

ORIGINAL ARTICLE

Bacterial Infection and Sensitivity Pattern of Cholecystitis among Cholecystectomy Patients

ABSTRACT

Aims and objectives: This retrospective type of study was done to know the bacterial cause of cholecystitis and to isolate different bacteria present in bile of cholecystectomy patients. Antibiotic sensitivity was also done to know the antibiotic-resistance pattern among the organism isolated.

Materials and methods: In this study, 126 patients' bile was sent to the Microbiology Department for culture and antibiotic-sensitivity testing during the period of October 2017–November 2018. Cultures were placed in blood agar and MacConkey agar. Organisms were isolated on the basis of growth characteristics and biochemical findings. Antibiotic sensitivity was done using the Kirby–Bauer disk-diffusion method.

Results: This study included 126 post-cholecystectomy patients, out of which the male-to-female ratio was 1:2.71. While the female was 92 (83%) and the male was 34 (17%). In this study, we have included all the age-groups of patients, but most of the patients were middle-aged, that is, between 41 and 60 years 78 (62%). In the microbiological analysis, only 68 (54%) samples were culture-positive. In our study, *Escherichia coli* 43 (63.2%) was isolated among maximum samples and the second most common was *Klebsiella* spp. 17 (25%).

Conclusion: Therefore, it is important to know about common bacteria causing gallbladder infection and their antibiotic-resistance pattern. This study may be helpful in designing the antibiotic prophylaxis among these patients.

Keywords: Analysis, Antibiotic sensitivity, Bile, Cholecystectomy.

INTRODUCTION

Gallbladder stones are one of the most common surgical conditions in North India, and out of all surgeries done for the gastrointestinal tract, cholecystectomy is the most common.¹ Bile is normally sterile, but may get infected in cholelithiasis. The incidence of bacterial presence in bile varies from 10 to 70%. Chances of Bactibilia are increasing in patients having obstruction and stasis of gallbladder due to gallstones.² The gallstone diseases are more prevalent in Western countries like United States, United Kingdom, and Australia, and incidence ranges between 15 and 25%. In India, gallstones are more common in the East and northern parts of India as compared with the South and West regions.^{3,4} In 85–95% of cases, cholecystitis is associated with cholelithiasis.⁵

Among all the culture-positive samples of bile, the most common bacteria isolated were *Escherichia* and *Klebsiella*. The bacteriological profile of bile sampled from the gallbladder is more informative of the cause of cholecystitis because gallbladder is a closed sac, and direct sampling from the gallbladder is more relevant to know the causative organism.^{6,7}

The study was done to know the most common bacteria associated with cholecystitis and their sensitivity pattern among cholecystectomy patients.

MATERIALS AND METHODS

The retrospective type of study was done for one-year duration in tertiary care settings. In patients of open cholecystectomy, bile was collected in a sterile syringe, in the case of laparoscopic cholecystectomy, bile was collected in a sterile container. The syringe or container is sent to the Microbiology Department after proper labeling. In microbiology lab, bile samples were inoculated on blood agar and MacConkey agar, and incubated

Ethical statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

at 37°C for 24–48 hours. The bile was reported sterile if there was no growth even after 48 hours of incubation. All growth of cultures were identified on the basis of colony morphology, microscopic examination, and appropriate biochemical reactions. Antimicrobial-susceptibility testing was done by Kirby–Bauer method according to Clinical and Laboratory Standard Institute (CLSI) Guidelines.^{8,9}

RESULTS

This study included a total of 126 patients among which male-to-female ratio was 1:2.71. While female was 92 (83%) and male



Figs 1A to C: (A) Gallbladder with multiple stones; (B) Intact gallbladder; and (C) Cholesterosis of gallbladder

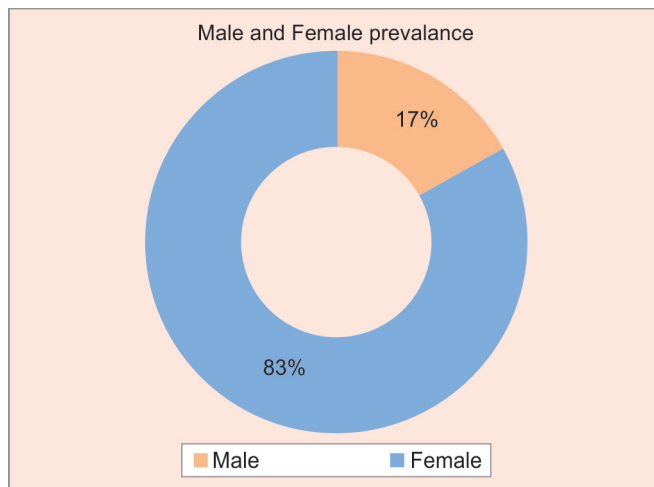


Fig. 2: Sex distribution

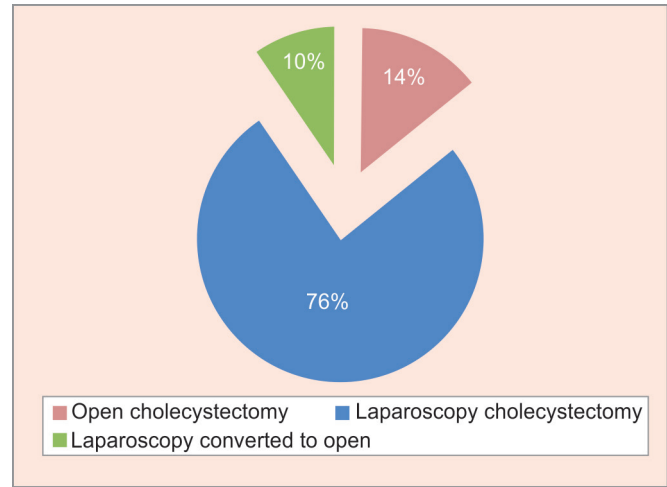


Fig. 3: Distribution of surgical treatment procedure

Table 1: Age-group-wise distribution

Sl. no.	Age-group	Total %
1.	01–20	01 (0.8%)
2.	21–40	22 (17.4%)
3.	41–60	78 (62%)
4.	>61	25 (19.8%)

was 34 (17%). We have included all ages of patients in our study, in which maximum patients were in 41–60 age-group, 78 (62%) followed by 25 (19.8%) in the age-group >61, 22 (17.4%) in 21–40 age-group, and 1 (0.8%) in 01–20 age-group (Figs 1 and 2, Table 1). Out of 126 patients, 96 (76.2%) patients underwent laparoscopy cholecystectomy, in 18 (14.3%) patients, open cholecystectomy was performed, and in 12 (9.5%), laparoscopy surgery was converted to open surgery (Fig. 3).

Out of 126 bile samples for culture and sensitivity, only 68 (54%) samples were culture-positive. *E. coli* 43 (63.2%) was the most common isolate followed by *Klebsiella* spp. 17 (25%). Other organisms isolated were 4 (6%) *Pseudomonas* spp., 2 (3%) *Salmonella* spp. and *Staphylococcus aureus*, and *Acinetobacter* 1 (1.4%) each. The remaining bile samples 58 (46%) were sterile (Fig. 4).

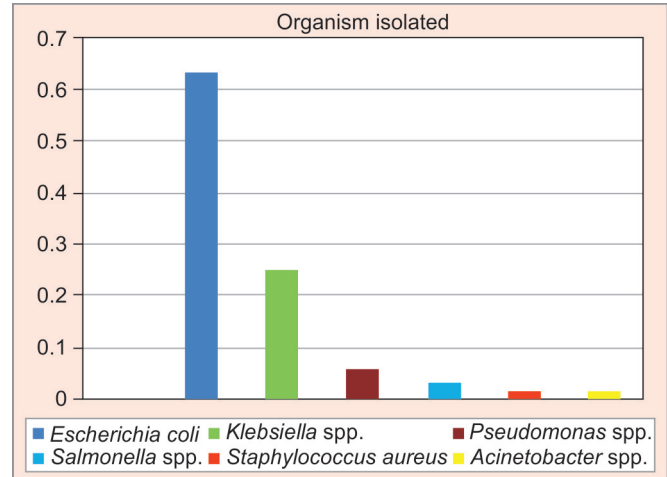


Fig. 4: Bacteriological profile of bile

All Gram-negative bacterial isolates showed maximum sensitivity toward imipenem, meropenem, piperacillin/tazobactam, cefepime, and ceftriaxone/sulbactam. No organism was found to be resistance to colistin and polymyxin B. Among gram-positive, bacterial isolates showed sensitivity to linezolid and teicoplanin (Table 2).

Bacteriological Profile of Bile

Table 2: Antibigram of the bacteria isolated

Antibiotic	Resistance					
	<i>E. coli</i>	<i>Klebsiella spp.</i>	<i>Pseudomonas spp.</i>	<i>Salmonella spp.</i>	<i>Acinetobacter spp.</i>	<i>S. aureus</i>
Piperacillin	43 (100%)	17 (100%)	4 (100%)	2 (100%)	1 (100%)	–
Ceftazidime	22 (51.2%)	17 (100%)	4 (100%)	1 (50%)	1 (100%)	–
Ceftriaxone	22 (51.2%)	17 (100%)	4 (100%)	1 (50%)	1 (100%)	1 (100%)
Cefoperazone	22 (51.2%)	17 (100%)	4 (100%)	1 (50%)	1 (100%)	1 (100%)
Gentamicin	43 (100%)	10 (58.8%)	3 (75%)	2 (100%)	1 (100%)	–
Amikacin	43 (100%)	10 (58.8%)	3 (75%)	2 (100%)	1 (100%)	–
Ciprofloxacin	43 (100%)	14 (82.3%)	2 (50%)	2 (100%)	1 (100%)	1 (100%)
Levofloxacin	43 (100%)	14 (82.3%)	2 (50%)	2 (100%)	1 (100%)	1 (100%)
Imipenem	0	8 (47%)	1 (25%)	0	1 (100%)	0
Meropenem	0	8 (47%)	1 (25%)	0	1 (100%)	0
Chloramphenicol	0	–	–	0	–	–
Cefixime	–	–	–	–	–	1 (100%)
Colistin	0	0	0	0	0	–
Polymyxin B	0	0	0	0	0	–
Piperacillin/Tazobactam	0	10 (58.8%)	1 (25%)	0	0	–
Ceftriaxone/Sulbactam	0	10 (58.8%)	1 (25%)	0	0	–
Cefepime/Tazobactam	0	10 (58.8%)	1 (25%)	0	0	–
Doxycycline	–	–	4 (100%)	–	0	–
Aztreonam	–	–	0	–	–	–
Erythromycin	–	–	–	–	–	1 (100%)
Clindamycin	–	–	–	–	–	1 (100%)
Linezolid	–	–	–	–	–	0
Teicoplanin	–	–	–	–	–	0
Vancomycin	–	–	–	–	–	0
Rifampicin	–	–	–	–	–	0

DISCUSSION

This study includes 126 patients admitted to our surgery unit over a period of 1 year. In this, 54% bile samples showed positive bile culture. The data showed high prevalence in western Uttar Pradesh. Our finding contrasts with other researchers. They reported very low prevalence.^{10–12}

In this study, most of the cases were of middle-age-group that is between 41 and 60 years, that is similar to other studies. Chuttani et al. reported maximum incidence of cholelithiasis in-between 31 and 60 years.^{3–6,13} In our study, 17% were males and 83% were females, and male-to-female ratio was 1:2.71. Similar female predominance has been reported by many researchers.^{11–16} The most common organism isolated in bile culture was *E. coli* 63.2%, and the second most common was *Klebsiella* spp. in 25% of the patients. Our findings were similar to other studies published by Capoor et al., Bhansali et al., Cristina et al., Sharma et al., Pratik et al., and many more, the most common organism isolated was *E. coli* followed by *Klebsiella* spp. As *E. coli* and *Klebsiella* both are the most common bacteria isolated in the bile culture as they are the commonest bacteria found in GIT and infection to the biliary system comes from the GIT.^{17–22}

Our study was similar to Gupta et al., Khalid Anjum et al., Kumar et al., Manan et al., Bhansali et al., Flores et al., Pratik et al., and Fuks et al.^{2,11,13,16,19–23}

CONCLUSION

Normally, bile is sterile in the gallbladder in the absence of gallstone or any pathology of the biliary tract. There is high incidence of bacteribilia in cases of the inflamed gallbladder with gallstones or biliary tract obstruction. Gram-negative organisms are more common in bile infection as they are part of normal GI flora and may cause ascending infection in the gallbladder. Drug resistance is a growing health problem, nowadays, undue and inappropriate use of antibiotics are the main cause of growing drug resistance.

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