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PREVALENCE OF ESBL PRODUCING GRAM NEGATIVE BACTERIA FROM RESPIRATORY SECRETIONS

Medical Science

KEYWORDS: ESBL, Gram negative bacilli, RTI, Prevalence of ESBL

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ABSTRACT

Extended-spectrum beta-lactamases (ESBLs) are enzymes secreted by some bacteria which make some antibiotics ineffective. *Klebsiella pneumoniae* and *Escherichia coli* remain the major ESBL-producing organisms isolated worldwide. This prospective study was conducted in the Department of Microbiology at DM WIMS Medical College, Wayanad. A total of 234 isolates were obtained from clinical samples processed from May to August 2016. All the gram negative rods were screened and tested for ESBL production. ESBL was detected in 19 strains. Out of these 19 ESBL producers 11(57.9%) were Klebsiella followed by E.coli 4 (21%), Acinetobacter 3(15.78%), Pseudomonas 1(5.26%).Routine detection of ESBL-producing microorganisms should be done in each laboratory using the standard detection methods so as to control the spread of these infections and also to implement proper therapeutic strategies.

Introduction

Extended-spectrum beta-lactamases (ESBLs) are enzymes secreted by some bacteria which make some antibiotics ineffective. This makes the infection caused by the bacteria much harder to treat. ESBL isolates were first detected in Western Europe in the mid-1980s. Since then the incidence of such cases are increasing steadily. ESBLs are able to hydrolyze 3 and 4 generation cephalosporins and monobactams. [1,2]. This may lead to increased patient mortality. Therefore, control of the initial outbreak of ESBL producing organisms in a hospital or specialized unit of a hospital is of critical importance [3,4,5]. These strains are inhibited by β-lactamase inhibitors.

Klebsiella pneumoniae and Escherichia coli remain the major ESBL-producing organisms isolated worldwide [6]. Prevalence of ESBLs varies from one area to another. Previous studies from India and abroad have reported ESBL production varying from 8 to 80%. However, there is paucity scientific information available on antibiotic profile with rate of ESBL production in respiratory isolates. Hence the present study was undertaken to evaluate the seroprevalence of ESBL producing gram negative bacteria from respiratory secretions.

Materials and methods

This prospective study was conducted in the Department of Microbiology at DM WIMS Medical College, Wayanad. A total of 234 isolates were obtained from clinical samples processed from May to August 2016.

All samples were inoculated on Mac Conkey's and Blood agar, incubated at 37 C for overnight, and colonies were processed. Routine disc diffusion susceptibility testing was performed by modified KirbyBauer's disc diffusion method [7]. The antibiotic sensitivity was tested with cefotaxime—30 µg; ceftazidime—30 µg; ceftriaxone—30 µg; amikacin—10 µg; amoxycillin—20 µg; gentamycin—10 µg; tetracycline—30 µg; imipenem—30 µg; ciprofloxacin—5 µg; aztreonam—30 µg; cotrimoxazole—1.25/23.75 µg. The results were interpreted as per the National Committee for Clinical Laboratory Standards (NCCLS) recommendations [8].

ESBL production was confirmed among potential ESBL-producing isolates by phenotypic tests. Lawn culture of the organism was made and 3rd-generation cephalosporins ceftazidime (30 µg) disc and ceftazidime + clavulinic acid (30 µg + 10µg) disc was placed with 25mm apart. An increase of ≥5mm in zone of inhibition for Ceftazidime + clavulinic acid compared to ceftazidime was confirmed as ESBL producers.

Results

A total of 234 samples were collected for this study. Out of 234 samples collected 83 were culture positive. Most predominant organism was Klebsiella 23(27.7%) followed by Pseudomonas 18(21.6%), Acinetobacter 10(12%), Candida 9 (10%), E.coli 5 (6%), Streptococcus 4 (4.8%), Enterobacter 4(4.8%), Staphylococcus 3(3.6%), Aspergillus 3(3.6%), Moraxella 3(3.6%), Citrobacter 1(1.2%).
All the gram negative rods were screened and tested for ESBL production. ESBL was detected in 19 strains. Out of these 19 ESBL producers 11(57.9%) were Klebsiella followed by E.coli 4 (21%), Acinetobacter 3(15.78%), Pseudomonas 1(5.26%).

Among these 19 isolates 15 were from samples collected from male patients (78.9%) and 4 were from females. Most of them 10(52.63%) were belonging to the age group 40-60. 7 (36.8%) cases were belonging to age group 60-80 and one case each in 20-40 and 80-100 age group.

Discussion

In India, high prevalence of ESBL-producing *Klebsiella pneumoniae* strains has been reported by various groups [9,10]. The present study also supports this evidence. Out of the 23 isolates of *Klebsiella pneumoniae,* 11 were ESBL producers, so a prevalence of 58% of *Klebsiella pneumoniae* is noted in the study area (western area of Wayanad district).

In this study, the infection rate was higher in males (78.9%) than females (21.05%).Females enrolled in the study comprised largely of housewives and people belonging to age group above 60. Since they were less mobile, they must have experienced less exposure to respiratory risk factors. Vulnerability of males may also be attributed to predisposing factors like smoking and alcoholism.

In this study, majority of infected patients belonged to the age group of 40-60 (52.63%) and then followed by 60-80 (36.8%) An increased incidence of RTI as they get older may be due to less effective immune system in older patients owing to either malnutrition or underlying degenerative diseases such as diabetes mellitus emphysema, uraemia etc (11)

Conclusion

Routine detection of ESBL-producing microorganisms should be

done in each laboratory using the standard detection methods so as to control the spread of these infections and also to implement proper therapeutic strategies. For the detection, the phenotypic confirmatory disc diffusion test is simple, sensitive, and cost effective. There is a need to emphasize on the rational use of antimicrobials and adherence to the concept of "reserve drugs" to minimize the misuse of available antimicrobials. In addition, regular antimicrobial susceptibility surveillance is essential.

REFERENCES

1. Bradford PA. "Extended-spectrum β-lactamases in the 21st century: characterization, epidemiology, and detection of this important resistance threat." Clin Microbiol Rev. 2001;14(48):933–51.
2. Giraud-Morin C, Fosse TA. Seven-year survey of Klebsiella pneumoniae producing TEM-24 extended-spectrum-lactamase in Nice University Hospital (1994–2000) J. Hosp. Infect. 2003;54:25–31.
3. Paterson DL, Bonomo RA. Extended spectrum β-lactamases: a clinical update. Clin Microbiol Rev.2005;18:657–86
4. Nathisuwan S, Burgess DS, Lewis JS. 2nd Extended Spectrum β-lactamases: Epidemiology, Detection and treatment. Pharmacotherapy. 2001;21:920–8.
5. Rupp ME, Fey PD. Extended Spectrum β-lactamase (ESBL) – Producing Enterobacteriaceae. Drugs.2003;63:353–65
6. G. A. Jacoby and L. S. Munoz-Price, "The new β-lactamases," The New England Journal of Medicine, vol. 352, no. 4, pp. 380– 391, 2005.
7. A. W. Bauer, H. Truck, and J. C. Sherries, "Antibiotic Susceptibility testing by standardized single disc method,"American Journal of Clinical Pathology, vol. 45, pp. 493–496,
1990.
8. National Committee for Clinical Laboratory Standards NCCLS, Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria that Grow Aerobically, Approved Standard M7-A5 and informational Supplement M100-S10, National Committee for Clinical Laboratory Standards, Wayne, Pa, USA, 2000.
9. J. B. Hansotia, V. Agarwal, A. A. Pathak, and A. M. Saoji, "Extended spectrum β-lactamase mediated resistance to third generation cephalosporins in Klebsiella pneumoniae in Nagpur,
central India," Indian Journal ofMedical Research, vol. 105, pp. 158–161, 1997.
10. V. Manchanda, N. P. Singh, R. Goyal, A. Kumar, and S. S. Thukral, "Phenotypic characteristics of clinical isolates of Klebsiella pneumoniae & evaluation of available phenotypic techniques for detection of extended spectrum betalactamases," Indian Journal of Medical Research, vol. 122, no.4, pp. 330–337, 2005.
11. Macfarlane JT, Colville A, Guion A, Macfarlan RM, Rose DH,(1993). Prospective study of etiology and outcme of adult LRTIs in the community;341:511-514.