

Original Research Article

<https://doi.org/10.20546/ijcmas.2020.906.020>

Bacteriological Profile of Bile in Cholecystectomy Patients at Rims, Ranchi, India

Md Khalid Anjum^{1*}, Amber Prasad¹, Makbul Ansari²,
Manoj Kumar¹ and Kumari Seema¹

¹Department of Microbiology, ²Department of Surgery, Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand, India

*Corresponding author

ABSTRACT

To study the Bacteriological profile of bile of the patients undergoing Cholecystectomy and their antibiogram. This prospective study was carried out in the Department of Microbiology at Rajendra Institute of Medical Sciences, Ranchi between 1st March, 2018 to 31st July, 2018, of patients belonging to age group ranging from seven years to seventy five years, undergoing cholecystectomy for cholelithiasis. The collected Bile samples were cultured and bacteria were isolated. These were identified and antibiogram was done for all isolates. Total 64 patients (12 males, 52 females) were included in this study. 11(17.19%) patients showed positive bile culture, in which *Escherichia coli* {n=04 (36.36%)} was the most common isolate followed by *Klebsiella pneumoniae* {n=03 (27.27%)}. Other organisms isolated were *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Enterococcus* spp. and CoNS. The remaining bile samples were sterile {n=53}. Out of 64 patients, 27 (42.19%) underwent open laparotomy and the remaining 37 laparoscopically. Most patients were of 51-60 years age group {n=22 (34.34%)} followed by 31-40 years {n=13 (20.31%)}. On antibiogram, *E.coli* (75%) and *K. pneumoniae* (66.6%) were sensitive to piperacillin/tazobactam and amikacin. *P. aeruginosa* showed sensitivity to piperacillin/tazobactam & ceftazidime. *Staphylococcus aureus* (MRSA) was sensitive to vancomycin and linezolid.

Keywords

Antibiogram
cholelithiasis
Klebsiella pneumoniae

Article Info

Accepted:
14 May 2020
Available Online:
10 June 2020

Introduction

Cholecystectomy is an operation that is frequently done in recent time, and is commonly performed for gall bladder stone. Generally bile remains in sterile condition, because the daily excretion of bile causes flush out the microorganism entering the biliary tract in healthy persons. Bacterial

colonization of bile occurs, when there is gall stone in gall bladder or in biliary tree. In some cases, previous biliary intervention may also predispose to the bacterial infection without gall bladder stone.

Upon bile duct obstruction bacteria grow in stagnant bile and sometimes enter into systemic circulation causing sepsis or multi

organ dysfunction syndrome. Hence it is important to know the microbiological profile of gallbladder before prophylactic treatment given.

The incidence of gallstone disease has a marked rise in western countries during the past century. In the USA, UK, and Australia the prevalence rate ranges between 15 to 25%. In India it more common in North than South and in East than West¹⁻³. Incidence of gallstone also increases with age and is more in female than male (M:F =1:4). About half of the gallstone patients are asymptomatic and among them 1 -2 % requires cholecystectomy every year^{4,5}.

Gram negative enteric aerobes such as *Escherichia coli*, *Klebsiella* species and *Proteus* species are commonly isolated, while *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Bacteroides fragilis* etc. are less commonly found. Prophylactic antibiotics therapy would be appropriate according to organisms isolated from bile and hence it could prevent postoperative infections. Prophylactic treatment does not sterilize bile, but prevent infections. The postoperative infection rate is less when prophylaxis has been given, even when rates of bactibilia are similar in treated patients and untreated individuals.

The main objectives include to study the bacteriological profile of bile of the patients undergoing Cholecystectomy. And also to determine antibiogram of isolated organisms.

Materials and Methods

This prospective study was carried out in the Department of Microbiology at Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand, India, between 1st March, 2018 to 31st July, 2018, of patients belonging to age group ranging from seven years to seventy five years, undergoing cholecystectomy for

cholelithiasis.

The patients were admitted a night before surgery in the Department of Surgery and were examined and investigated by concerned surgical team and anaesthetic team for fitness for surgery. Consent was taken from the patient or patient's attendant after explaining the nature of procedure such as open or laparoscopic, and even potential for conversion from laparoscopic approach to open cholecystectomy. All the patients were given one dose of IV injection of Ceftriaxone 1gram at induction of anaesthesia and 2 doses of the same were given postoperatively.

The abdomens were examined and findings were noted. Bile was aspirated from the gallbladder of the patients undergoing open cholecystectomy using a sterile syringe (5 ml), but in case of laparoscopic cholecystectomy, bile was collected from the excised gallbladder. The bile was collected in a sterile container and after proper labeling, it was transferred to Department of Microbiology, RIMS, Ranchi immediately. In the microbiology laboratory the bile sample was inoculated on the basal media such as nutrient agar, MacConkey agar, and blood agar, and incubated aerobically at 37°C temperature for 24- 48 h for the growth of organisms. The bile was sterile when there was no growth even after 48 hours of incubation. All positive culture were identified by their colony morphology on the plate, microscopic examination of Gram's staining and appropriate biochemical reactions. Antimicrobial susceptibility testing was performed on Mueller Hinton agar plates using disc diffusion method according to Clinical and Laboratory Standard Institute (CLSI) Guidelines.

Results and Discussion

Total 64 patients 12 (18.75%) male and 52 (81.75%) females were included in this study.

In which maximum number of patients 22 (34.37%) were in the age group 51-60 years followed by 13 (20.31%) in age group 31- 40 years. Out of 64 patients, 27 (42.19%) underwent open laparotomy and the remaining 37 laparoscopically.

Out of 64 bile samples received for microbiological analysis, only 11(17.19%) were culture positive. *Escherichia coli* {n=04 (36.36%)} was the most common isolate followed by *Klebsiella pneumoniae* {n=03 (27.27%)}. Other organisms isolated were *Pseudomonas aeruginosa* {n=01(9.09%)}, *Staphylococcus aureus* {n=01(9.09%)}, *Enterococcus* spp {n=01(9.09%)} and CoNS{n=01(9.09%)}. The remaining bile samples were sterile {n=53 (82.81%)}

On antibiogram, *Escherichia coli* showed maximum sensitivity to Piperacillin/Tazobactam, and Amikacin in 3 (75%) cases followed by Gentamicin and imipenem in 2 (50%) cases. *Klebsiella pneumoniae* showed maximum sensitivity to Piperacillin/Tazobactam, and Amikacin in 2(66.66%) cases. *Pseudomonas aeruginosa* showed sensitivity to piperacillin/tazobactam & ceftazidime. Among gram positive isolates *Staphylococcus aureus* (MRSA) was sensitive to vancomycin and linezolid and *Enterococcus* spp. was sensitive to piperacillin/tazobactam and ofloxacin.

In our study, 64 bile samples were cultured for the presence of microorganisms, out of which 11 (17.19%) showed bacterial growth which was in accordance with sabir (16%)⁶ and Van Leeuwen (16.4%)⁷. In this study, it was observed that the female were commonly affected and male to female ratio was 1 : 4.33. Study done by Kumar M *et al.*,⁸ and Ahmad *et al.*,⁹ recorded male to female ratio of 1: 3.85. In this study Majority of patients 22(34.37%) found in age group between 51-60 years, which is accordance to Gill HS *et al.*,¹⁰.

Bile in the gallbladder is normally sterile in absence of gallstone or any pathology of biliary tract because of various anatomical and physiological mechanisms such as a competent sphincter of Oddi prevents from intestinal contents refluxing into the bile duct, and antegrade bile flow flushes the biliary system periodically, keeping it free of organisms. In addition to it bile salts and immunoglobulin A (IgA) in bile as it's component have antibacterial activity to protect the biliary tree from bacteria. Obstruction to bile duct for prolonged period leads to impaired intestinal wall barrier function, causing bacteria to colonize bile easier, thus *E. coli* is the most common bacterium in development of bile infection. The enteric gram negative aerobes are commonest organisms to be found in infected bile. In our study, the most common organism isolated were *Escherichia coli* (36.36%) followed by *Klebsiella pneumoniae* (27.27%). Similar results were seen in Sharma K *et al.*,¹¹ and Parekh PM *et al.*,¹².

In our study, on culture and sensitivity test, *Escherichia coli* showed maximum sensitivity to Piperacillin/Tazobactam, and Amikacin in 3 (75%) cases followed by Gentamicin and imipenem in 2 (50%) cases. *Klebsiella pneumoniae* showed maximum sensitivity to Piperacillin/Tazobactam, and Amikacin in 2(66.66%) cases. *Pseudomonas aeruginosa* showed sensitivity to piperacillin/tazobactam & ceftazidime. Among gram positive isolates *Staphylococcus aureus* (MRSA) was sensitive to vancomycin and linezolid and *Enterococcus* spp. was sensitive to piperacillin/tazobactam and ofloxacin.

In Parekh PM *et al.*,¹² it showed that Piperacilin and tazobactam also shows good sensitivity against isolated organism from bile and they are more effective against pseudomonas. In Kumar M *et al.*,⁸ sensitivity of the organisms grown on bile

found that *Escherichia Coli* showed maximum sensitivity to Amoxicillin/Clavulinic acid, Piperacillin / Tazobactam, Imipenem, Amikacin in 9 (100 %) cases followed by Gentamycin in 8 (88.89%) cases. *Escherichia coli* showed high resistance to Ciprofloxacin, Ceftazidime in 6 (66.67%) cases followed by Ceftazidime, Trimethoprim-Sulphamethoxazole in 4 (44.44%) cases.

Klebsiella pneumoniae showed maximum sensitivity to Amoxicillin/Clavulinic acid, Piperacillin/Tazobactam, Imipenem and Amikacin in 5(100 %) cases followed by Gentamicin, Ceftriaxone, Ceftazidime in 4 (80%) cases. *Klebsiella* spp. showed high resistance to Ciprofloxacin, Norfloxacin in 4 (80%) cases followed by Trimethoprim-Sulphamethoxazole, Nitrofurantoin in 3 (60%) cases.

Table.1 Organism isolated from bile culture

Organism isolated	No. of positive bile culture	Percentage
<i>Escherichia coli</i>	04	36.36
<i>Klebsiella pneumoniae</i>	03	27.27
<i>Pseudomonas aeruginosa</i>	01	09.09
<i>Staph. aureus</i>	01	09.09
<i>Enterococcus spp.</i>	01	09.09
CoNS	01	09.09

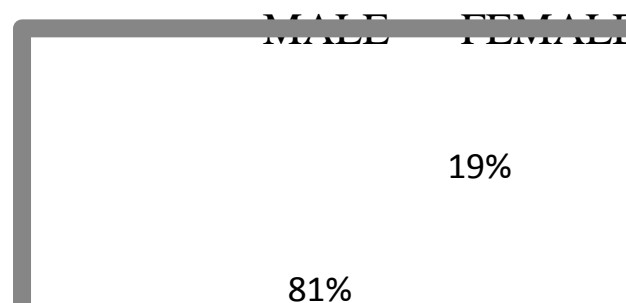


Fig.A Sex Distribution

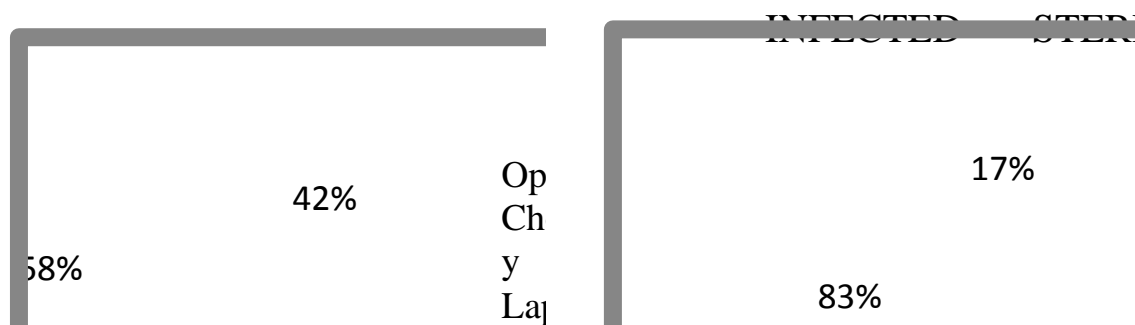


Fig.1 Types of surgery done in cholelithiasis

Fig.2 Bile culture result

Bile is normally sterile in the gall bladder in the absence of gallstone or any pathology of

biliary tract, in which there is increased prevalence of bacteriobilia. Prophylactic

antibiotics therapy would be appropriate according to isolated organisms from bile and it could prevent postoperative infections. Prophylactic treatments prevent infections but not sterilize the bile.

References

1. A prospective analysis of 1518 laparoscopic cholecystectomies. The southern surgeons club. *N Engl J Med* 1991;324:1073-8.
2. Ballal M, Jyothi KN, Antony B, Arun C, Prabhu T, Shivananda PG, *et al.*, Bacteriological spectrum of cholecystitis and its antibiogram. *Indian J Med Microbiol* 2001;19:212-4.
3. Thompson JE Jr, Pitt HA, Doty JE, Coleman J, Irving C. Broad spectrum penicillin as an adequate therapy for acute cholangitis. *Surg Gynecol Obstet* 1990;171:275-82.
4. Kaushik R, Sharma R, Batra R, Yadav TD, Attri AK, Kaushik SP, *et al.*, Laparoscopic cholecystectomy: An indian experience of 1233 cases. *J Laparoendosc Adv Surg Tech A* 2002;12:21-5.
5. Sachidananda S, Krishnan A, Janani K, Alexander PC, Velayutham V, Rajagopal S, *et al.*, Characteristics of gallbladder cancer in south india. *Indian J Surg Oncol* 2012;3:228-30.
6. Sabir O. Infected bile in gallbladder in cholelithiasis (dissertation). Karachi: College of Physicians and Surgeon Pakistan 1998.
7. Van Leeuwen PA, Keeman JN, Butzelaar RM, Van den Bogaard AE. Correlation between a positive gallbladder culture and subsequent wound infection after biliary surgery: a retrospective study of 840 patients. *Neth J Surg* 1985; 37: 179-82.
8. Kumar M, Oraon V, Sherwal BL, Bodra P, Agrawal AK, Sharma AK *et al.*, Bacterial Profile of Bile and Gall Stone in Symptomatic Cholelithiasis Patients. *Int J Med Res Prof.* 2017; 3(3):122-26. DOI:10.21276/ijmrp.2017.3.3.026.
9. Ahmad F, Sana I, Osman MH, YIS; Cholelithiasis – A clinical and microbiological Analysis, *I J of scientific studies*, july, 2014, vol. 2 (40-44).
10. Gill HS, Sandhu GS, Luna A, Gill AK Bacteriological Profile of Bile in Patients Undergoing Cholecystectomy; *Sch. Acad. J.Biosci.*, 2016;4(6):520-525, DOI:10.21276/sajb.2016.4.6.12.
11. Sharma K, Jad B, Mahajan B *et al.*, Bacteriological analysis of bile culture from a tertiary care hospital. *Int J Health Sci Res.* 2018; 8(5):88-91.
12. Pratik M P, Nimish J S, Pokhraj P S, Devang H P, Chetan M, Hitesh D T. Bacteriological analysis of bile in cholecystectomy patients. *Int J Res Med Sci.* 2015 Nov;3(11): 3091- 3096.

How to cite this article:

Md Khalid Anjum, Amber Prasad, Makbul Ansari, Manoj Kumar and Kumari Seema. 2020. Bacteriological Profile of Bile in Cholecystectomy Patients at Rims, Ranchi, India. *Int.J.Curr.Microbiol.App.Sci.* 9(06): 156-160. doi: <https://doi.org/10.20546/ijemas.2020.906.020>