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ORIGINAL: Prevalence of Acute Pancreatitis in Hospitalized Children with Renal Disease: A Five-Year Study

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ABSTRACT

Introduction: The aim of this study was to evaluate the characteristics and prognosis of acute pancreatitis in children with kidney disease in Ali Asghar Hospital between 2016 and 2020.

Material and Methods: In this retrospective cross-sectional descriptive study, children with kidney disease who developed acute pancreatitis between 2016 and 2020 were studied. All patients with kidney disease who were hospitalized in the kidney ward of Ali Asghar Hospital were retrospectively evaluated and patients with acute pancreatitis were included in the study. Data analysis was performed using SPSS statistical software version 26 and for quantitative variables mean and standard deviation and for qualitative variables absolute frequency and percentage were recorded.

Results: Finally, 12 patients with kidney disease had acute pancreatitis. The mean age of the 12 participants was 9.05 ± 4.27 years. The mean duration of kidney disease was 5.7 ± 3.52 years. Four patients (33.3%) had a history of pre-pancreatitis infection. Three patients (25%) had nephrotic syndrome. Seven patients (58.3%) had end-stage renal disease. Nine patients (75%) were on dialysis.

Conclusion: During the five-year period, only 12 cases of acute pancreatitis with a history of kidney disease were observed, none of which had a positive family history, and eventually all survived. Three-quarters of the cases also received dialysis treatment, and all cases presented with a clinical presentation of abdominal pain at first.

Introduction

Acute pancreatitis, or sudden inflammation of the pancreas, is one of the most common and costly diseases in children, which is associated with symptoms such as severe abdominal pain, vomiting and ileus in children. The prevalence of acute pancreatitis in children is about 1-4 per 10,000 people, which also has an upward trend (1). In fact, the prevalence of this disease has increased by about 64% from 1996 to 2000. The cause of the increase in the prevalence of this inflammatory disease is still unknown and depends on several factors such as systemic diseases and the increased performance of lipase and amylase tests in suspected children (2).

Numerous studies have shown that children with systemic or liver disease and a history of infection and trauma have developed acute pancreatitis as a secondary disease. Some

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studies have shown that diseases such as kidney failure or conditions such as kidney transplantation in patients with end-stage renal disease (ESRD) can also increase the risk of acute pancreatitis. Proper control of these diseases can be associated with normal pancreatic function and prevention (3).

The prevalence of death in children with acute pancreatitis secondary to ESRD is estimated to be about 8% based on studies. Due to the risk of fatal acute pancreatitis and the high costs imposed on the medical system, recognizing the risk factors and their role in the incidence of this disease is very important (4).

The etiology of acute pancreatitis in the pediatric population is very different from that in adults. Studies show that the most common causes of acute pancreatitis in children are: medications, certain infections, trauma, and anatomical abnormalities in children that predispose them to acute pancreatitis (5).

In addition, genetic factors are involved in the development of acute recurrent pancreatitis in children. According to studies, mutations in the genes PRSS1, CFTR, SPINK1, and CTRC are observed in some patients with acute pancreatitis who did not have a known predisposition to pancreatitis. The cause of the increase in the prevalence of this inflammatory disease is still unknown and depends on several factors such as systemic diseases and the increased performance of lipase and amylase tests in suspected children. Numerous studies have shown that children with systemic or liver disease and a history of infection and trauma have developed acute pancreatitis as a secondary disease. Some studies have shown that diseases such as kidney failure or conditions such as kidney transplantation in patients with end-stage renal disease (ESRD) can also increase the risk of developing acute pancreatitis (3).

Studies have shown that the mortality rate in children with acute pancreatitis secondary to ESRD is estimated at about 8% based on studies. Due to the lack of sufficient studies on the prevalence of acute pancreatitis in children with kidney disease, we decided to estimate the prevalence of acute pancreatitis in children with kidney disease hospitalized in Ali Asghar Hospital from 2016 to 2020.

Methods

This was a retrospective descriptive cross-sectional study on all patients with kidney disease admitted to Ali Asghar Hospital in Tehran between 2016 and 2020. Data were collected by census and the hospital records of all children under 18 years of age with hospitalized kidney disease were evaluated. In order to access the medical records, the necessary arrangements were made with the hospital management and the required permits were obtained. Confirmation of the diagnosis of acute pancreatitis based on pediatric clinical symptoms such as abdominal pain and restlessness, tenderness in the epigastric region and nausea and vomiting, high levels of pancreatic enzymes (more than 3 times the upper limit of normal) and imaging findings such as abdominal CT scan and Ultrasound of patients' abdomen was evaluated.

The data of all patients under 18 years of age with renal impairment who had clinical signs in favor of acute pancreatitis or the presence of pancreatic enzymes (Amylase, Lipase) at least 3 times its maximum normal level were entered in the researcher-made checklist. Information includes demographic characteristics (including age, sex, BMI), type of kidney disease, history of acute pancreatitis, time of onset of kidney disease, history of dialysis and kidney transplantation, time of referral for acute pancreatitis, clinical signs at diagnosis of acute pancreatitis, history of disease Pancreatitis in first-degree relatives, history of pre-pancreatitis infection, type of treatment received (dialysis) and death due to acute pancreatitis were recorded.

This study was based on the transparency of the Helsinki Convention. For this purpose, the treatment information of all patients is confidential with the researchers and no secondary use of the information obtained from the study will be made. Researchers at

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all stages of this study were committed to adhering to the ethical principles of the Helsinki Convention. This study was conducted after the approval of the ethics committee in biomedical research of Iran University of Medical Sciences (registration code: IR.IUMS.FMD.REC.1399.389).
Data analysis was performed using SPSS v.26 statistical software and for quantitative variables mean and standard deviation and for qualitative variables absolute frequency and percentage were recorded.

Results

Twelve patients (7 women and 5 men) with kidney disease who had acute pancreatitis in Ali Asghar Hospital in Tehran during 2016-2020 were included in the study and their demographic information was collected (***Table 1***).

Table 1. Demographic and clinical information of patients

Variables (unit)		Mean (SD)
Age (year)		9.05 (4.27)
BMI (Kg/m^2)		18.8 (6.8)
Kidney disease duration (year)		5.7 (3.52)
Pancreatic Enzyme (ml)	Amylase	185 (164.42)
	Lipase	238 (99.75)

All patients presented with abdominal pain and 7 (58.3%) reported nausea or vomiting during the visit. Four patients had fever. Seven (58.3%) had ESRD. Three patients (25%) had a history of kidney transplantation and one of them (8.3%) had rejected the transplant. 9 patients (75%) were on dialysis. Other results are shown in ***Table 2***.

Table 2. Frequency of kidney disease in patients

Type of Kidney Disease	Frequency (%)
RPGN	2 (16.7)
Nephrotic Syndrome	3 (25)
RTA	1 (8.3)
HUS	1 (8.3)
ARPKD	1 (8.3)
PUV	2 (16.7)
Barter Syndrome	1 (8.3)
Congenital Hypo dysplastic	1 (8.3)

RPGN: rapidly progressive glomerulonephritis; RTA: renal tubular acidosis; HUS: hemolytic uremic syndrome; ARPKD: autosomal recessive polycystic kidney disease; PUV: posterior urethral valve

Discussion

The results showed that most patients had about three to six years of acute renal involvement before pancreatitis and about one third of patients had a history of pre-pancreatitis infection. About 60% of patients had ESRD, and the most common renal disease was nephrotic syndrome, which was present in a quarter of patients. In this study, a quarter of patients had a history of kidney transplantation, of which one had a history of transplant rejection. It is noteworthy that all of the patients referred presented with abdominal pain and about 60% of them also had nausea or vomiting. Three-quarters of the patients also received dialysis treatment and none of the patients had a positive family history of acute pancreatitis and were also alive at the end of the study.
Compared to the study of Chen et al., The prevalence of mortality due to acute pancreatitis in ESRD patients was about 8%, while in our study, mortality due to this disease was not observed. Also, in our study, the history of gallstones was not examined, but in the study, it was suggested as one of the risk factors for acute pancreatitis (4).
Compared to the study of Sánchez-Ramírez et al., It can be seen that in this study, the family history of acute pancreatitis is one of the risk factors, but in our study, none of the evaluated cases had a positive family history in this regard. Also, in our study, the history of trauma was not examined, but in the study, it was mentioned as one of the risk factors for acute pancreatitis (2). This study, like the study by De Tersant et al., Concluded that acute pancreatitis is a complication of chronic kidney disease (3).
According to a study by Chen et al. Conducted in 2016 on the records of 67,000 children with end-stage renal disease (ESRD), the prevalence of acute pancreatitis in these children was about 0.5%, as well as older age, female and A history of gallstones was one of the risk factors for acute pancreatitis. The frequency of death due to acute pancreatitis in these children was 8% (4).

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In 2017, Abu-El-Haija et al. proposed a study to classify acute pancreatitis in the pediatric population. Researchers in this article, using existing study sources on the incidence of acute pancreatitis in children and also inspired by the descriptive guideline of adult acute pancreatitis, stated that acute pancreatitis in children is divided into three categories: Mild, moderately severe and Severe. Mild form is the disease without causing organ failure and regional or systemic complications in the patient's body, which will often improve within a week. Moderately severe form is a form of the disease that leads to organ failure or transient systemic complications in the patient, which will eventually disappear after 48 hours. Severe form will be associated with systemic inflammatory response syndrome (SIRS) in the patient (6).

One of the limitations of this study is that the small sample size reduced the strength and accuracy of the study, which seems to increase somewhat by increasing the study period (for example, 10 or 15 years). Be fixed. Another limitation of this study was the lack of similar internal studies. As a result, it is suggested that studies with a longer study period, such as history of gallstones, trauma, electrolyte abnormalities such as hypern-atremia, and biochemical markers such as procalcitonin, CRP and IL-6 be performed in the future.

Conclusion

Finally, during the five-year period, only 12 cases of acute pancreatitis with a history of kidney disease were observed, none of which had a positive family history, and eventually all survived. Three-quarters of the cases also received dialysis treatment, and all cases presented with a clinical presentation of abdominal pain at first.

Ethical standards statement

This study was conducted after the approval of the ethics committee in biomedical research of Iran University of Medical Sciences (registration code: IR.IUMS.FMD.REC.1399.389).

Conflicts of interest

The authors declare no conflict of interest regarding publication of this article.

Authors' contributions

All authors have intellectually committed to the study design and process. The final manuscript was revised and accepted by all authors.

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