

A Clinical Study of Cholelithiasis in Children

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Abstract

Background: Cholelithiasis is relatively rare in children but the increased use of ultrasonography has led to increased detection of asymptomatic gall stones in children. Gallbladder disease in children is evolving and studies suggest an ever increasing frequency of gallbladder disease and resultant cholecystectomies in children. The clinical picture of cholelithiasis in children is analyzed in the study.

Methods: A cross-sectional study in the Department of Surgery, Regional Institute of Medical Sciences, Imphal, Manipur. The procedure and data collection were carried out for two calendar years from September 2015 to August 2017. Forty children less than 18 years were enrolled in the study.

Results: Among the 40 children, 12 (30%) patients are male and 28 (70%) are female patients. The peak age of incidence is found to be 11- 15 years (57.5%). Factors predisposing for gallstones are idiopathic in 28 patients (70%), obesity in 5 patients (12.5%), haemolytic disorders in 4 patients (10%), and other known etiology in 3 patients (7.5%). The symptoms reported by patients were right upper quadrant pain 14 patients (35%), asymptomatic in 9 patients (22.5%), right upper quadrant pain associated with vomiting were in 6 (15%) patients, 5 (12.5%) patients had nonspecific abdominal pain where as epigastric pain was noticed in 4 (10%) patients and one (2.5%) patient each was noticed to have fat intolerance and cholestatic jaundice. Laparoscopic cholecystectomy was done for 27 (67.5%) patients, open cholecystectomy in 8 (20%) patients and 5 (12.5%) patients were treated conservatively.

Conclusions: Cholelithiasis rarely occurs in children but the increased use of ultrasonography has led to increased detection of gall stones in patients. Majority of the patients do not have identifiable risk factors. Most of the patients present with right upper quadrant pain, nausea/vomiting and asymptomatic. Laparoscopic cholecystectomy was advised for majority of symptomatic cholelithiasis.

Key words: Cholelithiasis, Childhood, Laparoscopic cholecystectomy.

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I. Introduction

Cholelithiasis rarely occurs in children but the increased use of ultrasonography has led to increased detection of gall stones in patients. Cholelithiasis and choledocholithiasis have been increasingly diagnosed in recent years in children. This phenomenon may be attributed to better medical imaging (especially ultrasonography) and its usage in investigating children with unexplained abdominal pain and /or a genuine increase in the incidence of cholelithiasis due to increasing use of total parenteral nutrition, abdominal surgery or sepsis. Gallbladder disease in children is evolving and studies suggest an ever increasing frequency of gallbladder disease and resultant cholecystectomies in children.¹ In 1959, the prevalence of cholelithiasis in children younger than 18 yrs was noted to be 0.15%.² Since that time, the prevalence has increased with estimates ranging from 1.9% to 4.0%.³ The number of cholecystectomies increased accordingly. In contrast to adults, the epidemiology of Cholelithiasis in children is unknown as most of the studies deals with a limited number of patients. Studies from Europe have shown an overall prevalence of gallstones disease of 0.13% to 0.2%⁴ in children. The report from India by Ganesh et al⁵ has shown prevalence of 0.3% in a hospital based on observation among 13,675 children.

Etiologically divided cholelithiasis in children into three groups, hemolytic, other known etiology, and idiopathic. Almost 20% to 30% of all gallstones in children are due to hemolytic disease such as sickle cell disease, hereditary spherocytosis and thalassemia. In around 40% to 50% of cases, gallstones are due to another known etiology such as total parenteral nutrition, prolonged fasting, ileal disease or ileal resection, frusemide therapy, congenital biliary diseases such as choledochal cyst, chronic liver disease and progressive familial intrahepatic cholestasis (PFIC). Around 30% to 40% cases are idiopathic.

In haemolytic disorder, cholelithiasis is usually not seen before the age of five and there after the incidence increases progressively with age. In sickle cell disease the prevalence of pigment gallstones was reported to be 10% to 15% in children under 10 years of age it increased to 40% in those aged 10-18 years of age, and 50% in adults.⁶ The prevalence of gallstone in hereditary spherocytosis was 10% to 20% and in adults it was 40%.⁷ In thalassemeia , the reported figure is low(10%to 15%)⁸ with longer survival of thalassemeia patients higher prevalence of gallstones(50%) has been reported. The highest prevalence of gallstones have been reported in thalassemeia with Gilbert syndrome genotype.⁹ Gallstones in infancy are usually asymptomatic but occasionally can present with cholestatic jaundice, transient acholic stools, sepsis. In symptomatic infants, gallstones are most often associated with stones in the common bile duct than stones in the gallbladder alone. Children with gallstones can present with acute abdominal pain due to cholecystitis, cholangitis or pancreatitis. Most commonly, children with cholelithiasis present with typical right upper quadrant pain in 50% with or without nausea, vomiting and fat intolerance and non specific abdominal symptoms in 25% including poorly localized abdominal pain and nausea. Around 20% of cases are asymptomatic. In adolescent age group, the symptoms are similar to those reported in adults. Fatty food intolerance, biliary colic and acute or chronic cholecystitis are usual presenting features of symptomatic patients.

The universally used and the most accurate diagnostic test in detecting the presence of gallstones is ultrasonography. Gallstones are usually mobile, single or multiple and characteristically cast an acoustic shadow. Biliary sludge though appearing echogenic on ultrasound, does not cast an acoustic shadow. A stone, as small as 1.5mm , can be detected by ultrasonography. The sensitivity and specificity of ultrasonography exceeds 95% for gallbladder cholelithiasis, but this figure is only 50%-70% for choledocholithiasis. Magnetic resonance cholangio-pancreatography(MRCP) is being used increasingly to investigate complicated gallstone disease. Endoscopic retrograde cholangio-pancreatography(ERCP) offers the additional advantage of therapeutic intervention in common bile duct stones.

II. Aims And Objects

1. To study the clinical presentation of gallstones in children age less than 18 years.
2. To evaluate the management.

III. Methods And Materials

A cross-sectional study in the Department of Surgery, Regional Institute of Medical Sciences, Imphal, Manipur. The procedure and data collection were carried out for two calendar years from September 2015 to August 2017. Forty children less than 18 years were enrolled in the study. Ultrasonographic diagnosis of cholelithiasis was based on the presence of echogenic foci that produced acoustic shadowing in the gallbladder or in the region of gallbladder fossa. Data on age, gender, socioeconomic status, predisposing factors (hemolytic anemia, use of injection ceftriaxone, parentral nutrition, obesity), presenting symptoms, imaging findings, treatment, complication and outcome were noted.

IV. Results

4.1 Age and gender

A total of 40 patients of age group less than 18 years diagnosed with gallstones from September 2015 to August 2017 were studied. Out of 40 patients 12 (30%) are male and 28 (70%) are female patients as displayed in table 1. Majority of the patients were from the age group 11- 18 years which consisted of combine 87.5% of cases. The mean age group was 13.50+/-3.18.

Table 1: Sex distribution of the patients

Sex	No. of patients	Percentage (%)
Male	12	30
Female	28	70
Total	40	100.0

4.2 Predisposing factors

The risk factors predisposing to gallstone formation are displayed in Table 2. Factors predisposing for gallstones are idiopathic in 28 patients (70%), obesity in 5 patients (12.5%), haemolytic disorders in 4 patients (10%), and other known etiology (parentral nutrition, ceftriaxone injection) in 3 patients (7.5%). Out of 40 children, 31 (77.5%) were nutritionally normal as per BMI. Four (10%) children were overweight and 5 (12.5%) were obese.

Table 2: Distribution of the patients by etiology

Predisposing factors	No. of patients	Percentage
Idiopathic	28	70
Obesity	5	12.5
Hemolytic	4	10

Other known etiology	3	7.5
Total	40	100.0

V. Clinical presentation

Right upper quadrant pain was the most common symptom in 14 patients (35%), followed by; those with right upper quadrant pain associated with vomiting were in 6 (15%) patients. five (12.5%) patients had nonspecific abdominal pain whereas epigastric pain was noticed in 4 (10%) patients and one (2.5%) patient each was noticed to have fat intolerance and cholestatic jaundice. Nine patients had no symptoms related to gall stones and it was incidentally found out by ultra sonogram done for other diagnosis such as evaluation of fever as shown in table 3.

Table 3: Distribution of the patients by symptoms

Symptoms	No. of patients	Percentage
Isolated right upper quadrant pain	14	35
Right upper quadrant pain with vomiting	6	15
Non specific abdominal symptoms	5	12.5
Epigastric pain	4	10
Jaundice	1	2.5
Fat intolerance	1	2.5
Asymptomatic	9	22.5
Total	40	100

5.1 Laboratory investigations

Anemia was noticed predominantly in 19 (47.5%) patients. Elevated alanine aminotransferase was noted in 11 (27.5%) and 9 (22.5%) patients had elevated alkaline phosphatase. GGT was found to be elevated in 7(17.5%) patients. Elevated bilirubin levels are noted in 3 patients (7.5%).

VI. Management

Most of the patients underwent surgical management 87.5% i.e. cholecystectomy, 4 patients (10%) managed conservatively and one patient took medical management with UDCA.

Table 4: Management

management	No. of patients	Percentage
medical	1	2.5
surgical	35	87.5
conservative	4	10
Total	40	100.0

Among those who underwent cholecystectomy most of the patients underwent laparoscopic cholecystectomy 27 patients (77.1%), and open cholecystectomy in 8 patients (22.9%). The gallstones were analyzed and most of the patients had cholesterol stones in 19 patients (54.3%), mixed stones in 9 patients (25.7%) and pigment stones were found in 7 patients (20%) as shown in table 5.

Table 5: Distribution of the patients by type of stones

Type of stones	No. of patients	Percentage
Pigment	7	20
Cholesterol	19	54.3
Mixed	9	25.7
Total	35	100.0

6.1 Complications associated with surgery

Out of 35 patients who underwent surgery, 5 patients developed mild or less severe post operative complications (wound infection, serous discharge, and post operative pyrexia). One patient had bile duct injury intraoperatively.

Table 6: Complications associated with surgery

Complications	No. of patients (N=35)	Percentage
NIL	29	82.9
YES	6	17.1
• Intra op Bile duct injury	1	2.9
• Post op pyrexia	2	5.7
• Wound infection	3	8.6

VII. Discussion

Gallstone disease represents a significant burden for health care worldwide and is common in adults. Cholelithiasis is relatively uncommon in younger age group. However there is an increase in the diagnosis of gallstones in adolescent age due to wide spread use of ultrasonography (USG). As little is known about natural history of childhood cholelithiasis hence guidelines for management are lacking. It has been observed that most of the time the gallstones remain un-detected in pediatrics population until complications develop. The present prospective series consists of 40 patients aged below 18 years of age with the mean age of 13.50 \pm 3.18 years and females are 70% compared to males 30% which is almost consistent with the finding of Mehta S et al¹⁰ in which the mean age is 13.10 \pm 0.91 years, females are 73% and also consistent with the finding of Reif S et al¹¹ in which the mean age is 12.2 years \pm 6.2 years. However male incidence was found to be high in Bhasin SK et al¹² study. Geographically majority of the patients was from urban region 60%, belongs to Hindu religion 65% and middle class socio-economic status 75% which is consistent with the findings of the study conducted by Bhasin et al.¹² Among various religions Hindus comprised of 65%, Muslims and Christians constitute 17.5% each. The increased incidence among Hindus may be due to majority of population or due to their dietary habits which comprised of fats and protein of both animal and vegetable source and also carbohydrate in the form of rice or they may seek prompt medical attention very early or more health conscious compared to other religion, or due to some other factors which is not yet studied. The incidence of gallstones disease in various ethnic groups might be controlled by genetic or other unidentified factors.

Etiology was idiopathic in 70% of patients, obesity in 12.5%, hemolytic disorders in 10% and other known etiology in 7.5% of the patients. Della Corte C et al¹³ in their study reported that 95 patients (52.5%) had no risk factors, 24% patients (n = 51) had family history, 16 patients (7.6%) had hemolytic disorders, obesity in 14 patients (6.7%) and antibiotic consumption in 11 patients (5%). Similarly, Gocke et al¹⁴ in their study observed no identifiable risk factors in 43.5% children, whereas; 16.1% were having familial history, 12.9% hemolytic diseases, 8.1% were overweight and 12% children had history of antibiotic intake. Many studies state that hemolytic anemia constitutes about 40 -50% as etiology for paediatric cholelithiasis. In the study by Poddar, hemolytic anemia constituted about 40 % as cause for pediatric cholelithiasis.¹⁵ Our present series does not show such an association, as hemolytic anemia was present in only four of our 40 cases.

In the present study right upper quadrant pain was the most common symptom in 14 patients (35%), followed by; those with right upper quadrant pain associated with vomiting were in 6 (15%) patients. Five (12.5%) patients had nonspecific abdominal pain whereas epigastric pain was noticed in 4 (10%) patients and one (2.5%) patient each was noticed to have fat intolerance and cholestatic jaundice. Nine patients had no symptoms related to gall stones. Dooki MR et al¹⁶ in their study reported that abdominal pain was the most common symptom (44 patients, 67%). Other symptoms or signs included vomiting in 23 (35%), fever in 11 (17%), diarrhea in 9 (14%), agitation in 4 (6%), hepatomegaly or splenomegaly in 4 (6%), jaundice in 3 (4.5%); 5 (7.5%) patients were asymptomatic. Gocke et al¹⁴ in their study observed that symptoms reported by patients or parents were abdominal pain in 62 patients (81.5%), vomiting in 44(57.9%), fever in 11(14.5%), irritability in 11(14.5%), jaundice in 5(6.6%) patients.

Anemia was noticed predominantly in 19 (47.5%) patients. Elevated alanine aminotransferase was noted in 11 (27.5%) and 7 (17.5%) patients had elevated alkaline phosphatase. GGT was found to be elevated in 2(5%) patients. Elevated bilirubin levels are noted in 3 patients (7.5%). Kumar DJ et al¹⁷ in their study reported that anemia was noticed predominantly in 46 (76.7%) patients. Elevated alanine aminotransferase was noted in 19 (31.7%) and 14 (23.3%) patients had elevated alkaline phosphatase. GGT was found to be elevated in 15 (25%) patients. Abnormal lipid profile was identified in 5 (8.3%) patients. Management of gallstones depends on the symptoms and the age of the patients and there is no consensus about the management of asymptomatic gall stones in children. In recent years laparoscopic cholecystectomy has proved to be advantageous over open cholecystectomy due to its minimally invasive nature. Most of the patients underwent surgical management 35 patients (87.5%) i.e. cholecystectomy, 4 patients (10%) managed conservatively and one patient took medical management. Out of which 27 patients underwent laparoscopic cholecystectomy (77.1%), and open cholecystectomy in 8 patients (22.9%). The comparison of various parameters between laparoscopic cholecystectomy and open cholecystectomy in one study reported significantly less duration of hospital stay and decreased overall cost in patients undergoing laparoscopic cholecystectomy. The other advantages are decreased pain, avoidance of upper abdominal muscle cutting incision, faster return to activity and cosmetically better scar, are well documented.

The patients who underwent cholecystectomy, the gallstones were analyzed and most of the patients had cholesterol stones in 19 patients (54.3%), mixed stones in 9 patients (25.7%) and pigment stones were found in 7 patients (20%). Holcomb et al¹⁸ in his study observed that in majority of the patients, the gallstones were composed of cholesterol primarily and varied in color from pale yellow to dark yellowish brown with a few having greenish color. Gowda DJ et al¹⁹ observed that 20 patients had pigmented stones and 02 patients had

cholesterol stones. Similarly Bhasin SK et al¹² in his study observed that 52 patients (65%) had mixed stones, 16 patients (20%) had pure pigment stones while only 12 patients (15%) had pure cholesterol stones.

VIII. Summary

In our present study majority of the patients were from the age group 11- 18 years which consisted of combine 87.5% of cases. The mean age group was 13.50+/-3.18years. Female children with low socioeconomic status, urban area and belonging to Hindu religion were more affected by the disease.

In this study, the predisposing factors were idiopathic in 70% of patients, obesity in 12.5%, hemolytic disorders in 10% and other known etiology in 7.5% of the patients. Most of the children in the study were found to be in the normal BMI range than obesity. Right upper quadrant pain was the most common symptom in 14 patients (35%), followed by; those with right upper quadrant pain associated with vomiting were in 6 (15%) patients. Five (12.5%) patients had nonspecific abdominal pain whereas epigastric pain was noticed in 4 (10%) patients and one (2.5%) patient each was noticed to have fat intolerance and cholestatic jaundice. Nine patients had no symptoms related to gall stones and it was incidentally found out by ultra sonogram done for other diagnosis such as evaluation of fever. Majority of the patients had symptoms for more than 1 week to 1 month seen in 19 patients (72.5%), from 1 month to 1 year 4 patients (7.5%), from 1 year to 5 years 3 patients (7.5%). Anemia was noticed predominantly in 19 (47.5%) patients. Elevated alanine aminotransferase was noted in 11 (27.5%) and 7 (17.5%) patients had elevated alkaline phosphatase. GGT was found to be elevated in 2(5%) patients. Elevated bilirubin levels are noted in 3 patients (7.5%). Majority of the patients have multiple stones 72.5% followed by single stone in 12.5%, sludge 7.5% and thickened GB wall in 7.5% on ultrasonographic findings.

In the present study, most of the patients underwent surgical management 87.5% i.e. cholecystectomy, 4 patients (10%) managed conservatively and one patient took medical therapy. In the surgery group out of 35 patients, 27(77.1%) underwent laparoscopic cholecystectomy and open cholecystectomy in 8 patients (22.9%). The patients who underwent cholecystectomy, the gallstones were analyzed and most of the patients had cholesterol stones in 19 patients (54.3%), mixed stones in 9 patients (25.7%) and pigment stones were found in 7 patients (20%). Out of 35 patients who underwent surgery, 5 patients developed mild or less severe post operative complications (wound infection, serous discharge, and post operative pyrexia). One patient had bile duct injury intraoperatively.

IX. Conclusion

Cholelithiasis in children was reported about three centuries back, remained relatively uncommon in the past but now it is evolving and ever increasing in frequency. The present study suggests an increasing incidence of gallstones in children. The present study comprised 40 children with cholelithiasis, admitted and treated in the Department of Surgery, Regional Institute of Medical Sciences, Imphal during the period September 2015 to August 2017. Detailed examination was conducted on all the patients and all the relevant investigations were done. The results obtained were analyzed using appropriate statistical tools.

This study had concluded that cholelithiasis in children is increasing in frequency in this part of the country, mean age group was 13.50+/-3.18, with female patients predominance, with majority from middle class socioeconomic status, Hindu religion and mostly of unknown etiology. The patients mostly present with the right upper quadrant pain or asymptomatic diagnosed as cholelithiasis on ultrasonography. In view of high incidence of serious complications of gall stones in children and because of longer life expectancy this study recommends that expectant management of gallstones may not be safe and hence laparoscopic cholecystectomy must be done even in asymptomatic cholelithiasis. Laparoscopic cholecystectomy is a safe and efficacious treatment for cholelithiasis in children.

The patients, who underwent cholecystectomy, found to have cholesterol stones maximum, followed by mixed and pigment stones. Only one patient had bile duct injury intraoperatively, 5 patients developed mild or less severe post operative complications (wound infection, serous discharge, and post operative pyrexia). HPE of the cholecystectomy specimens showed chronic cholecystitis in more than half of the patients and acute cholecystitis in one third of the patients. The purpose of this study is to know the clinical presentation and management of gallstone disease in children. In the Indian medical literature, only few studies were there on cholelithiasis in children, hence there arises a need to study the pattern of clinical presentation of cholelithiasis in childhood. The present study will give some idea about clinical presentation and treatment outcome of cholelithiasis in children's of this region. Further the data, thus obtained may be helpful in improving the diagnostic accuracy and decision making in the management of cholelithiasis in children.

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