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Evaluation of Factors Leading to the Development of Acute Pancreatitis at Tertiary Care Hospital, Karachi

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ABSTRACT

Acute pancreatitis (AP) involves pancreatic inflammation that may extend to surrounding tissues. Clinical outcomes can be predicted through assessment of disease-specific prognostic markers. **Objectives:** To evaluate the prevalence of etiological factors for AP among patients at a tertiary healthcare center in Karachi. **Methods:** A descriptive cross-sectional design, this six-month study was conducted in the Medicine Department of Civil Hospital, Karachi, from 06-08-2022 to 05-02-2023. Participants were selected through convenience sampling (a non-probability approach). Data processing was done by SPSS version 26.0. Chi-square test was applied by taking a p-value of ≤ 0.05, which is significant. **Results:** The research cohort comprised 135 eligible participants with a mean age of 46.71 ± 6.82 years. Gender distribution showed 55 male patients (40.7%) and 80 female patients (59.3%). Out of the 135 patients, 43.7% had cholelithiasis, 11.1% had alcohol induced pancreatitis, 17.8% had post-ERCP pancreatitis, 14.8% had hypertriglyceridemia, and 10.4% had IgG4-mediated pancreatitis. **Conclusions:** Acute pancreatitis is a multi-factorial pathology of different severity and outcomes. Gallstones were found to be the most prevalent cause of the condition.

INTRODUCTION

Acute pancreatitis (AP) is a form of inflammation of the pancreas. Although it has a mild course in most cases and does not cause serious complications in about 80% of cases, it may cause serious complications, and up to 20% may also succumb to it in some individuals [1]. A patient with acute epigastric pain that radiates to the back, nausea and vomiting must also be urgently examined to exclude several potentially fatal illnesses, among which there are myocardial infarction, rupture or aortic aneurysm, peptic ulcer disease and its complications of hemorrhage or penetrating injury, and acute pancreatitis [2]. The patient's history should guide the clinician, who should conduct a physical inspection to assess specific issues and review the results of appropriate diagnostic tests to establish a proper treatment plan by narrowing the range of potential diagnoses [3, 4]. The prevalence of risk factors is known to

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vary geographically and demographically, which is one reason the causes and incidence of acute pancreatitis differ across geographic regions [5]. Common etiological factors include alcoholic pancreatitis with higher overall acute pancreatitis incidence in certain countries as compared to countries with predominantly gallstone pancreatitis, as it is reported differently in various countries in terms of incidence curve [6]. Hospital visits in emergency departments due to acute pancreatitis have been on the rise. In 2012, the emergency visits rate for AP was 105 per 100,000 population, and the general mortality rate was approximately 1%. Death is more likely to occur when age increases, the presence of comorbidity and greater severity of diseases, especially caused by infected pancreatic necrosis and multiorgan failure [7]. Gallstones are the most prevalent causative factor of acute pancreatitis, whereas alcohol is more prominent among middle-aged men. The unknown cause known as idiopathic cases causes 20% to 34% of the cases, with no difference in their rates of occurrence among men and women [8-10]. The rate of idiopathic pancreatitis may vary depending on the clinician's diligence in seeking the underlying cause of the condition, as reported by patients [11]. Autoimmune pancreatitis (AIP) is an infrequent nonneoplastic disease, which is considered a different manifestation of pancreatic ductal adenocarcinoma (PDAC). The level of serum immunoglobulin G4 (IgG4) is useful for distinguishing between these disorders, as elevated IgG4 is a characteristic feature of AIP but not observed in PDAC patients [12]. Hameed et al., reported the etiologic distribution of acute pancreatitis (AP) in their cohort: 74% cholelithiasis, 2.6% alcohol-induced pancreatitis, 4.5% post-ERCP pancreatitis, and 0.6% hypertriglyceridemia with IgG4-mediated pancreatitis [13]. Efficient prevention measures and treatment regimens are still important interventions recommended to be adopted globally to limit the morbidity and deaths due to acute pancreatitis. Although significant progress has been made in the pathophysiological understanding of this condition over the last fifteen years, it remains challenging for clinicians to manage its multifactorial aetiology and complex clinical manifestations [14]. There are also changes in lifestyle, demographic shifts, socioeconomic status, and morbidities that continue to evolve. These factors should be acknowledged in the prevention of the onset of irreversible chronic pancreatitis, as the most valuable measures to prevent its occurrence must have been established previously [15]. Ultimately, understanding the various causes that contribute to the development of acute pancreatitis is crucial for effectively managing and preventing the condition. This study provides a benchmark that can be shared with other healthcare facilities, which will be the study's key result. Finally, there is a need to understand the factors leading to the development of acute pancreatitis for its better management and prevention. Hence, the results from this study form the benchmark that is shared with other healthcare facilities. The findings of this study are expected to provide valuable insights into the unique clinical profile of acute pancreatitis in this population, enabling the development of targeted interventions and enhancing the overall management of this challenging condition.

This study aims to evaluate the prevalence of etiological factors for AP among patients at a tertiary healthcare center in Karachi.

METHODS

A descriptive cross-sectional study was conducted at the Department of Medicine, Civil Hospital, Karachi, from 06-08-2022 to 05-02-2023 after getting ethical approval from the CPSP research evaluation unit (Ref No: CPSP/REU/MED-2019-183-15622) and written informed consent was obtained from the patients. Using the WHO sample size calculator with a 4.5% post-ERCP incidence rate [13], 3.5% margin of error, and 95% confidence interval, we calculated a required sample of 135 subjects. A design effect (DEFF) of 1 was applied to account for a simple random sampling design. The total population size was estimated at 20,0000. The study utilized a non-probability consecutive sampling methodology. Inclusion criteria was confined on newly diagnosed patients with acute pancreatitis presenting within 24 hours, either gender, patients having age of 30-60 years were included and patients with history of hepatitis B, C and HIV, patients with history of malignancy, pregnant women, patients with history of asthma, COPD, stroke, congestive heart failure, Patients with chronic liver disease and chronic kidney disease were excluded from the study. The patient's history was taken in detail, and they underwent a clinical examination upon admission. The researcher also examined possible causes of acute pancreatitis development, such as cholelithiasis (diagnosed with the help of an abdominal ultrasound), alcohol abuse, post-ERCP surgery, hypertriglyceridemia (a lipid profile), and IgG4-related pancreatitis (a sample of IgG4). A quantitative research design was employed in this study; participants' age was treated as a continuous variable. Qualitative variables were gender, residential status, type 2 diabetes mellitus, hypertension, smoking status and the risk factors of acute pancreatitis. The data analysis was conducted using the SPSS version 26.0. Means were calculated as the mean value ± standard deviation (SD) in cases of normally distributed quantitative variables. Qualitative variables, including gender, residence status, type II diabetes mellitus, hypertension, smoking status, and all factors

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related to acute pancreatitis (cholelithiasis, alcohol consumption, post-ERCP, hypertriglyceridemia, and IgG4-mediated pancreatitis), were calculated in terms of frequency and percentages. To measure the modification effect of the factors, stratification was based on the attributes of age, gender, residence status, type 2 diabetes mellitus, hypertension, and smoking status. This enabled them to be evaluated regarding their effects on the outcome variables. Following stratification of the data, statistical analysis was conducted using chi-square or Fisher's exact tests, where a p-value ≤ 0.05 denoted significance.

RESULTS

This research analyzed 135 patients treated at the Civil Hospital Karachi's Department of Medicine, Pakistan, who met the study's inclusion and exclusion criteria. The participants' ages varied from 30 to 60 years, with a mean age of 46.71 ± 6.82 years. Regarding the gender distribution, 55 (40.7%) were male and 80 (59.3%) were female. Regarding the status of residence, 43 (31.9%) were residing in urban locations, while 92 (68.1%) were in rural locations. Regarding hospital stay, most of the patients stay for ≤5 days (66.67%) (Table 1).

Table 1: Demographic, Clinical, and Biochemical Characteristics of Patients

Variables	Frequency (%)	Mean ± SD
Age (Years)		
30-45	103 (76.30%)	46.71 ± 6.82
46-60	32 (23.70%)	
Gender		
Male	55 (40.70%)	-
Female	80 (59.30%)	
Residence		
Urban	43 (31.90%)	-
Rural	92 (68.10%)	
Length of Hospital Stay		
≤5	90 (66.67%)	-
>5	45 (33.33%)	

Findings demonstrate risk factors causing pancreatitis. Out of 135 patients, 59 (43.7%) and 76 (56.3%) had and did not have cholelithiasis, respectively. Out of 135 patients, 15 (11.10%) had alcohol, and 120 (88.90%) did not have respectively. Out of 135 patients, 24 (17.8%) had post-ERCP, and 111 (82.2%) did not have post-ERCP, respectively. Out of 135 patients, 20 (14.8%) had hypertriglyceridemia, and 115 (85.2%) did not have hypertriglyceridemia, respectively. Out of 135 patients, 14 (10.4%) had IgG4-mediated disease, and 121 (89.6%) did not have IgG4-mediated disease, respectively, where chi-square results indicate a p-value of 0.001 (Table 2).

Table 2: Risk Factors Causing Pancreatitis

Variables	Frequency (%)	p-Value
Cholilithiasis	59 (43.70%)	0.001
Alcohol	15 (11.10%)	0.001
Post ERCP	24 (17.80%)	0.002
Hypertriglyceridemia	20 (14.8%)	0.002
IgG4 mediated	14 (10.4%)	0.003

Results shows the associated factors causing pancreatitis. Frequency distribution on diabetes mellitus type II showed that out of 135 patients, 97(71.90%) had diabetes mellitus type II while 38 (28.10%) did not have diabetes mellitus type II respectively. In the case of hypertension, 46 (34.1) patients were dominated by hypertension, whereas 89 (65.9) were non-hypertensive. About smoking status, 15 (11.1%) patients were smokers, while 88.9% of patients were non-smokers (Table 3).

Table 3: Associated Factors

Variables	Frequency (%)
Diabetes Mellitus Type II	
Yes	97 (71.90%)
No	38 (28.10%)
Hypertension	
Yes	46 (34.10%)
No	89 (65.90%)
Smoking	
Yes	15 (11.10%)
No	112 (88.90%)

An age and gender stratification of cholelithiasis revealed that among individuals aged 30-45 years, 45 (43.7%) had cholelithiasis, while 58 (56.3%) did not. In the 46-60 years age group, cholelithiasis was exhibited in 14 (43.8%), whereas most had no such occurrence (18, 56.2%). The relationship between cholelithiasis and age was not statistically significant, with a p-value of 0.99. In the stratification by gender, 15 (27.3%) out of the total of males had cholelithiasis, whereas 40 (72.7%) were found to possess none. Among the female patients, 44 (55%) had cholelithiasis, while 36 (45%) did not. The p-value was large (p=0.01), indicating a significant association (Table 4).

Table 4: Stratification for Age and Gender with Respect to Cholelithiasis

Variables	Cholelithiasis		p-Value
	Yes	No	
Age (Years)			
30-45	45 (43.7%)	58 (56.3%)	0.99
46-60	14 (43.8%)	18 (56.2%)	
Gender			
Male	15 (27.3%)	40 (72.7%)	0.01
Female	44 (55%)	36 (45%)	

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DISCUSSIONS

Acute pancreatitis is an interesting disease, categorized by the inflammation of pancreatic tissue, parenchyma oedema, and necrosis due to auto-digestion of the glandular enzymes, which can cause multi-organ failure or even death [16]. Gallstones represent the most common etiology of acute pancreatitis in Pakistan, whereas alcohol-related cases are relatively less frequent. In daily routine practice, drug-induced acute pancreatitis is not very common [17]. Over the last several decades, the intensive care of patients with AP has improved significantly because of its connection with high morbidity and mortality rates. The aetiology of the disease must be determined to effectively handle and prevent further occurrences of the disease. Two of the most frequent etiological factors, i.e. alcohol and gallstones, account for a total of 80%, and alcoholic pancreatitis is by far much more prevalent [18]. According to the recent recommendations, the current aetiology of AP must be determined in at least 80% of cases, and not more than 20% can be seen as idiopathic. The management and administration of care to AP should be planned according to the knowledge of the equivalence as well as the aetiology of the disease [19]. According to the study done by Hameed *et al.* out of the 154 patients, 59.1% were women [13]. The most frequent aetiology encountered was gallstones (74%), followed by idiopathic (13%). A cholecystectomy performed on 44.7% of gallstone pancreatitis patients is called a same-admission cholecystectomy. Upon admission, 14.9% of patients had serum amylase levels within three times the upper normal limit, while 29 (18.8%) exhibited serum lipase levels within the same range. A greater score on the Ranson and modified CT severity index translated to a greater triage and death percentage. The rate of complications was 21.4 % with a mortality rate to be 7.1%. There were two hundred and twelve (212) patients in a research study conducted by Patel *et al.*, [20], with 88 men (73.33%) and 32 women (26.66%). The average age of the participants was 36.96 years, with a standard deviation of 13.44 years. The most frequent presenting symptom was abdominal pain, and then came vomiting. Alcohol use was the major cause of acute pancreatitis, as it was the cause in 85 patients (70.8 per cent). The cause was identified in 25 patients (20.8%), and in five patients (4.1%), it was unknown. There were three deaths as a result of severe pancreatitis among the patients (2.5%). Additionally, a body mass index (BMI) of 25 kg/m^2 or higher, a hematocrit (HCT) of 44% or more, and a C-reactive protein (CRP) level of more than 150 mg/L were associated with a higher risk of developing severe acute pancreatitis. Datta *et al.*, used a sample of 40 patients with acute pancreatitis, comprising 20 male and 20 female, with an average age of 44.3 ± 2.7 years [21]. Out of the 40 cases, 26 patients (65%) received a diagnosis of moderate to severe acute pancreatitis.. Certain clinical parameters, such as ascites or pleural effusion, were not identified to have significant correlations with the severity of the illness. 62.5% of the cases displayed gallstones and metabolic conditions such as hypertriglyceridemia and hypercalcemia; however, none of them could be, in any way, significantly associated with the severity of the disease.

CONCLUSIONS

AP is still a typical diagnosis that causes hospitalization. Gallstones are the most frequent cause, and post-ERCP comes next. It has a great influence on institutional costs, hospitalization and death. The disease severity may be mild or severe and entails a risk of having systemic complications. The main points of management are timely fluid resuscitation, adequate nutrition support, and management of complications at the moment they occur. Patients with mild acute pancreatitis due to gallstones are normally recommended to undergo cholecystectomy before their release to avoid any recurrence. A multidisciplinary approach is encouraged when looking at moderate to severe cases of acute pancreatitis, especially with local and systemic complications.

Authors Contribution

Conceptualization: MA
Methodology: MA, AWS, RS, AZ
Formal analysis: MA
Writing review and editing: FT1, FT2, AWS, AZ

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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