Chapter 7

CONCLUSION

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To conclude, *S.aureus* has become difficult to treat life-threatening infection due to the increase in strains with reduced susceptibility to vancomycin. This shift is due to overuse of vancomycin in healthcare settings. As the treatment options were limited to treat MRSA infections prudent use of vancomycin can prevent treatment failures in future. In the present study all the isolates detected as hVISA gave vancomycin MIC's 1.5 - 2 µg/ml by routine CLSI method.

Many studies have reported hVISA strains from MRSA strains but the present study have detected hVISA isolates from MSSA strains. This highlights the fact that reduction in vancomycin susceptibility has become common among methicillin susceptible isolates of *S.aureus*. Therefore treatment of MSSA isolates with vancomycin can lead to treatment failures.

Also, isolates showing reduced susceptibility to vancomycin, differ from their normal phenotypic and genotypic charecteristics hence lot of difficultly arise in identification of these isolates. Thus misidentification of these isolates in clinical laboratories can pave way for treatment failures and can also lead to an understate prevalence of these isolates in clinical settings.

Hence there arises an alarming need to screen for this hVISA population in MRSA as well as MSSA strains and a thorough knowledge of these isolates is warranted in clinical laboratory settings to reduce treatment failures in future.

Chapter 8

SUMMARY

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A total of 468 non-duplicate *S.aureus* strains isolated from various samples like blood (23 strains), urine (24 strains), respiratory samples (13 strains) and exudates (408 strains) were used in the study. The study was carried out in Department of Microbiology, Chettinad Hospital and Research Institute.

Out of the 468 *S.aureus* strains 114 (24.36%) strains were detected as MRSA. Among these MRSA isolates, 3 isolates (2.6%) were from urine, 3 isolates (2.6%) were from respiratory samples, 7(6.1%) were blood isolates and 101(88.6%) were from exudates samples. Higher prevalence rate of MRSA was among blood isolates (30.43%).

Of the 468 *S.aureus* strains, 77 (16.4 %) strains were screened positive for hVISA/VISA by using 6µg vancomycin screen agar. However, out of these 77 hVISA/VISA strains only 33 (7 %) of the strains were confirmed as hVISA by PAP-AUC method which remains as one of the gold standard confirmatory technique.

All the hVISA strains confirmed by PAP-AUC method had PAP-AUC ratio between 0.9-1.2 and none of the strains gave PAP-AUC ratio ≥1.3. Among hVISA, 11(33 %) strains were MRSA.

Among 33 hVISA isolates, 1 isolate (3 %) was from urine, 5 isolates (15 %) were blood isolates and 27 (81 %) were from exudates samples. The prevalence of hVISA isolates was found to be higher among invasive isolates.

All the 33 hVISA strains (100 %) showed reduced autolysis with triton-X induced autolytic activity and reduced colony spreading property was appreciated in 13 (39 %) of these isolates.

Representative *hVISA* strains subjected to TEM analysis showed significant increase in their cell-wall thickness when compared with VSSA strains.

About 96 %, 57.8%, 64.0 % and 43.8 % of the MRSA isolates were biofilm producers, slime producers, beta-hemolytic and hemagglutination positive respectively.

Among hVISA isolates 55 %, 45 %, 76 %, 55 % were slime producers, biofilm producers, beta hemolytic and hemagglutination positive respectively. About 39 %, 18 % and 6 % of the isolates did not have colony spreading, did not produce DNase and weak coagulase producers respectively which clearly underscores some *agr* dysfunction in these isolates

Out of the 33 hVISA strains 14 (42.4 %) belonged to *agr* I, 8 (24.2 %) belonged to *agr* II, 10 (30 %) belonged to *agr* III and 1 (3 %) belonged to *agr* IV.

Among MR-hVISA isolates, *agr* I and II were predominant where as among MS-hVISA isolates *agr* I and III were common types.

Among *MRSA* isolates higher rate of resistance were observed with ciprofloxacin (47 %), co-trimoxazole (53 %) and erythromycin (54 %) and least resistance with netilmicin (2 %), tetracycline (5 %), clindamycin (22 %) and gentamicin (27 %) .

However, *hVISA* isolates showed significantly less resistance to various group of antibiotics other than vancomycin, like netilmicin (0 %) clindamycin (3 %), tetracycline (3 %), gentamicin (12 %), cloxacillin (33 %), erythromycin (36 %), ciprofloxacin (36 %) and cotrimoxazole (39 %).

Among MRSA and hVISA isolates, high level mupirocin resistance was observed in 8.7% and 12% of the strains respectively. Only 0.8% of the MRSA isolates showed low level mupirocin resistance. All the HLMR and LLMR isolates were susceptible to fusidic acid.