Research Letter

Fecal carriage of extended spectrum beta Lactamase producing organisms in a teaching tertiary care hospital of north India

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ABSTRACT

Awareness of the fecal carriage of ESBL bacteria is very important for the clinicians, microbiologists, infection control practitioners and epidemiologists. Worldwide, the data shows that the presence of these bacteria pose a serious threat to both community and the hospital settings. So this study for the detection of fecal carriage of ESBL producing bacteria is pertinent for framing antibiotic and infection control policy.

Keywords: *ESBL, fecal carriage, antimicrobials, bacteria*

Reports of intestinal colonization with ESBL producing bacteria are of growing concern for clinicians, microbiologists, infection control practitioners and hospital epidemiologists. Though most of these carriers remain clinically silent, but studies have revealed that each clinically significant infection is supported by at least one patient of intestinal colonization in the same unit. In community settings, patients after discharge and their house hold contacts facilitates the transmission of these drug resistant organisms to other healthy persons. Moreover, the intestines provide the platform for the transfer of drug resistant genes to other susceptible bacteria. Thus, ESBL genes have stepped out of hospitals and have entered the community, posing a serious impact on the outcome of the patients and increasing overall healthcare costs. This increase is the result of antibiotic treatment failure, implementation of broader infection control practices, public health interventions and development of newer antimicrobial drugs designed for containing the spread of these multidrug resistant bacteria. [1, 2, 3]

It is necessary to avail geographical information on the prevailing levels of fecal carriage of ESBL producing gram negative bacteria and their antimicrobial susceptibility profile, as this will help in framing institutional antimicrobial stewardship and infection control policies. Hence, we analyzed the fecal samples to detect the presence of ESBL producing

bacteria and to know the antimicrobial susceptibility profile of these organisms.

The present study was conducted in the Department of Microbiology of a 1,300 bedded teaching tertiary care hospital in North India. A total of 50 consecutive stool isolates of E. coli (30) and Klebsiella spp (20) were included in the study. All stool isolates were identified based on the colony morphology and biochemical reactions. [4] ESBL detection was done as per Clinical and Laboratory Standards Institute (CLSI) guidelines. [5] All the ESBL producers were evaluated for antimicrobial susceptibility to various antimicrobial drugs. Antimicrobial susceptibility of ESBL isolates was done by disc diffusion method and results were interpreted according to CLSI guidelines using E.coli ATCC 25922 as control strain. [5] Antimicrobials used were cotrimoxazole (25µg), doxycycline (30µg), ciprofloxacin (5µg), amikacin (30µg), amoxyclav (30µg), ceftazidime (30µg), meropenem (10µg), imipenem (10µg), piperacillin/tazobactam (100/10µg). All ESBL detection tests and antimicrobial susceptibility tests were done on Mueller Hinton Agar (MHA). MHA and susceptibility discs were procured commercially from Hi-Media (Mumbai, India).

Of 50 stool isolates, ESBL production was found in 13 isolates (26%). Out of 50 isolates, eight (8/30, 26.67%) E. coli and five (5/20, 25%) Klebiella species were found to be positive for ESBL production. All the ESBL producers were evaluated for antimicrobial susceptibility to various antimicrobials. Maximum sensitivity was found against piperacillin/tazobactam (61.53%). All isolates (100%) were resistant to cotrimoxazole, whereas 60-90% isolates were highly resistant to the other antimicrobials tested. (Table1)

Table 1 Susceptibility pattern of ESBL producing stool isolates

	Number (n=13)	Pe
Cotrimoxazole	0	0
Doxycycline	1	7.69%
Ciprofloxacin	3	23.07%
Amikacin	4	30.76%
Amoxyclav	4	30.67%
Ceftazidime	1	7.69%
Meropenem	5	38.46%
Imipenem	5	38.46%
Piperacillin/tazobactam	8	61.53%

Our data shows that ESBL producing bacteria are colonizing the intestinal tract of 26% of isolates of our hospital. Fecal carriage of ESBL producing bacteria has been reported in hospital acquired infections, community acquired infections and their household contacts by other investigators. This carriage is a confirmed risk factor for developing infections by ESBL producing bacteria. Age >60 years, co-

morbidity, duration of stay, instrumentation, in-hospital use of piperacillin-tazobactam and vancomycin were found as independent risk factors for the colonization with ESBL producing bacteria. For community acquired infections, prior antimicrobial therapy or any other types of medical assistance are the predisposing factors for the acquisition of ESBL producing bacteria as colonizers. [1, 2, 6, 7, 8]

Antimicrobials play both positive and negative role in the emergence, dissemination and inhibition of these drug resistant bacteria. Indigenous anaerobic microflora of the gut inhibits colonization with resistant microorganisms. So, protection of the normal gut flora is important to decrease the emergence and survival of the resistant bacteria. Antimicrobials against anaerobes such as, clindamycin with negligible action against gram negative bacteria often encourage intestinal colonization with these resistant bacteria and should be avoided. On the contrary, drugs like cefepime, aztreonam and levofloxacin do not facilitate the growth of ESBL producing bacteria, as they have nominal activity against anaerobes. Drugs like piperacillin-tazobactam, ceftriaxone and ceftazidime shows balanced effect on the promotion and inhibition of the gut colonization. Promotion of colonization occurs either when a larger inoculum and highly resistant strains are administered or if the person is already colonized. [3, 9, 10]

Another strategy is to reduce the duration and to limit the use of antimicrobial therapy in order to withdraw antimicrobial selective pressure. In addition, one can make some periodic formulary changes to the antibiotic policy so that frequent usage of antibiotic against a specific pathogen can be avoided, thereby withdrawing antibiotic selective pressure. Though, antibiotic resistant gram negative bacilli have lesser tendency to contaminate the environment as compared to drug resistant gram positive bacteria still, there are reports of effective decontamination of the skin of the patients with chlorhexidine, alcohol based hand wash and polymyxin B. Thus, multifaceted approach is a necessity to contain the emergence and spread of the resistant organisms. [3]

Due to some constrains molecular characterization of the isolates was not done and we did not analyze the previous treatment records of the patients to know the antimicrobial drugs they might have received. Moreover, we did not access the proportion of clinical infections among the carriers and other patients co-admitted in the same ward. Still, this groundwork shows the existence of ESBL producing bacteria in the stool of the patients in our institute. To combat this problem, rigorous multidisciplinary approach should be exercised and integrated into prevention program in the future. All the approaches and programs should be periodically evaluated to know their outcomes and cost effectiveness so that all the finances can be utilized in a better way.

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