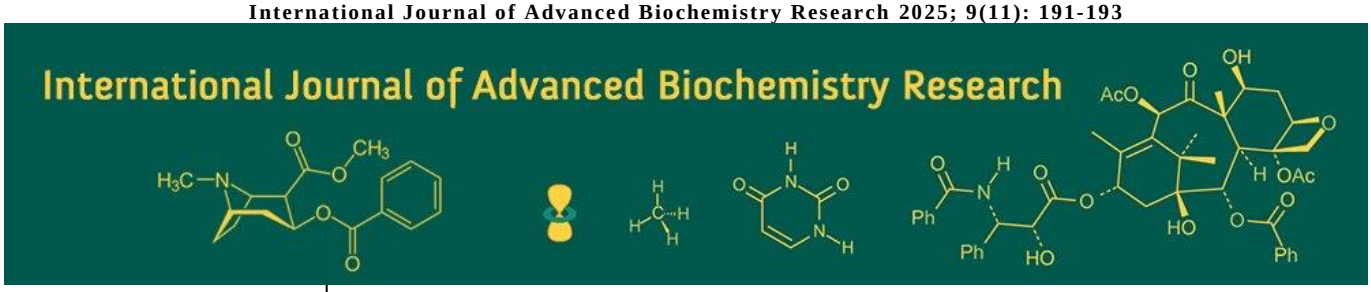

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Patel Hetvi J
Department of Veterinary Public Health and Epidemiology, College of Veterinary Science & A.H., Kamdhenu University, Anand, Gujarat, India

Dr. MN Brahmbhatt
Department of Veterinary Public Health and Epidemiology, College of Veterinary Science & A.H., Kamdhenu University, Anand, Gujarat, India

Dr. JB Nayak
Department of Veterinary Public Health and Epidemiology, College of Veterinary Science & A.H., Kamdhenu University, Anand, Gujarat, India

Shubhi Jaiswal
Department of Veterinary Public Health and Epidemiology, College of Veterinary Science & A.H., Kamdhenu University, Anand, Gujarat, India

Corresponding Author:
Patel Hetvi J
Department of Veterinary Public Health and Epidemiology, College of Veterinary Science & A.H., Kamdhenu University, Anand, Gujarat, India

Antibiotic susceptibility profile of *Staphylococcus aureus* isolated from poultry meat using disc diffusion method

Patel Hetvi J, MN Brahmbhatt, JB Nayak and Shubhi Jaiswal

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Abstract
The present study aimed to determine the antibiotic susceptibility pattern of *Staphylococcus aureus* isolates recovered from poultry meat using the disc diffusion method. A total of 46 *S. aureus* isolates were subjected to antibiotic sensitivity testing against ten commonly used antibiotics following the Clinical and Laboratory Standards Institute (CLSI) guidelines. The results revealed the highest resistance to oxacillin (65.22%) and chloramphenicol (60.87%), followed by moderate resistance to levofloxacin (23.91%). Low resistance was noted for amikacin (13.04%) and trimethoprim (10.87%), while all isolates were completely susceptible to ciprofloxacin. Gentamicin exhibited the highest sensitivity (93.48%), followed by doxycycline hydrochloride (76.09%). The overall antibiogram indicated a predominance of multidrug-resistant *S. aureus* strains in poultry meat, posing potential risks to public health. The observed resistance trends were in agreement with several previous reports, reflecting the growing concern of antimicrobial resistance in foodborne pathogens.

Keywords: *Staphylococcus aureus*, antibiotic susceptibility, poultry meat, disc diffusion, antimicrobial resistance

Introduction
Staphylococcus aureus is a major foodborne pathogen responsible for a broad range of infections in both humans and animals. Poultry meat, owing to its rich nutrient composition and frequent improper handling, provides a suitable environment for the growth and transmission of *S. aureus*. Contamination of poultry meat with this bacterium poses serious public health concerns, particularly when the isolates exhibit antimicrobial resistance (AMR).

The emergence of methicillin-resistant *S. aureus* (MRSA) has become a global issue, complicating treatment options and increasing the risk of foodborne infections (Fasiku *et al.*, 2020; Odetokun *et al.*, 2023) [3, 5]. The extensive and often indiscriminate use of antibiotics in poultry production has contributed to the selection of resistant strains that may be transmitted through the food chain, thereby threatening both animal and human health (Ruban *et al.*, 2018; Abbasi *et al.*, 2021) [6, 1].

Antibiotic susceptibility testing (AST) is an essential tool for evaluating the effectiveness of antimicrobial agents and guiding proper therapeutic management. Among the various methods available, the disc diffusion technique recommended by the Clinical and Laboratory Standards Institute (CLSI) is widely accepted due to its simplicity, reliability, and cost-effectiveness.

Considering the growing concern over antimicrobial resistance in foodborne pathogens, the present study was designed to assess the antibiotic susceptibility pattern of *S. aureus* isolated from poultry meat using the disc diffusion method and to compare the findings with previous research to evaluate current resistance trends.

Materials and Methods
Sample Collection and Isolation of *S. aureus*
A total of 46 *S. aureus* isolates were obtained from poultry meat samples collected from retail outlets in Anand, Gujarat. Samples were transported to the laboratory under chilled conditions and processed within 24 hours.

Isolation and identification of *S. aureus* were performed using standard bacteriological procedures, including Gram staining, catalase test, coagulase test, and mannitol fermentation on Mannitol Salt Agar (MSA).

Antibiotic Susceptibility Testing

Antibiotic susceptibility testing was performed using the disc diffusion method on Mueller-Hinton agar plates, following CLSI (2023) guidelines. Ten antibiotics commonly used in veterinary and human medicine were tested: Amikacin (30 µg), Ampicillin (10 µg), Cephotaxime (30 µg), Chloramphenicol (30 µg), Ciprofloxacin (5 µg), Doxycycline hydrochloride (30 µg), Gentamicin (10 µg), Levofloxacin (5 µg), Oxacillin (1 µg), and Trimethoprim (5 µg).

Bacterial suspensions equivalent to 0.5 McFarland standard were spread on agar surfaces, and antibiotic discs were placed aseptically. Plates were incubated at 37 °C for 24 hours, and the zones of inhibition were measured and interpreted according to CLSI standards as sensitive, intermediate, or resistant.

Data Analysis

The results were expressed as percentages of resistant, intermediate, and sensitive isolates for each antibiotic. Comparisons were made with previously published reports for correlation and trend analysis.

Results and Discussion

All 46 *S. aureus* isolates were successfully tested against the selected antibiotics (Table 1 & Figure 1). The isolates showed the highest resistance to oxacillin (65.22%) and chloramphenicol (60.87%), indicating the prevalence of β-lactam and chloramphenicol-resistant strains. Moderate resistance was observed for levofloxacin (23.91%), while low resistance was noted for amikacin (13.04%) and trimethoprim (10.87%). All isolates were fully susceptible to ciprofloxacin (100%), and the highest sensitivity was recorded for gentamicin (93.48%).

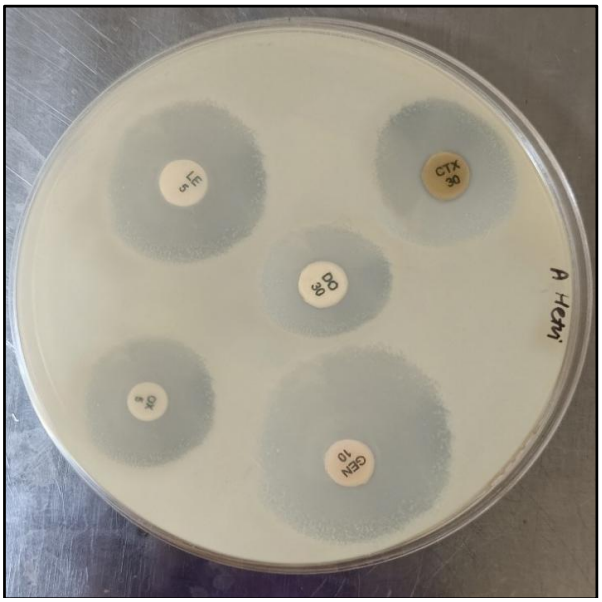
These findings are consistent with those of Ruban *et al.* (2018) [6], Odetokun *et al.* (2023) [5], who reported high sensitivity to gentamicin and varying resistance to β-lactam antibiotics. Ampicillin showed 67.30% resistance, aligning with reports from Abbasi *et al.* (2021) [1], and Jafarzade *et al.* (2023) [4]. The resistance to cephotaxime (54.35%) was higher than reported by Bantawa *et al.* (2019) [2] but comparable to other regional studies.

The variation in resistance rates among antibiotics could be attributed to differences in antibiotic usage patterns, regional practices, and the presence of resistance genes such as *mecA* and *blaZ* in *S. aureus*. The high level of oxacillin resistance suggests possible MRSA presence, warranting further molecular characterization.

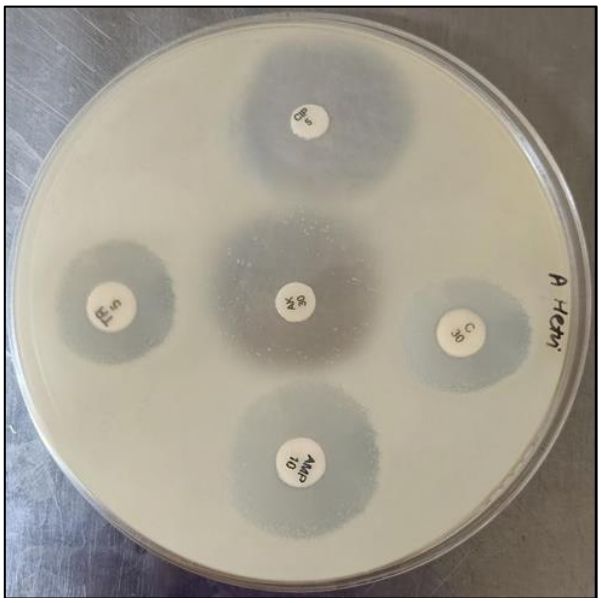
Overall, the study highlights the persistence of multidrug-resistant *S. aureus* in poultry meat, emphasizing the need for prudent antibiotic use, regular monitoring, and implementation of biosecurity measures to mitigate the spread of resistant pathogens.

Table 1: Antibiotic drug resistance pattern of *S. aureus* isolates

Sr. No.	Name of the antibiotics	Sensitive	Intermediate	Resistant
1.	Amikacin	40 (86.96%)	-	6 (13.04%)
2.	Ampicillin	15 (32.60%)	-	31(67.30%)
3.	Cephotaxime	13 (28.26%)	8 (17.39%)	25 (54.35%)
4.	Chloramphenicol	18 (39.13%)	-	28 (60.87%)
5.	Ciprofloxacin	46 (100%)	-	-
6.	Doxycycline hydrochloride	35 (76.09%)	5 (10.87%)	6 (13.04%)
7.	Gentamicin	43 (93.48%)	-	3 (6.52%)
8.	Levofloxacin	35 (76.09%)		11 (23.91%)
9.	Oxacillin	16 (34.78%)	-	30 (65.22%)
10.	Trimethoprim	39 (84.78%)	2 (4.35%)	5 (10.87%)



(Doxycycline hydrochloride, Gentamycin, Oxacillin, Levofloxacin, Cephotaxime)



Ampicillin, Trimethoprim, Ciprofloxacin, Chloramphenicol, Amikacin)

Antibiotic Susceptibility Testing

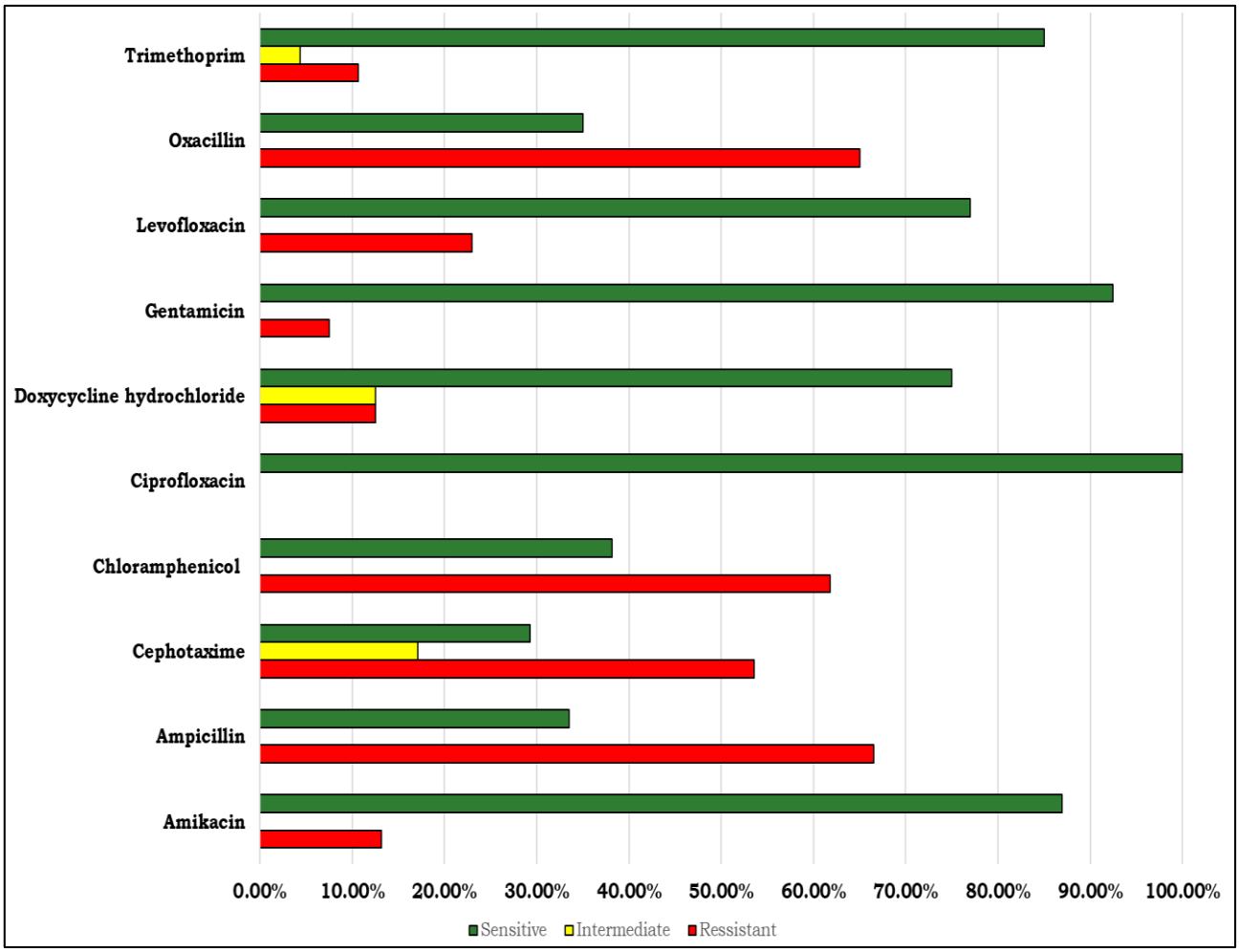


Fig 1: Antibiogram of *S. aureus* isolation

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