Conjugation mediated transfer of Extended Spectrum of β-Lactamases resistance among Poultry Enterobacteriaceae isolated from healthy native chicken

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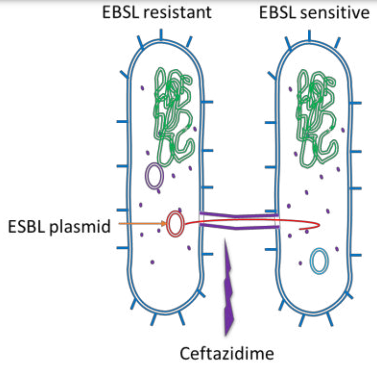
Hypothesis

Cell wall acting antibiotics influences conjugation mediated horizontal transfer of ESBL resistance among *E. coli, Klebsiella* spp. and *Salmonella* spp. isolated from healthy native chicken



Introduction

- Commensal and pathogenic microbes of poultry gastrointestinal tract may develop antimicrobial resistance (AMR) due to selection pressure imposed by continuous administration of antimicrobials through feed and water
- Emergence of ESBL resistance in poultry isolates of *E. coli, Klebsiella* spp. and *Salmonella* spp. can pose threat to One Health
- Horizontal transfer of ESBL resistance among members of the Enterobacteriaceae is often mediated through conjugation with ESBL genes carried on transferrable plasmid

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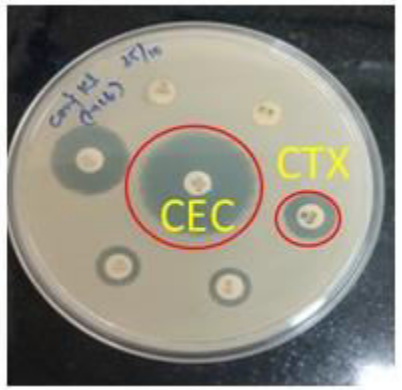
ONE HEALTH POULTRY HUB

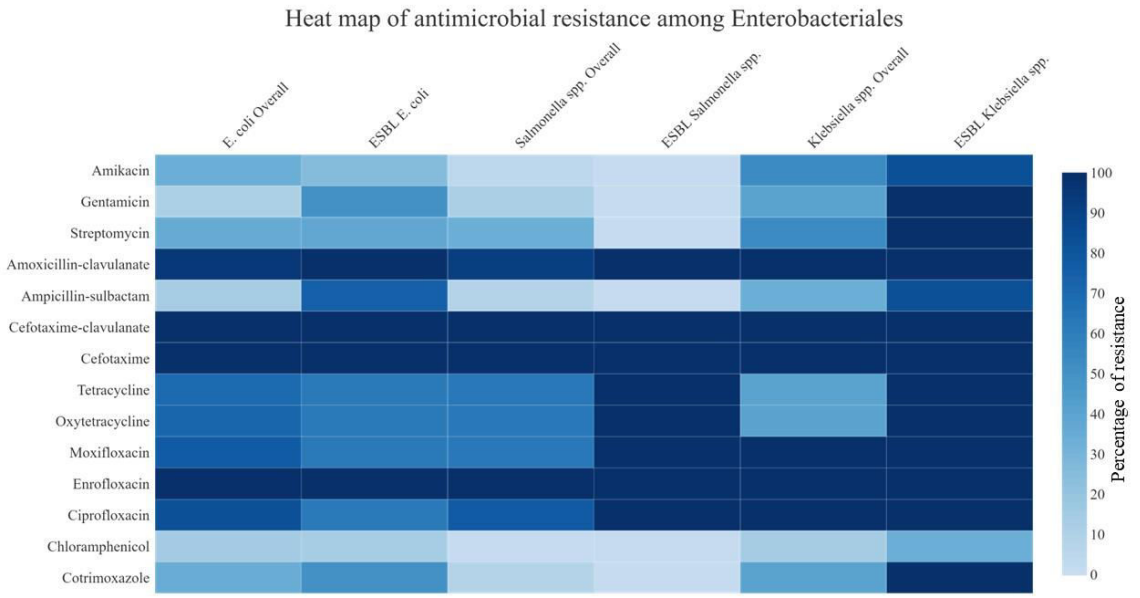
Methods

- Cloacal & environmental samples (n=325) – healthy native chicken – Tamilnadu, India
- ESBL isolation– MacConkey with Cefotaxime & Ceftazidime
- Antimicrobial susceptibility- double disc diffusion test – CEC & CTX
- Genotypic characterization of ESBL – 7 β lactam genes -PCR
- Conjugation experiment – Control ESBL isolates: DH5α
- ESBL: non-ESBL - Absence/ Presence of ceftazidime (1/10th of MIC)



Results

- ESBL phenotype: *E. coli*- 8.51%, *Klebsiella* spp. - 37.5%, *Salmonella enterica* - 7.41%
- All ESBL isolates are multidrug resistant
- *blaTEM* common genotype of ESBL
- Klebsiella - *blaTEM, blaSHV, blaOXA* found on plasmids
- Chromosome encoded ESBL resistance 87.5 % of ESBL *E. coli* (n=8)
- Tetracycline – *TetA*; Aminoglycoside – *Sul2*



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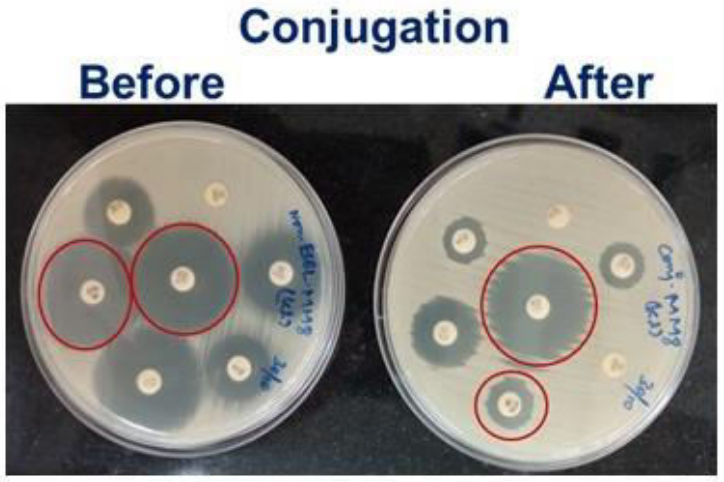
Results - Conjugation studies

- *E. coli* strain DH5α act as recipient for ESBL plasmid transfer
- *S. enterica* more efficiently transferred ESBL resistance to *Klebsiella* spp. and *E. coli*
- *S. enterica* carrying *blaTEM* transfer ESBL plasmid to *E. coli* & *Klebsiella* spp. even after exposure to ceftazidime @ 1/10th of MIC



Discussion

- ESBL genotypes vary according to geography, disease status of poultry
- Various plasmid, donor and recipient factors are involved in conjugation mediated transfer of ESBL resistance
- Exposure of donor strains to different concentrations of antibiotics influence ESBL transfer (Lopatkin *et al*., 2016; Liu *et al*., 2019; Ruotsalainen *et al*., 2020)

Conclusions

- Healthy native chicken carry MDR microflora and pathogens with ESBL resistance
- Isolates carrying transferrable ESBL resistance could transfer ESBL plasmid even after exposure to sub-lethal concentration of antibiotics