

Prevalence of High Level Aminoglycoside and Vancomycin Resistance among Enterococci at a Tertiary Care Hospital in Kanpur (India)

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ABSTRACT

Background: Enterococci resistant to vancomycin and high level aminoglycoside drugs are an emerging problem in hospital settings in India. This study was aimed to determine prevalence of vancomycin resistance and HLG and HLS resistance among enterococci at a tertiary care hospital in Kanpur.

Methods: HLG and HLS resistance was determined by disc diffusion method and VRE were detected by agar dilution method.

Results: Findings showed prevalence of VRE to be 12%, and HLG resistance 60% and HLS resistance 46% which alarms antibiotic policy makers and infection control team in hospitals for formulation of policies against these findings at a tertiary care centre.

Key Words: Prevalence, HLG, HLS, Vancomycin, Resistance, Enterococci

INTRODUCTION

Enterococci has been reported as important cause of urinary tract infection (UTI), bacteraemia and few more clinical problems, mostly in hospital settings. ^[1] Bactericidal synergy between beta-lactam and glycopeptides antibiotics are needed for management of serious enterococcal infections. ^[2] However, this synergy can't be achieved in case of high level resistance to either class of these antibiotics. ^[3-5] Many studies have shown that vancomycin resistance among enterococci is an emerging problem in India. ^[6-9] However, no research study has been done in Kanpur to determine prevalence of VRE in this set-up. So, this study on prevalence of vancomycin and high level aminoglycoside resistance among enterococci seems essential, report of which could be highly

beneficial for infection control and formulation of antibiotic policies in hospital set-up in this region.

MATERIALS AND METHODS

This study was conducted from November 2017 to May 2018 in Clinical Microbiology Laboratory of Rama Medical College Hospital and Research Centre, Kanpur. All enterococcal isolates isolated from various clinical specimens were tested for antibiotic sensitivity test (AST) including high level gentamicin (Gentamicin 120 mcg) and high level streptomycin (Streptomycin 300 mcg) discs by Kirby Bauer's disc diffusion method after matching bacterial suspension with Mac Farland's 0.5 standard according to standard CLSI guideline. ^[10] Zone of inhibition equal or less than 6 mm for both

high level aminoglycoside (HLA) drugs was reported as HLA resistant. As no other aminoglycoside drugs are superior to HLG and HLS, only these drugs were tested for AST. Antibiotic discs were procured from Hi-Media. Further, minimum inhibitory concentration (MIC) for vancomycin was determined by agar dilution method and MIC equal or greater than 32 mcg/ml was considered as vancomycin resistant enterococci. [11] Enterococcus faecalis ATCC 29212 was used as control strain.

Statistical Analysis:

All statistical analysis was done by using SPSS-version 16 (USA).

RESULT

Out of 50 enterococcal isolates, 29 (58%) were isolated from inpatients and 21 (42%) were from OPD patients. Most of the isolates were from urine (41/50=82%), and others being 10% (5/50) from pus, 6% (3/50) from blood, and 2% (1/50) from high vaginal swab. AST report showed, enterococcal isolates were 100% resistant to ciprofloxacin, 88% resistant to penicillin, 52% resistant to erythromycin, 56% resistant to norfloxacin, 32% resistant to nitrofurantoin, and 12% resistant to tetracycline. Prevalence of high level gentamicin (HLG) resistance was found to be 60% (30/50) and that of high level streptomycin (HLS) was found to be 46% (23/50) (Table-1).

Table-1 Showing AST pattern of Enterococci (Including HLG and HLS resistance)

Name of antibiotics	Sensitive (%)	Intermediate sensitive	Resistant (%)
Ciprofloxacin	0%	-	100%
Penicillin	12%	-	88%
Norfloxacin	44%	-	56%
Erythromycin	48%	-	52%
Nitrofurantoin	68%	-	32%
Vancomycin	86%	-	14%
Teicoplanin	86%	-	14%
Tetracycline	88%	-	12%
Linezolid	98%	-	2%
High level gentamicin (HLG)	40%	-	60%
High level streptomycin (HLS)	54%	-	46%

Though, vancomycin resistance by disc diffusion method was found to be 14% (7/50), agar dilution method confirmed only 12% (6/50) enterococcal isolates as vancomycin resistant enterococci (VRE). (Fig. 1)

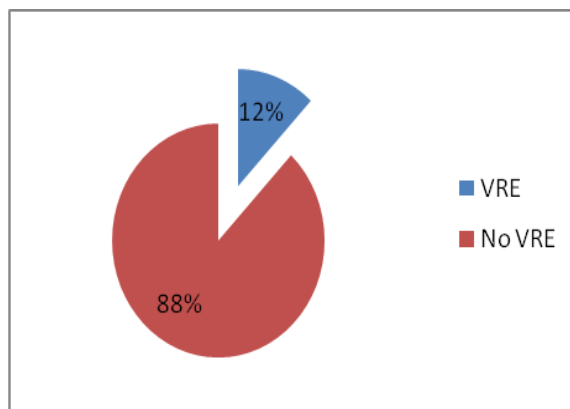


Fig.1: Showing prevalence of VRE among Enterococci

DISCUSSION

Antibiotic susceptibility by disc diffusion method showed, vancomycin resistance to be 14% (7/50), however, this method is not gold standard and was confirmed by agar dilution method which showed 12% (6/50) as VRE. Similar findings have been reported by other studies, 7.9% in Lucknow and 7% in Meerut. [1,12] This might be due to similar geographical locations and similar antibiotic policies in hospitals in this region. Moreover, slight increase in prevalence of VRE in our study compared to that in Lucknow and Meerut might be due to irrational use of antibiotics by population as the antibiotics are easily available in medical shops over the counter in this area and a different period of study as research in Lucknow was conducted during 2010. However, VRE prevalence has been reported to be very high (28%) compared to our study in south Indian hospital and Delhi also (25.2%). [9,13] This dissimilarity in findings might be due to different geographical locations and different antibiotic policies in various places including south and north India.

Determination of HLG and HLS resistance was performed by AST (Disc

diffusion method) as it has been reported that both the disc diffusion and agar dilution methods are equally standard methods for its detection. [14-16] We found prevalence of HLG and HLS resistance to be 60% and 46% respectively in our study. Bhatt et al in Dehradun also found similar findings (HLG resistance 65% and HLS resistance 45%). [17] This similarity in our findings might be due to similar hospital set-up and similar antibiotic policies here in north India. However, Elango et al from Chennai reported HLG and HLS resistance to be 42.7% and 29.8% respectively. [18] Different geographical locations, antibiotic policies, and period of study again might be responsible for these contrasting findings.

CONCLUSION

To summarise, both high level aminoglycoside drugs (HLG and HLS) and vancomycin resistance is in increasing trend in Kanpur. So, our study indicates need of regular surveillance detection of VRE, and HLG and HLS resistance pattern among enterococci. In addition, our finding alarms antibiotic policy makers and infection control team to plan for future strategies against these findings in our set-up.

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