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Original Article

Vancomycin Resistant Enterococcus

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Abstract

Background: To study prevalence of Vancomycin resistant Enterococcus in different wards of hospital and associated risk factors.

Methods:Samples were collected from different wards 110 positive samples were analyzed. To isolate the organism, samples were streaked on Blood and CLED medium and identified with specific colony characteristics and further confirmed by biochemical tests. Vancomycin drug sensitivity was performed on Mueller-Hinton agar plates by disc diffusion method.

Results:Out of 110 Enterococcus positive samples 32% showed resistance to Vancomycin. E. faecalis(67%) was observed as frequently present organism followed by E. faecium (33%). Most of the VRE strains were isolated from patients admitted to ICU (54%), hospitalized for more than one week and were on antibiotics.

Conclusion: Vancomycin resistant Enterococcus becomes an important issue for the health authorities. Lack of basic health necessities, unskilled medical staff and unnecessary medication are mentionable concerns, leading to the development of resistant strains.

Key Words: Vancomycin, Enterococcus, Nosocomial infection, Antibiotic resistance

Introduction

In this era of drug resistance, nosocomial or hospital acquired infections are the real threat to patient`s health and life. Among these infections Vancomycin resistant Enterococcus has been upraised as the utmost and important nosocomial infection. Emerging Vancomycin resistant Enterococcus is causing problems due to its natural resistance to many antibiotics. The advancement in the medical field and substantial rise in the use of antimicrobials put immense pressure [1] Bacteria has immense capability of handling any situation and causing drug resistance against almost every antimicrobial agent. [1]

Vancomycin is a glycopeptide, and was used as a drug of last choice against resistant gram positive strains. Initially Vancomycin was considered as a good therapy against organisms but now resistance has already been enused.[2] Enterococcus was the first resistant organism followed by S.aureus.[3] Since then Vancomycin resistant Enterococcus (VRE) are now considered as important nosocomial pathogen and have great concern for the health authorities. This emerging organism is omnipresent in hospital atmosphere particularly on medical equipment and objects.[4] Even it can be transferred through medical personal directly.[5,6] Natural and acquired resistance to many antimicrobials[7] and capability of transferring resistant gene to other organisms modulating towards increased mortality and morbidity due to VRE. [7-9]

The gram positive, Enterococci which is a part of gut normal flora is an important cause of nosocomial infections. Initially Enterococcus was considered as harmless pathogen.[10] with advancement in health facilities and emergence of drug resistance Enterococcus is now appraise as important nosocomial pathogen.[11] Though many different species of Enterococcus has been isolated but only two Entercocccus faeclis and Enterococcus faecium are the important pathogenic strains. Urinary tract infections are the most frequent nosocomial infection caused by the Enterococcus followed by post-surgery wound or intra abdominal and intra pelvic abscess and endocarditis. [10] Gastrointestinal tract, soft tissues and skin are the primary sites for the colonization of Enterococcus. The risk factors associated with the Vancomycin resistant Enterococcous (VRE) includes hospitalizations length, use of other antibiotics, catheterization and other comorbidities like diabetes, renal failure etc.[11-13]

Patients and Methods

Current study was structured to study the prevalence of vancomycin resistant strains of Enterococcus in hospital setting. For this purpose samples were collected from Civil hospital Karachi and Zubaida Medical Centre. The samples were collected from March 2016 till April 2018. Samples were collected from the patients whose age ranged from 5-90 years admitted to hospital`s medicine, surgery and ICU

wards. Patients suffering from cancers, menstruating women and toddlers were not included in this study. In this study two parameters length of stay at hospital and use of antibiotics were considered. Blood,urine and pus samples were streaked on Blood agar and CLED medium and organism were identified based on particular clonial characters and gram staining. For further confirmation litmus milk test was performed .Vancomycin susceptibility was performed by disc diffusion method on Mueller-Hinton agar plates (Oxoid) after making bacterial lawn with the help of sterile cotton swab where bacterial suspension of 0.5 McFarland index was used.[14] Plates were observed and clear area around discs was noted after 24 hours of incubation at 37°C and results were understood by CLSI.[15].E. faecalis ATCC 29212 was considered as reference strain for antibiotic susceptibility testing.

Results

A total of 110 positive samples were analyzed in this study. Among 110 positive samples 46% (51) positive isolates were from male and 54% (59) from female patient. Most of the organisms isolated from patients having age group ranged from 21-30 years followed by 61-70 years. The mean age calculated was 34 years. (Table 1).In present study E.faecalis (67%) was the most common isolated organism (Table 2). No other spp of Enterococcus were isolated in present study. Isolates from different wards revealed, Medicine (47%) being highest, wards followed by ICU (35%) (Table 3).Current results revealed 82.6%(n= 62) E.faecalis isolated from urine samples and 64 %(n=18) E.faecium from wound or pus (Table 4).Among 110 positive samples, 35 (32%) samples showed resistance from Vancomycin. Resistance was noted 54% in E.faecalis and 45% E.faecium(Table 5). In current study VRE were isolated in 54%(n=19) patients admitted in hospital for more than one week 40% (n=14)from patients taking antibiotics for more than one week (Table 6)

Table 1: Frequency of Enterococcus in different age groups

Age in years Sex	5-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total
Male	02	06	07	08	06	07	11	01	03	51
Female	02	02	10	13	10	05	09	03	05	59
Total	04	08	17	21	16	12	20	4	08	110

Table 2: Frequency of Enterococcus spp

Name of organism	% of organism
E.faecalis	67 (n=74)
E.faecium	33 (n=36)

Table 3: Frequency of Enterococcus species strains from different wards

Name of ward	% of isolates
Medicine	47% (n=52)
ICU	35% (n=38)
Surgery	18% (n=20)

Table 4: Number of isolated Enterococcus species from different samples

Name of organisms	Urine sample	Blood sample	Wound or pus sample
E.faecalis	62	2	10
E.faecium	13	5	18

Table 5: Number of Vancomycin resistant Enterococcus from different samples

Name of organisms	Urine sample	Blood sample	Wound or pus sample
E.faecalis	15	0	4
E.faecium	6	2	8

Table 6: Number of patients observed VRE having risk factors

Risk factors	Three days	Five days	More than one week
Length of stay at hospital	5	11	19
Use of Antibiotics	10	11	14

Discussion

The current study is focusing on the prevalence of VRE strains in hospital settings. The prevalence of VRE has been reported in different parts of world including Asia, Australia and even America. [16] In current study 32% (n= 35) isolated Enterococcus showed resistance to Vancomycin. In 2016 Akhtaret al., demonstrated 41.4% Vancomycin resistant Enterococcus strain among cancer patients, Babar et al (2015) stated 11% VRE .[17,18] Whereas Asifet al (2014) noticed 16% VRE in Lahore, Pakistan.[19] Our results were in accordance with the U.S CDC which coted 30% -35%VRE.[20,21] In contrast 4% VRE was documented by the European Antimicrobial Resistance Surveillance System (EARSS).[2]

Recent study demonstrated 54% vancomycin resistant in E.faecalis and 45% in E.faecium. A study conducted in Germany by Behnkeet al., quoted 23% reistantE.faecium.[22] In 2015 a research in Australia showed 48.7– 56.8% resistance among E. faecium .[23] The prevalence of E. faecalis and E.faecium was observed 67% and 33% in present study. Our results were in close association with the research conducted in Iran.[24]

In present study E.faecalis was the frequently isolated organism from the urine samples. In present study most of the organisms were isolated from Medicine

ward (47%). This could be due to large flow of patients in Medicine ward. Moreover lack of basic health facilities, more inclination towards consultants rather than general practitioner (GP) are also a contributing towards more inflow of patients in hospital settings. The VRE strains were mainly isolated from ICU (54% where n=19) in current study. National Nosocomial Infections Surveillance (NNIS) stated 28% VRE isolates were from ICU.[25] Nele and his co workers (2011) described VRE as second most common occurring organism in ICU settings.[26] Although Kampmeier et al described 3% VRE in ICU.[27] Reasons for ICU being a prime unit for nosocomial infections and drugs resistant strains are more invasive procedures, severely ill patients, immunosuppression etc.[28] In recent project 54% and 40% VRE strains were isolated from the patients having more than one week hospitalization and use of antibiotics history.This is most probably due to colonization of gastrointestinal tract by the opportunistic Enterococcus along with other factors. Unfortunately in present study, limited information was available regarding history of patient. Another important reason for the escalation of VRE incidence is the overwhelmed utilization of antimicrobials.[29,30] Particularly in our setup, cephalosporins and floroquinolones are the most frequently prescribed antibiotics for every disease in both hospital and community settings. This menacing situation has left few options available for the treatment of resistant infections. In addition to this transfer of resistant gene from Enterococci to Staphylococcus is also putting immense pressures on the emerging of VRE.[3,8] This requires the stewardship in prescribing antibiotics and genetic transfer of resistant strain. Reason for high prevalence of VRE in Pakistan might be lack of skilled medical personal, limited health facilities, improper personal hygiene. All emphasis should be given for prevention of VRE in hospital settings and guidelines and awareness programs should be constructed for this

Conclusion

1.Vancomycin resistant Enterococcus has becomes a challenging issue for the health authorities.

2.Lack of basic health necessities, unskilled medical staff and unnecessary medication are serious concerns for the development of resistant strains

3.It is required to construct better approach in context of direct contact preventive measures, proper disinfection of apparatus and medical personnel hygiene and protection.

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