# MICROBIOLOGY OF BILE IN SYMPTOMATIC UNCOMPLICATED GALLSTONE DISEASE

**Maqsood Ahmad, Muhammad Riaz Akhtar*, Adnan Ali**, Asrar Ahmad, Javed Sajjad Hashmi**

Combined Military Hospital Quetta Pakistan, *Pakistan Naval Ship Shifa Karachi Pakistan, **130 Medical Battalion Pakistan

## ABSTRACT

***Objective:*** To determine the microbiology of the bile culture and antimicrobial susceptibility in patients with symptomatic gallstone disease in our setup.

***Study Design:*** A descriptive study.

***Place and Duration of Study:*** Surgical Department Combined Military Hospital (CMH) Kharian from Oct, 2010 to Jun, 2011.

***Patients and Methods:*** A total of 106 patients underwent cholecystectomy due to symptomatic gallstones and their bile was cultured for aerobic and anaerobic bacteria and culture sensitivity was performed. Data was analysed by using statistical package for social sciences (SPSS) version 13.

***Results:*** Bile culture was negative in 81 patients (76.4%) and was positive in only 25 patients (23.6%). *Escheria Coli* was the most common cultured organism in 10 (40%) patients, *Klebsiella* in 5 (20%) patients, *Pseudomonas* in 5 (20%) patients, *Proteus* in 2 (8%) patients, *Staphlococcus aureus* in 2 (8%) patients and mixed organisms were cultured in 1 patient (4%). Cefoperazone with sulbactum and Amikacin were the most effective prophylactic antibiotics.

***Conclusion:*** Bile in majority of patients with symtomatic uncomplicated gallstone disease is sterile. E. coli is the most commonly cultured organism and cefoperazone with sulbactum and amikacin are the most appropriate antibiotics in our setup.

**Keywords:** Cholangitis, Cholecystitis, Cholecystectomy, Culture sensitivity.

## INTRODUCTION

Gallstone disease is one of the most common problems which affects gastrointestinal tract. Prevalence of the disease ranges from 11% to 36% which is related to many factors, including age, gender, and ethnic background[1]. Women are prone to have gallstones three times more than men and first-degree relatives of patients with gallstones have a twofold greater risk[2]. Incidence of gall stones increases with age[3]. Most patients with gallstones remain symptom free throughout life. Some patients progress to a symptomatic stage, with biliary colic caused by a stone obstruction. Symptomatic gallstone disease may lead to complications including acute cholecystitis, chronic cholecystitis, empyema of gallbladder, mucocele, choledocholithiasis with or without cholangitis, gallstone pancreatitis, gallstone ileus, and gallbladder carcinoma[4].

Biliary tract infection results from bile stasis due to chronic obstruction. The obstruction is usually attributed to gallstones in 80% of cases. Biliary obstruction causes an increase in ductal pressure, resulting in bacterial proliferation and dissemination. Bacterial infection is the most common type of biliary tract infection, with a gram-negative preponderance. Gram-positive and anaerobic bacteria are uncommon causative agents. Viral and fungal agents are rare[1].

Biliary microflora in patients who undergo cholecystectomy for symptomatic gallstone disease indicate the presence of bacteria in 20-46 % of patients and post operative infection rate is 7-20 %[5]. Most common cultured organisms are *Escherichia coli* (E coli), *Enterococci*, *Klebsiella*, *Pseudomonas* and some rare organisms are also cultured[6]. Many antibiotics are used empirically for prophylaxis against post operative infection. In one study culture sensitivity to amoxicillin/ clavulanic acid was 94.4%, to amikacin 90.7% and to teicoplanin it was 98.3%[6].

Gallstone disease (cholelithiasis) is one of the major health concerns in the world, especially in the developing countries[7] and cholecystectomy is a frequently performed procedure. Post operative infection rate is

Correspondence: **Dr Maqsood Ahmad**, Dept of Surgery, CMH Quetta, Pakistan
*Email: drmaqsood_ahmad@hotmail.com*
*Received: 05 Dec 2013; revised received 20 Jan 2014; accepted 30 Jan 2014*

significant and prophylactic antibiotics are required[1,5].

The aim of this study was to identify the common micro organisms in the bile of patients with symptomatic gallstone disease in our population and to choose an appropriate antibiotic regimen to treat these cases empirically.

## PATIENTS AND METHODS

This descriptive study was carried out at the surgical department of Combined Military Hospital (CMH) Kharian from Oct, 2010 to Jun, 2011. One hundred and six patients with symptomatic uncomplicated gallstones disease of either sex were selected by nonprobability consecutive sampling technique. Patients with acalculus cholecystitis, diabetes mellitus and immunocompromised patients were excluded.

At cholecystectomy 10 ml bile was aspirated under aseptic measures and was sent for culture sensitivity.

Data had been analyzed by using SPSS-13. Mean and standard deviation (SD) were calculated for quantitative variables like age while frequency and percentage were calculated for qualitative data like gender, micro-organisms cultured and antibiotic susceptibility.

## RESULTS

The age distribution ranged from 16 to 80 years (mean age: 46.26 years). Twenty eight patients were males (26.4%) and 78 (73.6%) were females. The male to female ratio was 9:25. Bile culture was positive in 25 (23.6%) patients and it was negative in 81 (76.4 %) patients. Most commonly cultured organism was E coli. It was cultured in 10 (40%) patients, *Klebsiella* in 5 (20%) patients, *Pseudomonas* in 5 (20%) patients, *Proteus* and *Staphylococcus aureus* in 2 (8%) patients and mixed organisms (E coli and pseudomonas) were cultured in 1 (4%) patient.

## DISCUSSION

Gallstone disease is one of the most common problems which affects gastrointestinal tract. Prevalence of the disease ranges from 11 to 36%[1]. Cholecystectomy is a frequently performed procedure. The age distribution in our study ranged from 16 to 80 years. The mean age was 46.26 years. The male to female ratio was 9:25. These results were consistent with a study done by Elewant et al[8]. Bile culture positivity rates vary in different studies[9]. This variety may be due to difference in proportion of acute choloecystitis in different studies. In our study bile culture was positive in 25 (23.6%) out of 106 patients. In a sudy conducted by Demirl et al[10] bile culture positivity rate was 19.3 %. Bile culture positivity rate is generally reported high in patients with acute cholecystitis, obstructive jaundice, diabetes mellitus and immuno compromised patients. As it was found in our study, E.coli is the most common cultured organism in other studies[8,9,10] as well. *Pseudomonas aeruginosa* has been reported as the predominant flora by Dhir et al[11].

**Table-1: Showing culture and sensitivity pattern of antibiotics.**

| Drug | Sensitive cases | Resistant cases |
|---|---|---|
| Amikacin | 22 (88%) | 3 (12%) |
| Co-amoxiclav | 19 (76%) | 5 (20%) |
| Ampicillin | 4 (16%) | 20 (80%) |
| Ceftazidime | 20 (80%) | 5 (20%) |
| Cefoperazone plus Sulbactum | 24 (96%) | 1 (4%) |
| Ciprpfloxacin | 19 (76%) | 6 (24%) |
| Cloxacillin | 6 (24%) | 19 (76%) |
| Cotrimoxazole | 14 (56%) | 7 (28%) |
| Ceftriaxone | 19 (76%) | 4 (16%) |
| Doxycycline | 12 (48%) | 8 (32%) |
| Erythromycin | 8 (32%) | 13 (52%) |
| Gentamycin | 11 (44%) | 6 (24%) |
| Imipenem | 24 (96%) | 1 (4%) |
| Tigeceline | 13 (52%) | 3 (12%) |
| Tazocin | 20 (80%) | 2 (8%) |
| Vancomycin | 16 (64%) | 3 (12%) |

E. coli showed good sensitvity to amikacin, cefoperazone plus sulbactem, imepenim (100%) and ceftriaxone (90%) but it was resistant to ampicillin (80%) in most of the cases. *Klebsiella* showed good sensitivity to cefoperazone plus sulbactem and ceftazidime (100%). *Proteus* was sensitive to amikacin, cefoperazone plus

sulbactem, ceftazidime and imepenim (100%). (Table-2).

*Pseudomonas* had good sensitivity to cefoperazone plus sulbactem and imepenim (100%) but all cases were resistant to Ampicillin.

**Table-2: Showing anti microbial sensitivity pattern of bacterial species.**

| Sensitivity | E.Coli n=10 | Klebsiella n=5 | Pseudomonas n=5 | Proteus n =2 | Staph n=2 | Mixed Organism n=1 |
|---|---|---|---|---|---|---|
| Amikacin | 100% | 80% | 80% | 100% | 50% | 100% |
| Cefoperazone plus Salbactum | 100% | 100% | 100% | 100% | 100% | 0% |
| Ceftazidime | 80% | 100% | 60% | 100% | 50% | 100% |
| Ciprofloxacin | 90% | 80% | 60% | 50% | 50% | 100% |
| Ceftriaxone | 90% | 80% | 80% | 50% | 0% | 100% |
| Ampicillin | 20% | 20% | 0% | 0% | 50% | 0% |
| Imipenim | 100% | 80% | 100% | 100% | 100% | 100% |

Staph. Staphylococcus Aureus

Culture sensitivity in our study revealed that cephalosporins, quinolones , imipenim, aminoglycosides and tazocin are most effective antibiotics against different organisms cultured from bile of patients undergoing cholecystectomy. Our study results are consistent with a study done by Bae et al[6] but sulzone cefaperazone and sulbactam was not included in that study.

In our study sulzone was the most effective antibiotic against gram positive and negative organisms cultured from bile of patients undergoing cholecystectomy (average sensitivity was 96%). The next most effective antibiotic was imipenim with average sensitivity of 96%. Similar results were noted in Bae et al[6] study where average sensitivity of imipenim was 87.3%. The sensitivity to amikacin was 88% consitent with Bae et al[6] study (94.4%). In our study ceftriaxone and co-amoxiclave were having average sensitivity of 76% which are a bit different from Bae et al[6] study (60.8% and 94.4%).

## CONCLUSION

Bile in majority of patients with symptomatic uncomplicated gallstones is sterile. E. Coli is the most commonly cultured organism from bile of symptomatic uncomplicated cholelithiasis patients. Cefoperazone with sulbactum and amikacin are the most appropriate antibiotics to be used prophylactically in cholecystectomy.

## CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

## REFERENCES


1. Capoor MR, Nair D, Rajni, Khanna G, Krishna SV, Chintamani MS et al. Microflora of bile sspirates in patients with acute cholecystitis with or without cholelithiasis: A tropical experience. Braz J Infect Dis 2008 ;12: 222-5.
2. Geller DA, Goss JA, Sung AT. Gallbladder and the extrahepatic biliary system in: Charles F, Dana K, Tumothy R, David L, John G, Raphael E, (edi). Schwartz's principles of surgery. 8th ed. New York: Mc Graw-Hill 2005; p. 1093-1133.
3. Pierce RA, Strasberg SM . Biliary surgery in: Klingensmith ME, Chen LE ,Glasgow SC , Goers TA , Melby SJ, (edi). The Washington Manual of Surgery . 5th ed. Philadelphia: Washington University 2008 ; 264-281.
4. Conlon K. The gall bladder and the bile duct In: Williams NS, Bulstrode CJ, Connell PR, (edi). Bailey & love's short practice of surgery. 25th ed. London: Edward Arnold publishers Ltd 2008 ; 1111-29.
5. Abeysuriya V, Deen KI, Wijesuriya T, Salgado SS. Microbiology of gallbladder bile in uncomplicated symptomatic cholelithiasis. Hepatobiliary Pancreat Dis Int. 2008 ; 7: 633-37.
6. Bae WK, Moon YS, Kim JH, Lee SH, Kim NH, Kim KA, et al. Microbiologic study of the bile culture and antimicrobial susceptibility in patients with biliary tract infection. Korean J Gastroenterol 2008 ; 51: 248-54.
7. Channa NA, Khand FD, Bhanger M, Leghari MH. Surgical incidence of cholelithiasis in Hyderabad and adjoining areas (Pakistan). Pak J Med Sci 2004; 20: 13-7.
8. Vaishnavi C, Kochhar R, Kaur S, Singh G. Estimation of endotoxin in infected bile from patients with biliary diseases.Trop Gastroenterol. 2006; 27: 1: 22-5.
9. Prakash A, Varma KN, Kappor M. Prakash OM. Diseased gall bladder in India. Ind J Surg 1974; 59: 214-216.
10. Lund J. Surgical indications in cholelithiasis. Prophylactic cholecystectomy elucidated on the basis of long-term follow up on 526 nonoperated cases. Ann Surg 1960; 151-153
11. Diehl AK, Sugarek NJ, Todd KH. Clinical evaluation for gallstone disease: usefulness of symptoms and signs in diagnosis. Am J Med 1990; 89-92.