E. coli plasmid-mediated colistin resistance in Faisalabad, Pakistan: A glance

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Antimicrobial resistance (AMR) is one of the major leading problem and an issue for medical science in this era. The discovery of *mcr-1* gene has led to medical science to hands off at present. This work aims to give a glance on plasmid-mediated *mcr-1* gene mechanism of resistance to colistin in *Escherichia coli* and current status of *mcr-1* in Faisalabad, Pakistan.

Key Words: *AMR; mcr-1 gene; E. coli*

INTRODUCTION

E. coli is a straight gram-negative rod, most abundant facultative anaerobe in colon and feces. It has three antigens that are used to identify the organism in epidemiologic investigations: the O, or cell wall, antigen; the H, or flagellar; and the K, or capsular, antigen. *E. coli* have different structures of special interests such as plasmids self-replicating, double stranded, extra-chromosomal DNA.

Plasmids help bacteria in transmission of traits, transferring drug resistant genes between same and even different species as well [1]. The first report of plasmid mediated colistin resistance designated as *mcr-1* is from China during a routine surveillance project on antimicrobial resistance in commensal *E. coli* from food animals. The *mcr-1* gene was isolated from a pig of *E. coli* strain SHP45 [2].

ANTIMICROBIAL RESISTANCE (AMR)

Antimicrobial resistance is the leading issue and universal threat to one health in this era; WHO and US Centres for Disease Control and Prevention are clearly stating about medical science going towards pre-antibiotic era [2].

COLISTIN

Colistin is a polycationic peptide, belongs to family of polymyxins such as (polymyxin B or polymyxin E) used as antimicrobial agent to treat infections caused by *Enterbacteraciae* multidrug resistant pathogens [3]. Colistin is used to tackle the infections caused by ESKAPE group resistant pathogens (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter* spp.) [4].

PLASMID-MEDIATED COLISTIN RESISTANCE

The *mcr-1* gene encodes a family of phosphoethanolamine transferases that modified the lipid A, by adding phosphoethanolamine into lipid A, that masks the negative charge of LPS and lowers its affinity towards cationic molecule of colistin, and hence shows resistance to colistin [2].

EPIDEMIOLOGICAL VIEW OF COLISTIN RESISTANCE IN FAISALABAD, PAKISTAN

The first clinical report of Indian subcontinent showed one colistin-resistant *E. coli* isolate was collected from a 35-year-old male patient suffering from burn associated wounds, from Faisalabad in Pakistan [5]. In another report one APEC isolate (Pk-200) harbored the *mcr-1* gene recovered from colibacillosis affected poultry [6].

The first detection of *mcr-1* in colistin-resistant extended-spectrum β-lactamase-producing *E. coli* (ESBL-*E. coli*) isolated from wild transboundary migratory waterfowl species *Fulica atra* from Pakistan [7]. In another recent report, of 100 healthy broiler chicken, colistin resistant *E. coli* were found in only 8 (8%) samples of commensal *E. coli* strains [8].

CONCLUSION

There is an urgent emphasize needed to look for *mcr-1* gene, not only in birds but also in animals. The birds can travel and disseminate more than animals, but we cannot neglect the impact of human interaction between domestic and wild life. Moreover, there should also be a plan for addressing people to make them aware, about global geographical boundaries and respected danger of MDR-strains.

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