

# Bacterial Infection Frequency and Culture Sensitivity of Bacteria in Cholelithiasis

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## ABSTRACT

**Background:** The potential etiologic factor in Biliary infection is a calculous cholecystitis and pre-emptive antibiotic cover in high risk supposed cases may put off progress of complications. Bacteria are present in 20-46% of the patients who undergo cholecystectomy for uncomplicated symptomatic gallstone disease. No bacterial segregates have been found in fit persons. Post-operative bug and its avoidance is of concern to most surgeons, since the rate of post-operative wound infection after optional cholecystectomy in unfussy indicative cholelithiasis ranges from 7% to 20%. Culture of bile from the gallbladder at cholecystectomy for patients with unfussy cholelithiasis has exposed mainly E. coli 51% and Klebsiella 26.5% and Pseudomonas aeruginosa 22.4%.

**Aim:** To ascertain the bacterial growth in bile of patients having symptomatic uncomplicated gallstones and sensitivity for antibiotics namely Ceftriaxone, Ceftazidime and Gentamycin by culture and sensitivity analysis.

**Study design:** Descriptive cross-sectional survey

**Setting:** Surgical unit II Sir Ganga Ram Hospital, Lahore

**Duration of study:** Six months from 04-10-15 to 04-4-16

**Sample size:** 175 cases calculated fulfilling the inclusion criteria were selected for study. These patients underwent cholecystectomy and bile was taken for culture sensitivity per operatively.

**Sampling technique:** Non-probability purposive sampling

**Results:** In this study, bacteria were present in 28% of bile samples of patients suffering from symptomatic uncomplicated gallstones. E. coli were 51%, Klebsiella 26.5% and Pseudomonas aeruginosa 22.4%. Sensitivity of Ceftriaxone was 100% for E. coli, Klebsiella and Pseudomonas aeruginosa respectively.

**Conclusion:** Bile contains primarily E. coli, Klebsiella and Pseudomonas aeruginosa in 28% of patients symptomatic uncomplicated cholelithiasis. According to antibiotic sensitivity reports of our study it is concluded that Ceftriaxone is most sensitive antibiotic for patients with infected bile.

**Key words:** Biliary microflora, Biliary infection, Gall stones

## INTRODUCTION

In developing countries like Pakistan, biliary infection is a potential etiologic factor in calculus cholecystitis and pre-emptive antibiotic cover in high risk suspected cases may prevent development of complications.<sup>(1,2,5)</sup> Cholelithiasis has shown principally E. coli 40% and Klebsiella 23%<sup>(1,7)</sup>.

Bacterial infection is a primary factor in the pathogenesis of brown pigment stones.<sup>1,2,3,6</sup> Usually bile is sterile, bacteria isolated from bile culture is 25%, 66% and 67% for gall bladder (GB) stones, common bile duct (CBD) stones, intrahepatic duct (IHD) stones, respectively. The bacteria isolated from bile are primarily gram-negative enteric coliforms. Escherichia coli (E. coli) alone or mixed with another organism is present in 50% of the positive cultures.<sup>1,2,3,5</sup> Other coliforms e.g. Klebsiella, Enterobacter and Proteus are less commonly isolated.<sup>1,3,5</sup> Streptococcus Faecalis (Enterococcus) is an aerobic gram-positive coccus that is also frequently isolated.<sup>1</sup> Anaerobic microorganisms are isolated in less than 10% of the cases, Clostridium

Perfringens being the most common. This profile of biliary bacteria, with predominance of aerobic organisms, is consistent with an ascending route of infection from the small intestine.

A few studies reveal that there is no bacterial growth found in uncomplicated symptomatic gallstone patients undergoing cholecystectomy<sup>4</sup>. However, there is population variation in cases of infected bile in different regions of the world. Moreover there is some variation in antibiotic sensitivity as well (Ceftazidime 98%, Ceftriaxone 100%, Gentamycin 100%).<sup>(2,8,10)</sup> Until now, there has been little research on this topic and whatever literature is available either too much old or doesn't cover the topic completely. In some studies H-Pylori is also found in bile.<sup>9</sup>

The aim of the study is to ascertain the bacterial growth in bile of patients having symptomatic uncomplicated gallstones so that conflict regarding the frequency of presence of bacteria existing in different previously conducted studies is resolved. Once the presence of bacteria is established, the study will also analyze the sensitivity of pre-emptive antibiotic (Ceftazidime, Ceftriaxone and Gentamycin) by culture and sensitivity analysis which will guide us about which pre-emptive antibiotic should be used in our local setup.

## MATERIAL AND METHODS

This study was conducted in Surgical unit II Sir Ganga Ram Hospital, Lahore during a period of six months. Sample size of 175 cases calculated with 95% confidence level,

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6% margin of error and taking expected percentage of bacterial infection that is 20%(least among all) in patients with uncomplicated symptomatic cholelithiasis.

**Inclusion criteria:**

- The patients undergoing cholecystectomy for cholelithiasis, diagnosed on ultrasound.
- Age 20 years to 60 years
- Both gender

**Exclusion criteria:**

- Acute cholecystitis diagnosed on ultrasound.
- Obstructive jaundice diagnosed on ultrasound and Liver Functions Test (Increased Alkaline Phosphatase).
- Gall bladder malignancy diagnosed on CT scan.
- Those patients who don't give consent

**RESULTS**

In our study, 175 patients were included over the period of 6 months who underwent cholecystectomy for symptomatic uncomplicated gallstone diseases at Sir Ganga Ram

Table 1: Growth of organism

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
E. Coli	25	51.0	51.0	51.0
Klebsiella	13	26.5	26.5	77.6
Pseudomonas Auroginosa	11	22.4	22.4	100.0
Total	49	100.0	100.0	

Table 2: Ceftriaxone Sensitivity

Ceftriaxone	Growth of the Organism			Total
	E. Coli	Klebsiella	Pseudomonas Auroginosa	
Sensitive	25	13	11	49
Total	25	13	11	49

Table 3: Ceftazidime Sensitivity

Ceftazidime	Growth of the Organism			Total
	E. Coli	Klebsiella	Pseudomonas Auroginosa	
Sensitive	24	12	11	47
Resistant	1	1	0	2
Total	25	13	11	49

Table 4: Gentamycin Sensitivity.

Gentamycin	Growth of the Organism			Total
	E. Coli	Klebsiella	Pseudomonas Auroginosa	
Sensitive	25	12	10	47
Resistant	0	1	1	2
Total	25	13	11	49

**DISCUSSION**

Patients with gallstones stay asymptomatic (90%) for over 10 years. About 15% of patients with gallstones need Surgery for uncomplicated symptomatic gallstones. Post operative morbidity and infectious complications incidence in patients with pathogenic bacteria in gallbladder bile than in patients with no bacterial expansion or opportunistic bacteria is high.

The role of prophylactic antibiotic has long been debated in different circles. There are a number of studies that claim reduction in postoperative complication rate with use of antibiotics particularly Ceftriaxone, Ceftazidime and Gentamycin. The sensitivity of Ceftriaxone is 100 % for all the three bacteria that are present in gallstone disease.

Hospita l(SurgicalUnitII) age range was between 20 to 60 years. Bile was collected peroperatively and sent for Culture &Sensitivity for Bacteria. Out of 175 patients , 28 number of cases were found positive for bile infection (Table 1). Different group of micro-organisms were detected in this culture sensitivity report in which Ecoli were found in 25 number of cases which happened to be 51% of positive culture. 13 number of cases were positive for Klebsiella which is 26.5% of positive culture.Pseudomonas Aurogenosa was found in 11 number of cases which was 22.4 % of positive bile culture.

The sensitivity for drugs like Ceftriaxone, Ceftazidime and Gentamycin were also studied shown in (Table 2,3,4). Sensitivity of Ceftriaxone was 100% for Ecoli, 100% for Klebsiella and 100 % for Pseudomonas Aurogenosa. Sensitivity for Ceftazidime was 96% for Ecoli , 92.3% for Klebsiella and 100% for Pseudomonas aurogenosa. Sensitivity for Gentamycin was 100% for Ecoli,93 % for Klebsiella , 90.9 for Pseudomonas.

Similarly Ceftazidime is 96% sensitive to Ecoli, 90% to Klebsiella and 98% to Pseudomonas. Gentamycin is 100% sensitive to Klebsiella, 100% for Ecoli and 97% for Pseudomonas.

One can argue that administration of prophylactic antibiotic may alter the positive culture rate of bile. Antibiotics were administered at the time of induction of anesthesia in all cases . The average time however that cholecystectomy takes is 35 to 50 minutes. In our study antibiotic sensitivity of ceftriaxone was 100% each for Ecoli, Klebsiella and Pseudomonas. Sensitivity for ceftazidime was 96% for Ecoli, 92.3 % for Klebsiella and 100 % for Pseudomonas auroginosa .Sensitivity of Gentimycin was 100% Ecoli, 93% for Klebsiella and 90.9% for

*Pseudomonas aeruginosa*. None of the studies state that one particular antibiotic is superior to others.

## CONCLUSION

Bile contains primarily *E. coli*, *Klebsiella* and *Pseudomonas aeruginosa* in 28% of patients symptomatic uncomplicated cholelithiasis. According to antibiotic sensitivity reports of our study it is concluded that Ceftriaxone is most sensitive antibiotic for patients with infected bile.

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