



Epidemiology of Pancreatitis in the State of Odisha

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Abstract

Background and Aims: Background and Aim of the Study: Acute pancreatitis is a surgical condition which may impact other organs resulting in damage to multiple organs or death. Chronic pancreatitis (CP) has deadly long-term consequences such as diabetes mellitus and pancreatic cancer. Although there have been several studies evaluating the epidemiology of pancreatitis in India, due to the diversity of the country, more evidence is required from different regions of the country. Therefore, this study evaluates the epidemiology of acute and CP in the state of Odisha.

Methodology: This study was a prospective study carried out in a single hospital, Institute of Medical Sciences and Sum Hospital, Bhubaneswar, during 2016–2017.

Results: Results showed that there were more acute cases of pancreatitis (n=65, 73.9%) and overall pancreatitis was more prevalent in men (n = 70; 79%). Unfortunately, an overwhelming majority of the patients do not know what aggravates (n = 71; 81.8%) or alleviates (n = 79; 89.8%) their condition. There was no significant difference in the type of pancreatitis (acute, chronic, acute, or chronic) by gender, smoking, educational status, diet, alcohol intake, socioeconomic status, and religion (P > 0.05).

Conclusion: Men were more likely to develop acute and CP than women. Future studies should explore the genetic interactions modifying disease development, especially in India.

Keywords: Chronic pancreatitis, diagnostic tools, epidemiology, gallstones.

Introduction

Acute pancreatitis is a frequent acute surgical condition which may impact on other organs apart from the pancreas resulting in damage to multiple organs or death [1] and high rates of morbidity and mortality [2]. Despite innovations in intensive and surgical care over the past few years, there has been little difference in mortality rates [3]. There is an increasing incidence of acute pancreatitis worldwide due to increased incidence of morbid obesity [4]. The two main causes of acute pancreatitis are gallstones and alcohol, contributing to 80% of all cases, with gallstone pancreatitis being more common

[5, 1]. For better management and care of pancreatitis, knowledge of the pattern, cause, and severity of the illness is beneficial. Therefore, guidelines posit that physicians should establish the etiology of acute pancreatitis in up to 80% of cases and no >20% should be concluded as idiopathic [6]. The complications resulting from acute pancreatitis can be divided into local and systemic. Examples of local complications are necrosis, acute fluid collections, infected necrosis, pseudocyst, and ascites, with infected necrosis being the deadliest [7]. Systemic complications are failure of a single organ or multiple organs.

The yearly incidence rate of acute pancreatitis is estimated at 13–45 per 100,000 persons. While the majority of population distribution data of acute pancreatitis are from US, Europe, and South East Asia, mostly Japan, it is encouraging that statistics from other regions are emerging [8]. There are problems with current estimates, with varying disease

estimates, due to the employment of different methodologies, difficulties in making the right diagnosis, utilization of diverse diagnostic criteria, as well as unique lifestyle risk factors [9]. Furthermore, available statistics show differences in demographic distributions unique to the region; for example, there is a higher prevalence of pancreatitis associated with alcohol in the West and Japan in comparison to other Asian countries and there is a type of chronic pancreatitis (CP) that is more prevalent in tropical countries (20–125 per 100,000 persons found in certain parts of Southern India) [10]. Several population studies have found significant increases in the incidence of acute pancreatitis [9, 11]. With increasing levels of obesity, the number of acute pancreatitis is likely to rise, because obesity contributes to the formation of gallstone [12]. Acute pancreatitis can recur intermittently, resulting in an ongoing condition called CP [13]. CP is a serious condition that can

have a severe negative effect on the quality of life of a person in addition to

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Figure 1: The mean SD of certain variables

Variable	Range	Mean (\pm SD)
Age (years)	6–76	39.03 (14.65)
Age of onset (years)	3–76	37.86 (14.66)
Number of packs smoked per day	1–4	1.30 (0.8)
Quantity of alcohol (ml)	50–500	116.52 (126.43)
BMI	20–24.20	21.86 (2.65)
Hemoglobin	3–6.15	12.84 (2.70)
RBS	72–299.20	127.13 (56.20)
Amylase	18.20–2896.20	565.11 (705.20)
Lipase	0.0–1432.0	352.12 (419.44)
BUN	0.0–67.0	24.48 (14.12)
Creatinine	-	0.88 (0.92)
Bilirubin	0.20–36.80	2.34 (4.71)
Protein	4.50–8.76	6.66 (0.84)
Albumin	1.95–6.0	3.79 (0.74)
Globulin	2.0–4.90	2.97 (0.5)

SD: Standard deviation, BMI: Body mass index

deadly long-term consequences [13]. If not properly treated, long-term complications of CP are diabetes mellitus and pancreatic cancer [13]. The diagnosis of CP is very tough, which is why it is difficult for epidemiological studies to accurately conclude on its incidence rates. At present, there is no reliable diagnostic test for CP and making a definitive diagnosis takes times. The diagnosis of CP is mainly dependent on signs of pancreatic ductal or parenchymal alterations which are characteristic as the disease progresses [14]. For this reason, the diagnosis of CP is majorly done using imaging techniques such as magnetic resonance cholangiopancreatography (MRCP), computed tomography (CT) scan, and endoscopic ultrasound [15]. Recent findings have shown a higher incidence of CP due to changes in methodology as well as the use of improved diagnostic tools. Results have shown that CP is 2 times more common in men than women [16]. A Chinese study also revealed an increase from 3.08 per 100,000 persons to 13.53 per 100,000 between 1996 and 2003 [17]. However, this increase was more

in middle-aged patients and in areas of China that is more westernized [17]. Several studies have established that there is a strong relationship between alcohol consumption and CP [16]. Globally, the most frequent etiology of CP is alcohol, with some studies revealing that alcohol was implicated in almost 90% of cases [16]. Results from a multicenter study in the US revealed that alcohol was identified as the cause of 49% of cases of CP (111 out of 1158). It was more common in Blacks than Whites (77 vs. 42%) [9]. A multicenter study in

Figure 2: The percentages and frequencies of selected variables

Variables	n (%)
Diagnosis	
Acute	65 (73.9)
Chronic	18 (20.5)
Acute or chronic	5 (5.7)
Gender	
Male	70 (79.5)
Female	18 (20.5)
Aggravating factor	
After eating	2 (2.3)
After food	2 (2.3)
After eating	6 (6.8)
Alcohol	1 (1.1)
Fatty food	1 (1.1)
Oily food	3 (3.4)
Vomiting	1 (1.1)
Not known	72 (81.8)
Relieving factor	
After drinking	1 (1.1)
After vomiting	1 (1.1)
Bending forward	3 (3.4)
Empty stomach	3 (3.4)
On medication	1 (1.1)
Not known	79 (89.8)
Intensity of pain	
Mild	12 (37.5)
Moderate	13 (40.6)
Severe	7 (21.9)
Radiation	
Chest	1 (1.1)
Right hypochondria	1 (1.1)
Left epigastric	1 (1.1)
Back	67 (95.7)
Antibiotics taken	
Pipracil tazobactam	40 (49.4)
Imicellum	8 (9.9)
Tramadol	25 (30.9)
Xone	4 (4.9)
Tazar	2 (2.5)
Specipine	2 (2.5)

Figure 3: Clinical impact of pancreatitis

Clinical impact	Yes	No	P-value
Anorexia	24	64	0.46
Vomiting	67	21	0.682
Fatigue	21	67	0.898
Fever	17	71	0.518
Abdominal tenderness	78	10	0.558

Italy carried out between 2000 and 2005 found that alcohol was responsible for 34% of cases of CP (out of 893) [18]. Smoking has been shown to be a significant risk factor in pancreatitis, and its role is more significant when combined with alcohol [19]. Other causes of CP have been established in literature, including genetics, smoking, and autoimmune disease. It is for this reason that the TIGAR-O classification system was proposed because it recognizes that there are diverse variables that cause pancreatitis [20].

In the past two decades, genetics has been implicated in the etiology of pancreatitis, and for this reason, 4 genes (CTFR, PRSS1, CTFC, and SPINK1) are evaluated in persons with CP of unknown etiology [20]. While alcohol-related pancreatitis is more common in middle-aged men, genetics is implicated in early-onset disease, and there is no difference between men and women. Other well-established conditions that lead

to CP are hyperlipidemia, autoimmune diseases, hypercalcemia, post-necrotic, as well as duct obstruction [21]. In women, approximately 70% of cases are not related to alcohol [16]. The largest remaining group of CP patients does not have any specific etiology and is called idiopathic CP. While studies put its incidence rate at 10–30%, the number can rise up to 60% in India and China [22].

There have been several studies evaluating the epidemiology of pancreatitis in India. However, India being a very large country with significant diversity means that factors that may be implicated in the etiology of pancreatitis may vary from one region to another. Thus, the more evidence-based study is necessary for different regions and ethnicity to find specific regional etiology in this vast country. Therefore, the aim of this study was to evaluate the epidemiology of acute and CP, its risk factors and clinical impacts of pancreatitis in the state of

Odisha.

Methodology

Ethics

This study was guided by the Helsinki II declaration, and the protocol was approved by the ethical approval committee of the hospital (Institutional Ethical Committee, Institute of Medical Sciences and Sum Hospital [IMS and SUM], Bhubaneswar).

Study design

This study was a prospective study carried out in a single hospital. The study enrolled patients with a diagnosis of pancreatitis who visited the IMS and SUM Hospital, Bhubaneswar, during the year 2016–2017. A pro forma was used to evaluate several relevant clinical parameters in the patient. The parameters included site of pain and radiation, duration, aggravating and relieving factors, anorexia, vomiting, abdominal lump/distention, sugar level, weight loss, blood pressure, and among others. Patients were informed about the details and objectives of this study and those who were interested signed informed consent. Patients were included in the study after a definite diagnosis of acute or CP was made. We followed the practice guidelines of Banks and Freeman [7] to differentiate acute and CP. According to these guidelines, CP results from irreversible scarring of the pancreas, resulting from prolonged inflammation. Six major etiologies for CP that has been identified are toxic/metabolic,

Figure 3: Clinical impact of pancreatitis

Variables	Acute pancreatitis, n (%)		CP, n (%)		Acute on CP, n (%)	
	Yes	No	Yes	No	Yes	No
Gallstones	3 (4.6)	62 (95.4)	1 (5.6)	17 (94.4)	-	5 (100)
Diabetes mellitus	7 (10.8)	57 (89.1)	1 (5.6)	17 (94.4)	1 (20)	4 (80)
Smoking	21 (32.3)	44 (67.7)	5 (27.8)	13 (72.2)	1 (20)	4 (80)
Alcohol	28 (43.1)	37 (56.9)	7 (38.9)	11 (61.1)	2 (40)	3 (60)
BMI						
Normal				80 (90.9)		
Underweight				8 (9.1)		

idiopathic, genetic, autoimmune, recurrent and severe acute pancreatitis, and obstruction. The most common symptom associated with CP is pain localized to the upper-to-middle abdomen, along with food malabsorption, and eventual development of diabetes. Patients with no definite diagnosis of acute or CP were excluded from the study. Data were also collected on several sociodemographic variables such as age, gender, religion, level of education, socioeconomic status, family history of pancreatitis, family history of pancreatic cancer, age of onset of symptoms, smoking, alcohol intake, dietary inclinations, and body mass index (BMI). Smoking was measured by number of sticks per day, while alcohol was measured in MLS taken daily.

Data analysis

The obtained data were then analyzed statistically using SPSS version 22. Descriptive analyzes were presented as proportions for categorical data and as mean \pm standard deviation (SD). Continuous variables were compared using the ANOVA, and for categorical data using chi-square test, as applicable. $P < 0.05$ was considered statistically significant.

Results

The total number of patients surveyed was 88, with majority being males ($n = 70$, 79.5%) and a few females ($n = 18$, 20.5%). 86 of the participants belong to the Hindu religion (97.7%). Most of the patients were graduates ($n = 46$, 46.6%) and did not have a family history of pancreatitis ($n = 87$, 98.9%) or pancreatic cancer ($n = 88$, 100%). Furthermore, an overwhelming majority of the patients belong to the middle class ($n = 67$, 76.1%), while the remaining were in the lower class ($n = 19$, 21.6%) and a few were in the higher income category ($n = 2$; 2.3%). Table 1 reveals that the youngest patient in this study was 3 years old, while the oldest was 76 years, with a mean age of 39.03 (SD = 14.65). Importantly, the onset of pancreatitis in our cohort was quite early (6 years). Participants smoked as high as 4 sticks of cigarette and consumed >500 ml of alcohol a day. Their mean BMI shows that their weight was within a healthy range. A summary of patient characteristics is provided in Table 1.

According to Table 2, there were more acute cases of pancreatitis ($n = 65$; 73.9%) followed by CP ($n = 18$; 20.5%) and acute

on chronic ($n = 5$; 5.7%). Overall pancreatitis was more prevalent in men ($n = 70$; 79.0%). Unfortunately, an overwhelming majority of the patients do not know what aggravates ($n = 71$; 81.8%) or alleviates ($n = 79$; 89.8%) their condition. Assessment of pain was made carefully based on the following symptoms [23, 24]. The cardinal symptom of acute pancreatitis is abdominal pain, which is characteristically dull, boring, and steady. Usually, the pain is sudden in onset and gradually intensifies in severity until reaching a constant ache. Most often, it is located in the upper abdomen, usually in the epigastric region, but it may be perceived more on the left or right side, depending on which portion of the pancreas is involved. The pain radiates directly through the abdomen to the back in approximately one-half of cases [23]. On the other hand, there are no international consensus guidelines or universally accepted pain assessment tools for CP including all relevant aspects of pain [24]. Hence, for assessing CP, we relied mostly on reports of chronic abdominal pain that adversely impacts their quality of life. Those who could ascertain the intensity of their pain said it was mostly mild ($n = 12$; 37.5%) and moderate ($n = 13$; 40.6%). The region that pancreatitis' pain radiated to the most was the back ($n = 67$; 95.7%). Furthermore, the antibiotic mostly taken by patients with pancreatitis is piperacillin tazobactam. This information and others are summarized in Table 2.

Association between different types of pancreatitis and various sociodemographic characteristics

The results of the analysis showed that there was no significant difference in the type of pancreatitis (acute, chronic, and acute on chronic) by gender, smoking, educational status, diet, socioeconomic status, and religion ($P > 0.05$). However, there was a significant difference between type of pancreatitis and age ($P < 0.05$), with acute pancreatitis more prevalent in those who are older (mean = 41.2, SD = 14.8), while acute on CP was more prevalent in younger participants (mean = 23.4, SD = 9.1) ($F = 4.412$; $P = 0.015$). Furthermore, a similar result was obtained for age of onset, with acute pancreatitis starting a little late (40.2, SD = 14.7), while acute on chronic started earlier (mean = 23.5, SD = 9.2) ($F = 4.447$; $P = 0.015$). This is not shown in table.

Clinical impacts of pancreatitis

While it was found that pancreatitis is associated with fatigue, vomiting, and fever, the findings were not statistically significant ($P = 0.05$). However, there was a significant but tenuous relationship between anorexia and pancreatitis. This is shown in Table 3.

Acute pancreatitis

Anorexia was reported in 30.8% ($n = 20$) of patients with acute pancreatitis, while 23.1% ($n = 15$) said they were always fatigued. Furthermore, an overwhelming majority of the patients reported that they always vomited ($n = 50$, 76.9%) and abdominal tenderness was present ($n = 58$, 89.2%). However, only some of them had fever as a result of their condition ($n = 13$, 20.0%).

CP

Only a few patients with CP in this study reported they had anorexia ($n = 3$, 16.7%), fever ($n = 4$, 22.2%), and fatigue ($n = 5$, 27.8%). However, many of the patients complained of vomiting ($n = 14$, 77.8%) and presented with abdominal tenderness ($n = 16$, 88.9%).

Acute on CP

There was no patient in this category that reported fever, only a few complained of anorexia and fatigue ($n = 1$, 20%), respectively. However, many of the patients with acute on CP complained of vomiting ($n = 3$, 60.0%) and abdominal tenderness was found ($n = 4$, 80.0%).

Prevalence of risk factors of acute and CP

The major risk factors for acute and CP identified in literature were explored in this study. The result reveals that the majority of the patients did not have gallstones (95.5%; $n = 83$) and only 9 (10.3%) were diabetic. 27 patients smoked (30.7%) and 37 (42.0) took alcohol. This information is summarized in Table 4.

Discussion

The findings of this study were very interesting and varied significantly from the results of other studies in India and beyond. There were differing etiologic profiles to those reported in the literature. First of all, gallstones and alcohol were not implicated as the cause of acute or CP in our study. While a previous study in India did not find gallstones to be a significant cause of acute pancreatitis, it found that alcohol was implicated in the majority of the cases of

acute pancreatitis [15]. As a matter of fact, it has been established that the two significant causes of acute pancreatitis are gallstones and alcohol, contributing to 80% of all cases [1]. This difference between our study and previous studies is likely due to differences in geography and social behavior between India and the Western countries where most of these researches originate from. While consumption of alcohol is increasing in India and China due to Westernization and urbanization [25], it cannot be compared to the rate of consumption in the West, and that is why alcohol-induced pancreatitis is more common in the West than in Asian countries [8, 26, 27]. Another probable reason why we did not see many cases of gallstones was because the BMI of the patients in this study was mostly within the normal range. It has been found that obesity increases the risk for developing gallstones [12]. Furthermore, smoking was also not a significant risk factor for

pancreatitis in this study, a finding which is at variance with results in literature [18]. This is probably due to the small sample size which resulted in an insignificant number of smokers. The finding that diabetes mellitus was not a significant cause of acute or CP is similar to the result on earlier Indian study [15]. Therefore, it is likely that majority of the patients in our study has idiopathic pancreatitis, a finding which is consistent with earlier findings that 60% of acute and CP in India and China are idiopathic [22]. This finding is also in line with another Indian study which concluded that a large number of their patients had an idiopathic etiology [15]. It is plausible that many of the cases of pancreatitis in our study were genetic, even though we did not explore this possibility. Thus, it will be good if genetic factors are explored in cases where a definite etiology cannot be established in acute and CP in India. Pancreatitis in our study was more common in men than

women, a finding which is similar to other studies [16]. This study has several limitations. First of all, the study was carried out in a single center, and hence, the results may not represent the wider population. Furthermore, the sample size was small, which means the findings of this study cannot be generalized. It was not able to analyze diagnostic trends because it was not a longitudinal study.

Conclusion

Alcohol, gallstones, smoking, and diabetes mellitus were not significant risk factors for acute or CP in this study. Furthermore, BMI was not a significant etiology because most of the patients were within the normal weight range. However, men were more likely to develop acute and CP than women. Future studies should explore the genetic interactions modifying disease development, especially in India.

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