Original Research

CLINICAL ASPECTS OF BILE CULTURE IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Background: The estimated prevalence of gallstone disease in India ranges from 2% to 9%. Cholecystectomy is one of the most common surgical procedures in India. In 10–70% of individuals undergoing laparoscopic cholecystectomy, bile culture detects bacteria; in older patients, those with acute cholecystitis, or those who have had preoperative ERCP, the percentage reaches up to 59.7%. The most prevalent pathogen is Escherichia coli. Since many isolates are resistant to common preventative medicines, cultures aid in guiding antibiotic therapy. **Methods:** This cross-sectional study was conducted in the patients admitted for cholecystectomy in the department of General Surgery in a tertiary care hospital in Chennai.60 patients were included in the study. All patients undergoing laparoscopic/open cholecystectomy above 18 years of age were included for the study. Patients with previous biliary tract surgery, patients in immunocompromised status and pregnant women were excluded from the study. **Results:** Among 60 patients, 31 to 40 years were 25 % and 51 to 60 years were 25%. Mean age of the participants was 46.85±14.52 years. 23.3% were males and 76.7% were females. Among the symptoms all patients had abdominal pain followed by nausea/vomiting, fever, and dyspepsia. There was no growth in 53% of bile culture, remaining 47% were various micro-organisms like Escherichia coli, Klebsiella, Proteus vulgaris, Enterococcus, Salmonella, and Shigella. **Conclusion:** Ceftriaxone and PIPTAZ demonstrated the greatest degree of effectiveness against the pathogens like E. coli and other bacteria. Antibacterial activity against suspected causal organisms, the severity of the cholecystitis, and the local susceptibility pattern are all factors that need to be taken into consideration while prescribing antibiotics.

Keywords: Cholecystectomy, Cholelithiasis, Susceptibility, Antibiotics.

INTRODUCTION

The incidence of gallstone illnesses is on the rise, and cholecystectomy is rapidly becoming the elective abdominal procedure that is performed most frequently these days(1). The advent of laparoscopic cholecystectomy has significantly reduced the likelihood of post-operative complications when compared to open cholecystectomy. Since bile is thought to be sterile, cholecystectomy is typically seen as a relatively risk-free surgical treatment. The presence of bacteria in bile, on the other hand, is a risk factor that can raise the likelihood of unfavourable outcomes both before and after surgery(2). Bactibilia is a risk factor for poor operative outcome. Even with laparoscopic cholecystectomy, there is still a possibility of bile leakage or spilling, which can lead to an increased risk of surgical site infection, intra-abdominal abscesses, many delayed complications presenting as bowel obstruction, fistulas, and chronic abdominal pain and lengthier stay in the hospital (3). The right knowledge about the biliary microflora and its antibiotic sensitivity can decrease the likelihood of these poor outcomes by using appropriate prophylactic antibiotics. This study aimed to evaluate the incidence of biliary microflora and prepare an antibiogram for gall bladder pathologies in a tertiary care hospital.

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MATERIALS AND METHODS

Study design: Cross-sectional Study
Study setting: Kilpauk Medical College & Hospital
Study duration: April 2022 – September 2022.
Study population: This study was conducted in the patients admitted for cholecystectomy in the department of General Surgery
Selection of patients: Inclusion criteria: 1. All patients above the age of 18 years 2. All patients undergoing laparoscopic/open cholecystectomy

Exclusion criteria: 1. Patients who are not willing to give consent for the study. 2. Pregnant women 3. Patients with previous biliary tract surgery 4. Patients with immunocompromised status like HIV, or on chemotherapy.

Sample size: Sample size was calculated using the culture-positive as primary outcome measure. Using data from the reference study(4), the prevalence of culture- positive was 25%. We estimated a total of 60 subjects with a precision of 11 % at 95% confidence interval.

Statistical analysis

The data was entered in Microsoft excel and analysed in SPSS version 25

Ethical Approval:

This study was approved by the Institutional Ethics Committee (IEC) of Kilpauk Medical College.

RESULTS

Sixty patients were selected for the study. Among them 13.3% were in 20-30 years, 25% 31-40 yrs, 13.3% 41-50 yrs, 25% 51-60 yrs and 23.3% 61-70 yrs as shown in Table-1. Total mean age of the participants was 46.85±14.52 years.

Table 1: Distribution of Age among the Study Participants (N=60)

Sl.no	Age	Frequency	Percentage
1	20-30	8	13.3
2	31-40	15	25
3	41-50	8	13.3
4	51-60	15	25
5	61-70	14	23.3

Fig-1 shows the gender distribution, in which 23.3% were males and 76.7% were females

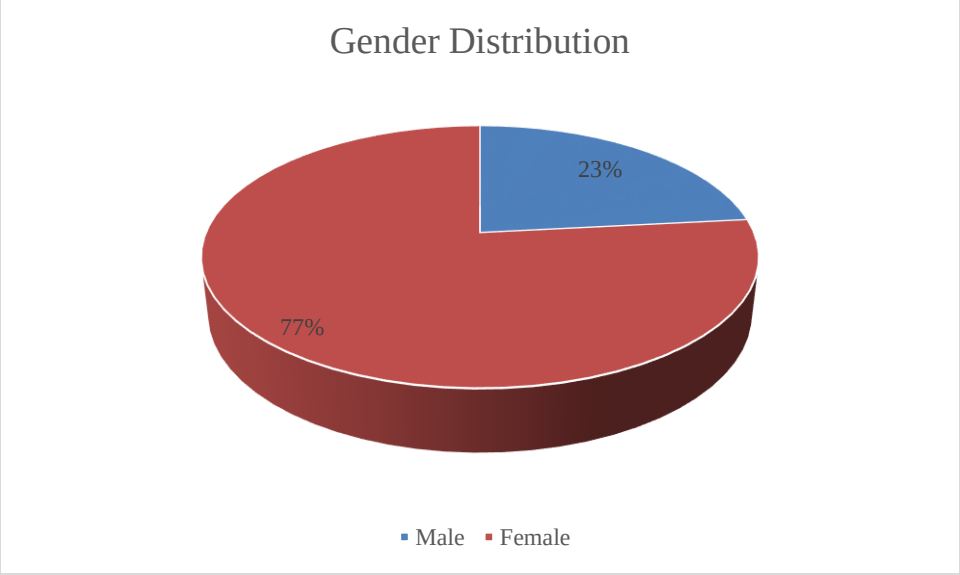

Fig -1 Gender Distribution of the Study Participants

Table 2: Distribution of Diet among the Study Participants (N=60)

Sl.no	Diet	Frequency	Percentage
1	Vegetarian	16	26.7
2	Mixed	44	73.3

In the diet taken by the patients, 26.7% were vegetarians and 73.3% were on mixed diet. Among the symptoms 41.6% had nausea/vomiting, 40% had fever, and 31.6% had dyspepsia. Almost all had abdominal pain as shown in Table-3.

Table 3: Distribution of Symptoms among the Study Participants (N=60)

Sl.no	Symptoms	Frequency	Percentage
1	Abdominal pain	60	100
2	Fever	24	40
3	Dyspepsia	19	31.6
4	Nausea/Vomiting	25	41.6

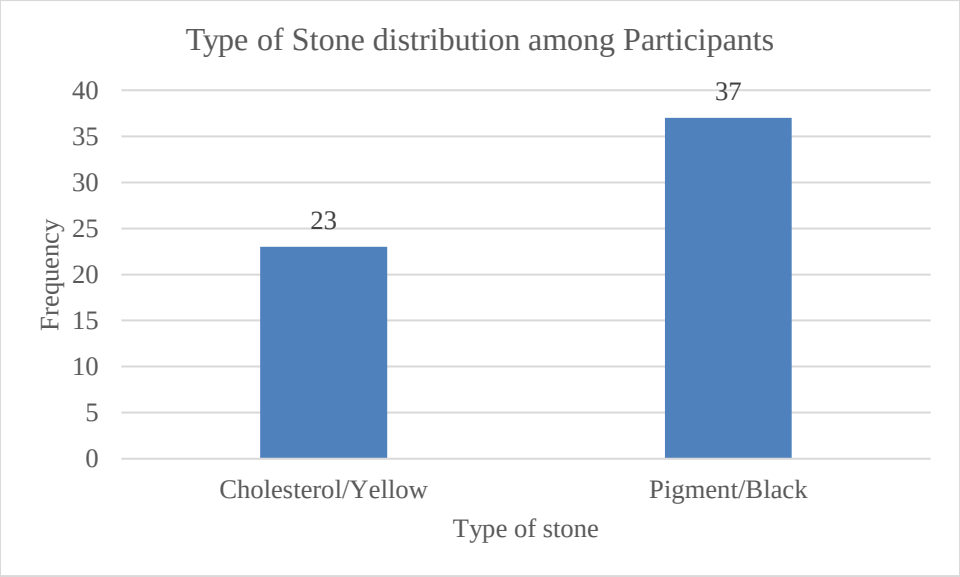

Fig - 2: Distribution of Type of Stone among the Study Participants (N=60)

There were about no growth in 53% of bile culture, followed by 15% Escherichia coli, 11.7% Klebsiella, 8.3% Proteus vulgaris, 6.7% Enterococcus, 3.3% Salmonella and 1.7% shigella.

Table 4: Distribution of Biliary Flora among the Study Participants (N=60)

Sl.no	Organism	Frequency	Percent
1	Escherichia coli	9	15
2	Enterococcus	4	6.7
3	Klebsiella	7	11.7
4	No growth	32	53.3
5	Proteus vulgaris	5	8.3
6	Salmonella	2	3.3
7	Shigella	1	1.7

Table 5: Distribution of antibiotic sensitivity for Escherichia coli (N=9)

Sl. no	Organism	Frequency	Percent
1	Escherichia coli	9	15
2	Enterococcus	4	6.7
3	Klebsiella	7	11.7
4	No growth	32	53.3
5	Proteus vulgaris	5	8.3
6	Salmonella	2	3.3
7	Shigella	1	1.7

Table 6: Distribution of Antibiotic Sensitivity for Enterococcus (N=4)

Sl. no	Antibiotic	Sensitivity		Resistance	
		Frequency	Percent	Frequency	Percent
1	Ceftriaxone	5	71.4	2	28.6

2	Piptaz	4	57.1	1	14.3
3	Ciprofloxacin	4	57.1	2	28.6
4	Amoxicillin	3	75	4	57.1
5	Meropenem	0	0	2	28.6
6	Amikacin	1	14.3	0	0

The sensitivity and resistance patterns of various microorganisms to different antibiotics are presented in the tables 5-10.

Table 7: Distribution of Antibiotic Sensitivity for Klebsiella (N=7)

Sl.no	Antibiotic	Sensitivity		Resistance	
		Frequency	Percent	Frequency	Percent
1	Ceftriaxone	1	25	3	75
2	Piptaz	3	75	0	0
3	Ciprofloxacin	3	75	1	25
4	Amoxicillin	2	50	2	50
5	Meropenem	0	0	1	25
6	Amikacin	0	0	0	0

Table 8: Distribution of Antibiotic Sensitivity for Proteus Vulgaris (N=5)

Sl.no	Antibiotic	Sensitivity		Resistance	
1	Ceftriaxone	5	100	0	0
2	Piptaz	3	60	1	20
3	Ciprofloxacin	3	60	2	40
4	Amoxicillin	0	0	5	100
5	Meropenem	0	0	0	0
6	Amikacin	2	40	0	0

Table 9: Distribution of antibiotic sensitivity for salmonella (n=2)

Sl.no	Antibiotic	Sensitivity		Resistance	
		Frequency	Percent	Frequency	Percent
1	Ceftriaxone	1	100	0	0
2	Piptaz	0	0	1	100
3	Ciprofloxacin	1	100	1	100
4	Amoxicillin	1	100	1	100
5	Meropenem	0	0	0	0
6	Amikacin	0	0	0	0

Table 10: Distribution of antibiotic sensitivity for Shigella (n=1)

Sl.no	Antibiotic	Sensitivity		Resistance	
		Frequency	Percent	Frequency	Percent
1	Ceftriaxone	2	100	0	0
2	Piptaz	1	50	1	50
3	Ciprofloxacin	1	50	1	50
4	Amoxicillin	0	0	2	100
5	Meropenem	1	50	0	0
6	Amikacin	0	0	0	0

DISCUSSION

This study conducted among the patients undergoing cholecystectomy showed mean age of the participants was 46.85±14.52 years. Among the study participants 23.3% were males and 76.7% were females. In a study that was conducted by Thapa et al.(5) 259 patients presented with symptoms of cholelithiasis. It was found that there were 24.7% male patients and 75.2% female patients with a male to female patient ratio of 1:3, which was similar to the present study. According

to the available research, gallstone disease is more prevalent among obese, fertile women over the age of forty. Analysis of the patients' eating habits was performed because of the significance of their participation in the development of gallstones in the pathogenesis of the disease. In our study around 26.7% are vegetarians and 73.3% are on mixed diet.

All the cases studied presented with abdominal pain (100%) and it became the most common clinical presentation. Around 41.6% had nausea/vomiting, 31.6% had dyspepsia, and 40% had fever. Similar findings were present in the study done by Ganesan et al.(6). 74.9% cases showed no evidence of the growth of any organisms in bile culture according to the study done by Yun and Seo (4) which is higher than the present study finding which showed negative culture in 53% patients.

In the current study bile culture of the remaining patients showed 15% Escherichia coli, 11.7% Klebsiella, 8.3% Proteus vulgaris, 6.7% Enterococcus, 3.3% Salmonella and 1.7% shigella. This finding was quite similar to that of a study done by Abeysuriya et al.(7) in which the researchers found that bacterial isolates were considerably more abundant in bile that included pigment stones than in bile that contained cholesterol stones. According to the findings of a study conducted by Tabata and Nakayama et al.(8) the incidence of bacteria was quite high in instances involving bile pigment calcium stones as well as combination stones.

In the present study Escherichia coli showed high sensitivity towards ceftriaxone 88.9%, 77.8% sensitivity towards PIPTAZ, 44.4% towards ciprofloxacin and 22.2% towards amoxicillin. Escherichia coli showed high resistance towards amoxicillin 77.8%, 55.6% resistance towards ciprofloxacin and 11.1% resistance towards amikacin and ceftriaxone respectively. Enterococcus showed high sensitivity towards PIPTAZ 75%, 75% towards ciprofloxacin, 50% towards amoxicillin and 25% towards ceftriaxone. Enterococcus showed high resistance towards ceftriaxone 75%, 50% towards amoxicillin, 25% towards ciprofloxacin and meropenem respectively.

Klebsiella were 71.4% sensitive towards ceftriaxone,57.1% sensitive to PIPTAZ, 57.1% sensitive towards ciprofloxacin, 75% sensitive towards amoxicillin and 14.3% towards amikacin. Klebsiella is highly resistance towards amoxicillin 57.1%, 28.6% towards meropenem, ceftriaxone and ciprofloxacin respectively. Proteus vulgaris was highly sensitive towards ceftriaxone 100%, 60% towards PIPTAZ, 60% towards ciprofloxacin and 40% towards amikacin. Proteus vulgaris was highly resistance towards amoxicillin 100% and 40% towards ciprofloxacin and 20% towards PIPTAZ. Salmonella was highly sensitive towards ceftriaxone, 50% towards PIPTAZ, 50% ciprofloxacin and 50% meropenem. Salmonella resistance 50% towards PIPTAZ, 50% to ciprofloxacin and 100% to amoxicillin. Shigella was sensitive towards ceftriaxone, ciprofloxacin, and amoxicillin. Shigella was resistance towards PIPTAZ, ciprofloxacin and amoxicillin.

A history of past and recurring hospitalisation, prolonged hospital stays, and widespread usage of broad range antibiotics have all contributed to the selective survival and growth of antibiotic-resistant organisms(9). Previous research has found that the antibiotic combinations piperacillin-tazobactam and meropenem produce the best results, with quinolones being the preferred choice for Gram-negative isolates and vancomycin being the preferred choice for Gram-positive infections(10). When it comes to the prescription of medications, antibacterial activity against suspected causal organisms, the severity of the cholecystitis, and the local susceptibility pattern are all the factors that need to be taken into consideration.

CONCLUSION

This study concludes that E. coli was the bacteria that was isolated most frequently from bile culture, followed by enterococcus, klebsiella, proteus vulgaris, salmonella, and shigella. Ceftriaxone and PIPTAZ demonstrated the greatest degree of effectiveness against these pathogens. Appropriate antimicrobial coverage is essential to reduce the risk of complications and associated morbidity in patients with symptomatic cholelithiasis. The selection of antibiotics should be guided by local antimicrobial resistance patterns, the severity of infection, and individual patient factors to ensure optimal clinical outcomes.

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