Avian Pathogenic Escherichia coli (APEC) is the contributing agent behind the avian infectious disease colibacillosis, which causes substantial fatalities in poultry industries having a significant impact on the economy and food safety. Several virulence genes have been shown to be concomitant with the extra-intestinal survival of APEC. This study investigates the antibiotic resistance patterns and APEC-associated virulence genes content in Escherichia coli (E. coli) isolated from non-healthy and healthy broiler chickens from a commercial poultry farm in Qatar. A total of 158 E. coli strains were isolated from 47 chickens from five different organs (air sac, cloacal, kidney, liver, and trachea). Based on genetic criteria, 65% were APEC strains containing five or more virulence genes, and 34% were non-pathogenic E. coli (NPEC) strains. The genes ompT, hlyF, iron, tsh, vas, iss, cvi/cva, and lacU were significantly prevalent in all APEC strains. E. coli isolates showed 96% resistance to at least one of the 18 antibiotics, with high resistance to ampicillin, cephalothin, ciprofloxacin, tetracycline, and fosfomycin. Our findings indicate high antibiotic resistance prevalence in non-healthy and healthy chicken carcasses. Such resistant E. coli can spread to humans, hence, special programs are required to monitor the use of antibiotics in chicken production in Qatar.

Discussion

- Detection of cases of resistant APEC strains in commercial poultry business is alarming.
- This study exhibited a high level of resistance, including 96% to about one antibiotic among E. coli isolates from both healthy and non-healthy chicken samples.
- High resistance of 96.3% and 82.4% to ampicillin, 100% and 94.1% to cephalothin, 97.8% and 100% to ciprofloxacin, 80% and 82.4% to tetracycline, 84.4% and 76.5% to fosfomycin was reported among non-healthy and healthy chickens, respectively.
- The mcr-1 gene was available in all isolates showing colistin resistance, validating its function in colistin resistance.
- This research reported a significantly high level of MDR E. coli (99.3%) in the chicken samples.
- The increase of antibiotic-resistant strains, especially colistin and multidrug resistance strains in Qatar’s poultry farms could easily spread to humans through chicken meat consumption and non-compliance with hygiene practices among farmworkers.

Conclusion

- It is Qatar’s first study to genetically isolate Avian Pathogenic Escherichia coli (APEC) and its resistance in connection to antibiotics among broiler chickens.
- The findings validate the existence of APEC strains among chickens and high antibiotic resistance prevalence in healthy and non-healthy broiler chickens.
- E.coli can easily spread to people; hence, special programs are needed to manage the usage of antibiotics in Qatar’s poultry industry and monitor the transmission and spread of APEC within this industry.

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