



Short Communication

ANTIBIOTIC SUSCEPTIBILITY PATTERN OF NOSOCOMIAL ISOLATES OF STAPHYLOCOCCUS HAEMOLYTICUS FROM A TERTIARY CARE HOSPITALVishal Sharma^{1*} and Neerja Jindal²¹Department of Microbiology, Chintpurni Medical College and Hospital, Pathankot, Punjab, India²Department of Microbiology, GGS Medical College, Faridkot, India

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Abstract: *Staphylococcus haemolyticus* is a potentially important nosocomial species and is characterized by resistance to multiple antimicrobial agents. This study was undertaken to determine the prevalence and antimicrobial susceptibility pattern of *Staphylococcus haemolyticus* isolates in hospitalized patients and their antimicrobial resistance pattern. The study comprised of 100 *S. haemolyticus* strains isolated from various clinical specimens. Antibiotic susceptibility was performed and interpreted as per standard protocols. Methicillin resistance was determined by minimum inhibitory concentration of oxacillin by macro broth dilution test. Susceptibility to glycopeptides (vancomycin and teicoplanin) was determined by broth macro dilution method. High level of resistance was found to various antibiotics tested. Methicillin resistance was found in 56% of *S. haemolyticus* strains. All the study isolates were susceptible to vancomycin and teicoplanin. Judicious use of antimicrobials with continuous monitoring of MIC levels of glycopeptides and effective infection control practices could help prevent emergence of resistance to these agents.

Keywords: Nosocomial, Methicillin, Minimum Inhibitory Concentration, Oxacillin, Glycopeptides, Broth Macro Dilution

INTRODUCTION

Once considered as harmless commensals, coagulase negative staphylococci (CNS) have become an important cause of morbidity and mortality in hospital setting worldwide.^[1] Of the various species of CNS, *S. haemolyticus* has emerged as an important nosocomial pathogen and is implicated in urinary tract infections, native valve endocarditis, septicemia, peritonitis, wound, bone and joint infections.^[2] Many studies have reported it to more resistant to various antibiotics, as compared to other CNS.^[3,4] The reports of emergence of glycopeptide (vancomycin and teicoplanin) resistance in CNS in general and *S. haemolyticus* isolates in particular has posed a fearsome threat to already challenging therapy of these resistant strains (especially methicillin resistant).^[5,6] Therefore the present study was undertaken to determine the prevalence of *S. haemolyticus* among clinical isolates of coagulase negative staphylococci and to determine their antibiogram in our tertiary care hospital.

MATERIAL AND METHODS

A total of 250 coagulase negative staphylococci were isolated from various clinical specimens (blood, pus urine, catheter tips and sterile fluids) obtained from inpatients of our tertiary care hospital. The isolates were identified by standard procedures (gram staining, catalase test, slide and tube coagulase test) and speciated by a battery of tests. These included tests for sensitivity to novobiocin (5µg), test for urease

production, fermentation of mannose and ornithine decarboxylation test.^[2,7,8,9] Isolates which were novobiocin sensitive and negative for tests for urease, mannose and ornithine decarboxylase test were identified as *Staphylococcus haemolyticus* and included in the study. One hundred *Staphylococcus haemolyticus* isolates thus identified were subjected to antimicrobial susceptibility testing by Kirby Bauer disc diffusion method.^[10] Various antibiotics tested were penicillin (10µg), cefoxitin (30µg), gentamicin (10µg), amikacin (30µg), ciprofloxacin and linezolid (30µg). Norfloxacin (10µg) and nitrofurantoin (300µg) were put up only for urinary isolates while erythromycin was not tested for urinary isolates. Methicillin resistance was detected by studying minimum inhibitory concentration (MIC) of oxacillin by broth dilution method. Susceptibility for vancomycin and teicoplanin was studied by doing MIC by macro broth dilution test with dilutions ranging from (0.5µg/ml-128µg/ml). The results were interpreted as per CLSI guidelines.^[10]

RESULTS

Of the 250 coagulase negative staphylococci isolated in our study, *S. haemolyticus* constituted 40% (100/250). Maximum isolation was from urine (42%) followed pus (30%), intravenous catheter tips (12%), body fluids (10%) and blood (6%). The antimicrobial susceptibility of 100 *S. haemolyticus* isolates is depicted in Table.1. The maximum resistance in this study was observed against penicillin (100%) followed by cefoxitin

***Corresponding Author:**

Dr. Vishal Sharma,

Assistant Professor, Department Of Microbiology,

Chintpurni Medical College and Hospital,

Pathankot, Punjab, India



(56%) gentamicin (43%), amikacin (26%), erythromycin (20%), norfloxacin (14%), nitrofurantoin (12%) and linezolid (0%). Resistance to methicillin was detected in 56% isolates and MIC of these resistant isolates ranged between 0.5µg/ml to 32µg/ml. All the isolates were susceptible to vancomycin and teicoplanin, and their minimum inhibitory concentrations are given in Table.2.

Table.1: Antibiogram of *Staphylococcus haemolyticus* isolates (n=100)

Antibiotics	No. of strains	Sensitive	Resistant
Penicillin	100	0	100
Cefoxitin	100	44	56
Ciprofloxacin	100	61	39
Gentamicin	100	57	43
Norfloxacin*	42	28	14
Nitrofurantoin*	42	30	12
Erythromycin †	58	38	20
Amikacin	100	74	26
Linezolid	100	100	0

* Put up only for urine samples, † not put up in urine samples

Table.2: MIC of Vancomycin and Teicoplanin by broth macro dilution method

Antibiotics	≤0.25µg/ml	=1µg/ml	=2µg/ml
Vancomycin	87	13	-
Teicoplanin	66	25	9

DISCUSSION

In the present study prevalence of *S. haemolyticus* among clinical isolates of CNS is 40%. *S. haemolyticus* has been reported as the most common isolate accounting for 72% (82/114) of the CNS isolations by Chaudary et al and second in frequency only to *S. epidermidis* by some other workers.^[4,5] Interestingly, *S. haemolyticus* was the predominant isolate from urine specimens 73.68% (42/57) which is similar to an Indian study where; of the 63 CNS isolates from urine, 53 (84.1%) were *S. haemolyticus*.⁵ Many other authors also have reported this species to as an important pathogen in nosocomial urinary tract infections.¹¹ Isolation from pus, blood, catheter tips and body fluids has also been reported in different studies.^[4,9,12,13]

Methicillin resistance was detected in 56% of *S. haemolyticus* strains in the present study. Other authors have also reported high resistance to methicillin in *S. haemolyticus* as compared to other species of coagulase negative staphylococci.^[4,5,13] All our study isolates were susceptible to vancomycin and teicoplanin which is in accordance with many other studies.^[4,9,13] However there have been reports of reduced susceptibility to frank resistance to glycopeptides in *S. haemolyticus* from different parts of the world.^[5,6,14] This is because of the peculiar propensity of these organisms to develop resistance to glycopeptides in a single step exposure to this antibiotic. Isolates of this species have acquired resistance to glycopeptides even earlier than

enterococci and other staphylococcus species.^[14] This is a worrisome problem as glycopeptides are the last resort in treatment of infections by staphylococcus species.^[5]

Our study highlights the high prevalence of resistance to various antibiotics in *S. haemolyticus* which calls for routine antimicrobial susceptibility testing. Prevalence of high resistance to multiple drugs in these isolates in our hospital and their hundred percent susceptibility to glycopeptides (vancomycin and teicoplanin) suggests the need of judicious use of these antibiotics and continuous monitoring for any emergence of resistance to these novel agents.

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