Frequency of Coagulase Negative Staphylococci isolated from hospital departments

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Abstract

Coagulase negative staphylococci (CoNS) are normal and opportunistic pathogens. A total of 250 samples were screened for CoNS from hospital departments such as Urology, Gastroenterology, Nephrology, Internal medicine and Pediatric surgery. Samples were transferred on selective growth medium mannitol salt agar (MSA), Baird-Parker agar containing 8 mg/L ciprofloxacin (BPC) and bromocresol purple agar containing 75 mg/L aztreonam and 6 mg/L oxacillin (BCPA). Strains showed pin point colony on medium and isolated strains were characterized on the basis of biochemical tests and coagulase tests. Fifty five samples were CoNS positive. CoNS strains were present in 49.09% (urology dept.), 7.27% (Gastroenterology dept.), 34.54% (Nephrology dept.), 3.63% (Internal medicine dept.) and 5.45% (Pediatric surgery dept.). Result confirms that CoNS are major agents of nosocomial infection and spread through utensil and unhygienic conditions in hospital.

Keywords: Coagulase negative staphylococci, hospital departments, ciprofloxacin, coagulase.

Introduction

Genus Staphylococcus comprises 42 validly described species and subspecies of gram-positive, catalase positive cocci (Bannerman, 2003; Ghebremedhin et al., 2008). On the basis of coagulase test, Staphylococcus genera are classified into coagulase positive and coagulase negative. Coagulase-negative staphylococci are a group of adaptable and opportunistic pathogens have the ability to persist and multiply into a variety of environments and cause a wide spectrum of diseases in both humans and animals (Pilipcincova et al., 2010; Akinkunmi and Lamikanra, 2010; Deshwal et al., 2011).

Reports indicated that CoNS are among the 5 most commonly reported pathogens in hospitals conducting hospital-wide surveillance (Schaberg et al., 1991; Jarvis and Martone, 1992). Boyce et al. (1997) Reported that nurses are the carrier to spread the staphylococcal infections. Another study indicated that about 12 (17%) of 70 contacts between a health-care worker and staphylococcal colonised patient resulted in transmission of staphylococcal infect from the patient to the gloves of the health-care worker (McBryde et al., 2004). Herard et al. (1998) reported that CoNS are recognized as major agents of nosocomial infection and their great capacity to colonize catheters and most prostheses. Previous findings revealed that CoNS is responsible for nosocomial infection but least information is reported about the occurrence of CoNS in various hospital departments. Therefore, this study was carried out to determine the occurrence of CoNS in various hospital departments.

Materials and methods

Study area: Five departments namely Urology, Gastroenterology, Nephrology, Internal medicine and Pediatric surgery of a private Medical College located in Moradabad was selected for this study. Fifty samples from each department were collected.

Isolation of Staphylococcus: Samples were taken from various utensils such as catheter, stethoscope, thermometer, blood pressure instrument and apron etc. Sterilized moist cotton swab was used to collect sample from the utensils. Sample was spread on sterilized selective media namely mannitol salt agar (MSA), Baird-Parker agar containing 8 mg/L ciprofloxacin (BPC) and bromocresol purple agar containing 75 mg/L aztreonam and 6 mg/L oxacillin (BCPA).

Biochemical characterization of CoNS: Isolated strains were characterized on the basis of gram staining and biochemicals tests. Such tests were done according to Bergey's manual of Determinative Bacteriology (Holt et al., 1994).

Coagulase test: This test was used to differentiate coagulase positive and negative staphylococci. It is done by slide agglutination and tube coagulase test.

1. Slide agglutination test: Dense suspensions of Staphylococci from culture are made on two ends of clean glass slide. One was labeled as “test” and the other as “control”. The control suspension serves to rule out false positivity due to autoagglutination.
The test suspension is treated with a drop of citrated plasma and mixed well. Agglutination or clumping of cocci within 5–10 sec is taken as positive.

2. Tube coagulase test: Three test tubes are taken and labeled “test”, “negative control” and “positive control”. Each tube is filled with 0.5 mL of 1 in 10 diluted rabbit plasma. To the tube labeled test, 0.1 mL of overnight broth culture of test bacteria is added. To the tube labeled positive control, 0.1 mL of overnight broth culture of known S. aureus (coagulase positive) is added and to the tube labeled negative control, 0.1 mL of sterile broth is added. All the tubes are incubated at 37°C and observed up to 4 h. Positive result is indicated by gelling of the plasma, which remains in place even after inverting the tube. If the test remains negative until 4 h at 37°C, the tube is kept at room temperature for overnight incubation.

Results and discussion
A total of 250 samples were collected from 5 departments were screened for coagulase negative staphylococci. Strains showed pin point colony on mannitol salt agar (MSA), Baird-Parker agar containing 8 mg/L ciprofloxacin (BPC) and bromocresol purple agar containing 75 mg/L aztreonam and 6 mg/L oxacillin (BCPA). Fifty five isolated strains showed gram positive cocci in group i.e. Staphylococcus, oxidase (-), VP (+), coagulase (-), phosphatase (-), nitrate (-), arginine (-), urea (+), protease (-). Novobiocin MIC≥1.6 µg/mL (resistant), form acid from lactose, maltose, mannitol, fructose, sucrose and coagulase negative. Similar observations were mentioned by Holt et al. (1994) and Cowan and Steel’s manual for the identification of medical bacteria (Barrow and Feltham, 1993).

Coagulase negative staphylococci were isolated from all departments. Maximum CoNS were found in Urology dept. and least CoNS was observed in Pediatric surgery dept. (Table 1). Some findings reported that CoNS strains are a part of the normal and pathogenic microflora in human (Agvald-Ohman et al., 2004; Deshwal et al., 2011) and also mentioned that large, relatively stable reservoirs were identified in the faeces, around the ear, and in the axilla and nares (Eastick et al., 1996). The reports suggest that such normal flora can spread from utensil to human and cause disease. Reports suggest that CoNS commonly cause diseases such as urinary tract infection (Kolawole et al., 2009), intraocular infection (Bannerman et al., 1997), bacteraemia (Singh et al., 2009), prosthetic valve endocarditis (Revilla et al., 2005), endophthalmitis (Ramadan and Menkabo, 2007). Study findings clearly indicate that CoNS are significantly present in various departments especially in urology dept. Maximum CoNS were found in urology dept. (49.09%) and nephrology dept. (34.54%) and it may be due to contaminated utensil and unhygienic condition in department.

Table 1. Frequency of CoNS isolated from hospital departments.

<table>
<thead>
<tr>
<th>Departments</th>
<th>Samples</th>
<th>Total CoNS</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urology</td>
<td>50</td>
<td>27</td>
<td>49.99</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>50</td>
<td>04</td>
<td>07.27</td>
</tr>
<tr>
<td>Nephrology</td>
<td>50</td>
<td>19</td>
<td>34.54</td>
</tr>
<tr>
<td>Internal medicine</td>
<td>50</td>
<td>03</td>
<td>05.45</td>
</tr>
<tr>
<td>Pediatric surgery</td>
<td>50</td>
<td>02</td>
<td>03.63</td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>55</td>
<td>22</td>
</tr>
</tbody>
</table>

Conclusion
CoNS strains are responsible for nosocomial infections. These strains are abundance in major department of hospitals. Present finding suggests that all utensils and instruments which are used in diagnosis or treatment of patient should be properly sterilized and also a hygienic condition in hospital departments should also be maintained.

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