

Evaluation of Aetiological Factors and Outcome of Cholelithiasis in Children: Experience in Tertiary Level Hospitals

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Abstract

Introduction: Gallstone disease is frequently reported in children in last few decades due to widespread use of ultrasonography (USG) as diagnostic tool. There may be absolute increase in number because of increased use of Total Parenteral Nutrition (TPN), ileal resections and use of certain drugs like Ceftriaxone. Traditionally childhood cholelithiasis is classified as haemolytic or non haemolytic in origin.

Objectives: To share this experience about the aetiology and outcome of childhood cholelithiasis.

Material and Methods: This observational study was carried out in the Department of Paediatric Surgery, Combined Military Hospital (CMH) Dhaka, Dhaka Shishu Hospital (DSH) and Bangabandhu Sheikh Mujib Medical University (BSMMU) during the period of January 2016 to December 2018.

Results: During the study period a total of 65 children with childhood cholelithiasis were treated in 3 major hospitals of Dhaka city (CMH Dhaka-35, DSH-15, and BSMMU-15) and included 29(44.62%) male and 36(55.38%) female children making a female to male ratio of 1.24:1. There were 23(35.38%) children in the asymptomatic group and 42(64.62%) in the symptomatic group. In this study haemolytic anaemia was present in 12(18.46%) children with gallstone disease and 53(81.54%) were in non haemolytic group. Gallstone dissolved in 17(26.15%) children in subsequent follow up within 6 months and 48(73.85%) required operative treatment.

Conclusion: Childhood cholelithiasis is being recognized with increased frequency recently. So cholelithiasis should be excluded in all cases of vague, intermittent abdominal pain in susceptible paediatric age group. Childhood cholelithiasis has less chance of complication and high rate of resolution.

Key-words: Aetiological factors, Cholelithiasis, Children, Tertiary level hospital.

Introduction

Cholelithiasis was thought to be rare in children but increasing number of cases is reported in recent years. It could be due to increased diagnosis from frequent use of ultrasonography (USG) and/or a real increase from known risk factors like prematurity, Total Parenteral Nutrition (TPN) and obesity¹. Gallstone disease is one of the most frequent gastrointestinal diseases incurring a huge burden on medical system. In the medical literature, in 1507 Antonio Benivenius, a pathologist first described cholelithiasis in adults². The prevalence of gallstone in paediatric group is mentioned to be

0.13%- 0.3%, but in obese kids and adolescent the rate is reported as 2%-6.1%³. Real-time USG can detect about 96% gallbladder pathology⁴. It is safe and effective in children though infrequently used in the evaluation of pancreatobiliary diseases in children⁵. Foetal gallstone can be detected during antenatal USG. Gallstones in infants, children and adolescents seem to form different populations about predisposing factors and pathogenesis of gallstones⁶. Cholelithiasis involves a complex interaction of local factors like impaired gallbladder contractility and general factors like fluctuation of bilirubin level and diet. Unknown genetic factors can contribute. Biliary pseudolithiasis can develop in around 46% of children getting ceftriaxone. The introduction of newer technology like hepatobiliary scintigraphy and laparoscopic cholecystectomy (LC) resulted a sharp rise in both the detection and treatment of gallstones in children⁷. Now a days asymptomatic gallstone is a very frequent clinical entity due to wide spread availability of USG. Treatment of such silent gallstones poses an actual dilemma for the surgeons and patients. In the past, cholelithiasis in children occurred almost exclusively in children with haemolytic disease like hereditary spherocytosis, sickle cell disease, or thalassaemia. Now most paediatric gallstones are idiopathic⁸. Many predisposing factors for cholelithiasis are related to diet, while some links are uncontrollable like age, gender, race, family history etc. The management protocol of cholelithiasis in adults is described, but knowledge regarding the natural progression and management guideline for gallstone in children is lacking⁹. Spontaneous disappearance of gallstone is common in infants and young children. So watchful waiting for some time (6-12 months) can be followed even for stones in the bile duct. The LC is the gold standard procedure in symptomatic group¹⁰.

Although the prevalence of childhood cholelithiasis is increasing, no study was done in our country about the aetiology and outcome of cholelithiasis in children. This study was carried out to share this experience about the aetiology and outcome of childhood cholelithiasis in 3 tertiary level hospitals in Bangladesh.

Materials and Methods

This prospective observational study was carried out on children with cholelithiasis, who were treated in Paediatric Surgery Department of CMH Dhaka, Dhaka Shishu Hospital (DSH) and Bangabandhu Sheikh Mujib Medical University (BSMMU) during the period of January 2016 to December 2018, to share this experience about aetiology and outcome cholelithiasis in children. All children with cholelithiasis irrespective of age, sex, body weight, presentation were included in the study. During this period a total of 65 children with cholelithiasis were treated in these hospitals. They were divided into 2 groups depending on symptoms: asymptomatic and

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symptomatic. Particulars of all these patients were recorded which included age, sex, height, body weight, clinical feature, aetiology, treatment offered, outcome etc. Data were collected from detailed history, thorough clinical examination and relevant investigations (ultrasonography and Hb electrophoresis). All children who required surgery underwent operative treatment as elective procedure. They were followed up at 01 month, 3 months and 6 months. All relevant clinical information, investigation results and findings were analyzed.

Results

A total of 65 patients with childhood cholelithiasis were treated in 3 major hospitals of Dhaka city (CMH Dhaka-35, DSH-15, BSMMU-15) which included 29(44.62%) male and 36(55.38%) female children making a female to male ratio of 1.24:1. There was only 1(1.54%) child below 1 year of age, 11(16.92%) in 1-5 year age range and 53 (81.54%) in 6-12 years. There were 23 children (35.38%) in the asymptomatic group (13 female and 10 male) and 42 children (64.62%) in the symptomatic group (23 female and 19 male) (Table-I). Among 65 children, 20(30.77%) had biliary colic, 5(7.69%) had acute abdominal pain, 17(26.15%) had non specific abdominal pain. No aetiological factor could be detected in 14(21.54%) cases. Among 12 children with haemolytic disease, HbE β thalassaemia was the commonest disease found in 7(58.33%) children (Table-II). In this study haemolytic anaemia was present in 12(18.46%) children with gallstone disease and 53(81.54%) were in non haemolytic group (Figure-1). Among 65 children, 24(36.9%) had cholelithiasis in parents. Ceftriaxone was linked with 18(27.69%) children with cholelithiasis (Figure-2). Gallstone dissolved in 17(26.15%) children in subsequent follow up within 6 months (female 6, male 11) and 48(73.85%) required operative treatment (female 30, male 18). Among 48 children who required cholecystectomy 34(52.31%) underwent LC and 14(21.54%) open cholecystectomy (OC) (Table-III). The rate of cholecystectomy was considerably less in asymptomatic group in comparison to symptomatic group (12 of 23 versus 36 of 42). In CMH Dhaka, out of 35 children with cholelithiasis 9 dissolved, 24 underwent LC, and 2 underwent OC (Table-IV). The 2 children who underwent OC, cholecystectomy was done along with splenectomy for haemolytic anaemia with huge splenomegaly. None required conversion or emergency exploration.

Table-I: Distribution of age, sex and clinical findings of children with cholelithiasis (n=65)

Characteristics		Number	Percentage
Age	<1 year	1	1.54
	1-5 years	11	16.92
	6-12 years	53	81.54
Sex	Boys	29	44.62
	Girls	36	55.38
Clinical Symptom	Symptomatic	42	64.62
	Asymptomatic	23	35.38
Haemolytic Disease	Haemolytic	12	18.46
	Non haemolytic	53	81.54

Table-II: Clinical feature, aetiological factors and haematological disorder associated with cholelithiasis (n=65)

Characteristics		Frequency	Percentage
Clinical feature	Asymptomatic	23	35.38
	Biliary colic	20	30.77
	Non specific abdominal pain	17	26.15
	Acute abdominal pain	5	7.69
A etiological factor	Haemolytic anaemia	12	18.46
	Nonhaemolytic -Familiarity	24	36.92
	Ceftriaxone	18	27.69
	Specific condition (Downs 2, Portal hypertension 2, CF1)	5	7.69
	Umbilical catheterization	2	3.07
	Prolong fasting & dehydration	2	3.07
	Overweight	1	1.54
	Idiopathic	14	21.54
	Haematological disorder	HbE β thalassaemia	7
β thalassaemia		3	25
HbE trait		1	8.33
ABO incompatibility		1	8.33

Note: There is more than one factor involved in many cases

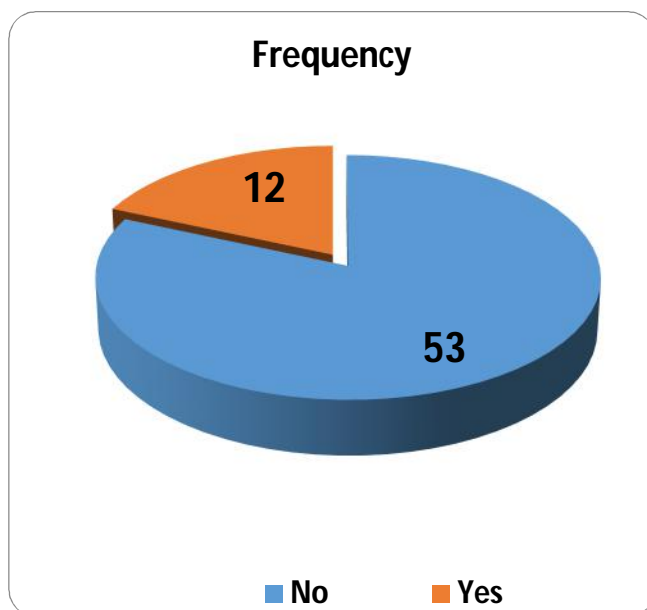


Figure-1: Distribution of children according to presence or absence of haemolytic anaemia

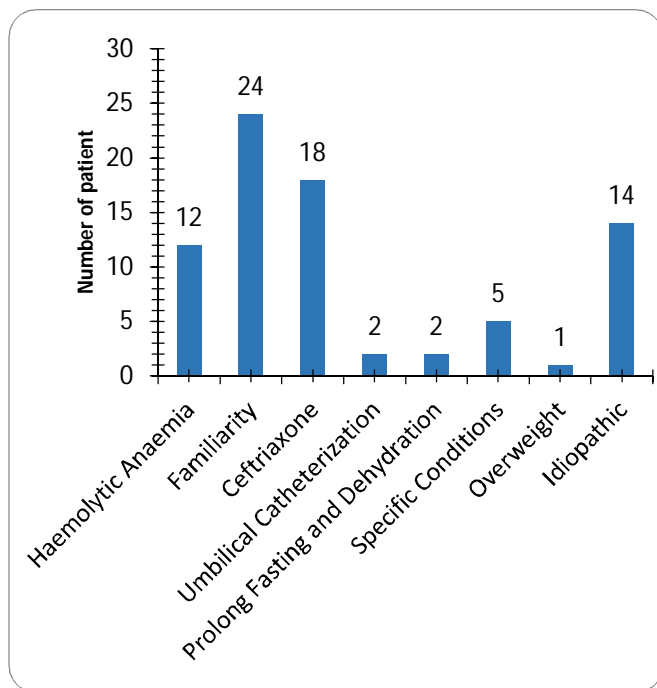


Figure-2: Frequency of aetiological factors of childhood cholelithiasis

Table-III: Outcome of treatment of cholelithiasis in children (n-65)

Outcome	Female	Male	Total
Dissolved	6	11	17(26.15)
Laparoscopic cholecystectomy	20	14	34(52.31)
Open cholecystectomy	10	4	14(21.54)

Table-IV: Treatment options adopted in different hospitals (n-65)

Hospital	Dissolved	Laparoscopy	Open procedure
CMH Dhaka	9	24	2
DSH	7	4	4
BSMMU	1	6	8



Figure-3: Ultrasound showing gallstones casting acoustic shadow

Discussion

Gallbladder disease includes a group of disorder extending from asymptomatic gallstones to symptomatic gallstones, acute calculous cholecystitis, choledocholithiasis, biliary pancreatitis and acalculous cholecystitis¹¹. The aetiology of childhood gallbladder disease is changing. Predisposing factors for childhood gallstone disease is shifted from haemolytic anaemia to non haemolytic causes¹². Congenital abnormality of gallbladder is infrequent, but often linked with gallstone disease. The prevalence of childhood cholelithiasis due to nonhaemolytic gallstones, mostly idiopathic is increased¹³. Pseudolithiasis or biliary sludge as sequelae of Ceftriaxone is usually reversible. It can develop 4 to 22 days after the starting of treatment and resolve within 3 to 63 days. Dysfunction of the gallbladder due to surgery and prolong fasting may contribute to the development of pseudolithiasis¹⁴. Gallstones are defined on USG as mobile echogenic material in the gallbladder casting acoustic shadow.

Expectant treatment protocol can be followed in majority of children with asymptomatic cholelithiasis. LC is the treatment of choice for children with biliary complaints but not advocated for those with vague complaints. Recently surgeons have started using single umbilical incision for introduction of all working instruments for better cosmetic results¹⁵. Many studies reported no significant difference about cosmetic outcome between single incision laparoscopic cholecystectomy (SILC) and standard 4 port lap chole¹⁶. Gallstones are of three types: cholesterol stone, pigment stone (brown/black) and mixed stones. Pure bilirubin gallstones are found up to the age of 6 years. Stones composed of mixed calcium bilirubinate can be detected in all ages. Black pigment gallstones are usually found in haemolytic diseases, but can also develop in TPN³.

The age of detection of cholelithiasis is related to aetiological factors and median age of detection is between 5 and 10 years¹⁷. In this study, 53(81.5%) children were in the age group 6-12 years. The sex ratio of gallstone disease before puberty seems to be equal although in adult female to male ratio is 4:1. In this study, out of 65 children with cholelithiasis 36(55.38%) were female and 29(44.62%) were male making a female to male ratio of 1.24:1. Girls were found significantly older than the boys (mean age 9.21 years and 7.59 years respectively) (p=.033). This matches with the reports of other studies where girls were older (mean age 10 years versus 7.7 years)¹⁸. In this study the mean age in children with cholelithiasis was 7.7 years in asymptomatic group and 8.8 years in the symptomatic group. We included children up to the age of 12 years as per policy of our paediatric surgery units. The reported mean age of asymptomatic group and symptomatic group was 8.2 years and 10.2 years respectively, which is higher than this finding. It included children up to the age of 18 years¹⁹. There were 23 (35.38%) children in the asymptomatic group in this study. Della corte found 64 patients (35.30%) in the asymptomatic group⁹. Out of symptomatic children 42 (64.62%), 20 (30.77%) had biliary colic, 5 (7.69%) had acute abdominal pain, 17 (26.15%) had nonspecific abdominal pain. Other studies reported 43 (52%) had biliary colic, 6 (7%) acute abdominal pain and 19 (24%) non-specific abdominal pain and 14 (17%) were asymptomatic⁹.

In this study haemolytic anaemia was an aetiological factor in 12 children (18.46%) and 53 (81.54%) had nonhaemolytic cholelithiasis. Studies reported nonhaemolytic cholelithiasis more

frequent than haemolytic cholelithiasis recently¹². In some study the most frequent (27.3%) risk factor for childhood cholelithiasis was Ceftriaxone. While in other study Ceftriaxone was involved only in 6% of cases²⁰. In this study 18 children (27.69%) with cholelithiasis were linked with Ceftriaxone. Familiarity of gallstone was the most frequent aetiological factor linked with cholelithiasis in this study, found in 24(36.92%) children. Presence of gallstones in one or more relatives was the most frequent aetiological factor found in childhood cholelithiasis⁹. In this study, 14(21.54%) had idiopathic gallstone and 51(78.61%) children had one or more risk factor for gallstone. Gallstone dissolved in 17(26.15%) children in subsequent follow up within 6 months and 48(73.85%) required operative treatment. Kirsaciloglu reported a resolution of 37% gallstones in children by 2 months irrespective of ursodeoxycholic acid (UDCA) treatment¹⁸.

Conclusion

The aetiology of childhood cholelithiasis is influenced by age, sex, genetic factor, geographical factors, referral status and available medical facilities. Based on the findings of this study we can conclude that asymptomatic cholelithiasis in children have relatively low chance of complication and high rate of resolution. As such asymptomatic younger children can safely be managed conservatively. Cholecystectomy preferably LC can be planned in older age group and gallstone associated with haemolytic anaemia. So research on the aetiological factors of cholelithiasis in children is likely to help in prevention and early diagnosis of cases, thus reduce the suffering of the children.

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