Letter to the Editor

Worldwide spread of NDM-1: are migratory birds culprits?

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Multi-drug resistance has become a major threat to community acquired and nosocomial infections, worldwide [1]. Carbapenems are used as last resort drugs because of the increasing resistance against beta-lactam group antibiotics. The resistance against the carbapenem antibiotic class has also emerged worldwide for at least a decade and became a major public health problem. The latest metallo-beta-lactamase (MBL) named New Delhi metallo-beta-lactamase (NDM-1) has been identified as a novel class of carbapenemase in *Enterobacteriaceae*. It was first identified in a Swedish patient who travelled to India to receive his treatment and was admitted to New Delhi hospital [2]. This was the first report of $bla_{\text{NDM-1}}$ and the first report of MBL carriage among Enterobacteriaceae in UK. Subsequently, many reports on the emerging trends of NDM-1 in different parts of the world have been published. A total of ten variants of NDM (NDM-1 to NDM-9, NDM-12) have been reported so far [3]. The hydrolytic activity against all β-lactam of NDM and its variants, except NDM-2, have been found increased as compared to NDM-1 [4].

Antibiotic use and its repercussions have been discussed extensively in the earlier decades. The situation may have global upshots if antibiotic resistance becomes pervasive in the intestinal bacterial flora of stationary and migratory birds. In a previous study 11 species of bacteria from masked booby (*Sula dactylatra*) and Christmas shearwater (*Puffinus nativitatis*) were identified, including Gram-negative bacilli and species of *Streptococcus*. During susceptibility testing some of the bacterial strains were found to be ESBL producers. The two bacteria harbouring the ESBL type were identified as *Serratia odorifera* biotype 1, which has zoonotic importance. Several multi-resistant bacteria including two isolates with ESBL phenotypes were identified in the masked booby and Christmas shearwater habitats in spite of minimal human presence, and the extreme geographical status of Easter Island. The detection of ESBLs in the birds is of great public health concern, especially because the antibiotic-resistant bacteria now are distributed globally [5].

It has also been previously reported that horizontal gene transfer is causing a spread of drug resistance through migratory birds. Between November and March 1983-1986, R plasmids were detected in *E. coli* strains isolated from faeces of migratory waterfowls, including whistling swans (*Cygnus columbianus*), black-tailed gulls(*Larus crassirostris*) and pintails (*Anas acuta*) collected from the San-in District, Japan [6].

Transfer of these resistant markers through horizontal gene transfer among the bacterial population isolated from these birds may become one of the major roots of global spread of resistance.

Previous studies have reported multidrug-resistance in wild birds. Moreover, in one of the studies, wild seagulls are haulers of ESBL-producing *E. coli,* although the rate was lower than previous study in which ESBL determinants were identified [7]. Recently it has been found that organisms in livestock, companion animals and wildlife are major spreading factors. The emergence of carbapenemase-producing *Escherichia coli*, VIM-1 producing Salmonella spp. and Acinetobacter spp., with OXA-23 and NDM-1 in livestock animals such as poultry, cattle and swine as well as in their environment, has been reported. Moreover, NDM-1 and OXA-48 producing *E. coli* and *Klebsiella pneumoniae,* and OXA-23 producing

Acinetobacter spp. were isolated from cats, dogs and horses [8].

Although no NDM-1 spread has been reported through migratory birds so far. it is time to think prudently in order to screen NDM-1 detection in migratory birds.The spread of NDM-1 and its variants in different geographical regions can be identified if NDM-1 producing bacterial strains are detected in birds migrating from different regions of the world. My experience suggests that exploring the antibiotic resistant markers, especially NDM-1, in bacteria isolated from stationary and migratory birds which will definitely provide a new insight to understand the mechanism of antibiotic -resistance and its control measures.

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