J. Indian Dietetic Association Volume 41, No.2, pp. 10-19, 2018

# HOSPITAL BASED STUDY ON THE RISK FACTORS AND CLINICAL PROFILE OF PATIENTS WITH PANCREATITIS IN MYSURU CITY.

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**ABSTRACT**

Pancreatitis is the pathologic inflammation of pancreas with diverse etiological factors. The incidence of pancreatitis cases and related hospitalizations have been increasing over the last decade. A total number of 30 patients (28 male and 2 female) from a hospital set-up were recruited for the study. A structured questionnaire was developed and administered to collect various information related to the study. The results revealed that alcohol was the major risk factor especially in the male patients. The occurrence was higher in the rural population as compared to urban. Approximately 50% of the patients had serum lipase and amylase levels higher than 3 fold of normal which is considered diagnostic of pancreatitis. Balthazar CT severity index indicated that majority of the subjects had mild severity.

**Keywords:** Acute/chronic pancreatitis, alcohol, serum lipase and amylase, Balthazar CTSI.

## INTRODUCTION

Pancreatitis, an inflammatory disease of the pancreas is broadly classified based on the duration of it symptoms and the associated pathological changes as Acute Pancreatitis (AP) and chronic pancreatitis (CP). While reversible inflammatory changes are noted in acute pancreatitis, irreversible damage to the pancreas characterizes chronic pancreatitis which may range from fibrosis to progressive destruction of both exocrine and endocrine pancreatic tissue. Pancreatitis presents itself in a wide spectrum of clinical presentation from chronic malabsorption to frank acute abdomen. Mean age of incidence of pancreatitis varies based on the type and etiology of pancreatitis as well as lifestyle and geographical conditions. In India, mean age of incidence for Chronic Pancreatitis is reported to be around 39.7 years . Being a developing economy, this definitely renders an increased burden on the health care system denying the community of manpower and work force[1]. Pancreatitis has a significant rate of mortality and morbidity because of a lack of comprehension of the natural history of occurrence and epidemiology of this disease[3]. In India, very little study has been carried out on this elusive disease;

especially its incidence, occurrence, etiology and outcome. Hence, the present study was carried out to study the trends in risk factors and clinical profile of patients with pancreatitis at 2 different hospital settings in Mysuru city. Balthazar CT index was used to assess the severity of the disease.

## MATERIALS AND METHODS

A hospital based cross sectional study was conducted for a period of 3 months in 2 hospitals; a government and a corporate multispecialty hospital in Mysuru city.

**Selection of subjects-** A total number of 30 patients meeting the inclusion and exclusion criteria were recruited for the study through purposive sampling. Balthazar CT severity index[1], a tool for assessing the severity of pancreatitis was employed to assess the severity in the subjects.

**Inclusion criteria**

- Patients of both gender within the age group of 25-75 years, with acute or chronic pancreatitis and with or without co-morbidities.
- Willingness to participate in the study.

**Exclusion criteria**

- Pancreatitis due to genetic mutation
- Pediatric population
- Pregnancy induced pancreatitis.

**Development of questionnaire** - A structured questionnaire was developed to collect information on the following aspects:

- Baseline characteristics- age, gender, socioeconomic status, occupation.
- Assessment of somatic status – BMI was calculated from height and weight.
- Medical history, etiological factors, clinical features of pancreatitis
- Biochemical investigations – Selected liver function tests, Hemoglobin, WBC count, serum electrolytes, serum urea, serum amylase and lipase levels were noted from the medical records.
- Radiological data – Impression of CT scan were recorded.
- Medications and nutrition support during hospitalization.

**Statistical analysis** – The data was computed and descriptive statistics such as percentage was calculated using the software Microsoft excel 2013. Mean SD was calculated for quantitative data.

## RESULTS

The baseline characteristics of the patients are represented in Table 1. The sex distribution of the patients comprised of 28 male and 2 female with a ratio of 14:1 depicting the predominance of the disease in the male category with majority of them in the age group 25-35 years. The mean age group of the patients with pancreatitis was 41.5 years (male 40.4±11.6 and female 57.5±12.0). The incidence of pancreatitis was higher among the rural population (63.3%) as compared to the urban population (35.7%). 33% of the patients had no formal education. Most of the subjects were self-employed such as, grocery shops, fruit shops and were daily wagers like coolies. Pancreatitis has an association with onset of malnutrition and weight loss. 52% of the patients had a normal BMI which can be due to the shorter time span of the study (Figure 1).

It was observed that acute pancreatitis was highest in the age group of 25-35 years. Chronic pancreatitis was found to be highest in the age group of 46-55 years which is obviously a progression from acute pancreatitis. The term acute on chronic pancreatitis was used for cases of acute pancreatitis with fast progressing symptoms of the chronic type. From among the different types of pancreatitis, incidence of acute pancreatitis was found to be the highest

Fig 1: Age wise classification of BMI according to Asia-Pacific standards

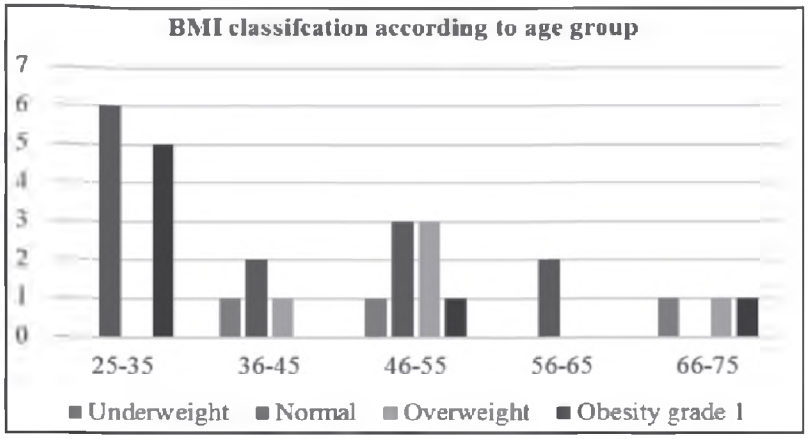



Table 1: Personal information of the study participants

| Study parameters | Subjects (n=30) | | Total |
|---|---|---|---|
| | Male (n=28) | Female (n=2) | |
| Age in years | | | |
| 25 – 35 | 11 (39.3) | 0 (0) | 11 (36.7) |
| 36-45 | 6 (21.4) | 0 (0) | 6 (20) |
| 46-55 | 8 (28.6) | 1 (50) | 9 (30) |
| 56-65 | 2 (7.1) | 0 (0) | 2 (6.7) |
| 66-75 | 1 (3.6) | 1 (50) | 2 (6.7) |
| Area | | | |
| Rural | 18 (64.3) | 1 (50) | 18 (63.3) |
| Urban | 10 (35.7) | 1 (50) | 11 (36.7) |
| Socio-economic status | | | |
| Occupation | | | |
| Small scale business | 8 (28.6) | 0 (0) | 8 (26.7) |
| Agriculture | 5 (17.9) | 0 (0) | 5 (16.7) |
| Daily wages | 7 (25) | 0 (0) | 7 (23.3) |
| Salaried class | 4 (14.3) | 0 (0) | 4 (13.3) |
| Retired | 2 (7.1) | 0 (0) | 2 (6.7) |
| Unemployed | 2 (7.1) | 2 (100) | 4 (13.3) |
| Monthly income | | | |
| =Rs 5,000/- | 6 (21.4) | 0 (0) | 6 (20) |
| >Rs 5to10,000/- | 5 (17.9) | 1 (50) | 6 (20) |
| =Rs 10to 15,000/ | 7 (25) | 0 (0) | 7 (23.3) |
| =Rs 15,000/- | 10 (35.7) | 1 (50) | 11 (36.6) |

*% in parentheses

(43%) out of which 92% was of interstitial edematous sub-type. The etiological factors of pancreatitis is represented in table 2. Alcohol was found to be the chief etiological factor i.e., in 73.3% of the cases, all males. Acute on chronic pancreatitis was found only among alcoholic patients. 68.2% of these alcohol consumers, all males were found to be consuming alcohol for more than 11 years. 46.7% of the alcohol consumer also had a habit of smoking with all of them on a daily basis. The contribution of gallstones to pancreatitis was next to alcohol with 16.7%. Triggering factors and frequency of attacks in acute on chronic pancreatitis and chronic pancreatitis is represented in table 3. The triggering factors for pancreatitis was found to be fatty foods (82.4%) and alcohol (64.7%). It was found that 76.5% of the patients experienced 1-3 pancreatitis attacks from the time of diagnosis till the date of study. Pancreatitis presents itself with various signs and symptoms. Frequent excruciating abdominal pain was reported by all the subjects followed by 70% of the subjects experiencing nausea and vomiting which can be due to increased intra-abdominal pressure. Only 7% of the subjects presented with steattorhea.

**Table 2: Distribution of etiological factors against the types of pancreatitis**

| Etiological factors | Alcohol | Gallstones | Idiopathic | Hypertriglyceridemia |
|---|---|---|---|---|
| | n (%) | | | |
| **Type of pancreatitis** | | | | |
| Acute pancreatitis (n=13) | 10 (76.9) | 1 (7.7) | 2 (15 4) | 0 (0) |
| Chronic pancreatitis (n=9) | 4 (44.4) | 4 (44.4) | 0 (0) | 1 (11.1) |
| Acute on chronic (n=8) | 8 (100) | 0 (0) | 0 (0) | 0 (0) |
| **Total** | 22 (73.3) | 5 (16.7) | 2 (6.7) | 1 (3.3) |

*% in parentheses

It was noted that the biochemical investigation were carried out based on the clinical presentation of the subjects. Hence, there is variation in the no of subjects against each biochemical parameter is represented in table 4. Raised WBC count (12.4±3.9) and neutrophils (76.7±10.2) were observed in the subjects (90%) indicating presence of inflammation. Mild disturbance in serum electrolytes was seen. The levels of blood urea was elevated in the subjects (47 ± 11.6). Total bilirubin which is the sum of conjugated and unconjugated bilirubin showed very high values in about 12% of the patients which indicates inflammation of the hepatocytes or bile obstruction. Reports of liver enzymes; Alkaline phosphatase (ALP) showed the maximum rise among the liver enzymes (241 ± 52.2) observed in 13 subjects whereas Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) were elevated in 6 subjects each. The Random Blood Sugar levels were elevated in 10 patients **(231.9± 74.9), who were known cases of diabetes.**

Table 5 presents the medications and nutrition support provided to the patients during hospitalization. 86.7% of the patients were on antacids. Parenteral nutrition mainly peripheral parenteral nutrition was the route of nutrition support in majority of the patients, either solely or in combination with oral feeds.

The levels of serum amylase and lipase is diagnostic of pancreatitis (table 6). 2 patients had serum amylase levels and 1 patient had serum lipase level in the normal ranges whereas around 50% had both amylase and lipase levels 3 fold above normal. The severity assessment using Balthazar CT severity index is presented in table 7. 57% of the patients were found to be having mild severity as per the CTSI and 19% fell under the severe category.

**Table 3: Risk factors and frequency of attacks among the subjects**

| Parameter | (n=30) | |
|---|---|---|
| | N | % |
| **Triggering factors** | | |
| Fatty food intake | 14 | 82.4 |
| High carbohydrate foods | 3 | 17.6 |
| Alcohol intake | 11 | 64.7 |
| **Number of attacks** | | |
| 1-3 | 13 | 76.5 |
| 4-6 | 3 | 17.6 |
| 7-10 | 1 | 5.9 |

**Table 4: Disease related biochemical parameters of the subjects**

| Hematological parameters | | | | | |
|---|---|---|---|---|---|
| | Reference range | Mean ± SD | | n | |
| | | Male | Female | Male | Female |
| Hemoglobin (g/dl) Non anemic | M - =13.0<br>F - =12.0 | 15.3 ± 1.2 | 14.3 ± 0.8 | 16 | 2 |
| Mild anemia | M – 11.0to 12.9<br>F – 11.0to 11.9 | 12.1±0.4 | 0 | 5 | |
| Moderate anemia | M -8 to 10.9<br>F – 8 to 10.9 | 10.3±0.2 | 0 | 4 | |
| Severe anemia | M -<8<br>F - <8 | 7.4 ± 0.5 | 0 | 3 | |
| RBC count (per mm$^3$) | M – 4.5-6 x $10^4$<br>F – 4.3-5.5 x $10^4$ | 4.8±1.0 | 5.4±0.9 | 26 | 2 |
| Platelet count ( thous/µg) | 150-450 | 344.3±136 | | 25 | |
| WBC count (per mm$^3$) | 4.5- 11x$10^4$ | 12.4±3.9* | | 23 | |
| Neutrophils (%) | 40-70 | 76.7±10.2 | | 26 | |
| Biochemical investigations | | | | | |
| Serum urea (mg/dl) | 10-45 | 47 ± 11.6 | | 23 | |
| Serum sodium (mmol/l) | 136-149 | 138.4+6.4 | | 29 | |
| Serum potassium (mmol/l) | 3.5-5.3 | 4.1±0.7 | | 29 | |
| Serum chloride (mmol/l) | 98-111 | 97.5±4.5* | | 29 | |
| Total bilirubin (mg/dl) | 0.2 – 1.2 | 0.7 ± 0.4* | | 23 | |
| | | 9.7 ± 4.4** | | 3 | |
| Aspartate aminotransferase (IU/L) | 5-40 | 18.9 ± 11.9* | | 18 | |
| | | 151.3 ± 47.9** | | 6 | |
| Alanine transaminase (IU/L) | 5-40 | 17.5 ± 10.6* | | 18 | |
| | | 145 ± 42.3** | | 6 | |
| Alkaline phosphatase (IU/L) | 40-129 | 125.7 ± 33.5* | | 5 | |
| | | 241 ± 52.2** | | 13 | |
| Random blood sugar | 79 – 160 | 97.2 ± 30.3* | | 19 | |
| | | 231.9 ± 74.9** | | 10 | |

*Within normal range, ** Above normal range

**Table 5: Medications and nutrition support during hospitalization**

| | | |
|---|---|---|
| **Medications** | | |
| Anti-acidity | 26 | 86.7 |
| Analgesic | 24 | 80 |
| Anti-bacterial | 24 | 80 |
| Anti-nausea | 12 | 40 |
| Anti pyretic | 1 | 3.3 |
| **Mode of feeding** | | |
| Parenteral | 13 | 43.3 |
| Oral and parenteral | 10 | 33.3 |
| Oral | 7 | 23.3 |
| Enteral | 0 | 0 |
| **Consistency of feed in case of oral feeding (n = 17)** | | |
| Regular/soft diet | 9 | 52.9 |
| Full fluid diet | 4 | 23.5 |
| Clear fluid diet | 4 | 23.5 |

## DISCUSSION

Pancreatitis is an inflammatory process of the pancreas with variable involvement of other regional tissue or remote organ systems. The disease is most often associated with alcoholism in males and gallstones in females. With the changing lifestyle and westernization of Indian population, there has been modification in the epidemiology of Pancreatitis in recent decades.

In this study, it was observed that, there was a skewed gender distribution in the occurrence of the disease with an absolute majority in the males. Similar studies project a higher degree of occurrence of pancreatitis in males[5]. This may be attributed to the pattern of prevalence of the two chief etiological factors viz., alcohol and tobacco consumption which is more common in males as compared to females. In pancreatitis, especially chronic pancreatitis, both exocrine

**Table 6: Diagnostic serum enzyme levels in subjects with pancreatitis**

| | | | n = 22 | | n = 18 | |
|---|---|---|---|---|---|---|
| Limits of enzyme levels | Normal serum levels of enzymes* | | Amylase levels | | Lipase levels | |
| | Amylase (U/L) | Lipase (IU/L) | n | % | N | % |
| Within normal limit | 0-86 | 0-64 | 2 | 9.1 | 1 | 5.6 |
| Above upper limit | >86 | >64 | 20 | 90.9 | 17 | 94.4 |
| Between upper limit and 2-fold elevation | 87-172 | 65-128 | 4 | 18.2 | 1 | 5.6 |
| Above 2-fold elevation | 173-258 | 129-192 | 5 | 22.7 | 6 | 33.3 |
| Above 3-fold elevation | >258 | >192 | 11 | 50 | 10 | 55.6 |

**Table 7: Severity assessment using Balthazar CT severity index**

| Parameter | | Subjects (n=21) | |
|---|---|---|---|
| | | n | % |
| Balthazar's CT score | | | |
| Grade A | 0 | 0 | 0 |
| Grade B | 1 | 0 | 0 |
| Grade C | 2 | 5 | 23.8 |
| Grade D | 3 | 9 | 42.9 |
| Grade E | 4 | 7 | 33.3 |
| Necrosis | | | |
| Absent | 0 | 16 | 76.2 |
| <30% (1/3rd) | 2 | 1 | 4.8 |
| 30 – 50% (1/2) | 4 | 3 | 14.3 |
| >50% (>50%) | 6 | | 4.8 |
| CTSI score | | | |
| Mild | 0 – 3 | 12 | 57.1 |
| Moderate | 4 – 6 | 5 | 23.8 |
| Severe | 7 – 10 | 4 | 19.0 |

and endocrine insufficiency may develop leading to malnutrition over time. Maldigestion is often a late complication and depends on the severity of the underlying disease[7]. Majority of the patients in the present study had a normal BMI which can be due to the shorter time span of the study and data collected at one point of time.

Pancreatitis is broadly classified into acute and chronic pancreatitis depending on varied pathologies and severity of the disease. The term acute on chronic pancreatitis is used to describe acute pancreatitis with fast progressing symptoms of the chronic type. Acute pancreatitis is further categorized as interstitial edematous and necrotizing based on the pathophysiology and diagnosed through radio imaging – computerized tomography[8].

The factors implicated in the causation of pancreatitis are multitudinal; both extrinsic and intrinsic factors such as alcohol, smoking, nutrition, toxins and gallstones, hypertriglyceridemia, genetics etc. Alcohol induced pancreatitis was the most prevalent especially in the male subjects. Similar observations have been reported by other studies[9]. There is a rise in per capita consumption of alcohol in India with a higher prevalence in the lesser educated and poor[10]. Various mechanisms such as induction of oxidative stress, inhibition of acinar secretion, enhancement of necrosis have been described as the course of action of alcohol, yet there is no definitive pathogenesis for alcohol induced pancreatitis[11]. It is worth noting that even though tobacco smoking is not vastly identified as a cause for pancreatitis, it cannot be ignored that 14 among the 22 cases with alcohol consumption also had a habit of smoking tobacco which is said to possibly amplify the effects of alcohol or independently cause the condition[12]. For hypertriglyceridemia to be a cause of pancreatitis, the serum triglyceride levels has to rise above 1000 mg/dL[13].

Severe abdominal pain, which was reported by all the patients in the study, is found to be characteristic of pancreatitis; acute or chronic. Pain is generally described to be in the upper

abdominal area radiating to the back. Nausea and vomiting was another common complaint which can be attributed to the raised intra-abdominal pressure, by-products of inflammatory reactions, high degree of fluid and electrolyte imbalance and severe pain in acute pancreatitis and dyspepsia owing to pancreatic insufficiency in cases of chronic pancreatitis. Extensive exocrine necrosis leads to exocrine pancreatic insufficiency with steatorrhea and is a major consequence of chronic pancreatitis. Lack of stool examinations or insufficient fat in the diet can mask associated steatorrhea even in patients with extensive necrosis. Studies quote steatorrhea as characteristic of pancreatitis[16].

The biochemical abnormalities encountered were abnormal levels of serum urea, liver enzymes and inflammatory markers. The inflammation associated with the disease, in addition to causing raised levels of leucocytes and neutrophils establishes a catabolic state resulting in rise in breakdown products of protein. Among the liver enzymes, the extracellular enzyme alkaline phosphatase was elevated in larger number of cases than the intracellular enzymes; alanine transaminase and aspartate aminotransferase. This may be due to the subsequent damage to the liver parenchyma as a result of the pathological changes taking place in the pancreas. It is ambiguous whether diabetes mellitus is a cause or effect of pancreatitis. There was no association found between pancreatitis and onset of diabetes as a result of the disease in the present study. A study suggests that patients with type 2 diabetes may have an increased risk of acute pancreatitis and biliary disease [17].

The patients are primarily treated with analgesics to alleviate the pain and anti-acidity drugs due to increased gastric reflux which is a consequence of the raised intra-abdominal pressure and a lesser amount of bicarbonate in the pancreatic juice and bile. Nutrition support is especially important in patients with pancreatitis due to the high metabolic needs and the inability to avail sufficient calories from an oral diet either due to pain or maldigestion. In the current study, patients were mainly provided peripheral parenteral nutrition, chosen out of convenience rather than providing nutritional aid. Although both parenteral and enteral nutrition are deemed to be equally effective in terms of normalization of serum enzyme levels[19], failure to use the gastrointestinal tract (GIT) in patients may exacerbate the stress response and disease severity, leading to more complications and prolonged hospitalization; thus enteral nutrition is preferred for nutrition therapy[17]. Serum amylase and lipase have been used as biochemical markers to diagnose pancreatitis. Traditionally, serum enzyme levels 3 times normal is considered diagnostic of pancreatitis. In acute pancreatitis, both serum amylase and lipase decline gradually due to the progressive destruction of the pancreas, after the initial rise but studies show that serum lipase level maybe elevated more consistently and for a longer period of time than serum amylase[18]. Studies have also reported higher specificity and sensitivity of serum lipase for the diagnosis of acute pancreatitis than serum amylase[19,20]. Thus in the present study, patients who showed pancreatic abnormalities in the CT scan had normal enzyme levels. Other studies have also established this pattern[5]. The Balthazar CT severity index (CTSI) scores calculated from the scan reports projected a mild severity in majority of the patients. CTSI is found to have a higher specificity in differentiating between mild, moderate or severe disease[21]. Higher the

CTSI score, greater are the complications and the mortality rates[2].

## CONCLUSION

The findings of the study are in conformity with the studies on different populations in India indicating alcohol to be the chief etiological factor for pancreatitis especially among male subjects. As the Balthazar score projected mild to moderate "severity" of pancreatitis in about 80% of the patients, it can be concluded that counselling can help prevent progression of the complications as well as fast progressing symptoms of the chronic type.

**Limitations of the study:**

1. The small sample size is a limitation to occur at definite conclusions.

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