

SATREPS research in Hanoi.

Community:

A potential reservoir
of CTX-M type ESBL-producing *Escherichia coli*?

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Aims

- >to investigate current situation of ESBL-producing *E. coli* in asymptomatic healthy individuals in Bavi.
- >to investigate possibilities of ESBL-producing *E. coli* transmission among household and households member
- >to investigate diversities in genetic backgrounds of ESBL-producing *E. coli* such as phylogenetic groups, bla_{CTX-M} , plasmids and pulsed-field gel electrophoresis (PFGE) patterns.

Strategy

- >analysis of ESBL-producing *E. coli* isolates obtained from three samplings at Jun 2013, Nov 2013 and Jun2014.
- >>molecular typing by PCR, conventional sequence analysis, evaluation of genetic relatedness by PFGE.

Materials and methods

- >From the same 199 healthy Vietnamese individuals belonged to 47 families, 597 fecal samples were collected.
- >Screening using MacConkey agar supplemented with 1 μ g/ml CTX.
- >PCR-based detection of *bla*_{CTX-M-1, -2, -9} and ₋₂₅ groups and phylogenetic classification.
- >Conventional sequence analysis of the detected *bla*_{CTX-M}s.
- >PFGE with XbaI-digested DNA samples for evaluation of genetic relatedness and S1 nuclease-digested samples for plasmid qualitative and quantitative characterization.

Results

- >The mean age of the participants at the last sampling was 40.5 years (SD = 23.1).
- >The age range was between 1 and 92 years.
- >The study population consisted of 93 men (46.7%) and 106 women (53.3%).
- >Prevalence of the CTX-M type ESBL-producing *E. coli* was **46.7%** in June 2013, **52.8%** in November 2013, and **46.2%** in June 2014.

Genotyping of *E. coli* possessing *bla*_{CTX-M} among the three samplings.

Detected sampling(s) of <i>E. coli</i> possessing <i>bla</i> _{CTX-M}			Detected <i>bla</i> _{CTX-M} group										Detected phylogenetic group							
			any CTX-M		CTX-M-1		CTX-M-2		CTX-M-9		CTX-M-25		A		B1		B2		D	
Jun-13	Nov-13	Jun-14	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*	n	%*
+			25	12.6	28	14.1	1	0.5	27	13.6	2	1.0	25	12.6	17	8.5	12	6.0	17	8.5
	+		36	18.1	14	7.0	0	0.0	35	17.6	0	0.0	29	14.6	12	6.0	3	1.5	45	22.6
		+	28	14.1	14	7.0	0	0.0	30	15.1	1	0.5	29	14.6	19	9.5	11	5.5	14	7.0
+	+		22	11.1	4	2.0	0	0.0	15	7.5	0	0.0	2	1.0	0	0.0	2	1.0	4	2.0
+		+	17	8.5	2	1.0	0	0.0	8	4.0	0	0.0	7	3.5	2	1.0	0	0.0	2	1.0
	+	+	18	9.0	0	0.0	0	0.0	25	12.6	0	0.0	0	0.0	0	0.0	0	0.0	5	2.5
+	+	+	29	14.6	0	0.0	0	0.0	16	8.0	0	0.0	1	0.5	0	0.0	0	0.0	2	1.0

*; Detection rates of *bla*_{CTX-M} (%) and phylogenetic group (%) are indicated in percentage of the 199 participants.

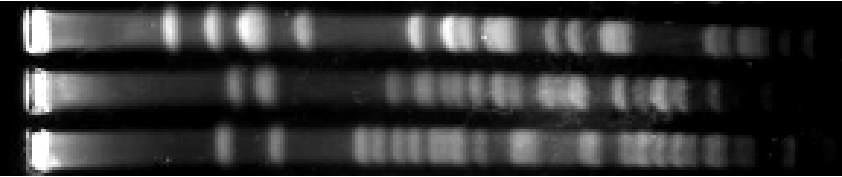
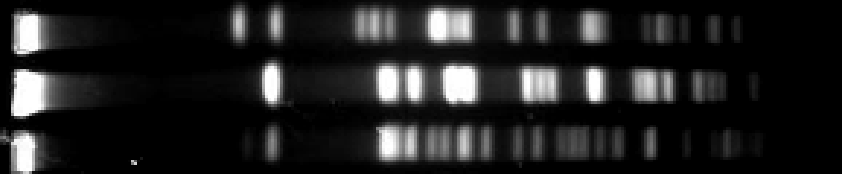
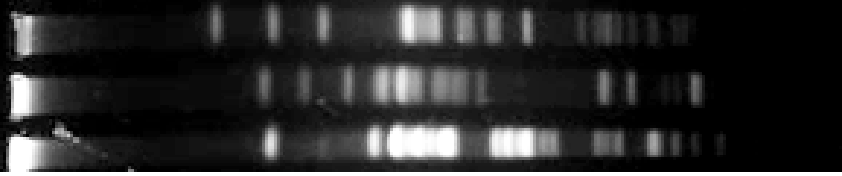
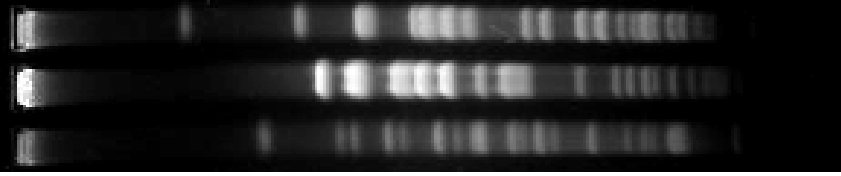
Results

>The prevalence was around **50%**.

Detected sampling(s) of <i>E. coli</i> possessing <i>bla</i> _{CTX-MS}			any detected CTX-M	
Jun-13	Nov-13	Jun-14	n	%
+			25	12.6
	+		36	18.1
		+	28	14.1
+	+		22	11.1
+		+	17	8.5
	+	+	18	9.0
+	+	+	29	14.6

Results

>PFGE patterns of the ESBL-producing *E. coli* isolates were valid.
 PFGE pattern was changing even in same individuals.

Samp.	CTX-M	Phy.G	PFGE pattern	ID#
Jun-14	9	D		5323
Nov-13	9	D		
Jun-13	9	D		
Jun-14	9	A		37122
Nov-13	9	A		
Jun-13	1+9	A		
Jun-14	9	A		38313
Nov-13	9	D		
Jun-13	9	A		
Jun-14	9	D		48122
Nov-13	9	B1		
Jun-13	1	A		

Results and Discussion

- >Prevalence of the CTX-M type ESBL-producing *E. coli* was high.
- >Carriage period of the CTX-M type ESBL-producing *E. coli* could be less than 6 month, even though one individual could carry several genetic heterogeneous *E.coli* strains possessing bla_{CTX-M} S.
- >There might be several strains of *E. coli* possessing bla_{CTX-M} in BaVi community.

- >Community might play role as a reservoir of the CTX-M type ESBL-producing *E. coli*.
- >And if certain ESBL-producing *E. coli* might be circulating, we can contain them by certain intervention(s).

Results

>Circulating in households were...

Household	Jun, 2013	Nov, 2013	Jun, 2014
<p>#20</p> <p>20121 (91) 20211 (54) — 20222 (53) 20322 (24) — 20311 (27)</p>	<p>CTX-M: 1, 9 PhyG: A</p>	<p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 9 PhyG: B1</p> <p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 9 PhyG: B1</p>	<p>CTX-M: 1, 9 PhyG: D</p> <p>CTX-M: 9 PhyG: B1</p> <p>CTX-M: 9 PhyG: D</p>
<p>#22</p> <p>22121 (78) 22211 (40) — 22222 (36) 22321 (6) — 22322 (1)</p>	<p>CTX-M: 1, 9 PhyG: D</p> <p>CTX-M: 9 PhyG: A</p> <p>CTX-M: 1 PhyG: B1</p>	<p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 9 PhyG: A</p> <p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 9 PhyG: D</p>	<p>CTX-M: 9 PhyG: B2</p> <p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 9 PhyG: D</p>
<p>#24</p> <p>24111 (73) — 24122 (73) 24211 (40) — 24222 (36) 24321 (18) — 24312 (9)</p>	<p>CTX-M: 1 PhyG: A</p> <p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 1 PhyG: D</p> <p>CTX-M: 1 PhyG: A</p>	<p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 9 PhyG: A</p> <p>CTX-M: 9 PhyG: D</p>	<p>CTX-M: 9 PhyG: A</p> <p>CTX-M: 9 PhyG: D</p> <p>CTX-M: 9 PhyG: B1</p> <p>CTX-M: 9 PhyG: D</p>

Results and Discussion

- >And if certain ESBL-producing *E. coli* might be circulating, we can contain them by certain interventions.
- >We should identify which factor can be contribution (risk) factor(s) for the higher prevalence in the community.
- >We should observe those ESBL-producing bacteria (or bacteria possessing plasmid mcr-1?) in human, live stock and environment.
- >Epidemiological analysis is essential. We are still working on....

Acknowledgements

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SATREPS members