

## Original Research Article

# Characterization and Antimicrobial-Resistance Patterns of *Escherichia coli* Isolated from Poultry in Babylon: Implications for Poultry Health and Public Safety

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**Abstract:** The most significant morphological, biochemical, and antimicrobial susceptibility traits of typical *E. coli* bacteria were shown by the study. Swab samples were collected from the colons of 20 fowl from various veterinary clinics in Babylon in December 2023, following the observation of clinical indications, selective growth on EMB and MacConkey agar, and positive biochemical reactions like the indole test and TSI agar fermentation made it easier to identify the bacteria. The investigation gave a thorough characterization of *Escherichia coli*, confirming that isolates demonstrated resistance to widely prescribed antibiotics, emphasising the necessity of judicious antibiotic use and heightened surveillance.

**Keywords:** *Escherichia Coli*, Resistance Antibiotics and Heightened Surveillance.

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## INTRODUCTION

Gram-negative *Escherichia coli* (*E. coli*) bacteria are frequently detected in the intestines of warm-blooded animals, such as chicken. Although the majority of *E. coli* strains are benign and essential for preserving gut health, certain strains can develop into pathogenicity and cause dangerous illnesses in people and animals. A major problem for the poultry industry because it can cause colibacillosis, generates large economic loss because of low productivity and increased mortality (Barnes *et al.*, 2008). Infections in poultry has involved the administration of antibiotics and causing antibiotic-resistant so more of it emerged as a result of the widespread and occasionally careless lead to complicating treatment and posing a risk to the public's health (Barbieri *et al.*, 2017) (Abady and Al Hindi., 2024). So it could trans these resistant strains from animals to people via the food chain and constitute a zoonotic danger exacerbates the problem of antibiotic resistance even more (Ewers *et al.*, 2009). This study reveal information to address the growing problem of antibiotic resistance, a more sustainable approach to

antibiotic use is required, in addition to preventive measures and alternative therapies.

## MATERIAL AND METHODS

Swab, samples toked from intestine (colons) of 20 fowl from various veterinary clinics in "Babylon in December 2023, following the observation of clinical indications (Figure 1). These samples were subsequently delivered to the microbiological lab for analysis. A variety of scientific gear, technical tools, and disposable materials were used, as well as particular culture medium and antibiotic discs. The culture media were prepared according to normal techniques and sterilised using an autoclave, with contamination checks performed during incubation. Bacterial samples were first cultured on nutritional agar, then grown on differential and selective media, and the diagnoses were confirmed using Gramme staining and biochemical tests such as the Triple Sugar Iron Test and Indole Production Test. Bacterial suspensions were produced, streaked on Mueller-Hinton agar, and incubated with antibiotics such as Ciprofloxacin, Tobramycin, Amoxicillin, and Ceftriaxone. Following incubation, the zones of

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inhibition were quantified and analysed using a standard antibiotic susceptibility table.



Figure 1: Collection of sample included in study

## RESULTS

The investigation gave a thorough characterization of *Escherichia coli*, confirming that it is a motile, facultatively anaerobic, bacilli-shaped, Gram-negative bacteria with peritrichous flagella (Figure 2A). Lactose fermentation produced a characteristic green metallic sheen on Eosin-Methylene Blue (EMB) agar, where the bacteria was successfully isolated (Figure 2B). On MacConkey agar, the bacterium produced pink colonies that further aided in its identification (Figure 3). The ability of *E. coli* to create

indole and ferment sugars was validated by biochemical assays, such as the Triple Sugar Iron (TSI) agar (Figure 4B) and the indole test (Figure 4A). The latter test demonstrated acid generation and gas creation without hydrogen sulphide. The results of the antibiotic susceptibility tests showed that the *E. coli* isolates varied in their level of resistance, with only 30% sensitive to ciprofloxacin, 15% to tobramycin, and 34% to ampicillin, and a low 14% to ceftiraxone (Figure 5, Table 1), highlighting the significance of cautious antibiotic administration and continuous resistance pattern monitoring.

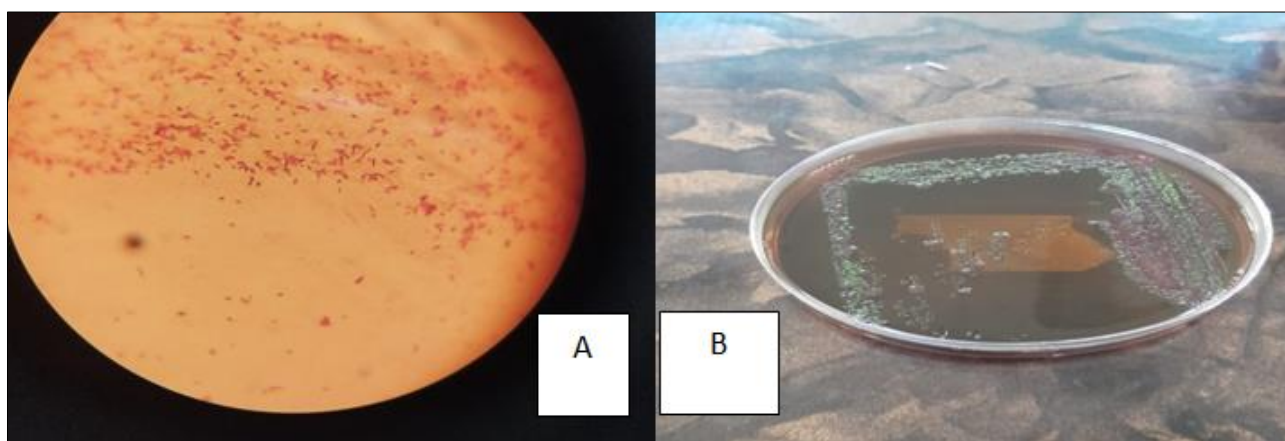


Figure 2: A Gram staining of *E. coli* and B- Isolation of *E. coli* on EMB agar

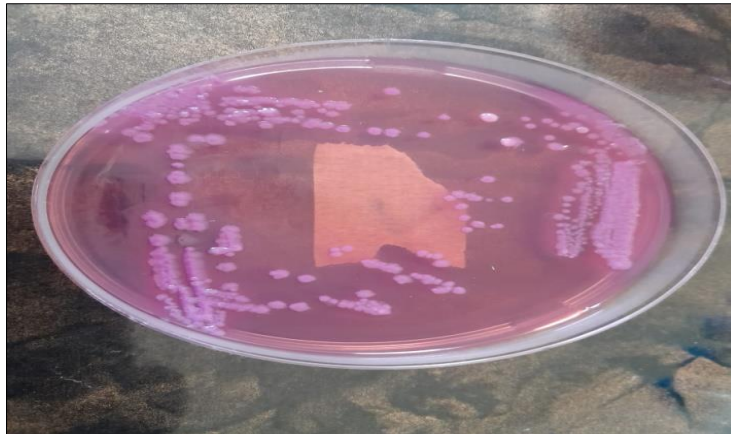


Figure 3: Isolation of *E.coli* on MacConkey agar

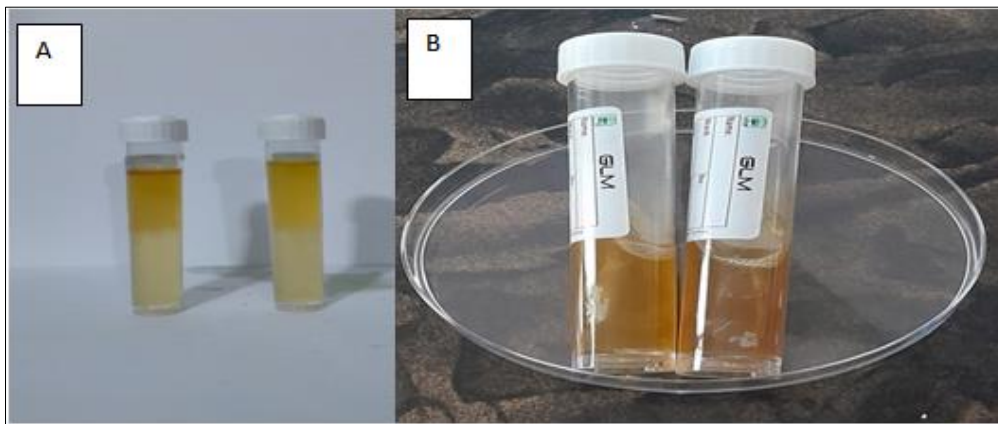


Figure 4: A Positive ping ring of *E.coli* with Indole biochemical test and B Growth of *E. coli* on TSI agar

Table: 1: Antimicrobial susceptibility patterns of *E. coli*

Type of antibiotic	Diameter of growth inhibition zone (%)
Ciprofloxacin	30%
Tobramycin	15%
Ceftiraxone	34%
Ampicillin	14%

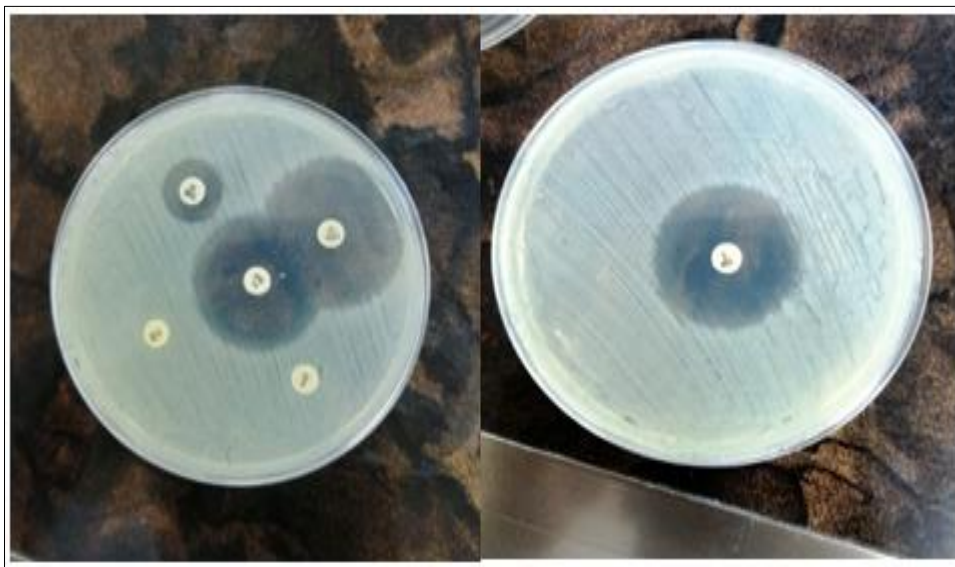


Figure 5: *E. coli* susceptibility to antimicrobial discs

## DISCUSSION

*Escherichia coli*, sometimes known as *E. coli*, is a common bacteria that is a component of the gut microbiota and may be found in the gastrointestinal tracts of humans and other warm-blooded animals, including chickens. Many strains are not harmful, but other strains have the ability to acquire antibiotic resistance genes, which can lead to serious problems for public health (Dho-Moulin & Fairbrother, 1999). The intestines of chickens naturally contain *E. Coli*, which can spread through fecal-oral transmission, polluting the surrounding area and perhaps infecting other birds.

Colibacillosis, a common infection of chickens that causes septicemia, is caused by the avian pathogenic *Escherichia coli* (APEC). According to research by Ewers *et al.*, (2009), the main causative agent of these pathogenic strains is *Escherichia coli*. This study found that pathogenic bacterial strains recovered from septicemic chickens have evolutionary similarities to healthy birds and their environments. These results suggest that the strains have the potential to spread colibacillosis among poultry populations and have the potential to be zoonotic. (1996; Barnes *et al.*, 2008; Wales *et al.*, 2010; Giovanardi *et al.*, 2005). Environmental and host variables, the illness can affect broiler birds of different ages in a variety of poultry production methods, for example layers and broilers.

The antibiotic susceptibility of *E. Coli* isolates, found that they were 80% resistant to ciprofloxacin, 75% resistant to tobramycin, 76% resistant to ceftiaxone, and 86% resistant to ampicillin. Increasing antibiotic resistance in the poultry, sector is seen by these findings. Antibiotics are no longer a reliable for *E. coli*, in order to less the spread of resistant strains, alternate treatment approaches, a stronger focus on illness prevention are required. Resistance in *E. coli* has important consequences for public health like poultry health, especially since consuming contaminated chicken products might spread resistant strains to humans. Treating common human illnesses, including urinary tract infections, where *E. coli* is a huge cause, this is especially alarming (Barbieri *et al.*, 2017). This reason, managing antibiotic resistance in poultry is essential to guaranteeing the effectiveness and safety of antibiotics for the benefit of both human and animal health.

## CONCLUSION

Bacterial diseases of poultry usually cause diseases of the gastrointestinal tract of birds. Antibiotic resistance has emerged as a result of the extensive and irregular use of antibiotics to control *E. coli*, which poses great risks to the health of both humans and animals. This sensitivity to ampicillin, ceftriaxone, tobramycin, and ciprofloxacin we found in our study. Therefore, it is necessary to combine the practical application of antibiotics with alternative management tactics, such as taking preventive measures and researching alternative treatments to solve the problem associated with antibiotics.

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