

RESEARCH ARTICLE

Intestinal carriage of ESBL-E among sick children in Mahajanga, Madagascar

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ABSTRACT

The emergence of extended spectrum beta-lactamases producing enterobacteriaceae (ESBL-E) to antimicrobials is a problem of public health.

This study was a descriptive investigation of the intestinal carriage of ESBL-E within pediatric unit of the University Hospital Center Zafisaona Gabriel in Mahajanga.

In whole, 46 individuals were enrolled, 37% (n=17) of whom were carriers of ESBL-E. No relation was established either between ESBL-E occurrence and gender, or age or previous admission (p>0,05). However the intake of antibiotics all along the past three months was associated with the ESBL-E carriage (p=0.02), 95%IC [23.0-50.9]. Isolates bacteria detected were Escherichia coli (47%), Klebsiella (41%) and Citrobacter koseri (12%).

One out of three children admitted in pediatric unit carried ESBL-E. It reflects how antimicrobial drugs are managed on children.

KEYWORDS:

ESBL-E, sick children, intestinal carriage.

HISTORY

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INTRODUCTION

The emergence of extended spectrum beta-lactamases producing enterobacteriaceae (ESBL-E) to antimicrobials is a problem of public health. Resistance to β -lactams in Enterobacteriaceae is primarily due to β -lactamases-mediated antibiotic hydrolysis; while an altered expression of efflux pumps and/or porins play only a minor role [1]. Based on substrate specificities; the β -lactamases family is divided into four functional groups: penicillinases, ESBLs, carbapenemases, and AmpC-type cephalosporinases [1]. Consequently, effective antibiotic therapy for treating these infections is limited to a small number of drugs [2]. Intestinal carriage of ESBL-E on hospitalized children in Mahajanga was not documented. The aims of this study were to determine the prevalence of ESBL-E on community settings and identify the factors associated with ESBL-E fecal carriage in sick children.

MATERIALS AND METHODS

This study was a descriptive investigation of the intestinal carriage of ESBL-E within pediatric unit of the University Hospital Center Zafisaona Gabriel in Mahajanga which is a North-west city of Madagascar. It was performed during seven months, between November 2017 and May 2018.

Patients recruited were children aged 2 years old and above. To looking for ESBL-E acquired in community, sample collection took place within the first 48 hours of

their admission after parents gave their consents when they were informed of the objectives and process of the study. Faecal samples were collected from rectal swab and cultured with Hektoen agar in the laboratory. The isolates of enterobacteriaceae were then screened for ESBL production using both the resistance phenotype and the double-disk synergy test using conventional combination: cefepime, ceftazidime, ceftriaxone and amoxicillin-clavulanic acid. The organisms were considered to be producing ESBL when the zone of inhibition around any of the expanded-spectrum cephalosporin discs showed a clear-cut increase towards the clavulanic acid disc.

RESULTS

In whole, 46 individuals were enrolled, 37% (n=17) of whom were carriers of ESBL-E. The sex-ratio of ESBL-E carriers was of 0.9. Age brackets between 10 to 15 years old were mostly affected (41%), followed by age 2 to 4 and those of 5 to 9, with respectively 29,5% and 29,5%. The reasons of admission of those children carried ESBL-E were: digestive (35%), infectious (23%), haematological (18%), cardiac pulmonary (12%), and neurological (12%). The period of hospital stay for these ESBL-E carriers vary from 2 to 10 days, with an average of 5 days. Among these patients, 23% were admitted with previous hospitalization. No relation was established either between ESBL-E occurrence and gender, or age or previous admission (p>0,05). However the intake of antibiotics all along the past three months was associated with the ESBL-E carriage (p<0.05) (95%IC [23.0-50.9]). Isolates bacteria detected were Escherichia coli (47%), Klebsiella (41%) and Citrobacter koseri (12%).

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Table 1 : Factors associated with ESBL-E fecal carriage in sick children.

Characteristic	Total N (%)	ESBL+ N (%)	ESBL- N (%)	p value
	46 (100%)	17 (37%)	29 (63%)	
Gender				0.35
▪ Male	27 (59%)	08(47%)	19 53%)	
▪ Female	19 (41%)	09(53%)	10 (47%)	
Using water for toilet				0.72
▪ Yes	35 (76%)	12 (70%)	23 79%)	
▪ No	11 (24%)	05 (30%)	06 (21%)	
Hospital admission in past				0.35
▪ Yes	15 (33%)	04 (23%)	11 (40%)	
▪ No	31 (67%)	13 (77%)	18 (60%)	
Taking antibiotic during last 3 months				0.02
▪ Yes	27 (59%)	06 (35%)	21 (72%)	
▪ No	19 (41%)	11 (65%)	08 (28%)	

DISCUSSION

This is the first study from Mahajanga reporting on ESBL-E carriage among sick children from the community. The fecal flora of children in the community represents a huge potential reservoir for ESBL which are located on highly transmissible plasmids. In this study, 37% of patients were carriers of intestinal ESBL-E producing enterobacteriaceae. In 2010 at Pediatric unit in Antananarivo among children on admission, authors reported 21.2% [3]. In french children, it was 4.6% in 2012 [4], other study found 11.6% in Tanzania in 2016 [5], 24.8% in Lebanon [6] and 31% in Niger [7] among in children in admission. However, when compared our results from other study among general population, this figure is rather much higher. Herindrainy reported an intestinal carriage of 10% in Antananarivo in 2009 [8]. Exploring these data from the investigated subjects, the ESBL-E prevalence of community acquired is much higher in pediatric unit. It could be interpreted as an abusive use of antibiotics on ambulatory treated children. Many reports have shown the link between β -lactam exposure and intestinal colonization by enterobacteria resistant to cephalosporins [9, 10]. Immediate action is needed to prevent resistant bacteria spreading in the community and healthcare facilities. In developing countries, high level of antibiotic consumption is related to high prevalence of infections. To reduce the use of antibiotics, stewardship and guidance on appropriate use is extremely important [5]. Although the sample was small, which may limit the significance of the observation, this finding reflects the high prevalence of the intestinal carriage of ESBL-E among children in this city.

CONCLUSION

One out of three children admitted in pediatric unit carried ESBL-E. Female gender and children above 10 were mostly carriers. The above results reported that in Mahajanga the prevalence of the intestinal carriage of ESBL-E is high. It reflects how antimicrobial drugs are managed on children. Effectively, hospital is a sensitive setting and could easily be contaminated by community-acquired ESBL-E and becoming a risk factor of nosocomial infection.

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