

Microbiological profile of biliary tract infections

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ABSTRACT

Background and objectives: Bacterial infection of biliary tract may cause severe inflammatory response or sepsis. An immediate bile culture and appropriate antibiotic administration are important to control the biliary tract infection. The objective of the study was to study the microbial profile and antibiotic sensitivity pattern in patients with biliary tract infection. **Materials and methods:** Fifty suspected cases of biliary tract infection admitted to the Department of Gastroenterology were enrolled. Bile samples from these patients were aseptically collected and sent to the Department of Microbiology. Samples were processed in automated BACTEC or BacT/ALERT system. Further identification and antimicrobial susceptibility testing was done by VITEK-2 system. **Results:** Of the 50 suspected cases of biliary tract infection, the majority were male patients and in the age group of 51-60 years. Growth was obtained in 22 (44%) bile samples. The organisms obtained were *Escherichia coli* (40%), *Klebsiella spp.* (20%), *Pseudomonas spp.* (16%), and coagulase-negative *Staphylococci* (8%). All Gram negative isolates were susceptible to tigecycline and colistin. A high susceptibility was seen to amikacin and carbapenems while low susceptibility was seen to others. All the Gram positive organisms were sensitive to vancomycin, teicoplanin and linezolid with low sensitivity to penicillin. **Interpretation and conclusion:** *E. coli* is the most common organism isolated from bile. Antimicrobial sensitivity patterns require a revision of empiric antibiotic therapy policy in cholangitis. Early detection and determination of antimicrobial susceptibility pattern is important to reduce the mortality and morbidity associated with bile fluid infections.

Keywords: Antimicrobial susceptibility, bile culture, Gram negative bacteria

INTRODUCTION

The bile is normally sterile but in the presence of obstruction, the chances of cholangitis increases.^[1,2] Acute cholangitis refers to inflammation of the biliary ductal system from bacterial or non-bacterial infection, usually in the setting of biliary obstruction.^[3] However, the presence of gallstones within either the gallbladder or biliary tree is associated with the bacterial colonization of the bile.^[4] In patients without stone disease, previous biliary intervention is associated with

high rates of bacteriobilia.^[5,6] Under conditions of normal bile flow, bacteria in the biliary system are of no clinical significance. Upon bile duct obstruction, bacteria proliferate within the stagnant bile while biliary pressure increases. Eventually, the bacteria presumably translocate into the circulation causing a systemic infection. Acute cholangitis spans a continuous clinical spectrum and can progress from a local biliary infection to advanced disease with sepsis and multiple organ dysfunction syndrome.^[7] Even recent studies have reported mortality rates of up to 10%.^[8,9]

The most common organisms isolated in bile are *Escherichia coli*, *Klebsiella spp.*, *Enterococcus spp.*, *Streptococcus spp.*, *Enterobacter spp.*, *Pseudomonas spp.* and *Candida spp.*^[1,2,3] Microbiology of cholangitis has not changed significantly but the emergence of drug resistance among these organisms has been a matter of

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concern. Although definitive management of cholangitis involves the relief of bile stasis, effective empiric antibiotic therapy is an indispensable part of the treatment.^[7,10] Antimicrobial therapy recommendations state that antibiotics should be administered as soon as the diagnosis of acute cholangitis is suspected or established. Therefore, the present study was undertaken to know the microbiological profile and current antibiotic susceptibility patterns of isolates from patients with biliary tract infection admitted in a teaching hospital in North India.

MATERIALS AND METHODS

Fifty suspected cases of biliary tract infection admitted to the Department of Gastroenterology were enrolled. Bile samples from these patients were aseptically collected and sent to the Department of Microbiology. Samples were processed in automated BACTEC or BacT/ALERT system. Smears were prepared from the positive culture bottles and Gram staining of the smears was done. Simultaneously all the positive bottles were sub-cultured on blood agar and MacConkey agar plates. The plates were incubated at 37°C for 18-24 hours. Identification of isolated organisms and antimicrobial susceptibility was done by VITEK-2 system.^[11]

RESULTS

Among 50 cases suspected with biliary tract infection, 56% were males. Mean age of the patients was 55.2 years. Of the 50 bile samples, growth was obtained in 22 (44%) samples. Bile culture positivity was more in females (50%) as compared to males (40%). Amongst the culture positive cases, maximum number of females and males were in the age group 61-70 years and 51-60 years respectively. The mean age of patients with positive bile culture was 54.6 years. Monomicrobial infection was seen in 19 (86%) cases whereas polymicrobial was seen in 3 (14%) culture positive cases. A total of 25 isolates were obtained from 22 samples. Majority of the isolates were Gram negative (84%), followed by Gram positive (12%) and yeasts (4%). Among the isolates the most common one was *E. coli* (40%), followed by *Klebsiella pneumoniae* (20%), *Pseudomonas aeruginosa* (16%) and coagulase-negative Staphylococci (8%) (Fig.1). All the Gram negative isolates were susceptible to tigecycline and colistin. They also showed high susceptibility to

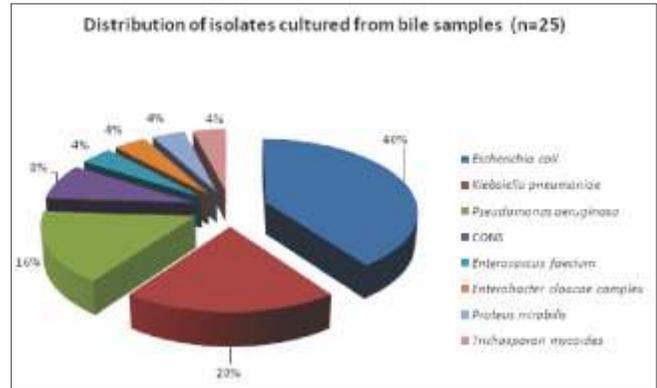


Fig. 1: Distribution of isolates cultured from bile samples (n=25)

amikacin (71.4%) and carbapenems (76.2%) while low susceptibility was seen to cefuroxime (20%), fluoroquinolones (23.8%), piperacillin/tazobactam (28.6%) and cefoperazone/sulbactam (28.6%) (Fig.2). Low susceptibility was seen for cephalosporins (20% each) and ciprofloxacin (20-30%) by *K. pneumoniae* and *E. coli*. High susceptibility was seen to aminoglycosides and carbapenems. *P. aeruginosa* had no sensitivity to ceftazidime, low sensitivity to fluoroquinolones (20-50%) and carbapenems (20-50%). All the Gram positive organisms were resistant to penicillin, whereas they showed 100% susceptibility to vancomycin, teicoplanin and linezolid. A single fungal isolate was identified as *Trichosporon mycoides* and was sensitive to fluconazole, voriconazole, flucytosine, amphotericin B and

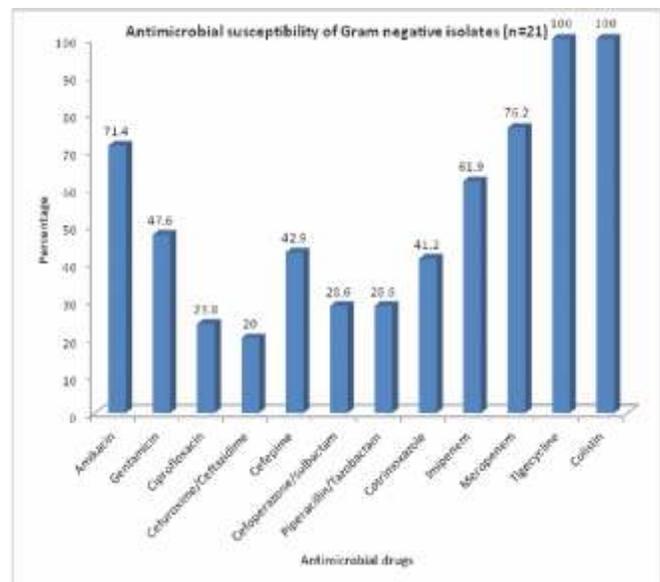


Fig.2: Antimicrobial susceptibility of Gram negative isolates (n=21)

capsosfungin drugs.

DISCUSSION

Infected bile in cholangitis is a pivotal risk factor in increasing rate of complications such as bacteremia, wound infection and intra-abdominal sepsis. Majority of the patients were in the age group of 51-60 years and were males. In our study, bile culture positivity was 44%. Our results are comparable with results of study by Fan *et al*^[12] and Shenoy *et al*,^[13] who showed 23-46% and 56% culture positive rates respectively.^[12,13] Bile culture positivity was more in females as compared to males. Amongst the culture positive cases, maximum number of females and males were in the age group 61-70 years and 51-60 years respectively. In a study done in UK, maximum patients with positive bile cultures had mean age of 63.8 ± 9.7 years.^[14]

Monomicrobial growth was obtained in 19 (86%) bile samples. Similar finding was reported by Kaya *et al*^[15] in which 95% patients had monomicrobial growth in bile culture. The Gram negative enteric organisms formed 84% of the isolates. *E. coli* (40%) was the most common isolate, followed by *Klebsiella pneumoniae* (20%) and *P. aeruginosa* (16%). Similar findings were seen in a study by Suri *et al*^[16] and Bae *et al*,^[17] in which *E. coli* was the most common isolate.^[16,17] In a study, Gram negative enteric aerobes accounted for 70–78% of positive bile cultures, in which *E. coli* and *Klebsiella* spp were the most common organisms. Vaishnavi *et al*^[18] investigated bile samples from 445 patients with biliary diseases as well as those requiring biliary drainage for other miscellaneous gastrointestinal diseases with special emphasis on *Salmonellae*. Bactericholia was detected in 68.8% patients with *E.coli* (17.5%) followed by *K. pneumoniae* (15.7%) and *P. aeruginosa* (14.6%) as the most common microorganisms isolated. *Salmonellae* were also isolated from 5.8% of the samples. However they did not study the antibiotic sensitivity profile of these organisms.

Among Gram negative isolates, 100% were sensitive to tigecycline and colistin. They also showed high susceptibility to amikacin and carbapenems, while low susceptibility was seen to cephalosporins, fluoroquinolones, piperacillin/tazobactam and cefoperazone/sulbactam. High sensitivity to amikacin (86%), carbapenems (83%) and piperacillin/ tazobactam (61%),

while low susceptibility to ampicillin (21%) and cefotaxime (14%) was observed by Kaya *et al*.^[15] Coagulase negative Staphylococci (CONS) accounted for 8% of the total isolates, which was in concordance with Bae *et al*^[17] who reported CONS to be 9.7% of the isolates.^[17] All the Gram positive organisms were sensitive to vancomycin, teicoplanin and linezolid. Similar findings were seen in a study in Korea.^[17]

To conclude, in the present study Gram negative bacteria were the commonest isolates from bile and showed high resistance to fluoroquinolones and cephalosporins. Thus, knowledge of the common etiologic agents and their local susceptibility profile is essential to ensure the appropriate choice of empiric antimicrobial therapy.

Conflict of interest: Nil

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