37%
9	Karnal	3	4%
10	Kurukshetra	5	6.67%
11	Panipat	5	6.67%
12	Rohtak	4	5.33%
13	Sonipat	2	2.67%
14	Yamuna Nagar	3	4%
Total		75	100%

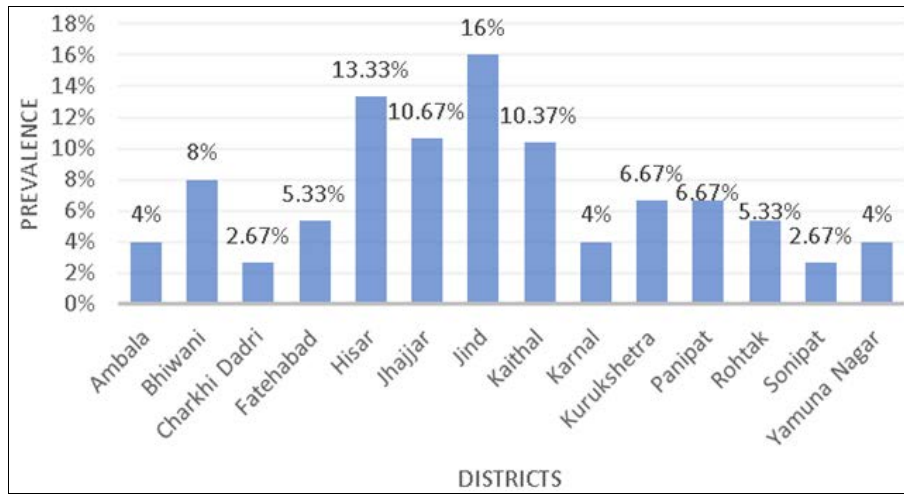


Fig 3: Prevalence of *E. coli* isolates in different districts of Haryana state

Broiler birds with less than 32 days of age (70.67%) showed more prevalence of *E. coli* isolates than birds with ≥ 32 days of age (29.33%) in the Haryana state.

Table 2: Age-wise prevalence of *E. coli* isolates in Haryana state

Age (in Days)	No. of flocks	Prevalence
≤ 31	22	29.33%
32-45	53	70.67%
Total	75	100%

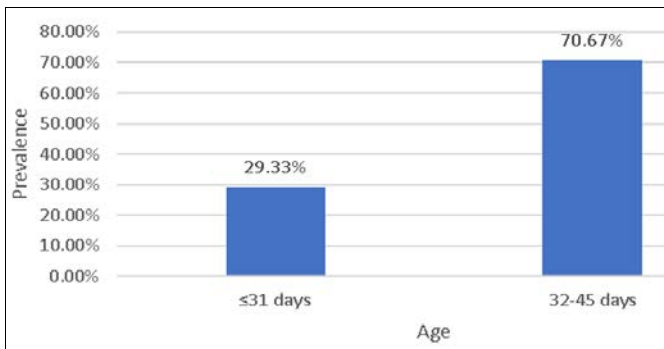


Fig 4: Age-wise prevalence of *E. coli* in Haryana state

Table 3: Weight-wise prevalence of *E. coli* isolates in Broiler birds of Haryana state

Weight of birds	No. of flocks	Prevalence
<2 Kg	25	33.33%
≥ 2 Kg	50	66.67%
Total	75	100%

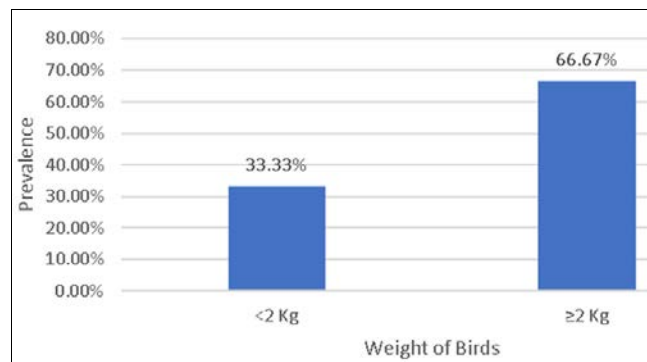


Fig 5: Weight-wise prevalence of *E. coli* isolates in Broiler birds of Haryana state

Conclusion

Strategies such as improved biosecurity measures, proper waste management, and judicious use of antibiotics can help reduce the prevalence and minimize the economic impact of *E. coli* infections in broiler production in India.

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