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Antibiotic susceptibility pattern of *Enterococcus* species from various clinical samples at a tertiary care hospital

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Abstract
Background: *Enterococcus* has emerged as a common organism present in hospital environment and is associated with intrinsic resistance to many antimicrobial agents like Cotrimoxazole, Aminoglycoside and Cephalosporin's. Due to injudicious use of antibiotics, *Enterococci* have developed acquired resistance to drugs like tetracycline, glycopeptides and quinolones etc. The ability of *Enterococci* to transfer drug resistance to other bacteria like *Staphylococci* has made condition alarming as physicians are left with limited therapeutic options which are expensive and causes toxicity in patients taking these agents. The aim of the study is to determine the distribution of *Enterococcus* in various samples and to know the antibiotic susceptibility pattern of *Enterococcus* isolates.
Material & Method: The study was conducted in Microbiology department. The study was conducted for a period of 6 months from August 2018 to Jan 2019. Various samples send to Microbiology department for culture and sensitivity was included in the study. The samples were subjected to gram stain (except blood) for provisional report and samples were inoculated on blood agar and MacConkey agar, incubated at 37^{o} C for 18-24 hours. Isolates were identified by colony characteristics and battery of biochemical tests. Antibiotic susceptibility testing was done on Mueller Hinton agar as per CLSI guidelines.
Result: Out of 1250 samples received in Microbiology department for culture and sensitivity, *Enterococcus* species isolated were 120 (9.6%). Out of 120 Enterococci isolates *E. faecalis* were 112 (93.33%) while *E. faecium* were 8 (6.66%). Majority of *Enterococci* spp. isolates were obtained from urine 54.2% followed by wound swab or pus sample which accounted to 28.33%, blood 12% and vaginal swab 5%. Majority of samples isolated were from Surgery department as 62% cases were reported from there followed by Medicine department, Obstetrics and Gynecology 20% and Paediatrics 7%. Antibiotic susceptibility testing of *Enterococci* isolates shows 100% sensitivity to vancomycin and linezolid followed by Piperacillin tazobactam 70 (84%), Gentamycin 60 (72%), ciprofloxacin 54 (45%). Maximum resistance was reported for Ampicillin where 72% of isolates were resistance to ampicillin.

Keywords: intrinsic resistance, acquired resistance, glycopeptides, quinolone, toxicity

1. Introduction

Enterococci were traditionally regarded as low grade pathogen, but over the time it has emerged as a common cause of nosocomial infection [1]. *Enterococci* are part of normal fecal flora. Sites which are less often colonized by *Enterococci* include oral cavity, genitourinary tract and skin especially in perianal area. Main site of *Enterococci* colonization in hospitalized patients are soft tissue and wounds, gastrointestinal tract and urinary tract [2].

Enterococci have up to 12 species but only species are often associated with human infections i.e. *E. faecalis* and *E. faecium* isolates show high drug resistance [3]. Most common infections caused by *Enterococci* are urinary tract infections (UTI), intra-abdominal and intra pelvic abscess and post-surgery wound infections. *Enterococci* are also seen in blood stream infection [4].

Enterococci from clinical source show increase resistance among the isolates. Until recently vancomycin was drug given in case of multi drug resistant *Enterococci*, however emergence of VRE (vancomycin resistant *Enterococci*) has made it difficult to treat serious *Enterococcal* infection [5]. The ability of *Enterococci* to transfer resistance to other bacteria rendering them resistant to drugs is of serious concern as limited therapeutic options makes treatment more difficult.

The aim of the present study is to know the distribution of *Enterococci* in various clinical samples and to know the antibiotic susceptibility pattern of these isolates. The study will be helpful in management of cases with *Enterococcal* infection as local antibiotic sensitivity pattern will guide in management of patients.

2. Material & method [6, 7]

The study was conducted in Microbiology department. The study was conducted for a period of 6 months from August 2018 to Jan 2019. Various samples send to Microbiology department for culture and sensitivity was included in the study. The samples were subjected to gram stain (except blood) for provisional report and samples were inoculated on blood agar and Mac Conkey agar, incubated at 37^{o} C for 18-24 hours. Isolates were identified by colony characteristics and battery of biochemical tests. Antibiotic susceptibility testing was done on Mueller Hinton agar as per CLSI guidelines.

3. Result

Out of 1250 samples received in Microbiology department for culture and sensitivity, *Enterococcus* species isolated were 120 (9.6%). Out of 120 *Enterococci* isolates *E. faecalis* were 112 (93.33%) while *E. faecium* were 8 (6.66%). Majority of *Enterococci* spp. isolates were obtained from urine 54.2% followed by wound swab or pus sample which accounted to 28.33%, blood 12% and vaginal swab 5%. As shown in table-1.Majority of samples isolated were from Surgery department as 62% cases were reported from there followed by Medicine department, Obstetrics and Gynecology 20% and Paediatrics 7%. Antibiotic susceptibility testing of Enterococci isolates shows 100% sensitivity to vancomycin and linezolid followed by Piperacillin tazobactam 70 (84%), Gentamycin 60 (72%), ciprofloxacin 54 (45%). Maximum resistance was reported for Ampicillin where 72% of isolates were resistance to ampicillin.

Table 1: Distribution of Enterococci in various clinical samples

Sample	Total No. of Isolates	Tot. No. of Enterococci isolates (%)	Tot. Distribution of *Enterococcus* isolates (n=120)
Urine	680	65 (9.55%)	54.2%
Pus/ Wound swab	314	34 (11%)	28.3%
Blood	180	15 (8.33%)	12%
Vaginal swab	76	06 (8.0%)	5%
Total	1250	120 (9.6%)	100%

4. Discussion

Enterococci causes variety of infections like UTI, soft tissue or wound infection, bacteremia etc. In the present study *Enterococcus* isolates are most commonly isolated from cases of urinary tract infection accounting to 53% of cases followed by pus/wound swab which accounted to 28.3% of isolates. *Enterococcus* isolated from blood were isolated in 12% cases while in vaginal swab *Enterococcus* were isolated in 5% of cases. Study done by Karmakar MG *et al* [8], Agarwal J *et al*, [9] Kaur N [10] and Atreyi Chakraborty *et al*. [11] shows similar results where majority of *Enterococcus* isolates were isolated from urine.

Most common *Enterococcus* species isolated was *E. faecalis* 112 (92.3%) followed by *E. faecium* 8 (6.66%). Study done by Bhat KG *et al*, [12] Facklam RR *et al*. [13] and Atryi Chakraborty *et al*, [11] shows similar results.

Antibiotic susceptibility testing of *Enterococci* isolates shows 100% sensitivity to vancomycin and linezolid followed by Piperacillin tazobactam 70 (84%), Gentamycin 60 (72%), ciprofloxacin 54 (45%). Maximum resistance was reported for Ampicillin where 72% of isolates were resistance to ampicillin. Study done by Atreyi Chakraborty *et al*. [11] showed vancomycin and linezolid as most effective drugs for treatment of *Enterococcus* infection. Similar results are seen in our study. However this is a hospital based study so the results cannot be generalized but it will guide physicians while prescribing drugs in case of *Enterococcus* infection and will help in better patient outcome.

5. Conclusion

Enterococci isolates are multi drug resistant and have the ability to transmit resistance to other bacteria. It is important to use antibiotics judiciously in such cases and adhere strictly to hospital infection control policies. In the present study *Enterococcus* isolates showed high sensitivity to vancomycin, linezolid, Piperacillin-tazobactam and Gentamycin. However majority of isolates are resistant to Ciprofloxacin and Ampicillin.

6. References

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