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Spectrum of acute, recurrent and chronic pancreatitis in children

Muhammad Imran[1], Sabeen Abid Khan[2], Munir Iqbal Malik[3]

1,2 Department of Paediatrics, Shifa College of Medicine, Shifa Tameer e Millat University, Islamabad, Pakistan; **3** Department of Paediatric Gastroenterology, Shifa College of Medicine, Shifa Tameer e Millat University, Islamabad, Pakistan

Correspondence: Sabeen Abid Khan. **Email:** sabeenk45@gmail.com

Abstract

Objective: To determine the clinical presentation, aetiology and outcome of pancreatitis in paediatric population.

Method: The retrospective study was conducted at Shifa International Hospital, Islamabad, Pakistan, and comprised data of children with pancreatitis presenting between 2013 and 2018. Medical records were reviewed and findings of clinical, laboratory workup and management were noted on a specifically developed proforma. Data was analysed using SPSS 23.

Results: Of the 51 subjects, 28(54.9%) were boys. The overall mean age was 10.6±4.9 years. The most frequent clinical symptom was epigastric pain 39(76.5%). The most common aetiology was gallstones/pancreatic stones 19(37.25%). Mean hospital stay was 5.1± 1.8 days, and it was longer in children aged up to 5 years compared to older children ($p<0.05$). Acute pancreatitis was seen in 23(45.09%) patients, followed by recurrent 19(37.25%) and chronic 9(17.64%). There was no mortality.

Conclusion: Timely diagnosis and prompt management of hemodynamic status could lead to successful recovery without any serious complications in paediatric pancreatitis.

Key Words: Childhood pancreatitis, Acute pancreatitis (AP), Recurrent pancreatitis.

Introduction

Pancreatitis is a progressive inflammatory infection of pancreas which starts as an acute complaint that is reversible but can transform into recurrent (RP) or chronic pancreatitis (CP) over months to years, depending on causal and modifying factors. It is defined mechanistically as a pathological fibro-inflammatory disease of the pancreas in children with genetic, environmental, or other risk factors who develop persistent pathologic responses to parenchymal injury or stress.[1]

Childhood pancreatitis is a serious, potentially life-threatening condition that may manifest in either acute (AP) or CP form with clinical signs of epigastric pain, vomiting and raised serum amylase and lipase enzymes.[2] According to the International Study Group of Paediatric Pancreatitis: in Search for a Cure (INSPIRE), two of three criteria must be fulfilled to diagnose AP in the paediatric population; namely, abdominal pain, serum amylase or lipase level that are three times the upper normal limit, and radiological findings diagnostic of AP[3,4] Acute recurrent pancreatitis (ARP) is defined as two or more episodes of pancreatitis in a year or more than three episodes ever. CP results in irreversible scarring of pancreas and usually presents with abdominal pain, malabsorptive stools and eventually glucose intolerance.[5]

AP is rare in age <20 years, but the number of cases has increased worldwide over the past few years.[6] A 10-year American study estimated that AP incidence has increased from 650 to 9561 cases between 2000 and 2009, showing a 51% increase.[7] The incidence of AP and CP in Pakistani children is not known, but Majbar et al. reported that in the United Kingdom, children of Pakistani origin had a seven-fold increased risk of developing AP compared to white chidren.[8]

The current study was planned to have a better understanding of the disease in our region and to identify different clinical presentations, etiology and outcome of pancreatitis in Pakistani children.

Materials and Methods

The retrospective study was conducted at Shifa International Hospital, Islamabad, Pakistan, and comprised data of children with pancreatitis presenting between 2013 and 2018. After approval from the institutional ethics review board, data was retrieved using non-probability convenience sampling related to paediatric patients <16 years of age who presented with acute, recurrent or chronic pancreatitis.

Age groups were defined as pre-school (0-5 years), school-going (6-11 years) and adolescent (12-16 years). Pancreatitis was defined using the INSPIRE criteria. Data was children with missing data was excluded. Demographic, clinical, laboratory, imaging and outcome data was collected on a structured data collection-form.

Data was analysed using SPSS 23. Continuous variables were described as mean and standard deviation (SD), and categorical variables as frequencies and percentages. Further analysis was done according to three age categories. Difference in categorical variables was analysed using Chi-square test. Analysis of variance (ANOVA) was used to determine continuous variables. $P<0.05$ was considered statistically significant.

Results

Of the 51 subjects, 28(54.9%) were boys. The overall mean age was 10.6±4.9 years. The most frequent clinical symptoms were epigastric pain 39(76.5%), nausea 32(62.7%), vomiting 45(88.2%), anorexia 23(45.1%), fever 9(17.7%) and abdominal distension 6(11.8%) (Table 1).

AP was the most common presentation 23(45.09%), followed by ARP 19(37.25%) and CP 9(17.64%) (Table 2).

Pancreatitis was seen less frequent in children aged <5 years 9(17%), while 21(41.2%) patients in the remaining two age groups. The most common cause of pancreatitis was gallstones, pancreatic stones/ sludge 19 (37.25%), followed by idiopathic 15(29.4%), and anatomic malformations 7(13.7%). Hyperlipidemia was seen in 6(11.7%) patients, and diabetes mellitus (DM) was the most common causative systemic disease (Table 3).

Gender was equally distributed in the three age categories. Epigastric pain and pain radiating to back was more common in adolescent and school-going age groups than <5 group, but the difference was not significant (p=0.15). Nausea and vomiting were equally distributed among the three age categories (p=0.92). More younger children were found pallor than the older age groups (p=0.006). Mean hospital stay was longer in the <5 age group than older children (p=0.05). Mean levels of amylase and lipase were increased in the adolescent group, but the finding was not significant (p>0.05). Types of pancreatitis were equally distributed among all age groups (p>0.05). Surgery was done in 24(47%) patients, and there was no mortality.

Discussion

This retrospective assessment of children with pancreatitis has some variation in the clinical presentation as well as aetiology of the disease in different age groups. The study showed slight male dominance 1.2:1. AP was the most common presentation in the study followed by ARP and CP. The study highlighted significant cases of ARP in children. This may be attributed to the fact that we have a well-established Gastroenterology Department in a tertiary care hospital with better diagnostic modalities like CT abdomen, **magnetic resonance cholangiopancreatography** (**MRCP**) and endoscopic retrograde cholangiopancreatography

(ERCP). Identifying causes of RP is important because a significant number can convert to CP which is an irreversible process with loss of pancreatic function.

The most common aetiology of pancreatitis was gallstones, pancreatic stones and biliary sludge, followed by idiopathic and anatomical causes, including pancreatic divisum, choledochal cyst, meandering main pancreatic duct (MMPD loop, and a rare type of anatomic variation of pancreatic duct Ansa pancreatica. To our knowledge, the current study is the first reporting Ansa pancreatica from Pakistan as a cause of RP in a child. Ansa pancreatica is a rare ductal malformation in which there is a communication between main and accessory pancreatic duct causing hindrance to drainage of pancreatic secretions. Ansa pancreatica has been associated with recurrent pancreatitis in alcoholic adults.[9] Our patient was an 11-year-old boy diagnosed on MRCP, who later underwent pancreatic duct stenting and sphincterotomy, and is asymptomatic since then.[10] Familial hyperlipidemia and hyper triglyceridemia was seen in 6(11.7%) patients. Our results are consistent with a study in which AP was found in majority of cases whereas CP was prevalent in two-fifth of the cases.[11] In most of the available literature on pancreatitis, AP is found to be more frequent than CP or RP.[12] The aetiology of AP and CP has been mostly biliary/obstructive, like gallstones and choledochal or pseudo cyst, medications or systemic diseases as well as idiopathic form.[13] Previous regional as well as Chinese literature suggests that aetiological factors for CP in children were genetic, anatomic anomalies, hyperlipidemia and trauma.[14] However, in the present study, the main causes of CP were gallstones, pancreatic stones/sludge, choledochal cyst and idiopathic. Serum immunoglobulin-4 (IgG4), done in 9 patients with RP CP did not show elevation. This finding is consistent with literature that IgG4 elevation might not be seen in children unlike in adults with pancreatitis. Further, workup for genetic mutations like PRSS-1, SPINK-1 were not available. Unlike in adults, trauma is less frequently reported as a cause of pancreatitis in children, and the current study also showed the same trend.

The most common clinical features observed were abdominal pain in the epigastrium region and pain radiating to the back, followed by vomiting, nausea and anorexia. Previous studies have also witnessed this clinical pattern[15]. In the present study, mean levels of WBCs, lipase and amylase were more raised in the adolescent group. A study reported that in one-third of its cases, serum amylase and lipase were found abnormal.[16] Serum lipase has a high sensitivity and specificity in the diagnosis of pancreatitis; thus, it can be safely utilised for investigating this condition.[17,18]

The initial management involved attention to hemodynamic status, maintaining hydration and pain relief.[19] Almost half of the cases 24(47%) were operated upon. Most of the surgical procedures were done for RP and CP, including laparoscopic cholecystectomy, Frey's procedure, pancreatic duct stenting, laparotomy and ERCP. In the present study, the mean hospital stay was 5.1 days, but, when sub-analysed, those aged up to 5 years had a mean stay of 6.5 days. Comparatively, many previous studies have had a longer duration of hospital stay; from 10.5 to 13.9 days.[20,21,22] The current study had zero mortality, but complications were observed mainly in patients with CP, like pancreatic pseudocyst seen in 4 patients and development of insulin0dependent diabetes mellitus (IDDM) in one patient.

Conclusion

Abdominal pain, vomiting, nausea and anorexia were the main clinical signs and symptoms of pancreatitis in children. Common aetiologies were gallstones, hyperlipidemia and anatomic abnormalities. Timely diagnosis and prompt management of hemodynamic status could lead to successful recovery without any serious complications.

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Table 1: Demographic and clinical features of study patients (n=51)

	No of cases	%age
Age (years)		
Up to 5	9	17.2%
5.1 to 12	21	41.2%
12.1 to 16	21	41.2%
Mean ± SD	10.6 ± 4.9	
Gender		
Male	28	54.9%
Female	23	45.1%
Body mass Index (BMI)		
Mean ± SD	19.1 ± 4.7	
Epigastric pain	39	76.5%
Pain radiating to back	16	31.4%
Diffused pain	12	23.5%
Nausea	32	62.7%
Vomiting	45	88.2%
Anorexia	23	45.1%
Fever	9	17.7%
Pallor	4	7.8%
Jaundice	4	7.8%
Abdominal distension	6	11.8%
Glasgow Coma Scale (GCS)		
10 to 14	5	9.8%
15	46	91.2%
Hospital stay		
Mean ± SD	5.1 ± 1.8	

SD: Standard deviation.

Table 2: Types of pancreatitis and their causes in the study patients (n=51)

Types of pancreatitis	No. of cases	%age
Acute Pancreatitis	23	45.09
Acute Recurrent	19	37.25
Chronic pancreatitis	9	17.64
Aetiology of Acute pancreatitis	No. of cases	%age
Idiopathic	10	43.47
Gall stones	5	21.73
Hyperlipidemia	3	13.04
Anatomic/Pancreatic divisum	2	8.69
Mumps	1	4.3
Drugs (l-Asparaginase)	1	4.3
Insulin-Dependent Diabetes Mellitus (IDDM)	1	4.3
Etiology of Acute recurrent Pancreatitis	No	%age
Idiopathic	4	21.05
Gall /pancreatic duct calculi/sludge	7	36.84
hyperlipidemia	3	15.78
Anatomic (Ansa pancreatica, pancreatic divisum, Meandering main pancreatic duct loop)	4	21.05
Systemic disease (IDDM)	1	5.26
Aetiology of chronic pancreatitis **(CP)**	No	%age
Idiopathic	1	11.11
Gall/pancreatic stone	7	77.77
Anatomic (choledochal cyst)	1	11.11
complications		
IDDM	1	
pseudocyst	4	

Table 3: Comparison of demographic, clinical, pathological and disease pattern between the three age groups

	Age (up to 5 years) n=9	**Age (5.1 to 12.0 years) n=21**	**Age (12.1 to 16.0 years) n=21**	**p-value**
Demographic and clinical parameters				
Gender				
Male	4 (44.4%)	14 (66.7%)	10 (47.6%)	0.36

Female	5 (55.5%)	7 (33.3%)	11 (52.3%)	
Epigastric pain	5 (55.5%)	16 (76.1%)	18 (85.7%)	0.15
Radiating back pain	2 (22.2%)	4 (19.0%)	10 (47.6%)	0.11
Diffused pain	2 (22.2%)	6 (28.5%)	4 (19.0%)	0.36
Nausea	7 (77.7%)	15 (71.4%)	15 (71.4%)	0.92
Vomiting	8 (88.9%)	19 (90.5%)	18 (85.7%)	0.89
Anorexia	7 (77.8)	10 (47.6%)	9 (42.8%)	0.22
Fever	3 (33.3%)	5 (23.8%)	3 (14.3%)	0.48
Pallor	3 (33.3%)	1 (4.8%)	0 (0.0%)	0.006
Jaundice	1 (11.1%)	0 (0.0%)	3 (14.3%)	0.20
Abdominal distension	1 (11.1%)	2 (9.5%)	3 (14.3%)	0.89
Glasgow Coma Scale (GCS)				
10-14	1 (11.1%)	2 (9.5%)	2 (9.5%)	0.91
Mean PICU stay (days)	1.8 ± 1.5	2.1 ± 0.7	2.1 ± 1.7	0.38
Mean Hospital stay (days)	6.5 ± 2.3	4.6 ± 1.4	5.1 ± 1.7	0.05
Pathological investigations				
WBCs (cells/mm^3)	14600.0 ± 3665.6	12595.2 ± 7687.7	12490.4 ± 4629.3	0.64
Haemoglobin (mg/dL)	11.7 ± 2.8	12.5 ± 1.5	12.7 ± 1.9	0.48
Platelets count (µL)	168808.1 ± 101869.8	171012.1 ± 152819.2	163617.6 ± 106354.1	0.99
Amylase (U/L)	937.3 ± 579.1	1001.6 ± 682.2	1073.5 ± 578.2	0.64
Lipase (U/L)	1846.6 ± 1505.9	1577.2 ± 1133.6	1953.6 ± 1554.3	0.79
Calcium (mg/dL)	8.5 ± 1.6	8.4 ± 1.4	8.7 ± 0.9	0.75
BSR (blood sugar) (mg/dL)	116.2 ± 26.9	133.3 ± 59.1	111.9 ± 42.2	0.35
Types of pancreatitis				
Acute Pancreatitis (n=23)	5 (21.7%)	8 (34.7%)	10(43.47%)	
Acute recurrent (n=19)	2 (10.5%)	11(57.89%)	6(31.5%%)	
Chronic Pancreatitis (9)	2 (22.2%)	1(11.1%)	6 (66.6%)	

WBC: White blood cell;