Effect of Carbapenem Exposure On The Fitness of Extended Spectrum Beta-Lactamase (ESBL)-Producing *Escherichia coli* Strains Isolated From Migrant Communities Working in the Klang Valley, Malaysia

RES-256

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Introduction

Silent carriage of **Extended Spectrum Beta-Lactamase (ESBL)-producing *Escherichia coli* (ESBLEC)** is a risk factor for onward dissemination of the bacteria and host future infections. We investigated the effect of carbapenem exposure on the fitness of **ESBLEC** strains isolated from economic migrants of the Klang Valley, Malaysia.

Methodology

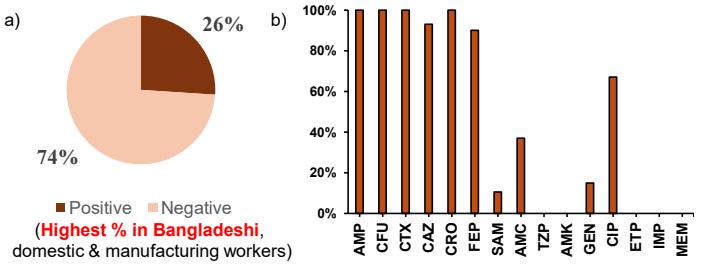
Participant recruitment → **ESBLEC identification (CHROMagar) and antibiotic susceptibility testing** (AST) → **ESBL and Enterobacterial Repetitive Intergenic Consensus Polymerase Chain Reaction (ERIC-PCR) Genotyping** → **representative strain selection**

Antibiotic exposure : (imipenem (IMP), meropenem (MEM) and ertapenem (ETP))
- Time based induction (24, 48 and 72 h with 1/2x MIC of tested strains)
- Concentration based induction (1x, 2x and 1/2x MIC of tested strains in 24 hour)

Fitness test
- Growth curve analysis
- Desiccation assay (24, 48 and 72 h)

Results

Figure 1 : ESBLEC carriage and AST results of tested strains



(**Highest % in Bangladeshi**, domestic & manufacturing workers)

Table 1 : Common AST profiles of tested strains

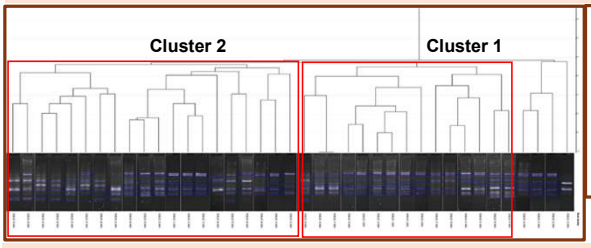
Most common AST profiles	No. of strains (%)
Ampicillin+ Cefuroxime + Cefotaxime + Ceftazidime + Ceftriaxone + Cefepime + Ciprofloxacin	14 (20.9)
Ampicillin+ Cefuroxime + Cefotaxime + Ceftazidime + Ceftriaxone + Cefepime	13 (19.4)
Ampicillin+ Cefuroxime + Cefotaxime + Ceftazidime + Ceftriaxone + Cefepime + Ampicillin/Sulbactam + Ciprofloxacin	12 (17.9)

Table 2 : ESBL genotyping of tested strains

ESBL gene / genotype	N (%)
*bla*TEM	27 (40.3)
*bla*CTX-M-1	61 (91.0)
*bla*CTX-M-9	5 (7.4)
*bla*OXA-1	15 (22.4)
ESBL genotype	
*bla*TEM	1 (1.5)
*bla*CTX-M-1	33 (49.3)
*bla*CTX-M-9	1 (1.5)
*bla*TEM + *bla*CTX-M-1	14 (20.9)
*bla*TEM + *bla*CTX-M-9	3 (4.5)
*bla*CTX-M-1 + *bla*OXA-1	7 (10.4)
*bla*CTX-M-9 + *bla*OXA-1	1 (1.5)
*bla*TEM + *bla*CTX-M-1 + *bla*OXA-1	7 (10.4)

Most prevalent ESBL gene among our study strains

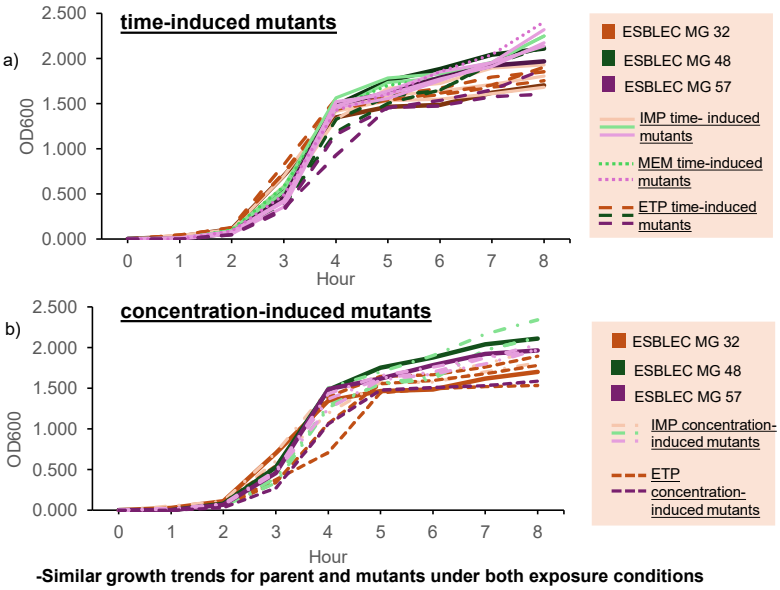
Figure 2 : ERIC-PCR analysis of strains with the most common AST profiles to select parent strains for carbapenem exposure



1) Carried *bla*CTX-M
2) Dominant ERIC fingerprint in each cluster

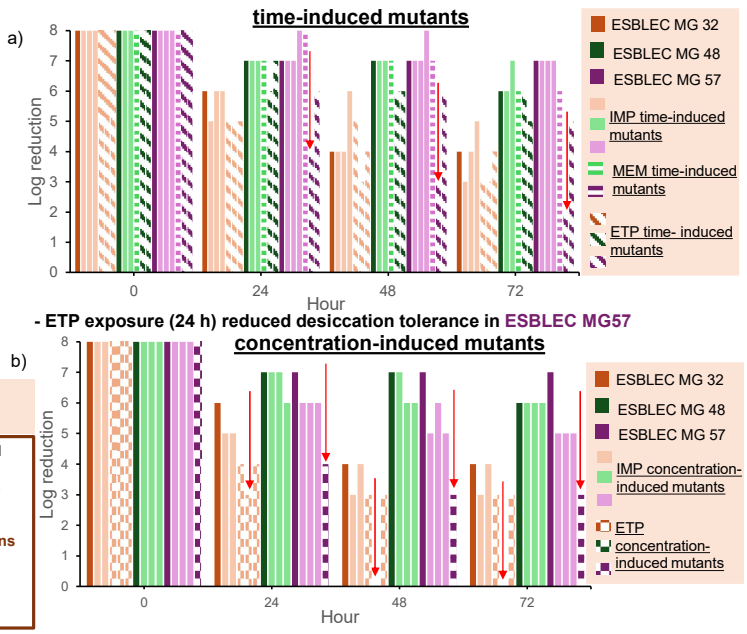
Representative strains selected
1. ESBLEC MG 32
2. ESBLEC MG 48
3. ESBLEC MG 57

Figure 3 : Growth curve analysis



-Similar growth trends for parent and mutants under both exposure conditions

Figure 4 : Desiccation assay analysis



- ETP exposure (24 h) reduced desiccation tolerance in ESBLEC MG57

- ETP exposure (½× MIC) reduced tolerance in ESBLEC MG57;
- ETP exposure (2× MIC) reduced tolerance in ESBLEC MG32

Table 3 : Number of strains that survived carbapenem exposure

	Time based induction			Concentration based induction		
ESBLEC MG	32	48	57	32	48	57
IMP Induction	3	2	3	2	3	3
MEM Induction	0	1	1	0	0	0
ETP Induction	3	2	2	3	0	1
Total strains	6	5	6	5	3	4

Conclusion

Our findings show the presence of ESBLEC in migrant communities and their phenotypic stability post-carbapenem exposure, posing a risk for forward antimicrobial resistance dissemination.

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