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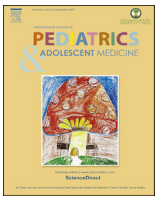

Original article

Etiology and clinical characteristics of pediatric acute pancreatitis in Saudi Arabia: a 20-year experience from a single tertiary center

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ABSTRACT

Background: Cases of acute pancreatitis (AP) have increased among pediatric populations worldwide; however, the natural course of this condition in Saudi Arabia was unknown.
Aim: To report the characteristics as well as outcomes of pediatric AP.
Patients and methods: A retrospective chart review study was conducted to include acute pancreatitis in patients ≤ 19 years. The period was from 1994 until 2015. Demographic, clinical, laboratory, imaging and outcome data were collected and analyzed.
Results: 50 patients (n = 26; 52% males vs. n = 24; 48% females) were included. The mean age at diagnosis was 11.6 years. The mean length of hospital stay was 10.5 days. 9 (18%) patients had a recurrence of AP and 4 (8%) had complications. Idiopathic AP was the most frequent etiology (n = 21; 42%), followed by cholelithiasis (n = 11; 22%). 2 patients (4%) had drug-induced AP, where one was taking isoniazid and the other had taken a large amount of erythromycin, amoxicillin and ibuprofen. 2 choledochal cysts complicated by AP (4%). Pancreaticobiliary diseases, as a complete entity, accounted for 34% (*n* = 17). Clinically, abdominal pain (n = 47; 94%) and vomiting (n = 38; 76%) were most commonly encountered. KUB was non-diagnostic in all patients. No patient died during their admission.
Conclusion: Although still relatively uncommon in Saudi Arabia, there are on average 2–3 cases of pediatric AP diagnosed annually in our institution. Idiopathic AP was the most common cause. Isoniazid and choledochal cysts are rare causes of AP and were reported in the study.

1. Introduction

Inflammation of the pancreas (pancreatitis) occurs as a result of the spillage and autodigestion of the pancreatic parenchyma by the digestive enzymes. Acute pancreatitis (AP) is characterized by the presence of inflammatory cells and results in reversible structural and functional changes over a short duration. In contrast, chronic pancreatitis causes irreversible changes that ultimately result in fibrosis and loss of exocrine and/or endocrine function [1].

According to the International Study Group of Pediatric Pancreatitis: in Search for a Cure (INSPPIRE), two of three criteria must be fulfilled to diagnose AP in the pediatric population; namely, abdominal pain, serum amylase or lipase levels that are three times the upper normal limit and radiological findings diagnostic of AP [2,3].

AP is a rare disorder among individuals aged younger than 20 years, the number of pediatric AP cases recorded worldwide has increased dramatically over the past few years [4]. A 10-year American study estimated that the incidence of primary AP among children had increased from 6350 cases to 9561 cases between 2000 and 2009, representing a 51% increase [5]. A retrospective chart review conducted in the United States of America

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(USA) found that the incidence of first pediatric AP admission increased from 2.3 per 100,000 children in 1993 to 13.2 per 100,000 children in 2004 [6]. The authors concluded that the observed rise might reflect increased testing for AP among the pediatric population.

To date, no national or regional studies have been conducted in Saudi Arabia to assess pediatric AP. Therefore, the aim of the current study was to describe the etiology, clinical characteristics of this disease among Saudi children and increase clinical awareness pediatric AP.

2. Methods

A 20-year retrospective chart review study was conducted at King Abdullah Specialized Children Hospital and King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, Saudi Arabia. Institutional Review Board (IRB) was obtained from the King Abdullah International Medical Research Center (KAIMRC), National Guard Health Affairs, Riyadh, Saudi Arabia, with a reference number of RC16/110/R.

Medical records were reviewed to identify all pediatric patients (age ≤19 years) who were diagnosed with primary AP between 1994 and 2015. Patients with missing data were excluded from the analysis. We defined age groups as the following; pre-schooler (0–5 years), schooler (6–11 years) and adolescent (12–19 years).

Demographic, clinical and outcome data were evaluated to establish shared features among patients with primary AP in our population. Imaging techniques, including kidney–ureter–bladder (KUB) plain film, ultrasonography (US) and computed tomography (CT), were also evaluated.

3. Statistical analysis

Statistical analysis was performed using JMP version 12 (SAS Institute, Cary, NC, USA). Continuous and categorical variables are given as the mean ± standard deviation (SD) and as the number and percentage, respectively. The Student's *t*-test was used to assess the differences in means. Differences in categorical variables were analyzed with the chi-squared test. Analysis of variance (ANOVA) was used to assess continuous variables. A test with *P* value of less than .05 was statistically significant.

4. Results

A total of 50 patients ($n = 26$; 52% males vs. $n = 24$; 48% females) were included. The mean age at diagnosis was 11.6 years. Patients were diagnosed with primary AP during the present study at a rate of two to three cases per year. (Baseline demographics are presented in Table 1).

Idiopathic AP was the most frequent etiology ($n = 21$; 42%), followed by gallstones ($n = 11$; 22%) (Summary of etiologies is shown in Table 2). 2 (4%) had drug-induced AP, where one was taking isoniazid while the other had ingested a large amount of pain killers and antibiotics (erythromycin, amoxicillin and ibuprofen). 2 patients had choledochal cysts complicated by AP ($n = 2$; 4%). Congenital and non-congenital pancreaticobiliary diseases, as a complete entity, accounted for 34% ($n = 17$).

The co-morbid conditions of patients with gallstone induce AP were: morbid obesity, i.e. BMI>40 ($n = 2$; 18%), chronic recurrent cholecystitis ($n = 1$; 9%), Haemophilia A ($n = 1$; 9%), Sickle Cell Anaemia ($n = 1$; 9%), Chronic Kidney Disease complicated by Disseminated Intravascular Coagulation ($n = 1$; 9%), Epilepsy Syndrome manged by Levetiracetam ($n = 1$; 9%). The rest of the patient with gasllstones ($n = 4$; 36%) were medically free.

Most of the patients ($n = 47$; 94%) had abdominal pain, with vomiting ($n = 28$; 76%) and nausea ($n = 10$; 20%). Amylase levels were high in 96% (n = 48) of the patients and normal in 2% (n = 1). The mean amylase level was 1168 U/L, the median was 861 U/L and the standard deviation was 1009 U/L. Lipase were less tested ($n = 5$; 10%). Lipase mean level was 538 U/L.

Table 1
Baseline demographics.

	Male	Female	Total
Mean of Age, *yr*	11.8	11.4	11.6
Male/Female	26 (52)	24 (48)	50 (100)
Nationality, *n (%)*			
Saudi	26 (52)	24 (48)	50 (100)
Non-Saudi	0	0	0
Clinical Presentation, *n (%)*			
1. Abdominal Pain	24 (92.3)	23 (95.8)	47 (94)
2. Vomiting	20 (76.9)	18 (75)	38 (76)
3. Nausea	5 (20.8)	5 (21.7)	10 (20)
4. Anorexia	2 (8.3)	3 (13)	5 (9.2)
5. Fever	4 (16.6)	0	4 (8)
Blood Pressure, *mean*	115/66	113/68	114/68
Heart Rate, *mean*	106.3	106.3	106
Respiratory Rate, *mean*	26.8	21.3	24
O_2 Saturation, *mean*	97.6	97.9	98
Temperature (C°), *mean*	36.9	36.9	37
Length of Admission, *days*	11.2	9.7	10.5
Recurrences, *n (%)*	6 (23)	3 (12.5)	9 (18)

All patients underwent KUB had non-significant findings ($n = 21$; 42%). 37% of US were non-yielding ($n = 14$). Enlarged and bulky pancreas was commonly detected ($n = 11$; 46%). CT was the superior imaging modality as it showed pancreatic changes suggestive of AP 84% ($n = 16$). 6 patients (12) had endoscopic retrograde cholangiopancreatography (ERCP). One patient (16.6%) underwent ERCP for removal of common bile duct (CBD) stone, while another was diagnosed with choledochal cyst involving the CBD. (See Radiographic Findings of Pediatric Acute Pancreatitis in Table 3).

The mean length of stay (LOS) was 10.5 days (2–62), median 6. The pre-schooler group had a mean LOS of 12 days, whereas the schooler and adolescent groups had a mean LOS of 15 and 8.1 days, respectively. Patients who were admitted to the pediatric Intensive Care Unit (PICU) had a mean LOS in the unit of 2.7 (1–7), median 2. The pre-schooler group had a mean LOS of 5.5 days, and the schooler and adolescent groups had a mean LOS of 2.75 and 2 days, respectively. Patients who presented with abdominal pain and fever had significantly longer PICU stay ($P = .0007$, $P = .0211$, respectively).

18% ($n = 9$) experienced recurrence of AP. 8% ($n = 4$) had complications; 2 (33.3%) acute respiratory distress syndrome, 1 (16.6%) septic shock, 1 (16.6%) hypocalcemia, 1 (16.6%) pseudocyst and 1 (16.6%) pancreatic necrosis. No patients died due to AP.

5. Discussion

The present study aimed to define a baseline for pediatric AP in Riyadh, Saudi Arabia, by describing the etiological factors, clinical presentation, relevant laboratory tests and imaging findings among all cases of primary disease identified at our institute. Pediatric AP was diagnosed at a rate of approximately two to three cases per year in the present study.

The etiology of AP among children is variable. A US-based study published in 1999 found that 25% of pediatric AP cases are of unknown etiology, with 13%–33% of cases attributed to blunt trauma, making it the most common cause of pancreatitis among both adults and children [7]. However, a study published in 2013 claimed that pediatric AP due to trauma is less common than previously

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