International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Study of Coagulase Negative Staphylococci Isolated From Clinical Specimens in Tertiary Care Hospital from Western Maharashtra

Priyanka Mane[1], Makarand Mane[2], S.T. Mohite[3], Satish.R.Patil[4]

[1]Assistant Professor, Department of Microbiology, KIMS, Karad, Maharashtra, India

[2]Assistant Professor, Department of Medicine, KIMS, Karad, Maharashtra, India

[3]Professor of Microbiology and Principal KIMS, Karad, Maharashtra, India

[4]Professor of Microbiology KIMS, Karad, Maharashtra, India

Abstract: ***Coagulase negative staphylococcus is now being increasingly recognized as pathogens. Coagulase negative staphylococci have become a common cause of nosocomial infections, particularly blood stream infections and infections related to prosthesis. The present study was carried out to study the coagulase negative staphylococcus isolated from various clinical specimens and to determine their antimicrobial susceptibility. Methodology-A total of 103 strains of coagulase negative staphylococci isolated in pure form from various clinical specimens were included in the study. All clinical specimens were processed as per the standard laboratory procedures. RESULTS - In present study majority of the isolates were from blood 44(42.72%) followed by urine 29(28.16%), pus 16(15.53%), catheter tip 6(5.83%), ETT 5(4.85%), and 1(0.97%) each from sputum, peritoneal fluid and pleural fluid.Maximum patients were 23 (22.33%) were in the age group of 21-30 years followed by 51-60 years (15.53%) and 41-50 yrs 15 (14.56%). Maximum no. of males 57 (55.34%) had CoNS infections as compared to females 46 (44.66%). the maximum sensitivity was seen to Netilmycin 71(68.93%) followed by Co-triamoxazole(60.19%) , Amikacin (46.60%) , Cephotaxime (42.72%). All the isolates were Penicillin-G resistant. Chloramphenicol resistance was observed 74.76%.***

Keywords: coagulase, negative staphylococci, antimicrobial susceptibility, tertiary care hospital

1. Introduction

Staphylococci are Gram positive cocci that occur in grape like clusters. Genus *Staphylococcus* consists of 32 different species which are animal pathogens or commensals. Coagulase negative staphylococcus (CoNS) is normal flora of skin. It forms white nonpigmented colonies similar to those of *Staphylococcus aureus*. It is differentiated from *Staphylococcus aureus* by failure to coagulate plasma. Historically CoNS have been considered as saprophytes with little pathogenic potential. However, it is now well known that under appropriate conditions they can produce serious human infections. CoNS are opportunistic bacteria. They cause infections in debilitated or immunocompromised patients and in patients fitted with urinary catheters, cardiac valves, pace makers and artificial joints[1].

Coagulase negative staphylococcus is now being increasingly recognized as pathogens. Coagulase negative staphylococci have become a common cause of nosocomial infections, particularly blood stream infections and infections related to prosthesis. They account for about 9% of the nosocomial infections. It is now possible to identify different species of staphylococcus for diagnostic laboratories. Because of this, more laboratories can access what potential clinical or epidemiological benefits this additional information might have[2].

All clinical isolates of coagulase negative staphylococcus with decreased susceptibility to glycopeptides have been oxacillin resistant and resistant to many other therapeutic agents. Because vancomycin is an important agent to treat clinically significant oxacillin resistant isolates, the decreased susceptibility of coagulase negative staphylococcus to vancomycin in particular limits therapeutic options. As a result, various infection control measures are required to decrease transmission and reduce infections caused due to CoNS[3].

The present study was carried out to study the coagulase negative staphylococcus isolated from various clinical specimens and to determine their antimicrobial susceptibility.

2. Methodology

The present study was carried out on various clinical specimens obtained from the patients attending Krishna Hospital and Medical research centre, Karad, during the period of July 2009 to June 2011. A total of 103 strains of coagulase negative staphylococci isolated in pure form from various clinical specimens were included in the study.

All clinical specimens were processed as per the standard laboratory procedures[4]. The general principles of collection, transport and storage of specimens are applicable to staphylococci. No special methods or precautions are usually required for these organisms because they are easily obtained from the clinical materials. They are relatively resistant to drying and moderate temperature changes.

Each clinical sample was processed for direct smear examination by Gram staining and inoculated on the routine culture media for isolation of the etiological agent. After 24 hrs of incubation, colonies on blood agar in pure form were followed by smear examination. Catalase test was done to differentiate between staphylococci and streptococci. Staphylococci are Gram positive cocci arranged in clusters and are catalase positive. The isolate was further subjected to slide and tube coagulase test. The staphylococci which were tube coagulase negative were included in the study. All the isolates were subjected to antibiotic susceptibility testing on Muller Hinton agar by Kirby-Bauer disc diffusion method according the CLSI guidelines[5]. The antibiotics tested were Netilmycin (30mcg), Vancomycin (30mcg), Cefoxitin (30mcg), Co-triamoxazole (25mcg), Cephotaxime (30mcg), Norfloxacin (10mcg), Ciprofloxacin (5mcg), Chloramphenicol (30mcg), Penicillin-G (10 units), Erythromycin (15mcg), Amikacin (10 mcg), Gentamycin (10mcg), Ampicillin (10mcg) etc.

Ethical Clearance

The study was approved by the Ethical committee of the Krishna Institute of Medical Sciences Deemed University, Karad, Maharashtra.

3. Results

Various clinical samples were followed for a period of 2 years from July 2009 to June 2011. Total 103 CoNS isolated in pure form were included in the study.

Table 1: Distribution of CoNS in various clinical specimens

Sr. No.	*Specimen*	*Total no. of CoNS*	*%*
1	Blood	44	42.72%
2	Urine	29	28.16%
3	Pus	16	15.53%
4	Catheter tip	6	5.83%
5	Peritoneal fluid	1	0.97%
6	ETT	5	4.85%
7	Sputum	1	0.97%
8	Pleural fluid	1	0.97%
		103	100%

In present study majority of the isolates were from blood 44(42.72%) followed by urine 29(28.16%), pus 16(15.53%), catheter tip 6(5.83%), ETT 5(4.85%), and 1(0.97%) each from sputum, peritoneal fluid and pleural fluid.

Table 2: Age & specimen-wise distribution of CoNS isolates

Age	Blood	Urine	Pus	Catheter tip	Peritoneal Fluid	ETT	Sputum	Pleural Fluid	Total	%
0-10	8	2	2	-	-	1	-	-	13	12.62
11-20	4	2	1	-	-	-	1	-	8	7.77
21-30	5	10	3	2	-	3	-	-	23	22.33
31-40	5	3	1	1	-	-	-	-	10	9.71
41-50	8	3	0	1	1	1	-	1	15	14.56
51-60	5	6	5	-	-	-	-	-	16	15.53
61-70	4	3	2	2	-	-	-	-	11	10.68
> 71	5	-	2	-	-	-	-	-	7	6.79

Table 3 : Sex & specimen -wise distribution of CoNS isolates

Sr. No.	Specimen	Male	Female	Total
1	Blood	27	17	44
2	Urine	18	11	29
3	Pus	8	8	16
4	Catheter tip	2	4	6
5	Peritoneal fluid	0	1	1
6	ETT	1	4	5
7	Sputum	0	1	1
8	Pleural fluid	1	0	1
	Total	57 (55.34%)	46 (44.66%)	103

Table no.2 & 3 shows age & specimen-wise and sex & specimen-wise distribution of CoNS isolates. Maximum patients were 23 (22.33%) were in the age group of 21-30 years followed by 51-60 years (15.53%) and 41-50 yrs 15 (14.56%). Maximum no. of males 57 (55.34%) had CoNS infections as compared to females 46 (44.66%).

Table 4: Antibiotic susceptibility pattern in CoNS

Antibiotic	Sensitive	%	Resistant	%
Amikacin (30mcg)	48	46.60	55	53.39
Ampicillin (10mcg)	35	33.98	68	66.02
Cephotaxime (30mcg)	44	42.72	59	57.28
Cefoxitin (30mcg)	32	31.07	71	68.93
Chloramphenicol (30mcg)	26	25.24	77	74.76
Ciprofloxacin (5mcg)	38	36.89	65	63.11
Co-triamoxazole (25mcg)	62	60.19	41	39.81
Erythromycin (15mcg)	35	14.56	68	66.02
Gentamycin (10mcg)	47	45.63	56	54.37
Netilmycin (30mcg)	71	68.93	32	31.07
Norfloxacin (10mcg)	35	33.98	68	66.02
Penicillin-G10units	0	0	100	100

In present study the antibiogram of CoNS, the maximum sensitivity was seen to Netilmycin 71(68.93%) followed by Co-triamoxazole(60.19%) , Amikacin (46.60%) , Cephotaxime (42.72%). All the isolates were Penicillin-G resistant. Chloramphenicol resistance was observed 74.76%.

4. Discussion

Various clinical samples were followed for a period of 2 years from July 2009 to June 2011. Total 103 CoNS isolated in pure form were included in the study. Maximum isolates were from blood 44 (42.72%) followed by urine 29 (28.16%), pus 16 (15.53%), ETT 5(4.85%), catheter tip (5.83%) and 1 (0.97%) each from sputum, peritoneal fluid and pleural fluid.

Various studies have been carried out for the isolation of CoNS proving their role as pathogens. Isolation rate of CoNS from blood varies from 4.71% (Phatak et al) [6] to 46.33% (Sharma et al) [7]. Shrikhande et al[8] isolated 23.68% and Marsik et al[9] 29.89% CoNS from blood respectively. Goyal et al[10] have reported 14.7% CoNS from blood and Choudhary et al[11]reported the incidence as 45%. In our study we have isolated 42.72% of CoNS from blood. Our study correlates with Sharma et al[7] and Choudhary et al[11].

In present study, 28.16% CoNS were isolated from urine. Phatak et al[6] have reported 18.66% CoNS from urine. Gill[12] has reported 6.78% and Gemell [13] has isolated 53% CoNS from urine. Mohan et al [14] have reported 56% isolates from urine whereas Choudhary et al [11] have reported 20% isolates from urine. Goyal et al[10] have reported the incidence to be 28.4%. The present study correlates with Goyal et al [10].

Gill and colleagues[12]and Sundaram et al[15]have isolated 17.4% and 20.1% CoNS from pus respectively. Incidence of CoNS from pus was reported to be 24.33% by Sharma et al[7], Choudhary et al[11] have reported the incidence to be 25% whereas Phatak et al[6] 36.7%. In present study we have got 15.33% isolates from pus. 5.83% CoNS were isolated from catheter tip. Similar findings were reported by Sharma et al[7](5.7%).

It was observed that CoNS infections were more common in 2nd and 3rd decades of life. This may be due to higher incidence of UTI, post operative wounds in these age groups. Also CoNS infections were more common in males as compared to females, their incidence being 55.34% and 44.66% respectively; probably males report and seek medical advice more than females.

The antibiotic resistance pattern was compared with the other studies in the last decade. The table shows resistance pattern of CoNS to various antibiotics (in percentage).

Antibiotic	Sharma et al[7] 2010	Choudhary et al[11] 2008	Goyal et al[10] 2006	Mohan et al[14] 2002	Present study
Netilmycin (30mcg)	-	-	-	-	31.07
Vancomycin (30mcg)	0	12	o	0	0
Cefoxitin (30mcg)	52	25	25	-	68.93
Co-triamoxazole (25mcg)	-	60	-	-	39.81
Cephotaxime (30mcg)	-	-	59	-	57.28
Norfloxacin (10mcg)	34.3	-	-	62.5	66.02
Ciprofloxacin (5mcg)	36.3	48	29	51	63.11
Chloramphenicol (30mcg)	-	-	-	40	74.76
Penicillin-G (10 units)	100	-	-	90.6	100
Erythromycin (15mcg)	27.9	68	23	-	66.02
Amikacin	22.7	-	-	-	53.39
Gentamycin (10mcg)	34	60	20	46.3	54.37
Ampicillin (10mcg)	-	-	89	-	66.02

5. Conclusion

To conclude, it seems that CoNS demands more recognition as pathogen specially when it is the sole isolate and it cannot be ignored as mere contaminant or commensal.

References

[1] Parija S C. Staphylococcus. In the Textbook of Microbiology and Immunology 2009: 181-189.
[2] Singh S, Gopa B, Agarwal S. K, Kumar M, Singh R. K. Simple method for speciation of clinically significant coagulase negative staphylococcus and its antibiotic sensitivity/resistant pattern in NICU of tertiary care centre, Lucknow, India. Journal of Biomedical Research 2008; 19(20): 5-8.
[3] Makhija S.V, Jalgaonkar S. V, Kher M. Slime producing staphylococci from clinical specimens: a simple diagnostic test. Indian Journal of Pathology and Microbiology 1995; 38 (2): 159-61.
[4] Baird D, colle J G, Fraser A G, Marmion B P. Staphylococcus: Cluster forming Gram positive cocci. Mackie McCartney Practical Medical Microbiology 1989,14th ed Vol 2: 304-316.
[5] Wayne PA. National Committee for clinical laboratory standards. Performance standards for antimicrobial disc susceptibility testing; 21st information supplement, Jan 2011; M100-S12.
[6] Phatak J, Udgaonkar U, Kulkarni R D, Pawar S G. Study of coagulase negative staphylococci and their incidence in human infections. Indian J Med Microbiol. 1994; 12: 90-95.
[7] V Sharma, N Jindal and P. Dev. Prevalence of methicillin resistant coagulase negative staphylococci in a tertiary care hospital. Iran J Microbiol. 2010; 2(4): 185-188.
[8] Shrikhande S, Thakkar YS, Pathak AA, Saoji AM. Species distribution of clinical isolated of staphylococci. Indian J Med Microbiol. 1996; 39: 207-210.
[9] Marsik F J and Brake S. Species identification and susceptibility to 17 antibiotics of coagulase negative Staphylococci isolated from clinical specimens. J Clin Microbiol 1982; 15 (4): 640-645.
[10] Goyal R, Singh NO, Kumar A, Kaur, Singh M, Sumita N, et al. Simple and economical methods of speciation and resistotyping of clinically significant coagulase negative staphylococci. Ind. J. Med Microbio. 2006; 24: 201-204
[11] U Uma Choudhary, Bharati Arora, Madhu Sharma. The prevalence of methicillin resistant coagulase negative staphylococcus in a tertiary care hospital in North India.

J Infect Dis Antimicrob Agent 2008; 25: 13-7.
[12] Gill V J, Selepak S T and Williams E C. Species identification and antibiotic susceptibility of coagulase negative staphylococci isolated from clinical specimens. J Clin microbial 1983; 18 (6): 1314-1319.
[13] Gemmell C J and Dawson J E. Identification of coagulase negative staphylococci with API Staph system. J Clin Microbiol 1982; 16: 874-877.
[14] Mohan V, Jindal N, Aggrawal P. Species distribution and antibiotic sensitivity pattern of coagulase negative staphylococci isolated from various clinical Specimens. Indian J Microbiol. 2002; 20: 45-6.
[15] Sundaram S P, Shantakumari S L and Murthy K V. Antimicrobial susceptibility pattern of Staphylococcus aureus and Coagulase negative staphylococci isolated from clinical specimens. Indian J Med Sci. 1982; 36: 91-96.

Author Profile

Dr. Priyanka M Mane is Assistant Professor, Department of Microbiology, KIMS, Karad, Maharashtra, India

Dr. Makarand B Mane is Assistant Professor, Department of Medicine, KIMS,Karad, Maharashtra, India

Dr. S.T. Mohite is Professor of Microbiology and Principal KIMS, Karad, Maharashtra, India

Dr. S. R . Patil is Professor of Microbiology KIMS, Karad, Maharashtra, India