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Dr. Refath Farzana is working as faulty of Microbiology in Khwaja Yunus Ali Medical College, Bangladesh. She had come into the possession of searching source, mechanism and dissemination of antimicrobial resistance through her Master degree in Medical Microbiology. Presently she has got the National nomination for Commonwealth Scholarship 2016 for pursuing doctoral degree in Cardiff University, UK.

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ISID/ESCMID Fellowship Report

Emergence and spread of multi-drug resistant A. baumannii *clones inside and outside of the hospital environments in Bangladesh*

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Introduction

The project entitled "Emergence and spread of multi-drug resistant *A. baumannii* clones inside and outside of the hospital environments in Bangladesh" was aimed to investigate the molecular epidemiology of MDR *A. baumannii,* for example, abundance of the clinically relevant antimicrobial resistant phenotypes and genotypes, clonal distribution, spread dynamics in Bangladesh. Antibiotic resistance is a serious challenge for the health care systems in Bangladesh which rending many infections difficult or impossible to treat. Some factors like poor health infrastructure, mismanagement of hospital hygiene and improper handling of hospital wastes are thought to be the contributing factors in the scenario of antibiotic resistance spread.

Materials and Methods

From January 2015 to March 2015, a total of 49 of putative *Acinetobacter* clinical isolates were collected from clinical microbiology laboratories of five hospitals in the Dhaka city of Bangladesh. In addition, 100 samples were collected in the same time from different environmental surfaces of Dhaka Medical College Hospital (DMCH) that includes such as bed rail, bed side table, bed sheet, pillow, clip file, switch board, floor, door, tap water, sink, blood pressure cuff, ventilator, catheter, O2 mask, sucker, multi-parameter monitor of ICU, toilets (pans, tap water, door, floor, sink) and sewage-drains. DMCH was chosen for taking environmental samples, as most of the patients from Dhaka city and country sides are generally referred to this hospital which represents the drug resistant scenario of the country. MDR *Acinetobacter baumannii* was identified by culture, biochemical tests and OXA-51 PCR. Susceptibilities to commonly used antibiotics were determined according to the European Committee on Antimicrobial Susceptibility Testing (EUCAST). Both clinical and environmental strains that have resistant phenotypes to quinolones were screen for plasmid mediated resistant genes (*qnrA, qnrB, qnrS*, *qepA*, *qnrC* and *aac(6)-Ib* by a series of established PCR protocols (Cattoir *et al.*, 2007; Park *et al.*, 2006; Perichon *et al.*, 2007;Wang *et al.*, 2009). Screening of 16S-methylase activity (*rmtA, rmtB, rmtC, rmtD, armA*) was performed by multiplex PCR. Multiplex PCR was also used to determine OXA carbapenemase (OXA-23, 24, 58, 143) (Woodford *et al.*, 2006; Higgins *et al.*, 2010). We used real-time PCR for detecting b*laNDM, blaVIM, balIMP, blaSPM, blaSIM, blaGIM* and *blaKPC* (Bisiklis *et al.*, 2007). The genetic profiles of *A. baumannii* isolates were determined by rep-PCR accordingly previously described method (Hasan *et al.*, 2012).

Forty nine putative clinical and 10 environmental MDR *A. baumannii* confirmed by biochemical tests and PCR were subjected to further analysis. Clinical isolates showed resistant to ciprofloxacin followed by piperacillin, cefepime, amoxicillin-clavulanic acid, cefotaxime, imipenem, meropenem, gentamicin, amikacin, tetracycline,ceftazidime and sulfamethoxazole-trimethoprim. However, environmental isolates were resistant to cefepime, cefotaxime, ceftazidime, amoxicillin-clavulanic acid, piperacillin, imipenem, meropenem, gentamicin, amikacin, ciprofloxacin followed by tetracycline and sulfamethoxazole-trimethoprim.

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Interestingly, all the human and environmental *A. baumannii* were sensitive to colistin. Ciprofloxacin resistant clinical isolates were positive for *aac6* and *qnrB1*, respectively. Some of the ciprofloxacin resistant human isolates did not have *qnrS1, qepA, qnrC1* and *qnrA1*. All the ciprofloxacin resistant environmental isolates had the *aac6* and one carried *qnrC1*. Isolates resistant to aminoglycoside had only *armA*. Among the 49 clinical isolates, 40 carried *blaOXA-23* and one had the *blaOXA-58*. All environmental MDR A. baumannii had only *blaOXA-23*.

We got total 36 different clones from clinical isolates of hospitals and environment. The predominant clonal type was the AC followed by BC and FC. There were certain common clinical clones that were circulated in different hospitals of Bangladesh. Common clones were found in both patients and environmental.

Conclusions

According to our findings, multi-drug resistant *A. baumannii* clones were wide spread in the hospital environment. OXA type carbapenem resistance was dominant among clinical and environmental isolates. Hospital hygiene, proper disposal of hospital waste and proper use of antibiotic must be practiced in order to stop further spread of common and novel *A. baumannii* clones.

Working from 1st May 2015 to 15th July 2015 at Zoonosis Laboratory, Dept. of Medical Science, Uppsala University facilitated my learning-understanding about laboratory etiquette, group working, and handling of modern equipments, proper treatment of laboratory waste and stress management. I was delighted to get warm welcome from Dr. Badrul Hasan on my arrival at Uppsala and on the first day in the laboratory as well along with his continuous guidance, inspiration and constructive criticism throughout the project. It was exciting to enlist as a member of zoonotic research group of Uppsala University and to attend every group meeting, journal club and scientific seminar. I am grateful to my colleagues of Uppsala University for their heartiest cooperation, friendliness and all types of help in the laboratory works.

I appreciate ISID's role to encourage young researchers from developing countries for working in international research environment. The fellowship programme exposed me to number of experienced physicians and veterinarians heightening my understanding about the professional and ethical issues impacting the practice of clinical laboratory science and biomedical science research as well as raising the opportunity of scientific collaboration and networking in future

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